Chairman’s Foreword

In the five years since Energy & Utility Skills (EU Skills) was licensed, our prime strategic objectives have been to tackle the looming skills shortages facing the gas, power and water industries.

These shortages have been created due to the high proportion of their workforces approaching retirement as a consequence of the post-privatisation drive for greater productivity.

For waste management, the task involved re-equipping the industry with the new skills needed for its transition, from operations based on waste disposal and dumping, to those based on recycling or the derivation of energy from waste.

The sustained pursuit of these objectives remains a high priority strongly supported by the sector’s employers. Nonetheless, far-reaching changes are a prospect as a result of the fundamental re-direction of energy policy at UK and EU levels. The drive for sustainability will affect all aspects of Britain’s infrastructure and essential utilities such as water and waste management. The implications for the future skills needs of our sector, in addition to the replenishing of established workforces, are potentially just as far-reaching.

The re-direction of EU and UK energy policies, now increasingly defined by directives and targets, are being driven by the need to tackle the threat of climate change, fears about the security and price of future oil and gas supplies, and recognition that the drive for sustainability must entail the rapid development of renewable energy sources and much greater energy efficiency. More specifically, a new EU directive imposes a compulsory target of 15% of Britain’s total energy mix from renewable sources by 2020. The target for the combination of electricity, which will have to bear the brunt of the required transformation, heat and transport, will mean change, innovation, investment and skills development unprecedented in scale and pace.
Just as the waste management industry is in the midst of transformation from dumping to recycling or re-use, so the water industry is faced not only with the renewal and expansion of ageing supply infrastructure, but also with substantially more demanding EU/UK regulatory standards for the management and control of its waste streams. At the same time, the water industry faces growing opportunities to invest innovatively in the beneficial use of sewage as a renewable source of biogas, for example.

The effect of the credit crisis and recession will be to reduce and delay the availability of capital funds to undertake the exceptional levels of infrastructure and utilities investment needed for the changes outlined above. The implication is for even more intense activity when the economic cycle turns up, and potentially, therefore, constraints from the shortage of people with the requisite accredited skills. Arguably, to forestall this, we should use the current downturn in the economic cycle to get ahead of the game, increasing the take-up of Apprenticeships or re-skilling programmes.

The skills challenge is recognised across the political spectrum, as is the essential requirement for strong employer leadership in assessing future skills needs. The means by which this leadership is translated into strategy and innovative responses to the skills challenge lies in the Sector Skills Councils. Of these, EU Skills has already gained an enviable reputation for productive employer engagement and the development of valued interventions, being Relicensed and judged by the National Audit Office (NAO) as ‘Outstanding’ continues to evidence this proven track record. This Sector Skills Assessment report describes the current and future skills challenges facing the sector and sets out the skills priorities in need of action.

Jack Carnell, Chairman
Energy & Utility Skills Ltd
Since we were licensed in 2003 we have embarked on a journey which has taken us from being the ‘voice of employers’ to the being the ‘catalyst for action’. Further evidence on this journey can be seen from the relicensing process that we have just completed being judged by the National Audit Office as ‘Outstanding’, and we will continue on our journey to be the ‘catalyst for action’.

This will mean putting employers firmly at the heart of developing a fit for purpose vocational educational training infrastructure. The critical nature of skills is becoming well understood in our industries as the recruitment of engineers and craft professionals is becoming increasingly more important. This is largely due to growing capital investment programmes, global competition for skilled engineers and an ageing workforce. All of this, against a steady 15 year legacy of a reducing labour pool and a decaying training infrastructure.

This picture is now complicated by an unprecedented global recession, which is unique, affecting the world sector by sector. There has never been a more important time for Sector Skills Councils and their role to marry employer specific skills needs with that of UK governments’ policies.

Ensuring that our ‘industries have the skills they need now and in the future’ is an ambitious but essential goal. This goal is too big for any one employer to address alone; instead it will require employers to collaborate, working together with their competitors, supply chain and micro businesses to increase the pool of skilled labour rather than competing for labour in a diminishing pool.

This is where EU Skills is able to put to use the workforce planning model, a tool which for the first time since privatisation is able to accurately forecast and plan the workforce needs, for each industry and to each key occupation, for the next 15 years. Already this has engaged Ofgem with the need to invest £72 million in skills. This tool will be the foundation of foresight and intelligence to inform our strategies going forward.
Another major strand of activity is based upon a need for our employers and employees to demonstrate their competences; and as such employers are more demanding of the qualifications and learning processes they use. This is happening at a time of rapid qualification reform within UK governments, and alignment is essential if employers and individuals alike are to view learning as a meaningful business and career development exercise.

We also now have to address the gaps within the training provision across our industries. The approval to develop a National Skills Academy for Power has established a model that can be used to inform our other industries. The plan shows the increasing priority EU Skills is giving to addressing this objective if our training provision is to meet the demands of new and replacement skills necessary.

Many employers have expressed a need for a more efficient education and training system to address the skills shortfall. There are government policies that will impact on the skills needs of our sector for example, license to operate. Technological and legislative policy demands will also play a fundamental role in what skills are expected to achieve. We will work with UK governments to align the wider policy needs to the skills objectives. This Sector Skills Assessment report provides a robust account of the skills needs of the sector and sets out the actions that EU Skills will carry out, through collaborative action, in order to address them.

Tim Balcon, Chief Executive
Energy & Utility Skills Ltd
# Contents

Chairman’s Foreword .................................................................................................................................................................................................................................................1  
Chief Executive’s Foreword .............................................................................................................................................................................................................................................3  

1 Introduction .................................................................................................................................................................................................................................................3  

2 About Energy & Utility Skills .................................................................................................................................................................................................................................9  
  2.1 Introduction .................................................................................................................................................................................................................................................9  
  2.2 Sector engagement .........................................................................................................................................................................................................................10  
  2.3 Partnership working .....................................................................................................................................................................................................................10  
  2.4 Nations and regions ...............................................................................................................................................................................................................11  

3 About the sector ..................................................................................................................................................................................................................................................13  
  3.1 Sector overview ...............................................................................................................................................................................................................................13  
  3.2 Gas (Transmission & Distribution) ...............................................................................................................................................................................................16  
    3.2.1 National Transmission System ...........................................................................................................................................................................17  
    3.2.2 Distribution ..................................................................................................................................................................................................................17  
    3.2.3 Supply and trade .......................................................................................................................................................................................................18  
  3.3 Gas (Utilisation) .........................................................................................................................................................................................................................18  
  3.4 Power ......................................................................................................................................................................................................................................................18  
    3.4.1 Structure .........................................................................................................................................................................................................................18  
    3.4.2 Generation including renewable energy .............................................................................................................................................................20  
    3.4.3 Transmission & Distribution ............................................................................................................................................................................21  
    3.4.4 Supply and trade .......................................................................................................................................................................................................22  
  3.5 Waste management ...............................................................................................................................................................................................................23  
  3.6 Water .................................................................................................................................................................................................................................................24  
  3.7 Contractors ......................................................................................................................................................................................................................................26  
  3.8 Workforce and business numbers ...............................................................................................................................................................................................26  
    3.8.1 Size .................................................................................................................................................................................................................................26  
    3.8.2 Narrow definition .......................................................................................................................................................................................................26  
    3.8.3 Broad definition ...........................................................................................................................................................................................................28  
    3.8.4 Historic occupational employment trends ....................................................................................................................................................31  
    3.8.5 Business unit estimates ........................................................................................................................................................................................................29  
  3.9 Workforce characteristics ...........................................................................................................................................................................................................33  
    3.9.1 Occupational structure ......................................................................................................................................................................................................33  
    3.9.2 Gender .................................................................................................................................................................................................................................35  
    3.9.3 Ethnicity .................................................................................................................................................................................................................................37  
    3.9.4 Age ..............................................................................................................................................................................................................................................39  
    3.9.5 Disability ...............................................................................................................................................................................................................................42  
    3.9.6 Full-time and part-time employment ...............................................................................................................................................................42  
  3.10 Sector productivity ..................................................................................................................................................................................................................44  
    3.10.1 Skills as a driver of productivity ........................................................................................................................................................................44  
    3.10.2 Gross Value Added (GVA) as a productivity measure ............................................................................................................................................46  
    3.10.3 Relative labour productivity compared to other UK sectors ..................................................................................................................................47  
    3.10.4 International benchmarking ............................................................................................................................................................................48  
    3.10.5 Total Factor Productivity (TFP) ............................................................................................................................................................................50  

4 About skills and employment ............................................................................................................................................................................................................53  
  4.1 UK policy framework ...............................................................................................................................................................................................................53  
    4.1.1 Skills .................................................................................................................................................................................................................................53  
    4.1.2 Employment ..............................................................................................................................................................................................................54  
  4.2 Skills policy in England ..............................................................................................................................................................................................................55  
  4.3 Skills policy in Northern Ireland ...................................................................................................................................................................................................56  
  4.4 Skills policy in Scotland ...............................................................................................................................................................................................................57  
  4.5 Skills policy in Wales ...............................................................................................................................................................................................................58  

5 What drives demand? .....................................................................................................................................................................................................................61  
  5.1 Gas (Transmission & Distribution) .........................................................................................................................................................................................61
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.1</td>
<td>Recruitment and retention</td>
<td>61</td>
</tr>
<tr>
<td>5.1.2</td>
<td>Market and regulatory drivers</td>
<td>62</td>
</tr>
<tr>
<td>5.1.3</td>
<td>Other external factors</td>
<td>63</td>
</tr>
<tr>
<td>5.1.4</td>
<td>Consumer demand</td>
<td>63</td>
</tr>
<tr>
<td>5.1.5</td>
<td>Policy drivers</td>
<td>63</td>
</tr>
<tr>
<td>5.2</td>
<td>Gas (Utilisation)</td>
<td>64</td>
</tr>
<tr>
<td>5.2.1</td>
<td>Recruitment and retention</td>
<td>64</td>
</tr>
<tr>
<td>5.2.2</td>
<td>Economic conditions</td>
<td>64</td>
</tr>
<tr>
<td>5.2.3</td>
<td>Market and regulatory drivers</td>
<td>65</td>
</tr>
<tr>
<td>5.2.4</td>
<td>Other external factors</td>
<td>65</td>
</tr>
<tr>
<td>5.2.5</td>
<td>Policy drivers</td>
<td>66</td>
</tr>
<tr>
<td>5.3</td>
<td>Power</td>
<td>67</td>
</tr>
<tr>
<td>5.3.1</td>
<td>Infrastructure development, recruitment and retention</td>
<td>67</td>
</tr>
<tr>
<td>5.3.2</td>
<td>Economic conditions</td>
<td>71</td>
</tr>
<tr>
<td>5.3.3</td>
<td>Market and regulatory drivers</td>
<td>71</td>
</tr>
<tr>
<td>5.3.4</td>
<td>Other external factors</td>
<td>72</td>
</tr>
<tr>
<td>5.3.5</td>
<td>Policy drivers</td>
<td>73</td>
</tr>
<tr>
<td>5.4</td>
<td>Waste management</td>
<td>75</td>
</tr>
<tr>
<td>5.4.1</td>
<td>Infrastructure, recruitment and retention</td>
<td>75</td>
</tr>
<tr>
<td>5.4.2</td>
<td>Economic conditions</td>
<td>75</td>
</tr>
<tr>
<td>5.4.3</td>
<td>Market and regulatory pressures</td>
<td>76</td>
</tr>
<tr>
<td>5.4.4</td>
<td>Other external factors</td>
<td>78</td>
</tr>
<tr>
<td>5.4.5</td>
<td>Consumer demand</td>
<td>78</td>
</tr>
<tr>
<td>5.4.6</td>
<td>Policy drivers</td>
<td>78</td>
</tr>
<tr>
<td>5.5</td>
<td>Water</td>
<td>80</td>
</tr>
<tr>
<td>5.5.1</td>
<td>Recruitment and retention</td>
<td>80</td>
</tr>
<tr>
<td>5.5.2</td>
<td>Economic conditions</td>
<td>80</td>
</tr>
<tr>
<td>5.5.3</td>
<td>Market and regulatory pressures</td>
<td>81</td>
</tr>
<tr>
<td>5.5.4</td>
<td>Other external factors</td>
<td>81</td>
</tr>
<tr>
<td>5.5.5</td>
<td>Consumer demand</td>
<td>81</td>
</tr>
<tr>
<td>5.5.6</td>
<td>Policy drivers</td>
<td>82</td>
</tr>
<tr>
<td>6.1</td>
<td>Current skills needs</td>
<td>85</td>
</tr>
<tr>
<td>6.1.1</td>
<td>Skills gaps by nation</td>
<td>86</td>
</tr>
<tr>
<td>6.1.2</td>
<td>Skills gaps by industry (England only)</td>
<td>87</td>
</tr>
<tr>
<td>6.1.3</td>
<td>Skills gaps by occupation (England only)</td>
<td>88</td>
</tr>
<tr>
<td>6.1.4</td>
<td>Main causes of a lack of proficiency</td>
<td>89</td>
</tr>
<tr>
<td>6.1.5</td>
<td>Skills that need improving</td>
<td>90</td>
</tr>
<tr>
<td>6.1.6</td>
<td>Impact of skills gaps</td>
<td>91</td>
</tr>
<tr>
<td>6.1.7</td>
<td>Skills gaps and multi-skilling</td>
<td>91</td>
</tr>
<tr>
<td>6.2</td>
<td>Qualifications</td>
<td>91</td>
</tr>
<tr>
<td>6.2.1</td>
<td>Qualification levels across the sector</td>
<td>91</td>
</tr>
<tr>
<td>6.2.2</td>
<td>Qualifications levels by occupation</td>
<td>92</td>
</tr>
<tr>
<td>6.3</td>
<td>Training</td>
<td>93</td>
</tr>
<tr>
<td>6.3.1</td>
<td>Training plans</td>
<td>93</td>
</tr>
<tr>
<td>6.3.2</td>
<td>Assessment of skills gaps and budgets for training expenditure</td>
<td>93</td>
</tr>
<tr>
<td>6.3.3</td>
<td>On and off-the-job training</td>
<td>93</td>
</tr>
<tr>
<td>6.3.4</td>
<td>Training in Northern Ireland</td>
<td>94</td>
</tr>
<tr>
<td>6.3.5</td>
<td>Training in Scotland</td>
<td>94</td>
</tr>
<tr>
<td>6.3.6</td>
<td>Training in Wales</td>
<td>95</td>
</tr>
<tr>
<td>6.3.7</td>
<td>Reasons for not providing training in past 12 months</td>
<td>95</td>
</tr>
<tr>
<td>6.3.8</td>
<td>Days spent training</td>
<td>95</td>
</tr>
<tr>
<td>6.4</td>
<td>Vacancies and recruitment difficulties</td>
<td>96</td>
</tr>
<tr>
<td>6.4.1</td>
<td>Vacancies</td>
<td>96</td>
</tr>
<tr>
<td>6.4.2</td>
<td>Vacancies by industry</td>
<td>96</td>
</tr>
<tr>
<td>6.4.3</td>
<td>Vacancies by occupation</td>
<td>96</td>
</tr>
<tr>
<td>6.4.4</td>
<td>Hard-to-fill vacancies (HTFV)</td>
<td>97</td>
</tr>
<tr>
<td>6.4.5</td>
<td>Hard-to-fill vacancies by occupation</td>
<td>98</td>
</tr>
<tr>
<td>6.4.6</td>
<td>Impact of hard-to-fill vacancies</td>
<td>98</td>
</tr>
<tr>
<td>6.4.7</td>
<td>Action taken to overcome HTFVs</td>
<td>99</td>
</tr>
<tr>
<td>6.4.8</td>
<td>Employer recruitment and perceptions of young people</td>
<td>100</td>
</tr>
<tr>
<td>6.4.9</td>
<td>Skills shortage vacancies (SSV)</td>
<td>101</td>
</tr>
</tbody>
</table>
## What lies ahead? ............................................................................................................................... 103

### 7.1 Gas (Transmission & Distribution)
- Trends occurring over the next five - 10 years? ................................................................. 104
- Likelihood of occurrence .................................................................................................. 104
- The implications for skills ......................................................................................... 105

### 7.2 Gas (Utilisation)
- Trends occurring over the next five – 10 years............................................................. 106
- Likelihood of occurrence .......................................................................................... 107
- The implications for skills ......................................................................................... 107

### 7.3 Power
- Trends occurring over the next 5-10 years ............................................................... 109
- Likelihood of occurrence .......................................................................................... 110
- The implications for skills ......................................................................................... 110

### 7.4 Waste Management
- Trends occurring over the next five - 10 years ......................................................... 112
- Likelihood of occurrence .......................................................................................... 113
- The implications for skills ......................................................................................... 113

### 7.5 Water
- Trends occurring over the next five - 10 years ......................................................... 115
- Likelihood of occurrence .......................................................................................... 116
- The implications for skills ......................................................................................... 116

## Action plans ....................................................................................................................................... 117

### 8.1 Core elements of delivery.......................................................................................... 117
### 8.2 Gas (Transmission & Distribution) ........................................................................... 119
### 8.3 Gas (Utilisation) ........................................................................................................ 120
### 8.4 Power............................................................................................................................... 121
- Renewable energy ......................................................................................................... 123
### 8.5 Waste management ..................................................................................................... 126
### 8.6 Water ............................................................................................................................... 127
“The skills challenge is recognised across the political spectrum, as is the essential requirement for strong employer leadership in assessing future skills needs. The means by which this leadership is translated into strategy and innovative responses to the skills challenge lies in the Sector Skills Councils. Of these, EU Skills has already gained an enviable reputation for productive employer engagement and the development of valued interventions.”

Jack Carnell, Chairman
Energy & Utility Skills Ltd

“Since we were licensed in 2003 we have embarked on a journey which has taken us from being the ‘voice of employers’ to being the ‘catalyst for action’. Further evidence on this journey can be seen from the relicensing process that we have just completed, being judged by the National Audit Office as ‘Outstanding’, and we will continue on our journey to be the ‘catalyst for action’.”

Tim Balcon, Chief Executive
Energy & Utility Skills Ltd
1 Introduction

This Sector Skills Assessment (SSA) provides a rigorous analysis of the sector and outlines the drivers of demand for skills, current skills needs and priorities for each of our industries to address in order to meet their skills challenges.

It draws on our own primary research and understanding of the sector and a range of secondary sources of information.

A key source of workforce data comes from our workforce planning model, which forecasts the sector’s recruitment and training requirements over the next 15 years.

Each section of this document consists of the following information:

Section 1 presents information about Energy & Utility Skills (EU Skills).

The key points in this section are:

- EU Skills is the Sector Skills Council (SSC) for the gas, power, waste management and water industries.

- EU Skills works with employers through strategic industry groups that provide intelligence and employer leadership to drive action on key industry issues.

- EU Skills is a strategic body that operates across the UK, working with a range of partners including trade associations and trade unions, governments and key stakeholders across the UK and in collaboration with our fellow SSCs on areas of common interest.

- Primary research is gathered using our workforce planning model which forecasts recruitment and training requirements over the next 15 years.
Section 2 provides an overview of the sector and its main policy drivers. The section also describes each of the industries in terms of its structure and make-up.

The key points in this section are:

- The structure of the sector has changed dramatically over the last 20 years as a result of privatisation and regulation and European Union and UK directives and legislation relating to energy, climate change and carbon reduction.

- The gas (transmission & distribution), power and water industries are dominated by a relatively small number of large companies, some with regional monopolies.

- The gas (utilisation) and waste management industries have a much larger proportion of self-employed and small and medium-sized enterprises.

- EU Skills’ research suggests that, across the UK, 536,200 employees operate in the sector within some 60,500 businesses.

- EU Skills’ workforce planning model presents a picture of significant levels of retirements, specifically in technical and engineering roles, over the coming decade in the gas, power and water industries.

- Gross Value Added (GVA) for the sector was reported at almost £19 billion for 2006.

Section 3 presents the key policy drivers that shape the employment and skills system across the UK and, therefore, impact on the work we do as an SSC.

Key points in this section are:

- The changing economic climate has recently driven government towards an activist industrial policy captured in Building Britain’s Future and New Industries, New Jobs.

- In their first annual assessment of progress towards the Leitch targets, the UK Commission for Employment and Skills (UKCES) has reported that there has been progress; however, by international comparisons, the UK is still lagging behind.

- Skills for Growth, a new national skills strategy for England, aims to target funding in the market areas and sectors that are crucial to future growth.

- Apprenticeships remain a key strand of the skills strategies in each of the four nations of the UK.

- SSCs have a strong delivery role across each of the four national skills strategies, with specific funding being made available to deliver sector skills solutions.
Section 4 outlines the drivers for skills and employment within each of the four industries in our sector.

The key drivers include recruitment and retention, economic conditions, market and regulatory pressures and consumer demand. Key points in this section are:

• The sector is experiencing an ageing workforce which is forecast to worsen over the next 15 years. Significant extra investment in attracting and retaining skills is required to refresh the workforce.

• Replacement of ageing infrastructure and the introduction of new technologies is driving the need for significant investment and engineering and higher-level skills across the sector.

• Security of supply is essential. As the UK is now a net importer of gas, and 16 power stations are due to close by 2018, there are major challenges for investment in infrastructure and also skills.

• The five-year regulatory cycle for the gas (transmission & distribution), power and water industries impacts on recruitment and skills development, with employers having to consider headcount targets over and above retention of key skills and expertise.

The drive for a UK-wide reduction in carbon emissions to meet climate change commitments is impacting on the sector. The transition from burning gas and coal to generate power towards the increased use of renewable and low carbon technologies (including nuclear and advanced waste treatment technologies) are driving the capability profile of the sector’s workforce.

Section 5 investigates the nature, extent and some of the causes of skills gaps in the existing workforce and skills shortages that affect the sector. It also analyses the qualifications profile of the workforce and the prevalence of the employers to arrange on-and off-the-job training for its workforce.

The key points in this section are:

• 15.8% of sector employers have skills gaps in England; 14% in Northern Ireland; 19% Scotland; 21.8% in Wales.

• The waste management industry experienced the most difficulty in terms of skills gaps, with 18.4% of establishments in England reporting such a problem.

• Across the sector around 12% of the workforce does not hold a qualification at, or above, NQF/SCQF Level 1.

• 21% of the sector’s workforce hold a Level 3 qualification as their highest attained qualification.

• Approximately one-in-five sector employers (21.1%) reported having vacancies that were proving hard-to-fill.
Section 6 builds on the drivers of demand and current skills needs to present the possible future trends for the sector and their associated skills needs.

The key points in this section are:

The main factors shaping the future of the sector relate to the transition towards a low carbon economy and an activist industrial policy, new technologies for the generation of energy, the drive towards the recycling and re-use of waste, ensuring security of energy supply and the legislative and regulatory impacts across the sector.

To address the above factors there are some core actions the sector will need to take in relation to skills. These are:

• Place more emphasis on workforce planning to highlight and address age profile issue.

• Raise the profile of the industry to attract employees.

• Increase the number of Apprentices to bring new people into the industry.

• Where appropriate, influence the economic regulator to take account of skills needs in the five-year price control review periods.

• Focus on technical upskilling and higher-level skills development.

• Forecast the skills needs for new and emerging technologies and develop National Occupational Standards and Apprenticeships to meet demand.

• Increase the number of engineers entering the industry.

• Increase training capacity across the industry.

Section 7 presents an action plan for each of the four industries in the sector, including renewable energy. Within each industry action plan, there are core elements of delivery that support our strategic objectives.

These are:

• Employer engagement to drive intelligence gathering through the application of the workforce planning model and strategic collaborative action.

• Qualifications and skills development pathways that open up the market for skills so that businesses can evidence this investment, and also show an industry-wide approach to competence including license to operate and endorsement of approved training and bespoke qualifications.

• Quality and capacity of training provision that is sufficient to meet the needs of the sector.

A summary of this full Sector Skills Assessment report can be found at www.euskills.co.uk.
Energy & Utility Skills is an employer-led organisation with a Board that demonstrates a wealth of experience in our sector.

Our Board members are advocates of the skills agenda and, as employers, they represent the sector’s views.

We are also proud to have the endorsement of nine leading industry figures as our Patrons.
EU Skills is the Sector Skills Council for the gas, power, waste management and water industries. EU Skills works with employers through strategic industry groups that provide intelligence and employer leadership to drive action on key industry issues.

EU Skills is a strategic body that operates across the UK, working with a range of partners including trade associations and trade unions, governments and key stakeholders across the UK and in collaboration with our fellow Sector Skills Councils on areas of common interest.

Primary research is gathered using our workforce planning model which forecasts recruitment and training requirements over the next 15 years.

2.1 Introduction

As the licensed SSC for the gas, power, waste management and water industries, EU Skills has developed strong engagement with employers and built a robust community within which employers have a voice on skills.

We are an employer-led organisation with a Board that demonstrates a wealth of experience in our sector. Our Board members are advocates of the skills agenda and, as employers, they represent the sector’s views.

We are also proud to have the endorsement of nine leading industry figures as our Patrons.

Working from our offices in the West Midlands, we have a workforce of over 60 staff consisting of dedicated teams delivering solutions to support the sector’s skills needs. This includes specialist teams working with each industry.

Our Strategic Plan 2009-2012 builds on our success to date and drives employer collaboration and leadership in order to further address the skills issues faced by the sector. This SSA provides a rigorous analysis of the sector and outlines the drivers of demand for skills, current skills needs and action plans for each of our industries to address these skills needs. It draws on our own primary research and understanding of the sector and a range of secondary sources of information.
Primary research is gathered using our workforce planning model. Developed in collaboration with employers in the gas (transmission & distribution), power and water industries, this model forecasts the number of leavers from the industry year-by-year, skillset-by-skillset. Employers can then use the model to determine their recruitment and training requirements over the next 15 years. More information about the model can be found in section seven and Annex B.

2.2 Sector engagement

We recognise that each industry within our sector, gas, power, waste management and water, is presented with a unique set of issues and challenges but faces the common goal of creating effective training and upskilling for their workforce. We work with employers in each of our industries and have developed strategic industry groups that provide intelligence and employer leadership to drive action on key industry issues. Our strategic groups are:

- The Power Sector Skills Strategy Group (PSSSG); a senior collaborative group of power industry companies, formed in July 2007 to address strategic skills issues across the power industry and to deliver a sustainable skills strategy to meet medium (two-five years) and long-term (five-20 years) needs.

- For gas (transmission & distribution), EU Skills works with the four Gas Distribution Network (GDN) asset owners to determine their short, medium and long-term skills issues and potential solutions. All the networks attend a quarterly Network Policy Forum chaired by EU Skills, to progress initiatives on a collaborative basis.

- For gas (utilisation), EU Skills provides secretariat to the Gas Industry Liaison Group (GILG) and the Standards Consultation Forum (SCF): two employer forums that now sit within the new standards setting structure for gas safe registration. The structure provides governance through a management board comprising EU Skills, SummitSkills, awarding bodies, the Health and Safety Executive (HSE) and Gas Safe Register and oversees consultation on the competence requirements for individuals needing registration to comply with the Gas Safety (Installation & Use) Regulations 1998. These groups also have a remit to discuss broader gas industry matters.

- The Waste Industry Skills Initiative (WISKI) was formed in 2009 to support the industry-wide delivery of a long-term, sustainable, skilled workforce through the development and endorsement of a programme of key projects and activities. WISKI enhances reporting lines to relevant employers and stakeholders through existing forums such as the Environmental Services Association HR Forum and the Training Managers Forum.

- EU Skills provides secretariat to the Water Industry Skills Steering Group (WISSG). The group is working to develop an industry-adopted skills strategy with a supporting programme of key projects that will enable the supply chain of the UK water industry to maximise the benefits from its investment in skills.

2.3 Partnership working

We are a strategic body that operates across the UK. We work with employers through the structures explained above and with relevant trade associations and trade unions. We work with the UK Government, Scottish Government and the Assemblies in Northern Ireland and Wales and their respective skills departments and the nine Regional Development Agencies (RDAs) in England. We have developed strategic relationships with the Department for Energy and
Climate Change (DECC) and the Department for Food and Rural Affairs (Defra).

We are also regulated as an SSC by the UKCES. UKCES was established as a key recommendation of the Leitch Review\(^1\) and is responsible for ensuring employers’ views are accounted for within the skills system alongside the SSC relicensing process taking place during 2009.

We aim to collaborate with our partner SSCs on common issues identified through the Alliance of SSCs. We represent the Alliance on the UK Vocational Qualification Reform Programme (UKVQRP) Board. On specific issues, we are part of a cross-sector collaboration\(^2\) formed to develop a Skills Strategy for Renewables. We are also partnering Cogent\(^3\) and ECITB\(^4\) in the newly formed Energy Forum, which is seen as a vital component to join up skills issues with government energy policies. We are also part of a cross-SSC science cluster led by SEMTA\(^5\) and we are leading on the production of the Low Carbon Cluster SSA report with a number of other SSCs\(^6\).

### 2.4 Nations and regions

EU Skills operates across all four nations of the UK and in the nine regions in England. We have high calibre representation for each nation on our Board. We also have a dedicated team of Skills Directors who are responsible for liaising with employers and government and their agencies in each nation and English region.

This involves routinely tracking policy issues and lobbying members of the UK Government, Scottish Government and Assemblies in Northern Ireland and Wales in relation to skills and sector issues. We have a programme of political monitoring and seek to influence key developments such as the progression of Bills through Parliament, the development of White Papers and the deliberations of Select Committees.

Activity is driven through action plans for each nation, building on the Stage 5 reports developed through our Sector Skills Agreement and updated for this SSA. We have a continuous record of brokering successful workforce development programmes in all four nations. These programmes have resulted in more than 8,000 training outcomes over the last four years. Our commitment to identifying employer demand and aligning this to national public policy and funding remains strong.

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\(^1\) HM Treasury, (December 2006), Prosperity for all in the global economy—world class skills, Final Report, Leitch Review of skills.

\(^2\) The collaboration includes SummitSkill, Asset Skills, Lantra, SEMTA, ECITB, Cogent, ConstructionSkills as well as EU Skills.

\(^3\) Cogent is the SSC for chemicals, pharmaceuticals, nuclear, oil & gas, petroleum & polymers.

\(^4\) ECITB is the sector body for the engineering construction industry.

\(^5\) SEMTA is the SSC for science, engineering and manufacturing technologies.

\(^6\) EU Skills, SEMTA, Cogent, Lantra, Skillfast, Proskills, Skills for Logistics, GoSkills, ConstructionSkills, Asset Skills, SummitSkills, ECITB.
3 About the Sector

The structure of the sector has changed dramatically over the last 20 years as a result of privatisation and regulation and European Union and UK directives and legislation relating to energy, climate change and carbon reduction.

The gas (transmission & distribution), power and water industries are dominated by a relatively small number of large companies, some with regional monopolies, but gas (utilisation) and waste management having a much larger proportion of self-employed and SMEs.

EU Skills’ research suggests that, across the UK, 536,200 employees operate in the sector within some 60,500 businesses.

EU Skills’ workforce planning model presents a picture of significant levels of retirements, specifically in technical and engineering roles, over the coming decade in the gas, power and water industries.

This section provides an overview of the sector and its main policy drivers. The section also describes each of the industries in terms of its structure and make-up.

As an SSC we have contractual responsibility for reporting on skills needs against a set of Standard Industrial Classification (SIC) codes and Standard Occupational Classification (SOC) codes. The description of the sector using SIC and SOC codes can be found in Annex A.

3.1 Sector overview

Around 20 years ago, the majority of the gas, power and water industries were government-owned and dominated by a small number of huge, vertically-integrated monopolies. In this nationalised state, they were widely recognised by the general public, and the full range of activities was carried out within these monopoly companies. However, since privatisation and the introduction of regulation, the structure of these industries has become increasingly complex with many functions, which were once carried out in-house, now being outsourced. This has led to a large increase in the number of small and medium-sized contractor companies that provide specialised services to each industry. The larger contracting companies tend to operate across all three industries (and some into the telecommunications industry as well) leading to increased demand for multi-utility training and qualifications.
However, much of the water industry and the transmission and distribution aspects of the power and gas industries are still vertically integrated regional monopolies, although they can also function as stand-alone businesses. It is anticipated that the vast majority of energy utilities will choose to retain the generation and production side of their business in order to guarantee security of supply, as well as look to acquire generation assets in new territories. These companies will include the wholesale/retail company and/or the retailer.

The process of privatisation was designed to stimulate competitiveness in monopoly utility companies that were considered to be growing stagnant; while the 1990 Competition Act furthered this aim. There is now competition between utility companies for business and also for skilled workers, which leads some businesses to poaching rather than working co-operatively to train and develop a pool of suitable workers. This poaching strategy has worked thus far, because of the pool of skilled labour that remained post-privatisation, but this pool is now nearing retirement and is expected to reduce significantly over the next decade.

Co-operation with contracting companies is also a priority need in order that training investment is compatible with strategic thinking. As stated above, as the larger contracting companies operate across the power, gas and water industries (and some in the telecommunications sector), there is a need for cross-utility co-operation to address skills issues.

Companies in the power, gas (transmission & distribution) and water industries are subject to economic regulation by the Ofgem and Ofwat, in which their costs, prices and investment levels are set at five-yearly Price Control Reviews (PCR). Economic regulation has a strong influence on skills strategy and investment as the five-year regulatory cycle incentivises management to focus on a shorter time horizon than is appropriate for skills development, given the lengthy lead times from recruitment to achieving competence. This has an effect on the whole supply chain, not just the regulated companies themselves.

Until recently, the PCR process has taken little account of skills, the rationale being that this is a normal business activity and special provision is unnecessary. However, the skills legacy from the past is running out and investment in new skills is essential. With the recent PCR for gas distribution, evidence of workforce ageing, skills shortages and increasing loss of staff in future years, led Ofgem to allow £72 million for training new workers.

Ofgem has recently announced plans to review the 20-year old regime governing the regulation of the gas and electricity networks. The two-year review will examine whether the current approach will continue to deliver customers reliable, well-run networks with good service at reasonable prices amid the growing investment challenges faced by the energy networks in the future.

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7 http://www.ofgem.gov.uk/Pages/OfgemHome.aspx
8 http://www.ofwat.gov.uk/
9 http://www.ofgem.gov.uk/Networks/Pages/Nwrks.aspx
Developing skills within any industry is a long-term commitment. Support through regulatory direction is essential to allow the industries to invest in long-term sustained recruitment across the whole sector. The skill level required coupled with the additional experiential need to deliver a competent workforce is something that will take several regulatory periods to deliver and consistency of approach throughout is essential.

In addition to privatisation and regulation of the sector, far reaching changes have been triggered in the supply and use of energy and the infrastructure required to support it by UK and European Union policy and legislation. This has also impacted on the waste management industry, as it transforms its approach from one of dumping to recycling or re-use. The water industry is faced with the substantially more demanding European Union/UK regulatory standards for the management and control of its waste streams, alongside the renewal and expansion of ageing supply infrastructure. These policies will provide the market-pull for emerging technologies and will be the catalyst for change in developing skills and training capacity.

The Energy Act contains the legislative provisions required to implement UK energy policy following the publication of the energy review in 2006 and the Energy White Paper in 2007. This policy is driven by the long-term energy challenges faced by the UK: tackling climate change by reducing carbon dioxide emissions and ensuring secure, clean and affordable energy. It reinforces the Renewables Obligations (RO) across the UK which are the main mechanisms for supporting generation of renewable electricity.

The Climate Change Act contains provisions that will set legally binding targets for reducing carbon dioxide emissions by 80% by 2050 compared to 1990 levels. It has established a committee on climate change that will advise government on the levels of carbon budgets to be set. The importance of the agenda was reinforced by the creation of the government department, DECC, in 2008.

As part of the European Commission’s 20 by 2020 programme, the UK has been asked to cut its greenhouse gas emissions by 16% and to increase the use of renewable energy to 15%. Meeting the targets will require a step change in renewables infrastructure development.

The UK’s plans to meet these targets are detailed in three interlinked documents released in July 2009. They are the Low Carbon Transition Plan, Low Carbon Industrial Strategy and the Renewable Energy Strategy July 2009. The strategies detail the first investments from the £405 million for low carbon industries announced at Budget 2009.

The Low Carbon Industrial Strategy is also part of a suite of documents launched as part of the Building Britain’s Future commitments and New Industries, New Jobs strategy as a response to the current economic climate. Other key aspects that impact on the sector are the Manufacturing Strategy and a review into the productivity and skills needs of the engineering construction sector.


HM Government, (April 2009), Building Britain’s Future: New Industries, New Jobs, BERR and DIUS.

HM Government, (July 2009), Advanced Manufacturing Strategy, BIS.

Announced in HM Government, (April 2009), Building Britain’s Future: New Industries, New Jobs, BERR and DIUS.

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Building Britain’s Future and New Industries, New Jobs sets out central government’s activist approach to adapting to the specialist demands of the modern economy and strengthen the UK’s industrial policy to support the UK’s economic renewal. There are also specific implications for the sector including work planned to update and develop Britain’s infrastructure. This involves adapting Britain’s energy grid to link homes and businesses to the new forms of power generation, including renewables and nuclear, and for helping them reduce their energy demands.

Other elements of public policy will also impact on our sector such as the Planning Act\(^ {17}\) which introduces a new system for approving major infrastructure of national importance. In addition, the fuel poverty and energy efficiency debates and development of sustainable waste strategies provide demands on the sector and the skills needed to enable change and innovation.

The respective structures and make-up of each of our sector’s industries are described in the following sections.

3.2 Gas (Transmission & Distribution)

This sub-sector of the gas industry consists of the transportation of gas through the National Transmission System (NTS) into the Local Distribution System, and then up to, and including, the main control valve, usually adjacent to the customers’ properties. The sub-sector also covers the manufacture and distribution of Liquefied Natural Gas (LNG) and other bottled gases and the operation and maintenance of network infrastructure, such as pipe laying, repair, maintenance and storage.

In privatising the gas industry in 1986, the government’s objective was to deliver lower energy costs through the introduction of competition. This led to significant changes in both ownership and structure across the industry. As a result, the last two decades have provided the regulatory frameworks and experience such that the UK leads the world in utility change and is often used internationally as the template.

Liberalisation (from 1991) has transformed the industry, with economic regulation playing a key role. British Gas, the then monopoly player, has fragmented and this has resulted in a previously straightforward and integrated industry becoming much more complex. The role of major players has diversified and transformed the industry as a result, making it more difficult to paint a clear picture of how the industry is structured.

Privatisation took the form of an unbundling of British Gas’ assets and operations (initially to create Centrica and The Lattice Group).

The merger between National Grid Plc and Lattice Group Plc provided a platform for further major cost savings, potentially resulting in new and broader occupations and related skills requirements.

3.2.1 National Transmission System

The NTS is owned and operated by National Grid on a monopoly basis and transports gas from the terminals where the gas enters the UK to the eight geographic Distribution Networks. The gas is transported through the system at high pressure, maintained through the use of 26 strategically placed compressor stations. From over 140 off-take points, the NTS supplies gas to 40 power stations, a small number of large industrial consumers and the 12 Local Distribution Zones (LDZs) that contain pipes operating at lower pressure which eventually supply the consumer. These 12 LDZs are now organised into the eight major networks, owned and operated by four asset owners, National Grid, Scotia Gas, Wales & West Utilities and Northern Gas Networks.

Linked to this network is the importation, storage and delivery into the NTS of LNG. LNG is natural gas that has been liquefied by reducing its temperature to minus 160 degrees Celsius, which then allows transportation, usually by ship. This can then be re-gasified and injected into the NTS. A major investment is being made by National Grid to extend the LNG Terminal at the Isle of Grain, as UK LNG importation is scheduled to increase over the next decade.

Additional storage facilities are situated in strategic locations close to areas of high demand or at the extremities of the network (Avonmouth (near Bristol), Dynevor Arms (South Wales), Partington (near Manchester) and Glenmavis (Strathclyde)). Their key feature is their location and their ability to rapidly revaporise the natural gas, and deliver it to the NTS. As a result, LNG storage is able to provide a peak gas supply to shippers and supplement National Grid’s network capacity. In addition, LNG is used as a contingency against the risk of emergencies such as system constraints, failures in supply or failures in end user interruption.

3.2.2 Distribution

Within the eight Distribution Networks, there are 12 LDZs which deliver the gas to the customer. Each LDZ is owned and operated by one company, again on a monopolistic basis\(^\text{18}\):

- North West, London, West Midlands, East Midlands and East Anglia are owned and managed by National Grid.
- Scotland, South of England and South East England are owned and managed by Scotia Gas Networks – operating as Scotland Gas Networks and Southern Gas Networks respectively.
- Wales and the South West are owned and managed by Wales and West Utilities.
- Northern and Yorkshire are owned by Northern Gas Networks, who have contracted operational activities to United Utilities Operations.

\(^{18}\) Taken from [http://www.nationalgrid.com/uk/Gas/About/How+Gas+is+Delivered/](http://www.nationalgrid.com/uk/Gas/About/How+Gas+is+Delivered/), accessed on 16th June 2009.
It is hoped that these four 'competing' networks (in as much as their performance will be measured and compared) will further strive for efficiency and quality gains. When negotiations take place for each five-year Distribution PCR the performance of each network is taken into account. In Northern Ireland, Phoenix Gas is responsible for the operation of the gas transmission system.

In addition to these principal network operators, there are also a growing number of independent gas transporters who compete for the operation of gas networks in the niche markets of new domestic, commercial and industrial development sites.

3.2.3 Supply and trade

Gas is supplied to the customer by around 70 'shippers'. This activity, as in the power industry, is completely open to competition with the shippers competing for customers primarily on price and customer service.

3.3 Gas (Utilisation)

This sub-sector of the gas industry covers all areas that take place on the customers’ side of the main control valve, which also includes meters. The industry is characterised by a plethora of self-employed and very small companies (the exception being British Gas) providing installation and maintenance services to industrial, commercial and domestic customers and micro-generation renewable energy.

The gas utilisation industry is not regulated, and is very competitive. There is a statutory, safety driven, requirement (under the Gas Safety [Installation & Use] Regulations 1998) for all businesses operating in the industry to be registered with Gas Safe Register. There was a change of Registrar in April 2009 when the HSE awarded a ten-year contract to Capita to operate the register, previously managed by CORGI. In doing so, the HSE separated the Registrar role from that of Competence Standard Setting for Registration and this is now undertaken by EU Skills, supported by SummitSkills, as the two SSCs with responsibility for skills in the relevant industries.

Often, businesses and their employees operate across a range of other installation and maintenance activities such as plumbing and heating using oil or solid fuel, electrical work and kitchen fitting etc. The partnership with SummitSkills is key to ensuring competency.

3.4 Power

3.4.1 Structure

This industry covers the activities associated with the production, transmission and distribution of electricity. EU Skills involvement starts at the point of electricity production, either by conventional methods or by renewable energy sources, and ends at, and including, the meters on customers’ properties. There are around 35 major generating companies operating in the industry and a growing number of small electricity generators (<50MW capacity) and auto-generators who produce electricity mainly for their own use.
Over the last decade, the power industry has seen a constant change in the ownership structure of the UK power industry involving both re-integration and specialisation. A more recent trend has been the separation of ownership of distribution from supply businesses. Currently the power industry is structured very much as shown below in figure 1.

Electricity is generated by a small number of large power stations; the generated electricity is then transported around the UK on a high voltage transmission network, and then around the regions on a lower voltage distribution network and delivered to the customer.

However, the UK, as with many other countries around the world, is now moving towards a more ‘distributed’ system. A distributed electricity system is one in which small and micro generators are connected directly to factories, offices, households and to distribution networks. Electricity not demanded by the directly connected customers is fed into the active distribution network to meet demand elsewhere. Electricity storage systems may be utilised to store any excess generation.

Large power stations and an increasing number of large-scale renewable energy plants (e.g., offshore wind) remain connected to the high voltage transmission network providing national back-up and ensure quality of supply. Again, storage may be utilised to accommodate the variable output of some forms of generation. Such a distributed electricity system is represented in figure 2.19

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19 Imperial College of Science, Technology and Medicine Centre for Environmental Technology, (September 2001), UK Electricity Networks: The nature of UK electricity transmission

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Figure 1: The current structure of the power industry
The resulting increase in the number of generating plants (and, therefore, grid connections) and total generated output means that the current transmission and distribution needs major expansion and refurbishment work over the coming years to ensure that it is up to the task of delivering this new reality.

3.4.2 Generation including renewable energy

Privatisation and the introduction of competition have transformed the generation sector, notably in terms of the number of organisations, capacity mix, the scale of projects and how generation output is sold. The number of companies has substantially increased since 1990 when only six existed. A combination of factors has reduced the concentration in the market, including the break-up of the nationalised power producers into smaller privatised companies, new entrants to the market and plant divestment by incumbent generators.

The sector has seen significant growth in generation of less than 50MW capacity, mainly in the form of combined heat and power (CHP) and renewable energy projects. Renewable energies are energies that are derived from natural processes that are replenished constantly. The range of renewable energy sources and technologies is diverse and complex, spanning a number of SSCs and sector bodies in addition to EU Skills. The drive for renewable energy has considerable government backing, as they play a vital part in climate change, and have challenging targets for growth to 2020 and beyond, as framed in the Energy Act.

Growth in small-scale generation is having a significant impact on distribution companies in particular as small projects connect directly to the regional distribution network rather than the high voltage transmission network. This represents a changing role for distribution companies with significant technical, commercial, management and skills implications.
Renewable energy technologies that employers in the EU Skills sector are involved in are included in the following table.

Table 1: Renewable energy technologies

<table>
<thead>
<tr>
<th>BULK ELECTRICITY</th>
<th>BULK HEAT</th>
<th>BUILT ENVIRONMENT</th>
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<tbody>
<tr>
<td>Wind</td>
<td>Biomass heat</td>
<td>Solar</td>
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<tr>
<td>• On-shore</td>
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<td>• Thermal/ heat</td>
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<td>• Off-shore</td>
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<tr>
<td>Marine</td>
<td>Solid recovered fuels</td>
<td>Biomass</td>
</tr>
<tr>
<td>• Wave</td>
<td></td>
<td>• Combined Heat and Power</td>
</tr>
<tr>
<td>• Tidal stream and barrages</td>
<td></td>
<td>• Boilers</td>
</tr>
<tr>
<td>Hydro</td>
<td>Combined Heat and Power</td>
<td>Heat pumps</td>
</tr>
<tr>
<td>Waste</td>
<td>Micro-Combined Heat and Power</td>
<td>Micro-hydro</td>
</tr>
<tr>
<td>• Incineration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Anaerobic digestion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Landfill gas</td>
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</tr>
<tr>
<td>Dedicated biomass</td>
<td>Micro-hydro</td>
<td>Fuel cells</td>
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<td>Solid recovered fuels</td>
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<tr>
<td>Combined Heat and Power</td>
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3.4.3 Transmission & Distribution

There are four transmission systems in the UK20: in England and Wales it is owned and operated by National Grid; in Scotland, the network is owned by Scottish Power (in the south) and Scottish & Southern Energy (in the north), although the network is operated by National Grid. In Northern Ireland, the network is owned and operated by Northern Ireland Electricity. All these companies operate under a transmission licence granted by Ofgem.

Transmission networks play a central role in the electricity system. Maintaining the balance between supply and demand is a vital task which touches every aspect of electricity supply. The transmission companies are required to develop, maintain and operate an efficient and economical system and a duty not to restrict, prevent or distort competition in generation and supply.

The transmission systems in the UK are fully ‘interconnected’. The transmission system in England and Wales is connected via overland links to that of Scottish Power, which in turn is interconnected with that of Scottish and Southern Energy. The Scottish Power system is also connected via an undersea cable to Northern Ireland’s system.

20 Energy Networks Association, (January 2008), Electricity Factsheet 03.
The link between England, Wales and Scotland is owned jointly by National Grid, Scottish Power and Scottish & Southern Energy. Also, the transmission system in England and Wales is connected to a grid belonging to Electricite de France through a cross-Channel link.

There are 12 licensed Distribution Network Operators (DNOs) in England and Wales and two in Scotland. These companies hold a distribution licence granted by Ofgem for the provision of distribution network services. Each DNO owns and operates the local electricity distribution system within its own authorised area. Therefore, each DNO has specific obligations and responsibilities in relation to defined service areas of the network.

All DNOs have statutory duties to develop and maintain an efficient, co-ordinated and economical system of distribution and facilitate competition in generation and supply. They have a duty to connect any customer who requires a supply. DNOs are obliged to meet minimum standards of performance related to distribution services, which are set by Ofgem.

The distribution system of each DNO reflects the size of the region it serves as well as the density of the regional population and the terrain. In urban areas wires are generally buried underground and in rural areas they are carried overhead. Companies try to minimise the visual impact of potential routes when installing or upgrading the network, using when possible the natural contours of the landscape.

### 3.4.4 Supply and trade

Competition in electricity supply has been introduced progressively since 1990. Large, industrial and commercial customers have been able to choose their supplier since 1990 and residential customers since 1998. Competition is now well-established. Ofgem state that around half of all energy customers in the UK have changed supplier at least once.

At the outset of privatisation there were 14 licensed Public Electricity Suppliers (PESs) in Great Britain. There are currently five large companies active in the market, created from these former PESs through mergers and acquisitions. In addition to these are British Gas, a few very small of new entrants and Viridian Group in Northern Ireland. The pursuit of a critical mass of customers established by market analysts to be around six million, to derive efficiencies from economies of scale and to obtain competitive advantage, has led to consolidation and a higher concentration in the market.

Supply companies operate nationally and compete on service and price head-to-head with each other. Customers are the key focus and competition has forced companies to become proactive by building brands, diversifying and differentiating their services from other suppliers, and taking innovative approaches to marketing. Most suppliers are spending substantial amounts of money on marketing and are making significant use of house-calls, telephone sales and media advertising.
3.5 Waste management

This industry covers the collection, transport, treatment and final management of waste and recyclables. Our remit with this industry covers the conventional journey of the UK’s waste generation. Once waste is collected, it will pass through a series of processes that result in either valuable or non-valuable outputs. Valuable outputs from waste, once dismantled and/or sorted, are passed to other parties that sit outside of our remit to be remade or recycled into new products. Non-valuable outputs, which consist of materials that are unsuitable for recovery, are either sent to landfill or used to create energy from waste.

The waste management industry has changed significantly over the last 10-15 years. Previously, local authorities undertook the majority of municipal collections and those same local authorities operated many landfill sites. This has gradually changed; initially by the outsourcing of certain operations (e.g., collections) by means of public tender for relatively short-term contracts (five-to-seven years) and now by some local authorities contracting for integrated waste management systems for periods of 25 to 30 years.

As a result of the increasing private sector market for waste management services, extensive mergers and acquisitions have occurred over the past few years and are likely to continue. These are happening not only through larger companies acquiring smaller, perhaps specialised, businesses, but also between small and medium sized enterprises (SME) in order to gain a certain critical mass. Although this trend is likely to continue, the role and importance of SME businesses within the industry is likely to remain vital to its success.

Economics has always played an important part in the direction that the industry has taken. According to analysis carried out by Biffa\(^{21}\), the cost per tonne of processing waste and subsequent disposal has always influenced the development routes taken in the UK. As government policies for waste disposal move towards resource management of waste, there is significant increase in price for capital investment and logistics.

So long as the private sector remains the dominant partner (in terms of revenue and turnover), labour market forecasts will be influenced by the timing of financial investment decisions (particularly capital investment procurement options). It will also be influenced by the willingness and ability of local authorities to pay for investment in new waste management infrastructure in municipal waste collection, processing and disposal of municipal waste.

The commercial competition in the industry between, for example, integrated waste management operators and also between large operators and one-man operators (e.g., skip companies) will put pressure on the long-term investment in skills development and on the capacity of the industry to respond in a timely manner to future opportunities. Even where integrated waste management solutions are used, nominated sub-contractors (primarily SMEs) may be selected by the main managing contractor, particularly where commercial advantage can be gained.

In addition, smaller local authorities may prefer to enter into partnering arrangements with medium-sized companies where innovative procurement, risk management and marketing are required to offer surplus Materials Recycling Facility (MRF) capacity to other local authorities and commercial businesses.

3.6 Water

This industry is made up of the regulated water utility companies (see figure 3), non-regulated subsidiary water utility companies (i.e., involved in construction, engineering, consultancy, etc.) and the supply chain (i.e., suppliers, manufacturers, contractors, etc). Combined, the industry starts at the generation of clean water right through to the customers’ stop valves in their homes. It also covers the collection and treatment of waste water collected through public sewers and private drains.

The water industry was privatised in 1989. In response to the increased level of regulation, some water companies have developed non-regulated businesses that act as service companies to the regulated part of the company and also compete externally for wider business.

The 10 water authorities were issued with licences to provide water supply and sewerage services. These were called water service companies. The 29 water companies were issued with licences to supply water only and were known as water supply companies, the relevant water service company being responsible for sewerage in their region. The water service companies supply approximately 75% of water, with the water supply companies providing the remainder.

In Scotland, Scottish Water, which is a public sector company, has replaced East of Scotland Water, North of Scotland Water and West of Scotland Water in providing water and wastewater services across the nation.

In Northern Ireland, Northern Ireland Water is responsible for water and wastewater services. From April 2007, the Water Service ceased to be part of the Department for Regional Development and became a profit-making Government Owned Company (GO-CO).

The resultant transformation in the industry has been different to that seen in the power and gas industries. Capital investment has, and continues to be, a significant influence on the industry with ever changing technologies to meet new standards. Outsourcing has been and will continue to be a major strategy.

Other companies in the water industry include:

- Contracting companies;
- Specialist water/flood resources consultants;
- Manufacturers and suppliers.

Large and medium sized firms are losing out to smaller firms that tend to be more flexible and adaptive to changing trends. The impact of this trend on overall employment in the industry is unclear at present.

The industry’s infrastructure has effectively remained the same since privatisation, with the maintenance of this status quo significantly hindering the development of competition in the market. However, the Water Act does now allow developers to lay water mains and services on their housing developments. As such a developer’s workforce must have a competent workforce as proved by their registering with Lloyds on the Water Industry Registration Scheme (WIRS) and their workforce registered on the Energy & Utility Skills Register (EUSR).

The Water Act also allows new entrants into the water supply market. Before, issuing a license to supply water, the Drinking Water Inspectorate (DWI) needs to be satisfied that the supplier has a competent workforce. EU Skills has worked with the water industry to develop a Framework for Competent Operators, which was approved by the Water UK Council in 2006.
Figure 3: The UK water industry

3.7 Contractors
With significant elements of the non-regulated aspects of the gas, power and water industries being contracted out, such as network construction, the contractor market is highly competitive. This is the case not just in the bidding for contracts, but also in the recruitment and retention of a suitably skilled workforce. With many contractors working across multiple industries (e.g., gas, power, water and telecommunications) there is extreme competition for skilled labour not only on a geographic basis, but also from outside of the utility sector.

The increase in the number of gas network owners around the UK will do little to ease the competitive pressures felt by the contractors, especially if, as emerging evidence suggests, that the skills and competency requirements of those employed by the contractors and imposed by the network owners are not consistent.

An example of an attempt to ease the impact of competition upon the contractor workforce is National Grid’s Alliance contracts between themselves and their major contractors. These contracts aim to foster a spirit of partnership between the contracted organisations in terms of recruitment, retention, training and development of their workforces.

3.8 Workforce and business numbers

3.8.1 Size
This section of the report provides estimates of the number of people employed across the sector and of the number of businesses that operate within it. It provides these estimates for each of the four industries and within each nation of the UK.

It should be noted that the numbers quoted in this report are estimates; they are not actual counts, and as such should be used in an appropriate manner. We provide two different estimates of the number of people employed in the sector. The first is a narrow definition based solely on analysing national datasets using EU Skills’ core SIC codes as described in Annex A. The second is a much broader estimate based on EU Skills’ own research and consultation with employers and stakeholders.

3.8.2 Narrow definition
This estimate is based on analysis of the latest official data sources and relevant SIC 2003 and 2007 codes. The Annual Business Inquiry (ABI) and Census of Employment are key sources of data providing an officially recognised assessment of workforce size. However, this data does not represent the full EU skills footprint. Moreover, the data fluctuates year-on-year. The levels and directions of variance suggest that the changes are driven more by the difficulties of accurately measuring the size of the workforce through a sample-based approach rather than reflecting any real world movements. There are also discontinuities within the 2007 data (including the change of reference date and changes to the methodology). These two factors mean that while this data is the most recent and robust national datasets available, they should be contextualised with sector specific knowledge.
The table below gives UK employee estimates based on the SIC codes for which EU Skills has responsibility for, and are taken from official data sources\textsuperscript{22}.

In addition to these 369,000 employees who operate in the core aspects of the sector, it is estimated that EU Skills also has a key role to play in the skills development of a further 34,000 employees in activities related to the wholesale of solid, liquid and gaseous fuels (SIC 2003 51.51) and in the wholesale of chemical products (SIC 2003 51.55).

**Table 2: UK employee estimates using the SIC-based definition of our footprint**

<table>
<thead>
<tr>
<th>SIC 2003 Code</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>37.10 Recycling of metal waste and scrap</td>
<td>8,500</td>
</tr>
<tr>
<td>37.20 Recycling of non-metal waste and scrap</td>
<td>11,500</td>
</tr>
<tr>
<td>40.11 Production of electricity</td>
<td>24,000</td>
</tr>
<tr>
<td>40.12 Transmission of electricity</td>
<td>14,500</td>
</tr>
<tr>
<td>40.13 Distribution and trade of electricity</td>
<td>30,000</td>
</tr>
<tr>
<td>40.21 Manufacture of gas</td>
<td>6,000</td>
</tr>
<tr>
<td>40.22 Distribution and trade of gaseous fuels through mains</td>
<td>11,500</td>
</tr>
<tr>
<td>41.00 Collection, purification and distribution of water</td>
<td>30,000</td>
</tr>
<tr>
<td>45.33 Plumbers</td>
<td>136,000</td>
</tr>
<tr>
<td>60.30 Transport via pipelines</td>
<td>500</td>
</tr>
<tr>
<td>90.01 Collection and treatment of sewage</td>
<td>22,500</td>
</tr>
<tr>
<td>90.02 Collection and treatment of other waste</td>
<td>74,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>369,000</strong></td>
</tr>
</tbody>
</table>


\textsuperscript{22} Due to discontinuities in the available official data sources (including the change of reference date, use of Business Register Survey data and changes to the minimum domain methodology); these figures should not be directly compared with historical data from these sources.
3.8.3 **Broad definition**

EU Skills’ own research suggests that this definition significantly under-estimates the size of the sector’s workforce. Table 3 below shows a total workforce estimate based on a broader definition of the sector which has been developed in conjunction with those who operate within it. This data is based on research which has been undertaken by EU Skills and endorsed by the sector through a rigorous consultation process which involved all of the major employers and stakeholders within each industry. Using this approach we get a much more realistic estimate of the size of the workforce.

Along with the estimates of employees working in each of the four industries, an additional element (based on national averages) has been built-in to represent those who are self-employed and are not included in employee numbers. Self-employment across the whole of the sector in England, Northern Ireland and Wales currently runs at a rate of 4% of the workforce, while in Scotland it is slightly lower at 3% 23.

The only sub-sector where we have accurate figures for self-employment is gas (utilisation), where the CORGI register (in 2006) shows that there are around 40,000 sole traders; this equates to 32% of the workforce. The self-employed workforce in the gas, power and waste management industries tend to provide support services such as consultancy and contracting.

---

Table 3: Estimates of total workforce by nation and industry

<table>
<thead>
<tr>
<th></th>
<th>UK</th>
<th>England</th>
<th>Northern Ireland</th>
<th>Scotland</th>
<th>Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas (Transmission &amp; Distribution)</td>
<td>18,500</td>
<td>15,000</td>
<td>500</td>
<td>2,500</td>
<td>500</td>
</tr>
<tr>
<td>40.21, Manufacture of gas</td>
<td>6,000</td>
<td>5,500</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>40.22, Distribution and trade of</td>
<td>11,500</td>
<td>8,500</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>gaseous fuels through mains</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated self-employed</td>
<td>1,000</td>
<td>500</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas (Utilisation)</td>
<td>123,700</td>
<td>105,800</td>
<td>1,400</td>
<td>10,700</td>
<td>5,800</td>
</tr>
<tr>
<td>CORGI registered gas operatives</td>
<td>123,700</td>
<td>105,800</td>
<td>1,400</td>
<td>10,700</td>
<td>5,800</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>87,000</td>
<td>62,500</td>
<td>2,000</td>
<td>15,500</td>
<td>6,500</td>
</tr>
<tr>
<td>Generation</td>
<td>18,000</td>
<td>13,000</td>
<td>500</td>
<td>3,000</td>
<td>1,500</td>
</tr>
<tr>
<td>Transmission and distribution</td>
<td>38,000²⁴</td>
<td>27,000</td>
<td>500</td>
<td>7,000</td>
<td>3,500</td>
</tr>
<tr>
<td>(including contractors)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply</td>
<td>21,500</td>
<td>15,500</td>
<td>500</td>
<td>3,500</td>
<td>1,500</td>
</tr>
<tr>
<td>Corporate functions</td>
<td>6,500</td>
<td>4,500</td>
<td>*</td>
<td>1,000</td>
<td>*</td>
</tr>
<tr>
<td>Estimated self-employed</td>
<td>3,000</td>
<td>2,000</td>
<td>*</td>
<td>500</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste management</td>
<td>141,000</td>
<td>110,000</td>
<td>4,000</td>
<td>17,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Integrated waste management companies</td>
<td>29,000</td>
<td>22,500</td>
<td>1,000</td>
<td>3,500</td>
<td>2,000</td>
</tr>
<tr>
<td>Public waste collection, disposal</td>
<td>60,000</td>
<td>47,000</td>
<td>1,500</td>
<td>7,500</td>
<td>4,000</td>
</tr>
<tr>
<td>authorities and LAWDCs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>UK</th>
<th>England</th>
<th>Northern Ireland</th>
<th>Scotland</th>
<th>Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMEs – Collection, processing and disposal</td>
<td>45,000</td>
<td>35,000</td>
<td>1,500</td>
<td>5,500</td>
<td>3,000</td>
</tr>
<tr>
<td>Support Services – Consultants</td>
<td>1,000</td>
<td>500</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>- Contractors</td>
<td>3,000</td>
<td>2,500</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>- Plant/ Equipment</td>
<td>2,000</td>
<td>1,500</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Regulators</td>
<td>500</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Others</td>
<td>500</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td>166,500</td>
<td>139,500</td>
<td>6,000</td>
<td>13,500</td>
<td>7,500</td>
</tr>
<tr>
<td>Water companies and utilities (Regulated)</td>
<td>37,000</td>
<td>28,500</td>
<td>2,000</td>
<td>4,500</td>
<td>2,000</td>
</tr>
<tr>
<td>Support services - Consultants</td>
<td>15,000</td>
<td>12,500</td>
<td>500</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>- Contractors</td>
<td>30,000</td>
<td>23,500</td>
<td>1,500</td>
<td>3,000</td>
<td>2,000</td>
</tr>
<tr>
<td>- Plant/ Equipment</td>
<td>30,000</td>
<td>25,500</td>
<td>1,000</td>
<td>2,000</td>
<td>1,500</td>
</tr>
<tr>
<td>Regulators</td>
<td>6,000</td>
<td>4,000</td>
<td>500</td>
<td>1,000</td>
<td>500</td>
</tr>
<tr>
<td>Others</td>
<td>14,000</td>
<td>12,500</td>
<td>500</td>
<td>1,000</td>
<td>500</td>
</tr>
<tr>
<td>Water utilities owned</td>
<td>28,000</td>
<td>27,500</td>
<td>0</td>
<td>500</td>
<td>0</td>
</tr>
<tr>
<td>(non-regulated)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated self-employed</td>
<td>6,500</td>
<td>5,500</td>
<td>*</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>TOTAL</td>
<td>536,200</td>
<td>432,800</td>
<td>13,900</td>
<td>59,200</td>
<td>30,300</td>
</tr>
</tbody>
</table>

* Denotes number is suppressed for confidentiality reasons.

Note: Totals may not add up due to rounding.

Using this broader definition of the sector, the total workforce is estimated to be 536,200; which is around 45% higher than the narrow definition. The chart below shows that 81% of the entire sector’s workforce is employed in England, 11% in Scotland, 6% in Wales and 3% in Northern Ireland.

3.8.4 Historic occupational employment trends

Analysis of Working Futures III data (which is based on the narrow SIC-based definition of the sector) suggests that total employment levels across the sector have decreased by 3.7% over the last decade (1999-2008). This compares to an increase of 9.1% across the UK economy as a whole.

The power industry has the widest distribution around the UK nations with 72% of the workforce employed in England, 17% in Scotland, 8% in Wales and 3% in Northern Ireland. At the other end of the scale, 86% of the gas (utilisation) workforce is employed in England.

Occupations that have seen increases in staffing levels include Corporate Managers and Customer Service occupations. Occupations that have seen significant reductions in staffing levels include: Administration; Secretarial; Skilled Metal/Electrical Trades; Process/Plant Operatives; and Elementary Trades.

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25 Warwick Institute of Employment Research/ Cambridge Econometrics, (2008), Working Futures III, Wilson, R.
Within the power, gas (transmission & distribution) and water industries, these workforce reductions are mainly the result of consolidation and restructuring following privatisation in the late 1980s, including the subsequent outsourcing of a number of operations. However, anecdotal evidence from employers in these industries suggests that the number of people actually working on key activities within, and for, the sector is estimated to have actually remained fairly stable. It is just the nature of the relationship between the employer and the activity that has changed. For example, much of the laying of cable ducts is not undertaken by the electricity companies themselves anymore; this is contracted out to specialist contractors who may operate across multiple industries of the economy, including telecommunications.

Within waste management, workforce increases are the result of the changing emphasis being placed upon the treatment and final disposal of waste. There are environmental and political pressures to reduce the amount of waste that is landfilled and increase the amount that is reused, recycled into new materials or treated in a manner that means value can be extracted from it (e.g. energy recovery, composting, etc.).

3.8.5 Business unit estimates

Across the UK, there are some 60,500 businesses operating in the sector: 10,200 VAT and PAYE registered businesses operating in the power, gas (transmission & distribution), waste management and water industries; with a further 50,300 businesses (including many non-VAT registered) in gas (utilisation). The chart below gives the breakdown of businesses by industry and nation.

Table 4: Business unit estimates by industry and nation

<table>
<thead>
<tr>
<th>Industry</th>
<th>UK</th>
<th>England</th>
<th>Northern Ireland</th>
<th>Scotland</th>
<th>Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>1,050</td>
<td>800</td>
<td>50</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>Gas (Transmission &amp; Distribution)</td>
<td>350</td>
<td>300</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Gas (Utilisation)**</td>
<td>50,300</td>
<td>44,400</td>
<td>500</td>
<td>2,900</td>
<td>2,500</td>
</tr>
<tr>
<td>Waste Management</td>
<td>6,200</td>
<td>5,050</td>
<td>250</td>
<td>450</td>
<td>450</td>
</tr>
<tr>
<td>Water</td>
<td>2,600</td>
<td>2,000</td>
<td>100</td>
<td>350</td>
<td>150</td>
</tr>
</tbody>
</table>


Note: * Denotes less than 50. ** Denotes the inclusion of non-VAT registered business units.
Across the power, gas (transmission & distribution), waste management and water industries micro-sized businesses dominate in terms of the business stock, but employ relatively few people. The vast majority of the workforce is employed in the small number of large businesses.

Table 5: Business units by sizeband

<table>
<thead>
<tr>
<th>Industry</th>
<th>Total</th>
<th>1-9</th>
<th>10-49</th>
<th>50-249</th>
<th>250+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>1,050</td>
<td>650</td>
<td>250</td>
<td>150</td>
<td>50</td>
</tr>
<tr>
<td>Gas (Transmission &amp; Distribution)</td>
<td>350</td>
<td>150</td>
<td>100</td>
<td>50</td>
<td>*</td>
</tr>
<tr>
<td>Gas (Utilisation)**</td>
<td>50,300</td>
<td>49,300</td>
<td>800</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Waste Management</td>
<td>6,200</td>
<td>4,350</td>
<td>1,400</td>
<td>450</td>
<td>*</td>
</tr>
<tr>
<td>Water</td>
<td>2,600</td>
<td>1,800</td>
<td>600</td>
<td>150</td>
<td>*</td>
</tr>
</tbody>
</table>

Note: * Denotes less than 50. ** Denotes the inclusion of non-VAT registered business units.

Official data sources for Great Britain\(^{26}\) (not shown in the tables above) show that micro businesses (those that employ less than ten people) employ 21% of the entire sector’s workforce, while the large businesses (250 or more employees), which make up just 0.2% of the business stock, employ around a third of the workforce. However, the gas (utilisation) industry is structured differently with 98% of businesses employing less than ten people; 79% of them are sole traders.

While this data does not include analysis of Northern Ireland’s businesses, the pattern is unlikely to be significantly different.

3.9 Workforce characteristics

This section provides an analysis of the characteristics of the workforce employed within the sector. It looks at the personal characteristics such as sex, ethnicity and age profile as well as productivity.

The latest data at this level of detail and robustness remains the 2001 Census of Population. However, while the data is from 2001, anecdotal evidence suggests that the proportions shown in the following analysis have not changed greatly over the intervening years. Thus, this data is still a useful source of information on the characteristics of the sector.

3.9.1 Occupational structure

Overall, the workforce employed within the sector is very similar in occupational structure to that of the whole UK workforce; with the exception of plant and machine operatives, which are constantly over-represented. There are, however, substantial industry variations.

\(^{26}\) Annual Business Inquiry, (2007).
The power industry employs more professional, skilled trades and sales & customer service occupations than either the UK or sector average. Only 13% of the power industry workforce is employed in operative and elementary occupations (compared to 23% of the entire UK workforce); reflecting the nature of the work being undertaken.

One-quarter of the gas transmission and distribution workforce is employed in a skilled trade – 12% higher than the UK average. This industry also employs a far greater proportion of people in administration & secretarial and sales & customer service occupations than both the sector and UK average. Just one-in-ten people are employed in elementary and operative occupations; again reflecting the generally skilled nature of the activities being undertaken. The gas utilisation workforce is not included in the above chart as it is assumed that as the data is based on the Gas Safe Register, they are all gas operatives, albeit they may have different specialisms. The occupational profile of the waste management industry is concentrated in the lower skilled occupations. 59% of this workforce is employed in operative and elementary occupations (23% is the UK average).

This reflects not only the skills requirements of the majority of activities undertaken within the industry, but also the significant number of drivers that are employed in the industry (around 30%).

Less than 40% of the workforce is employed within occupations that normally require a Level 3 qualification, compared to the UK average of 60%. This is a reflection of the nature of the activities currently undertaken by the industry.

This situation is likely to change over the coming years as less waste is sent to landfill and more goes through a process resulting in value being recovered. These are activities that are likely to demand a higher level of skill from the industry’s future workforce.

The water industry employs proportionately more professionals, associate professional/technical and plant and machine operative occupations than either the sector average or UK average. Again, this is a reflection of the nature of the activities undertaken by the industry, particularly in terms of the processes that are carried out in order to treat and transport water.
3.9.2 Gender

Data derived from the 2001 Census of Population highlights a gender distribution imbalance within each of the four industries. Across the whole UK economy, 43% of the workforce is female, compared to an EU Skills sector average of just 24%, within the power industry 16% of the workforce is female.

To validate that the data of the 2001 Census is still relevant, a number of additional, more up-to-date sources have been considered. Data taken from the ABI and National Online Manpower Information System (NOMIS) on employee job estimates by industry (unadjusted) have been averaged out over four quarters are presented in the table below.

### Table 6: Proportion of female employees by nation (sources compared)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>23.8%</td>
<td>24%</td>
<td>*</td>
</tr>
<tr>
<td>England</td>
<td>24.5%</td>
<td>24%</td>
<td>21.2%</td>
</tr>
<tr>
<td>Wales</td>
<td>20.8%</td>
<td>24%</td>
<td>16.8%</td>
</tr>
<tr>
<td>Scotland</td>
<td>23.3%</td>
<td>25%</td>
<td>21.3%</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>15.9%</td>
<td>17%</td>
<td>*</td>
</tr>
</tbody>
</table>


* Data not available

Figure 5 below shows the proportion of female employees in each industry and nation. Northern Ireland has the lowest proportion of females in the sector and Scotland the highest.

**Figure 5: Proportion of female employees by sector and nation**
The three datasets are broadly in line in terms of the proportion of females within the sector. However, it should be noted that with the smaller geographies of the Devolved Administrations, the data is less reliable and hence the percentage figures are subject to variations.

Figure 6 above shows the proportion of employees who are female within each occupational group, by industry, and compares them to the UK average.

The chart above shows that a strong gender bias exists across the sector, with high concentrations of female workers only in administrative & secretarial and sales & customer service roles. Across the sector, only around one-in-five managerial employees are female, compared with one-in-three across the UK economy. Those roles which could be considered to be ‘technical’ in nature employ very few females, as do low-skilled craft and elementary occupations. No data is available from the Gas Safe Register in terms of the sex of the gas operative workforce.
Figure 7 below shows that this picture is replicated across the four nations of the UK.

**Figure 7: Proportion of females within the energy and water sector by occupation and geography**


### 3.9.3 Ethnicity

Data relating to the ethnicity of the workforce is extremely difficult to obtain direct from employers; therefore data has been taken from the Census of Population 2001. Data from this source shows that 8% of the UK’s total workforce is from a black or minority ethnic (BME) background. Only the gas (transmission & distribution) industry approaches this national average.
Table 7: Ethnic background of the sector’s UK workforce

<table>
<thead>
<tr>
<th>Ethnic Group</th>
<th>Gas (Transmission &amp; Distribution)</th>
<th>Power</th>
<th>Waste management</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>93%</td>
<td>95%</td>
<td>96%</td>
<td>96%</td>
</tr>
<tr>
<td>Mixed</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Asian or Asian British</td>
<td>5%</td>
<td>3%</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Black or Black British</td>
<td>1%</td>
<td>1%</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Chinese</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Other</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>N/A</td>
<td>0</td>
<td>&lt;1%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>


The vast majority of the gas (transmission & distribution), power and water industries’ workforces are white, with Asian/ Asian British and Black/ Black British the only other ethnic groups to account for 1% or more of the workforce. Unfortunately, there is no ethnicity information available in the Gas Safe Register data, however, it is estimated that at least 95% are white.

A slightly more up-to-date data source has been taken from the Annual Population Survey (June 2009), for the period October 2007 to September 2008 for ‘energy & water’ sector. Data from this survey presents a slightly more diverse picture of the sector’s workforce with 6.3% being from a BME group. Perhaps unsurprisingly, England’s workforce is slightly more diverse than the workforces in each of the other nations in the UK.

Table 8: Percentage of the workforce that are from an ethnic minority

<table>
<thead>
<tr>
<th>% employed in energy &amp; water who are white</th>
<th>UK</th>
<th>England</th>
<th>Northern Ireland</th>
<th>Scotland</th>
<th>Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td>% employed in energy &amp; water who are ethnic minorities</td>
<td>93.7%</td>
<td>91.9%</td>
<td>96.1%</td>
<td>98.2%</td>
<td>98.3%</td>
</tr>
</tbody>
</table>

3.9.4 Age

Figure 8 below shows the age profiles of the four industries and compares them against the UK workforce. It should be noted however that this data includes the age profile of all employees in all occupations within each industry. EU Skills has identified, through its workforce planning model, that the age profile of the core technical and engineering workforce is quite heavily skewed towards the older age ranges. More information on this is presented below.

A recurrent theme throughout this report is the concentration of employees within the 35-44 and 45-54 year old age bands, with higher proportions of the gas (utilisation) and waste management workforces in the 55-64 year old group than the national average.

Data taken from the Annual Population Survey – Workplace Analysis (June 2009) for the period October 2007 to September 2008 highlights the following age distribution with approximately one-quarter of the workforce being in the 50 plus age group (see figure 9 below).

Figure 8: Age profile of workforce by industry

In general terms the gas (transmission & distribution), power and water industries have similar age profiles. This is likely to be a reflection of the industries’ restrictions in terms of employing under 18 year-olds and its desire to recruit a more experienced and mature individual into, what can be, dangerous roles and situations.

Overall, the above analysis presents these industries as having a roughly similar age profile to that of the UK as a whole. This does not however tie in with data supplied for EU Skills’ workforce planning model during 2008 and 2009, which presents a picture of significant levels of retirements over the coming decade (see figure 10 below). One reason for this is the high proportion of administration/secretarial and sales and customer service occupations that are employed by this industry (33% of the workforce is employed in these two roles, compared to the sector average of 22%).

There is a strong correlation between the age profile of an industry and its propensity to employ in certain occupations. In short, and unsurprisingly, the more senior positions tend to be filled by older employees, whilst sales and customer service attract younger employees. This appears to be a straightforward reflection of the nature of the roles.

Figure 10 below presents data taken from EU Skills’ workforce planning model which shows the age profile of the core technical and engineering workforce in the water, gas (transmission & distribution) and power industries.
This chart shows that, over time, an increasing number of the core technical and engineering workforce is expected to retire year-on-year between 2010 and 2024. The challenge in terms of replacing these leavers with competent replacements should not be underestimated. Additionally, data from EUSR suggests that in the higher-level technical and engineering occupations there is an issue related to the high number of workers who are due to retire within the next decade, and for whom replacements may be difficult to find in sufficient numbers.

For example, the age profile of registrations on the Safe Control of Operations (SCO) scheme is very much skewed towards an older workforce. The primary reason behind this seems to be that holders of this registration are typically senior engineers, normally with five to 10 years experience at operative level. This is an area in which EU Skills is undertaking further, in-depth investigations.

The gas (utilisation) industry has the highest age profile of all the industries, almost half of the workforce is over 45 years old, with just one-quarter aged under 34 years.

The waste management industry also has a considerably older workforce than both the UK and sector average, there seems to be two contributory factors behind the under representation of young people in the industry. Firstly, the poor image that the industry has among this age group leads many of them to reject it as an attractive long-term career option, and secondly, from an employer’s perspective it can be a difficult and costly exercise in gaining adequate insurance to cover young people working in what can be a dangerous environment.
leading them to seek a more experienced and mature employee.

It should be noted, however, that research undertaken by EU Skills\textsuperscript{27} suggests that treating waste management as one homogenous industry in terms of age profile can be misleading. For example, in some specialist recycling and treatment operations the workforce is generally skewed towards associate professional occupations rather than elementary, and as such the average age of the workforce is somewhat lower.

\textbf{3.9.5 Disability}

It is estimated\textsuperscript{28} that 0.7\% of the power industry’s workforce regards themselves as having a disability; however, as this figure is based upon a fairly small sample size, an accurate figure is not available.

Due to the physical and dexterous nature of many of the activities undertaken across the sector, it is unlikely that a relatively significant proportion of the workforce will have physically disabilities. However, there is some evidence which suggests that mental and learning disabilities are present in the sector’s workforce, although the extent and nature is unknown. This is particularly the case in the waste management industry, which does employ a number of people with learning disabilities; however, due to the nature of the workforce and the problems in identifying people with learning difficulties, quantifying this issue is problematic.

\textbf{3.9.6 Full-time and part-time employment}

91.7\% of Great Britain's total workforce is employed on a full-time contract. Of the 8.3\% that are employed on a part-time basis, 60.6\% are female and are likely to be employed in administrative or customer service roles.

The figure below shows gas (transmission & distribution) as having the highest proportion of full-time employees. Conversely, the water industry has the highest proportion of part-time workers. In addition, Wales has the highest proportion of full-time workers of the three nations within the UK.

Figure 11: Proportion of the workforce employed full-time by industry and nation


Analysis of employment status via an alternative source of information (employee job estimates – unadjusted) is shown in figure 12 below

Figure 12: Employment status of the sector workforce

Source: Employee Job Estimates – unadjusted (June 2009), March 2009.

Within the UK, 94.2% of the sector’s workforce are in full-time employment, and of the 5.8% that are part-time, 62.7% are female. Scotland has the highest proportion of part-time workers that are female, followed by Northern Ireland.
### 3.10 Sector productivity

It is recognised that the main driver of economic growth is increasing productivity, which in part is driven by technical change, as well as organisation change and other factors.\(^29\) This section aims to analyse skills as a productivity factor in relation to the sector. It also describes the productivity levels across the sector both in absolute terms and in relation to both other sectors in the UK economy and other countries around the world, alongside labour productivity and total factor productivity.

#### 3.10.1 Skills as a driver of productivity

Skills is one of central government's five drivers of productivity (investment, innovation, skills, enterprise and competition). This section looks at the impact of skills on productivity of the sector. The other drivers of productivity are addressed for each industry in the relevant parts of section two and three.

Empirical evidence shows that higher levels of skills are associated with higher levels of productivity. Skills are integrally linked to innovation, as higher skills levels allow workers to generate new ideas and adapt to the changing economic environment. With a more skilled managerial and general workforce, firms are better able to introduce technological and organisational change.

High quality management skills are crucial to both investment and innovation decisions. Within the power, gas and water industries, there are proportionately more managers employed than across the whole economy. Figure 13 below also shows, the industries suffer from relatively few management skills problems (based on a range of indicators) when compared to other industries of the UK economy, although improvements could be made.

#### Figure 13: Management skills problems by sector

![Management skills problems by sector](image)

Source: Adapted from Bosworth and Wilson, 2004.
The waste management industry, however, as a more labour intensive industry, employs proportionately fewer managers than the utility industries.

In terms of science, engineering and technology occupations, the chart below illustrates that the power, gas and water industries employs the second highest proportion of these within the UK economy.

However, this does not reflect the picture in the gas (utilisation) and waste management industries, where SMEs dominate the market structure along with greater proportions of craft and operative-level occupations.

**Figure 14: UK SET occupations by sector, 2003**

![Figure 14: UK SET occupations by sector, 2003](chart)

Source: Adapted from IES/SPRU
3.10.2 Gross Value Added (GVA) as a productivity measure

GVA data (broadly speaking the value of outputs minus the value of inputs) for power, gas (transmission & distribution) and water supply is relatively easy to come by, although they are grouped together as one homogeneous ‘sector’. However, productivity data for gas (utilisation) and waste management has proved very difficult to find; normally being amalgamated into construction and miscellaneous services respectively.

Between 1996 and 2006 absolute GVA levels across the industries has increased significantly in England and only slightly in Northern Ireland and Scotland. In Wales, however, it has decreased slightly. This increased output per worker is reflected in volume indices which illustrate that in 2003 labour productivity was 92.2% higher than in 1995 (based on 1995 prices), while across the whole of the UK economy labour productivity increased by 15.6% 30.

Figure 15 Gross Value Added by nation – electricity, gas and water (2006)

With the majority of the industries’ activities located in England (around 80% of the industries’ business units are located in England), it is unsurprising that England has by far the highest absolute GVA levels.

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30 Groningen Growth and Development Centre, (October 2005), .60-Industry Database.
### 3.10.3 Relative labour productivity compared to other UK sectors

Viewing absolute GVA levels within the power, gas and water industries in isolation gives us little or no indication as to how productive the industries are. To do this we need to look at labour productivity (output per person or hour) and also compare our industries against others of the UK economy. The chart below shows relative labour productivity levels of the power, gas and water industries compared to other industries of the UK economy in 2002.

![Figure 16: Distribution of relative productivity by selective sectors, 2002](chart)

**Source:** Adapted from Sectoral Productivity Differences across the UK, Research Report 13, October 2005.

In terms of output per employee, the power, gas and water industries are five times more productive than the UK average. This is principally the result of these industries being very capital intensive and employing relatively few employees (and even fewer part-time employees).

Overall, two-thirds of employers in the gas, power and water industries measure productivity levels per worker within their organisation\(^{31}\), and of these two-thirds undertake some sort of benchmarking exercise, either against their industry as a whole or against their peers.

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\(^{31}\) EU Skills (2006), Employer Survey.
The above data suggests that those employers who do not measure productivity per worker tend to be those who operate across more than one nation of the UK. This may be because, as a single entity, it is difficult for them to amalgamate their organisational productivity data into a single, company-wide measurement.

The mechanism used by employers to measure productivity per worker varies widely between individual organisations and operations. Employers tend to measure the output per team, gang, and/or individual in a way that is sympathetic to the work being undertaken. For example, metres of main laid per employee, ‘points for joints’, revenue/profit earned per employee etc.

Approximately 80% of those employers who do measure their internal productivity per worker use this information to benchmark themselves against either the industry as a whole or against their peers.

The methods used to undertake this exercise vary in their complexity with some organisations utilising third parties to facilitate the identification of similar organisations and then to benchmark specific measures (e.g. PriceWaterhouseCooper’s Saratoga benchmarking tool) while others use league tables or just look to benchmark pay and conditions. Very few look to benchmark outside of the UK.

All employers stated that they did use their internal analysis of productivity to help determine their training and development investments, although some employers stated that the impact was generally indirect and were unable to explain the exact nature of the link.

3.10.4 International benchmarking

This sub-section looks at international comparison between the UK’s productivity levels and those of other countries. Figure 17 below shows the relative growth in labour productivity (based on 1995 prices) in the power, gas and water industries within the UK and a selection of other countries.

### Table 9: Proportion of employers who measure productivity per worker within their organisation

<table>
<thead>
<tr>
<th></th>
<th>England</th>
<th>Northern Ireland</th>
<th>Scotland</th>
<th>Wales</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>56%</td>
<td>44%</td>
<td>50%</td>
<td>30%</td>
<td>61%</td>
</tr>
<tr>
<td>Gas</td>
<td>70%</td>
<td>50%</td>
<td>67%</td>
<td>57%</td>
<td>75%</td>
</tr>
<tr>
<td>Water</td>
<td>67%</td>
<td>57%</td>
<td>50%</td>
<td>33%</td>
<td>69%</td>
</tr>
<tr>
<td>Contractors</td>
<td>63%</td>
<td>60%</td>
<td>50%</td>
<td>33%</td>
<td>70%</td>
</tr>
<tr>
<td>Total</td>
<td>60%</td>
<td>64%</td>
<td>64%</td>
<td>41%</td>
<td>65%</td>
</tr>
</tbody>
</table>

As can clearly be seen, growth in labour productivity per hour worked in the UK outstripped those of the other main European Union countries, Australia and the USA. Across the whole of the UK economy, labour productivity per hour worked in all UK industries in 2003 was 119.4 compared to 204.3 in the power, gas and water industries.

A recent report by Ofgem\(^\text{32}\) also found that growth in the UK’s labour productivity levels outstripped that seen in France, Germany and the USA.


**Table 10:** Estimates of labour productivity growth in the power, gas and water industries

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>5.8%</td>
<td>5.7%</td>
<td>9.0%</td>
</tr>
<tr>
<td>France</td>
<td>6.9%</td>
<td>4.2%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Germany</td>
<td>n/a</td>
<td>n/a</td>
<td>4.7%</td>
</tr>
<tr>
<td>USA</td>
<td>3.2%</td>
<td>1.0%</td>
<td>2.0%</td>
</tr>
</tbody>
</table>

Source: CEPA calculations based on NIESR data.

This trend of improved productivity relative to other nations is also demonstrated in the figure below.
This shows that the power, gas and water industries are actually more productive than their USA counterparts and, as such, are a positive force in terms of trying to close the 'productivity gap' between the UK and the USA (as at 2001). All other major sectors of the UK economy (with the exception of mining and quarrying) are less productive than their USA counterparts and are, therefore, contributing to the productivity gap.

In addition to using GVA levels and labour productivity to estimate the productivity levels of industries, TFP can also be used. TFP is a measure of the efficiency with which capital and labour are combined. Out of 16 countries, the UK power, gas and water industries rank fifth in terms of TFP levels, but ninth in terms of TFP growth over the last decade. In total, between 1992 and 2001, UK TFP levels in power, gas and water were slightly higher than the average for all 16 countries.

An industry's propensity to employ higher-level skills and occupations is an important influence on TFP levels. The proportion of managers and professionals in the UK's power, gas and water industries compares very well with their international counterparts. Where there is one

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34 The 15 EU members that predate May 2004 accession, plus the USA.
35 Behind Spain, Norway, Italy and Belgium.
manager internationally, there are 2.01 in the UK; while there are 2.13 professionals for every one internationally.

Therefore, in terms of TFP, the UK’s power, gas and water industries lie just in the top half of the 16-country table, although below average growth in TFP during the last decade is a cause for concern.

Further investigations into TFP levels in the power, gas and water industries were commissioned by Ofgem36. This report confirms that the UK’s utility industry is relatively more productive than its international counterparts, with growth in TFP between 1990-1999 running at 3.7%, while France, Germany and the USA lag some way behind (1.8%, 1.4% and up to 1.9%37 respectively).

37 In the US, electricity TFP growth between 1990 and 1999 ran at 1.9%, while in gas and water the figure was 0.3%.
4 About employment and skills

The changing economic climate has recently driven government towards an activist industrial policy captured in *Building Britain’s Future* and *New Industries, New Jobs*.

In their first annual assessment of progress towards the Leitch targets, the UKCES has reported that there has been progress; however, by international comparisons, the UK is still lagging behind.

Skills for Growth, a new national skills strategy for England, aims to target funding in the market areas and sectors that are crucial to future growth.

Apprenticeships remain a key strand of the skills strategies in each of the four nations of the UK

SSCs have a strong delivery role across each of the four national skills strategies, with specific funding being made available to deliver sector skills solutions.

This section of the SSA presents the key policy drivers that shape the employment and skills system across the UK and discusses the implications of these on the work we carry out as an SSC. As skills policy is devolved, Scotland, Wales and Northern Ireland specific policy is described separately.

4.1 UK policy framework

4.1.1 Skills

The changing economic climate has provided a focal point for recent skills and employment policy. The importance of skills to the economy was recognised when Gordon Brown, as Chancellor of the Exchequer, and the then Secretary of State for Education and Skills, commissioned the Leitch review in 2004.

However, whilst the Leitch recommendations are still relevant, the emphasis has shifted towards reskilling, as opposed to upskilling, and identifying the skills and jobs that are going to build the UK’s future prosperity. In June 2009, the Prime Minister published *Building Britain’s Future* which outlined 12 commitments. One of the commitments was the move towards a more active industrial policy.

In April 2009, *New Industry, New Jobs* was launched by the Department for Business Enterprise and Regulatory Reform (BERR – now part of Business, Innovation and Skills (BIS)) as the key driver for this new industrial policy. It also announced a further suite of policies in key areas including: low carbon industries, advanced manufacturing, engineering construction and...

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38 HM Treasury, (December 2006), *Prosperity for all in the global economy—world class skills*, Final Report, Leitch Review of skills.

39 HM Government, (July 2009), *Building Britain’s Future*.

industrial opportunities in an ageing society. New Industry, New Jobs highlights the need for investment and growth in jobs to speed economic recovery and build manufacturing and services needed for the future.

The strategy highlights a need to ensure British science and technology is at the heart of upcoming changes in industrial production. It also identifies two key elements in raising productivity and improving resource efficiency. The first is the need for high levels of skills, and the second is the need to embrace technological change in relation to the shift to digital communications and low carbon technologies. There is a clear emphasis on the need to invest in education and skills as a key pillar of the UK’s economic and industrial strategy.

Whilst the New Industry, New Jobs agenda has been driven by the changing economic climate, Leitch explored ‘the UK’s optimal skills mix in order to maximise economic growth, productivity and social justice’. The main recommendations were to increase ‘economically valuable skills’. Leitch focused on adult skills, in recognition that 70% of the 2020 workforce had already left school, and proposed a series of objectives for literacy and numeracy, Apprenticeships and higher level skills.

In their first annual assessment of progress towards becoming a world class leader in skills and employment, UKCES have reported that there has been progress against the Leitch targets, however, by international comparisons, we are still lagging behind41. This is due to the fact that other countries are progressing at the same or a faster rate than the UK. UKCES predict that we are unlikely to be in the top eight countries by 2020 at the current rate of progress.

The Children, Skills and Learning Act42 received Royal Assent in November 2009. This aims to make education and skills provision more accountable and responsive to local needs. It will also provide for the setting up of Ofqual to increase confidence in qualifications as well as legislating on the right to request time for training and Apprenticeships. The Act follows the Education and Skills Act, the flagship education policy of the Brown Government, which extends the school leaving age from 16 to 18 by 2015.

4.1.2 Employment

In relation to jobs and employment, Jobs of the Future43, was launched in September 2009, which outlines where, as a result of expected growth and emerging global trends, new jobs could be created in the UK economy of the future in relation to the sectors identified in New Industry, New Jobs. Building Britain’s Future also included a commitment to a guaranteed job or training place, from January 2010, for every person under 25 years-old with an obligation to accept that offer or witness a benefit cut.

Budget 2009, included a number of measures in relation to jobs and training. These included the announcement that £1.7 billion will be made available over two years to ensure Jobcentre Plus and Flexible New Deal capacity is in place to respond effectively and accordingly to rising unemployment. To supplement this, the Future Jobs Fund (£1.2 billion) was also announced which will provide support for the long-term unemployed, building on the extra support now available to those unemployed for over six months. For young people, the commitment to the September Guarantee of a place in education

41 UKCES. (May 2009), Ambition 2020: Worldclass Skills and Jobs for the UK.
42 The Children, Skills and Learning and Education and Skills Acts apply to England, Northern Ireland and Wales. Scottish Parliament has complete power over its education and skills policy producing its own legislation.
43 BIS DWP. (September 2009), Jobs of the Future.
or training for all 16 and 17 year olds is to be met through £655 million of additional funding.

From a legislative perspective, the Welfare Reform Act\textsuperscript{44} supported by the Cabinet Office White Paper, New Opportunities\textsuperscript{45}, sets out plans to enable everyone to succeed in the new economy, helping them to prepare for or get back to work.

### 4.2 Skills policy in England

BIS launched Skills for Growth, a new national skills strategy, in November 2009, alongside the higher education framework, Higher Ambitions\textsuperscript{46}. The skills strategy has the twin objectives of establishing wider and more flexible access to training together with a focus on the skills required for the modern world of work. It aims to target funding in the market areas and sectors that are crucial to future growth. The proposals include:

- Doubling adult Apprenticeships for young adults to 35,000 in the next two years;
- Stronger pathways into higher education for Apprentices;
- A 5\textsuperscript{th} round of National Skills Academies;
- Regional Development Agencies (RDAs) leading on the development of regional skills strategies;
- Joint investment scheme pilots from 2010 between sector skills organisations and government;
- A simplification of the skills landscape including reducing the number of SSCs.

A joint White Paper from the Department for Innovation, Universities and Skills (DIUS – now part of the BIS) and the Department for Children, Schools and Families (DCSF) in 2008\textsuperscript{47} announced structural changes that will result in responsibility for the funding of 16 – 19 learning being transferred to Local Authorities in 2010. This enables them to become the single point of accountability for all 0 – 19 children’s services. The Skills Funding Agency (SFA) will be responsible for all adult learning funding from April 2010, replacing the Learning and Skills Council (LSC).

The Children, Skills and Learning Bill will place Apprenticeships on a statutory footing and expand them so that one in five young people undertake one by 2020. It will also introduce an Apprenticeship entitlement so that by 2013 all 16-year-olds who want an Apprenticeship and who gain five or more GCSE passes will be entitled to a place.

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\textsuperscript{44} The Welfare Reform White Paper, Raising Expectations and Increasing Support - Reforming Welfare for the Future, was published on the 10\textsuperscript{th} December by DWP. The proposal forms the basis of the Welfare Reform Act which received Royal Assent in November 2009.

\textsuperscript{45} New Opportunities – fair chances for the future, was launched on the 13 January by the Cabinet Office.

\textsuperscript{46} BIS, (November 2009), Skills for Growth – the national skills strategy; BIS, (November 2009), Higher Ambitions.

\textsuperscript{47} DCSF and DIUS (March 2008), Raising Expectations – enabling the system to deliver.
4.3 Skills policy in Northern Ireland

In 2008, the Northern Ireland Executive’s Programme for Government\(^{48}\) put the economy at centre stage of policy in Northern Ireland with ‘growing a dynamic and innovative economy’ a main element of the programme. This, and several of the Public Sector Agreement (PSA) targets, has both direct and indirect implications for skills in Northern Ireland.

The Department for Employment and Learning (DELNI) published ‘Success through Skills’, the Skills Strategy for Northern Ireland, in 2006\(^{49}\). The strategy aims to enable people to progress up a skills ladder in order to raise the skills level of the whole workforce and to help deliver high productivity and increased competitiveness in order to secure Northern Ireland's future in a global marketplace.

To realise this vision, an implementation plan was designed, which consists of four principal themes: understanding the demand for skills; improving skills levels of the workforce; improving quality and relevance of education and training; and tackling skills barriers to employment. DELNI has reported good progress on the implementation of the Skills Strategy of which SSCs have a central role in, particularly through the delivery of each Sector Skills Agreement.

DELNI published a formal Statement of Skills in response to the Leitch review\(^{50}\) and accepted the recommendations in principle, highlighting the new remit of SSCs. DELNI is currently working on a Review of the Northern Ireland Skills Strategy in the context of the Programme for Government and the Statement of Skills.

The revised Training for Success provision,\(^{51}\) branded and marketed as Apprenticeships Northern Ireland, has increased flexibilities so that there is no maximum age limit and the requirement for the number of hours worked has been reduced to 21 per week. DELNI has also requested that SSCs specify a future delivery programme for the pre-Apprenticeship component of Training for Success. A recent inquiry by the Committee for Employment and Learning\(^{52}\) showed that generally there was support for Apprenticeships and an acknowledgment of their role in providing the technical, professional and employability skills that employers need. However, some issues were identified that restrict the uptake of Apprenticeships by both employers and individuals.

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\(^{49}\) DEL (published 2006), Success Through Skills, following the consultation launched in 2004.

\(^{50}\) DEL (March 2008), A Statement of Skills in Northern Ireland.

\(^{51}\) Training for Success is designed for young people aged 16 - 18 (up to 24 years for those requiring additional support) and provides training to give them the tools and skills they need to get a job. This training provides young people with relevant qualifications as well as the required personal and behavioural skills to progress into work.

\(^{52}\) Northern Ireland Assembly Committee for Employment and Learning, (June 2009), Inquiry into the Way Forward for Apprenticeships Report.
4.4 Skills policy in Scotland

In September 2007, the Scottish Government published their Skills Strategy\(^53\) as a response to the Leitch Review. The strategy sets out the Government’s priorities for enhancing skills and qualifications within the existing and future Scottish workforce. It sets out a plan for developing a cohesive lifelong learning system encouraging individuals to develop skills to fulfil personal aspirations as well as to address employer requirements. The strategy also proposes improved structures for funding and information provision. In May 2009, Scottish Government published a progress on delivering the strategy on their website.

The strategy specifies the Government's expectations of SSCs\(^54\) indicating the profile of SSCs is too low within Scotland. Some structural change has arisen as a result of the strategy with the main development being the establishment of Skills Development Scotland (SDS)\(^55\). Scottish Government is currently focusing on a skills utilisation agenda with recommendations being considered to increase the number of Scottish employers that engage in activities to improve the effective use of skills in the workplace. The work so far suggests that a major change in the attitudes and workplace practices of many employers is required urgently.

Although the Apprenticeship (Scotland) Bill, which aimed to ensure there is an Apprentice place for every individual aged 16 to 18 that meets the entry requirements, has yet to be accepted, there is a guarantee from SDS that every 16–18 year old will receive support towards an Apprenticeship. To support this expansion, Scottish Government has increased the promotion of Apprenticeships in schools through advice and guidance to pupils, provide additional support for employers that train Apprentices and ensure the public sector match its Apprentice training levels with its overall employment levels.

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\(^{53}\) Scottish Government, (September 2007), Skills for Scotland: A Lifelong Skills Strategy.

\(^{54}\) To develop proper engagement with the broad spectrum of employers in their sector; to deliver sectoral labour market information that is trusted, well used and fits with the robust national information supplied by Futureskills Scotland; to ensure that employers have a say in the design and development of learning at all levels; and, to maintain strong partnerships with other key players in their sector as well as with Government, providers and intermediary bodies.

\(^{55}\) SDF takes on the responsibilities of Scottish Enterprise and Highlands and Islands Enterprise’s training intervention function, as well as merging the functions of Careers Scotland and leamdirect Scotland.
4.5 Skills policy in Wales

The driver for policy of skills in Wales, ‘Skills that Work for Wales’, was published in July 2008\textsuperscript{56} by the Welsh Assembly Government (WAG). It builds on policies set out in Skills and Employment Action Plans (1 and 2), and the One Wales policy document\textsuperscript{57}. Skills that Work for Wales is also the Welsh Assembly Government’s response to the Leitch Review and the review of the mission and purpose of Further Education (FE) in Wales.\textsuperscript{58}

The ambition of the WAG is for a highly-educated, highly-skilled, and high employment Wales. The WAG envisages a key role for SSCs within the strategy, stating that it wants to achieve a close working relationship with all SSCs. A number of objectives have been set for SSCs in relation to employer engagement, sectoral labour market information and informing the development of new qualifications.

The strategy sets out a number of specific policy areas for SSCs, which include:

- New pathways and vocational qualifications designed in conjunction with SSCs linked directly to the Welsh Baccalaureate;
- Clear definition of Apprenticeship entry requirements in conjunction with WAG’s review of the Apprenticeships blueprint;
- Sector needs identified through Sector Skills Agreements and Sector Qualifications Strategies (SQS) and action plans receiving investment through a Sector Priorities Fund available until 2011;
- Advice on the high-level skills needs in sectors, based on Sector Skills Agreements.

The Wales Employment and Skills Board (WESB) that was established by Skills that Work for Wales has played a key role in advising the UKCES on the role and performance of SSCs in Wales through its Chair, Sir Adrian Webb who is the Wales Commissioner for the UKCES.

Also as following the Webb Review, the WAG launched, Transforming Education and Training Provision in Wales\textsuperscript{59}. In response, post-16 providers across Wales have brought forward proposals on improving FE. The Quality and Effectiveness Framework\textsuperscript{60} aims to modernise post-16 education, achieve greater efficiency, offer more choice and better access for students and provide higher quality education and training.

The WAG has also published its Green Jobs Strategy. Capturing the Potential\textsuperscript{61} provides a delivery mechanism for the Sustainable Development Scheme, One Wales: One Planet\textsuperscript{62} and describes how the WAG plans to develop an environmentally sustainable, low carbon, low waste economy.

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\textsuperscript{56} WAG, (July 2008), Skills that Work for Wales.
\textsuperscript{58} DCELLS, (December 2007), the Webb Review - Promise and Performance.
\textsuperscript{59} WAG (September 2008), Transforming Education and Training Provision in Wales – Delivering Skills that Work for Wales. DCELLS
\textsuperscript{60} WAG (February 2009), The Quality and Effectiveness Framework for Post-16 Learning in Wales, DCELLS.
\textsuperscript{61} WAG, (July 2009), Capturing the Potential, A Green Jobs Strategy for Wales.
\textsuperscript{62} WAG, (November 2008), One Wales: One Planet.
“The changing economic climate has provided a focal point for recent skills and employment policy. The importance of skills to the economy was recognised when Gordon Brown, as Chancellor of the Exchequer, and the then Secretary of State for Education and Skills, commissioned the Leitch review in 2004”

HM Treasury, (December 2006), Prosperity for all in the global economy—world class skills, Final Report, Leitch Review of skills
5 What drives demand?

The sector is experiencing an ageing workforce which is forecast to worsen over the next 15 years. Significant extra investment in attracting and retaining skills, therefore, is required to refresh the workforce.

Replacement of ageing infrastructure and the introduction of new technologies is driving the need for significant investment and engineering and higher-level skills across the sector.

Security of supply is essential. As the UK is now a net importer of gas, and 16 power stations are due to close by 2018, there are major challenges for investment in infrastructure and also skills.

The five-year regulatory cycle for the gas (transmission & distribution), power and water industries impacts on recruitment and skills development, with employers having to consider headcount targets over and above retention of key skills and expertise.

This section of the SSA outlines the drivers for skills and employment within each of the four industries in our sector. The key drivers include recruitment and retention, economic conditions, market and regulatory pressures and consumer demand.

5.1 Gas (Transmission & Distribution)

5.1.1 Recruitment and retention

Recruitment of craft level people to undertake a range of roles in the gas distribution networks has always been relatively straightforward and this continues to be the case. Entry level is a Level 1 qualification that enables an individual to operate as a second, support person in a small team, usually made up of two or three people. Training, experience and competence assessment for this role may be achieved within three months, whereupon the individual is qualified to operate. Employers are able to recruit easily and continue to do so across all regions, mainly to replace natural wastage and retirees.

Recruitment at entry level provides the base resource pool for progression through to the next level, which is team leader; either for gas mains laying, gas service laying or a combination of both. There is also an emergency response role that involves the location and repair of public reported gas escapes.
Overall, it is not difficult for employers to retain resources at these levels. While there has always been, and still is, some movement of people between employers involved in utilities work, retention in the sector is pretty stable. Large-scale movement tends to be at the supply side contractor level, where major infrastructure projects in water, gas and sometimes power will create a specific demand for skilled workers. Examples of this would be the 30 year programme of gas mains replacement of metallic mains, the water industry need to replace a large number of lead service pipes and the drive by Ofwat to reduce water leakage. All these projects will tend to be undertaken by the same group of network construction contractors. As these projects take many years to complete, people working in the industry on these tasks have a relatively secure workload horizon and tend to remain in the industry for many years.

At the higher levels of skills and competence however, the position is more critical. The age profile within the industry remains high and recruitment of competent engineering managers is difficult. Upskilling from the workforce at the craftsperson/technician level is an option but this typically takes several years to complete, due to the need for extensive field experience before someone gains the capability to exercise engineering judgement in matters that have a major safety element. In 2009, Ofgem recognised the need for investment in skills for the long-term and allowed additional retention of funds in the PCR by the networks operators to enable this to occur. Each network operator is now engaged in the resource planning needed to achieve their objectives and to meet their safety case, which must be agreed with the HSE.

5.1.2 Market and regulatory drivers

In the days before privatisation and the break-up of the British Gas monopoly in the mid-1980s, the economic model was one based on the sale of gas. This generated significant income that fuelled and funded much of the rest of the industry, including infrastructure extensions, new housing development connections, appliance retail and service support. It also funded, on an annual basis, major recruitment and investment in new entrant Apprenticeships and graduates. It was typical for British Gas to recruit in excess of 700 new Apprentices each year.

Since the break-up of the industry, tens of thousands of jobs have been lost as employers sought to reduce costs through increased productivity, new technology and restructuring. Given that the infrastructure asset owners remain in a monopoly position, albeit now being subject to cost comparisons, the economic regulator Ofgem determines how much the employers may charge their customers for the transportation of gas. This economic model does have the negative consequence of reducing investment in skills, as asset owners seek to drive down the costs of operating the network. Set against this is a need to ensure that only competent people operate on the networks, underpinned by the HSE agreed safety case that each asset owner must have.
5.1.3 Other external factors

The safe transportation and distribution of gas across the UK is an essential industry, one that is critical in both economic and societal terms. Much of the current power generation is delivered by gas-fired stations and over 20 million homes depend on a secure gas supply for their cooking and heating. The skills issues facing the industry are similar across the whole of the UK, although as Northern Ireland is a relatively new network, these issues are not so acute there. For example, there are no old metallic mains in Northern Ireland so replacement of these is not an issue.

Safety is the priority issue and the capability and skills of the workforce is paramount in ensuring that the excellent safety record gained over many years is sustained. This may only be achieved through good quality training, coaching and assessment of the workforce and the industry has a good track record in this regard.

In the short-term, new technology and methods for mains and service laying including new pipeline materials are changing the way work is undertaken. There is an increased need for specialisation whereby teams will concentrate on particular techniques or activities and not attempt to carry out every type of activity, as was once the case. One example of this is the introduction of suction excavators that are able to extract spoil using a powerful air lance, then collecting it in a large vehicle tank. This type of equipment is very specialist and operated only by a dedicated team, trained specifically for this role. There are many other examples where this is the case.

5.1.4 Consumer demand

UK consumers have learned to rely on natural gas as a clean, reliable fuel. Over 20 million customers depend on it for heating and cooking. Providing this secure supply is essential, as is the need to maintain the integrity of the networks to reduce 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. As consumers are encouraged to lower their own carbon emissions and increase energy efficiency there could be a shift towards new technology such as heat pumps, solar panels etc., all of which would impact on the volumes of gas for transportation and distribution.

5.1.5 Policy drivers

In the longer-term, the need for a UK-wide reduction in carbon emissions to meet climate change commitments is likely to lead to a shift from burning gas to generate power, towards the use of renewable technologies and nuclear. Such a reduction would have a significant impact on the volumes of gas transported, leading inevitably to a reduction in income and resources required and recruited. Ultimately, the supply of gas is limited by its availability and as the UK is now a net importer of gas, there may be future issues around the security of supply that could impact significantly on the industry. To mitigate against this in the medium-term, the UK has invested significantly in infrastructure to facilitate the use of LNG; imported via tankers to new onshore terminals such as the Isle of Grain.
5.2 Gas (Utilisation)

5.2.1 Recruitment and retention

The gas utilisation industry involves a large number of employers and sole traders, with many of them undertaking work across more than one ‘trade’ or skillset. Obvious examples are plumbing businesses that install and maintain gas central heating systems alongside oil fired boilers, and kitchen fitters who will routinely install gas hobs and ovens; as part of a larger refurbishment or new build.

Recruitment is driven primarily by consumer demand. When new build housing construction and home improvements activities are growing, demand for new heating systems and appliances is generally strong. The opposite is equally true and is occurring at the moment, with demand for new systems, appliances and equipment being relatively weak.

This industry contains relatively few large businesses. The exception being organisations such as British Gas and National Grid, who provide engineers to respond to public-reported gas escapes both inside and outside properties. These organisations are currently able to recruit new entrants without any significant difficulty. This is likely to be due to a number of factors including brand recognition, reputations for good quality training, job and career prospects and above average earnings potential. These large organisations operate annual recruitment campaigns and maintain a continuous and sustainable resource pool that can replace their natural wastage and churn (which is traditionally relatively low).

The industry in general, however, is dependent upon a large number of SME businesses and sole traders. Recruitment of new entrants into these businesses tends to be more problematic, with some medium-sized businesses operating like the larger ones and maintaining their own directly-employed workforce and others being more reliant on sub-contracting and/or partnering to handle short-term increases in workload. Investment in new entrant resources into the industry is an expensive commitment and workload projections for SME businesses often do not go beyond a few months at best. SME businesses tend to operate within a fairly small geographic area and sometimes are wary of recruiting and training new people as they may, once competent, leave to establish a business of their own in direct competition.

5.2.2 Economic conditions

Since the break-up of the industry, competition across the gas utilisation industry has increased significantly. Whereas the large-scale recruitment, training and development of new engineers by British Gas previously supplied a large proportion of skilled labour to the whole industry, this is no longer the case. Certainly there are more businesses now operating in the industry and competition has had its usual impact on choice and price for consumers. At the same time however, the consistency of training quality and competence standards that the monopoly provided has undoubtedly been affected.
Entry to the industry remains relatively difficult without an employer to provide the essential work experience. This is a critical aspect of working safely on gas-burning equipment, and registration with the statutory body (Gas Safe Register) requires that everyone working within scope is competent. In order to achieve this competence, real work experience is essential. For this reason, potential unemployed new entrants often start their career in training as a plumber, which does not require gas safe registration, before adding gas work later when they have gained some experience in the related trade.

The entry level qualification is QCF/ SCQF Level 2 and, once qualified; many people remain at this level throughout their career. The qualification has a number of specialist options and routes within it and this enables people to move into specific areas such as: commercial and catering installation and maintenance, industrial applications, emergency first call response etc. There has always been a technician Level 3 qualification available and this facilitates a move into the design of systems, installation of more complex equipment or first line management.

5.2.3 Market and regulatory drivers

The gas (utilisation) industry is not economically regulated, and is very competitive. A key driver is the statutory, safety driven, requirement for all businesses operating in the industry to be registered with Gas Safe Register.

Market pressures for efficient operation and reduced consumer prices can create difficulties in terms of training, development and quality. The HSE, Gas Safe Register and EU Skills are committed to facilitating the demonstration of competence by all businesses and workers, to ensure the consumer is safeguarded.

5.2.4 Other external factors

The use of gas by consumers, for cooking and heating has grown since the early seventies, when coal gas was replaced by natural gas in a massive UK-wide conversion programme. The new fuel was cleaner, hotter and more reliable. Security of supply remains an absolute imperative as, in addition to any probable consumer negative reaction should the gas not be available when called for, there are major technical difficulties whenever supplies are disrupted. For example, when a gas main is subject to third party damage and a small village cut off, it may take several days of intense activity to restore supplies. This is because every property must be visited, tested, the supply purged of any air and appliances restored to a safe condition. Any large scale occurrence of this type of incident could potentially drive consumers away from gas as their preferred fuel.

When the North Sea gas fields were available to the UK with many years of supply lying ahead, international political considerations were not of significant concern. Now that the UK is a net importer of gas, however, there is more reliance on gas from other countries in areas of the world not renowned for their political stability. As gas and oil are finite resources, eventually world supplies will be depleted and so many new technologies are beginning to emerge. This means new requirements will be placed on gas utilisation engineers to manufacture, install and maintain some of the new appliances and equipment.
As policymakers strive to reduce UK carbon emissions, the use of fossil fuels may decline in favour of electrical powered appliances. Clearly, if this was to happen, the electrical power would need to be generated by some means and, ironically, this might involve more gas fired power stations in the medium-term. The effect on the utilisation industry however would be significant and reduce demand across the whole supply chain (i.e., the manufacture, installation and maintenance of gas burning appliances and related equipment).

5.2.5 Policy drivers

Government policies on the following areas are likely to be the most significant drivers:

- Climate change and any initiatives to reduce carbon emissions through use of high efficient equipment and the reduction in old, wasteful boilers etc.;
- Building Regulations and consequent housing and/or system improvements;
- Energy supply; what gas should be used for and at what price;
- Safety and Registration requirements.
5.3 Power

5.3.1 Infrastructure development, recruitment and retention

As the UK moves towards a more 'distributed' system of power generation, the 'energy mix' will change. Figure 19 shows the proportion of electricity generated by each of the various fuel sources in 2009 and what is envisaged in 2020.

Currently, gas, coal and nuclear power stations produce around 90% of UK's electricity. By 2020, it is forecast that this will fall to around 60%, with the various aspects of renewable energy increasing to 31% of all electricity generated across the UK, while in Scotland this could rise to 50%. Although the proportion of electricity generated by conventional/nuclear power is forecast to decline, the total output will increase in order to meet future demand.

Figure 19: The energy mix – today and 2020

[Diagram showing energy mix]

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HM Government. (July 2009), The UK Low Carbon Transition Plan: National strategy for climate and energy, DECC.
Around 16 power stations, representing approximately 25% (18GW) of our electricity generating capacity, are scheduled to close by 2018. Significant new investment is needed to replace them and to ensure a healthy margin of spare electricity generation capacity, and latest figures show the market is responding to this need with over 20GW of investment under construction or with planning consent. These investments comprise:

- The construction of 2GW of generating capacity that has recently been completed and will be commissioned this year;
- 8GW of new generating capacity that is currently under construction;
- An additional 10.5GW that has both planning consent and agreement to connect to the grid;
- A further 7.5 GW that has applied for planning consent in England and Wales.

The Energy Networks Strategy Group has estimated that the reinforcements necessary to strengthen the current transmission system so that it can accommodate a further 45GW of generation (34GW of which could be a combination of on and off-shore wind) by 2020 will cost in the region of £4.7 billion\(^4\). A further £15 billion is estimated to be required to build offshore connections. The practicalities of implementing these improvements will lead to significant demand for network and substation planning and design and construction. These reinforcements will be essential if government is to meet its 2020 renewable energy targets.

The Group found that much of the existing infrastructure is already operating near maximum capacity and that any increase in generation (which will occur in any scenario) would result in the need for network expansion/ reinforcement.

The Group also identifies the availability of suitably skilled people as a major risk, as many of those with the necessary skills are approaching retirement.

Other limiting factors on skills supply in the short-term include:

- Lead-time to full competency being around five years;
- Limited capacity to train to sufficient numbers (including physical constraints, limited availability of trainers and assessors, etc.).

DNOs are planning to increase their expenditure on their main activities by around £1 billion during Distribution Price Control Review 5 (DPCR5) (from £7.5 billion in DPCR4 to £8.5 billion in DPCR5). As with transmission, the practicalities of implementing the required improvements will lead to significant demand for skilled workers in a number of key craft, technical and engineering roles.

This increase in activity is a key driver of the increased labour demand by DNOs over the next five years and has resulted in the DNOs forecasting an additional £174 million of workforce renewal costs (from £87 million in DPCR4 to £261 million in DPCR5). Workforce renewal includes the costs of replacing staff that leave and increasing the workforce to manage the additional workload forecast for DPCR5.

**Figure 21: Workforce renewal costs (£m) by region, DPCR4 and 5**

![Graph showing workforce renewal costs by region for DPCR4 and 5](image)

Note: SSE have now provided Ofgem with their DPCR4 costs: SSE Hydro = £6m; SSE Southern = £11m.

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65 Ofgem, (May 2009), Electricity Distribution Price Control Review Methodology and Initial Results Paper, Ref: 47/09.
As can be seen in the chart above, all DNOs are forecasting significant additional investment in their workforce\(^6\). The additional £174 million forecast to be spent on workforce renewal in DPCR5 is split evenly between operational costs (i.e. maintaining the current network) and network investment (e.g. network expansion activities).

In total, £139 million is forecast to be spent on operational workforce costs, while £122 million is expected to be spent on network investment workforce costs.

EU Skills recently submitted evidence of skills shortages to the Migration Advisory Committee (MAC) in order that they might consider recommending to government that the affected occupations be placed on the UK’s Shortage Occupation List. The MAC subsequently accepted our submission and, from 14 December 2009, employers in the power generation and transmission and distribution industry will be able to recruit skilled workers from outside of the European Economic Area without the need to satisfy the requirements of the *resident labour market test*. The list of power industry occupations that are included are listed in table 11 below.

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\(^6\) Note: Scottish & Southern Energy’s costs for DPCR4 are not shown on the chart.
With the exception of the new connections business, employers are recruiting across all areas of the generation, transmission, distribution and metering business. The level of recruitment will increase dramatically over the next five years to meet the demands caused by:

- Infrastructure replacement programmes;
- Peak retirement of existing staff;
- Growth of new technologies, such as smart metering and renewable power generation.

Also, the sector faces a significant and worsening image problem that adversely affects its ability to recruit new talent from the marketplace. Retention of workers once they are trained in the sector has not previously been a problem. However, it is anticipated that going forward retention will become more of a challenge with young people wanting to be much more flexible and mobile in their careers, cessation of the final salary pension schemes and competition from other sectors for a limited engineering/technical talent base.

5.3.2 Economic conditions

The impact that the current recession is having on the electricity generation industry is minimal. Demand for electricity is relatively unaffected by such fluctuations in the economic cycle.

In terms of benefitting from the current increase in unemployment, the types of skills that are generally becoming available are not the skills that the electricity generation industry is in need of. All things being equal, if an individual has electricity generation skills and they are looking for a job in the industry they will achieve this without any problems.

Much of the industry has undertaken recruitment activities that have resulted in very low, if any, applications from appropriately skilled and experienced workers even though the total number of applicants might be substantial.

Some aspects of transmission and distribution are suffering from the stall in house building (i.e. new connections). Additionally, with unemployment increasing and the strength of Sterling increasing (particularly against the Euro-zone), coupled with improving economies across eastern Europe, the UK is not as much as an attractive option as it used to be. Indeed, one power industry employer has lost five highly skilled workers in 2009 alone due to them returning to their native country (three in Europe and two worldwide), while another has reported losing six skilled UK nationals (one to the USA and five to Australia).

Finally, government investment levels in capital programmes have remained buoyant during the current economic downturn. This, coupled with Ofgem’s recent relaxation of the rules governing new grid connections for renewable energy sites, means that there is an urgent need to attract the skilled workforce necessary to get many of these projects underway in time to meet the EU’s renewable energy targets in 2020.

5.3.3 Market and regulatory drivers

Privatisation of the former nationalised monopolies was intended, primarily, to create competition and increase choice for consumers. Thus electricity, for example, is generated by a diverse range of companies, while customers can choose to buy their electricity from several retail suppliers. But, within this system, there remain natural monopolies within the transmission and distribution systems that connect supplier to customer.
Ofgem sets the funding formula for the DNOs in five-year periods; the current period (DPCR4) runs from April 2005 to March 2010. The next period, DPCR5, runs from April 2010 to March 2015. The electricity transmission industry operates on an almost identical basis, with the current TPCR period running from April 2007 to March 2012.

Other regulatory aspects include those relating to health and safety, EU directives, planning acts, renewable and low carbon targets and the British Electricity Trading and Transmission Arrangement. The impact of these on the training and development investments made by employers can be substantial in terms of both maintaining a comprehensive knowledge of each framework/directive and its potential impact upon the operations and workforce, and subsequently ensuring that the workforce, as appropriate, have the skills and competencies to comply with them.

5.3.4 Other external factors

Within power generation, there is substantial UK and global demand for engineers. The closure of coal and nuclear generating plant means that the UK must construct new power stations and other energy infrastructure at a time when there will be very high demand for engineering construction resources from other sectors. In the sector skills response to the Energy White Paper it was reported that some 14GW of new power plant was in the Section 36 approval process, or had recently been approved by government. Much of this is combined cycle gas turbine (CCGT) stations, which are needed to bridge the supply gap as old stations close in the 2010s. The industry will also seek to build new, super-critical, coal-fired capacity, both to hedge against over-dependence on gas and to provide a flexible output to meet rapid changes in load. Set against this, new nuclear capacity has a longer lead time, with construction of the first station unlikely to start before 2012 and first power in 2017 at the earliest.

Industry projects face competition for construction-related skills from the continuing investment in the LNG terminals and gas storage, the off-shore wind programme, a potential up-turn in chemicals and hydrocarbon processing, the aircraft carriers and other Ministry of Defence (MoD) programmes, rail projects, Thames Gateway and, possibly, the Severn tidal power scheme. In addition, of course, there is the continuing maintenance activity in existing power stations. There is also likely to be some fabrication work for the North Sea, to support marine renewables and off-shore carbon storage.

The ageing workforce is a phenomenon seen across the world; reports of age-related skills shortages from Europe, North America and Australasia are common. Even in China, the modal age of the working population is rising. The oil and gas industry worldwide has faced the greatest challenge to date, having started this decade with a badly skewed age profile. Shortage of skilled people has slowed the pace of investment, making it harder for the industry to meet increasing demands for energy. We have already seen in the oil and gas industry that worldwide skills shortages lead to globalisation of the workforce. In turn this creates the opportunity for UK skills to be deployed on overseas projects and many UK jobs exist to service this international business. On the other hand, it creates a challenge for the UK in having to compete for resources against demand from overseas.

Over thirty countries are currently considering new nuclear power programmes. Against this global background, it is useful to put the UK’s investment needs in context. Worldwide, over the next 25
years-or-so, around 1000GW of old thermal generating plant will need to be replaced and, in the main, de-carbonised. In addition to this, most projections show that rising demand for electricity will require 1000GW of new capacity. For comparison, the UK’s generating capacity is around 80GW and total global capacity is around 4000GW. The UK’s investment of circa 45GW by 2020, although large by domestic standards, represents only circa 1% of the worldwide total. Despite the excellent prospects for the UK electricity industry, the challenge of sustaining the skills base is as significant as the challenge of maintaining power supplies. Furthermore, as demand on the manufacturers increases, they will start recruiting from essentially the same pool of talent. Moreover, the new plant will be more sophisticated with greater efficiency, flue gas treatment (FGD) and Carbon Capture and Storage (CCS). These additional activities and new technologies will be over-and-above the normal operation and maintenance of existing power stations and will exacerbate the skills shortage situation for qualified and experienced engineering staff. In addition to this investment in existing and new gas/coal-fired power stations, the increasing role of renewable energy in the UK’s energy mix will be an additional draw on an already stretched engineering labour market.

5.3.5 Policy drivers

In July 2009, the government released three key papers impacting on the UK’s energy industries. The Low Carbon Industrial Strategy, Low Carbon Transition Plan and the Renewable Energy Strategy set out the government’s intentions and plans for a low carbon economy and a more secure energy supply for the future.

The impending threat of dangerous climate change means emissions of carbon dioxide and other greenhouse gases must be reduced. A new focus on renewable energy will play a key role in this, together with nuclear power, carbon capture and storage.

For these reasons, and as part of EU-wide action to increase the use of renewable energy, the UK has committed to sourcing 15% of its energy from renewable sources by 2020 (20% in Scotland) – an increase in the share of renewables by almost a factor of seven from about 2.25% in 2008, in scarcely more than a decade.

Three quarters of electricity in the UK’s current energy generation mix is produced from coal and gas. By 2050, the UK will need to produce very few greenhouse gas emissions over all, and it is likely that emissions from the power sector will need to be reduced to almost zero. To do this we will need to produce our electricity from low carbon technologies such as renewables, nuclear and fossil fuel fired generation fitted with carbon capture and storage technology. Plans also acknowledge that we will need a bigger, smarter electricity grid that is able to manage a more complex system of energy supply and demand.

The government is going further to support renewable technology by increasing financial incentives for renewables developers through the Renewables Obligations and the forthcoming clean energy cashback initiative. It is also streamlining the planning process, supporting innovation, speeding up grid connection and developing UK supply chains. There are also promises of substantial investment in key areas of renewables, including wind and marine energy generation.

The Government’s Office for Nuclear Development has made strong progress in facilitating the building of new nuclear power
stations by energy companies, by taking action to streamline the planning and regulatory approvals processes for new nuclear power stations. The government is currently assessing sites nominated by potential developers, to establish which are potentially suitable for the deployment of new nuclear power stations by the end of 2025. This assessment will be included in a draft National Policy Statement for nuclear power, which the government will publish for consultation later in 2009.

In April 2009, the government announced that new fossil fuel power stations would have to be designed and built so that they could fit CCS in the future. In a consultation launched in June 2009, the government proposed a new financial and regulatory framework to drive the development of CCS. These proposals included plans to fund up to four CCS demonstrations in the UK and a requirement for any new coal power station to demonstrate CCS. DECC will also establish an Office of CCS to support the delivery of this work.

With the development of ‘cleaner coal’ technologies – increased efficiency of coal-fired power stations, co-firing with biomass and carbon capture and storage – there are likely to be recruitment and skills needs that will require the adequate supply of Higher Education (HE) graduates.
5.4 Waste management

5.4.1 Infrastructure, recruitment and retention

The waste management industry comprises of a relatively small number of large private employers, local authorities, a plethora of SMEs and a very active third sector. Local authorities drive the demand as clients, with private companies acting as contractors on behalf of the authorities, especially with regards to municipal and commercial waste. The large companies have efficiencies of scale in operation, whereas SMEs can offer specialised services in local markets. Third sector organisations have expertise in encouraging waste prevention and re-use and also in the area of kerbside collection of specialist items, e.g., bulky waste.

The waste industry operates within a competitive landscape. Demand depends on the volumes of waste generated which, in turn, depend on economic conditions and consumer spending. There has also been significant consolidation in the industry with a number of mergers and acquisitions, creating more competition amongst larger operators.

For recycling, the role of the refuse/ recycling operative is important to the performance of the industry. The value obtained for recyclates depends on quality of the material collected. Communication skills are important for operatives to inform householders (for domestic collection) on the types of materials that can be recycled, the importance of recycling and what happens to the recyclables collected. For processors there is the requirement to be able to grade certain types of recyclable, i.e., plastics to be able to segregate prior to reprocessing.

Mixed or contaminated recycling decreases its value and means that sometimes landfill is the only option. It is estimated that contaminated recycling costs Council Tax payers £12 million per year69.

Anecdotally, it is reported that there is difficulty in attracting skilled workers to the industry as it has a poor image and is not considered an attractive career choice. Once in the industry, however, retention is particularly good at higher levels.

5.4.2 Economic conditions

In 2008, the prices of recyclable waste plummeted before rebounding in 200970. The downturn has also affected processors and brokers, which rely on high commodity and recyclate prices. The impact of lower demand from overseas (most notably China) and diminishing construction, demolition and industrial waste levels in the UK have had an effect on businesses.

Other implications of the downturn have been the impact on local authority budgets and financing constraints for businesses in the development of new infrastructure.

Currently, therefore, very few employers are recruiting. In fact, a number have undergone reviews of their workforces and have been through redundancy exercises. However, insolvencies of waste companies are lower than almost all other sectors with less than 1% of businesses put into administration this year being from the waste industry.

The largest waste management firms have, however, all shown growth, despite difficult trading conditions over the previous year. Biffa posted 5% revenue growth, while Sita and Viridor posted

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70 Cardboard averaged about £53/tonne from 2004-2008, dropped to £19/tonne, and then went up to £59/tonne in May 2009. PET plastic averaged about £156/tonne, dropped to £75/tonne and then moved up to £195/tonne in May 2009. Aluminium dropped from £550/tonne to £400/tonne and steel from a peak of £235/tonne in May 2008 to £0/tonne in October 2008.
14% and 15% respectively. Veolia now accounts for 25% of the total UK revenue of the top 20 UK waste management companies. Waste’s contribution to the economy has been estimated at 0.5% GDP but the social implications for a world without waste collection are massive. In 2007, Naples suffered chaos with the closure of the only remaining working landfill in the area. The southern Italian city was turned into a dump as rubbish collectors went on strike, as they had nowhere to dispose of waste collected. A similar situation is currently happening in the UK, with refuse collectors taking industrial action in Leeds.

Profitability comes from efficiencies and techniques in treatment and processing of waste, i.e., sorting and segregating recyclables from residual waste enables income to be generated from the value in recyclables and also reduces costs in terms of land filling. However, other methods of treating waste can produce valuable by-products such as high technology incineration with energy recovery and CHP.

Historically, the industry was one of lift, shift and dump; with the majority of all waste streams going into landfill as this was the easiest and most economic option. However, the UK Landfill Tax was introduced in 1996 by the then Secretary of State for the Environment, John Gummer, and was the UK’s first environmental tax. Landfill tax is seen as a key mechanism in enabling the UK to meet its targets set out in the Landfill Directive for the land filling of biodegradable waste. By increasing the cost of landfill, other advanced waste treatment technologies, anaerobic digestion, gasification, pyrolysis are now becoming more financially attractive.

There are fiscal benefits in recycling; economic analysis of recycling also demonstrates costs and benefits that are outside of the financial transactions. Examples include: decreased air pollution and greenhouse gases from incineration, reduced hazardous waste leaching from landfills and decrease in methane production.

These new technologies require different skill sets with less reliance on manual operative roles as automation increases. This is particularly evident in areas that include the design, development, installation, operation and maintenance of process plant. Engineering roles along with methods to introduce practices in multi-skilling, upskilling and cross-sector skilling will all be relevant.

New technologies are also driving the capability profile of the workforce into one that will consist of more technically qualified staff working on a wider variety of technologies and on a variety of different processes. Skills that hardly existed before are already coming to the fore, including secondary manufacturing and marketing.

5.4.3 Market and regulatory pressures

A significant driver for the industry is regulation and legislation. To help drive the move to a low-carbon and resource-efficient economy, Budget 2009 announced a continued increase in the standard rate of landfill tax. The Scottish Government has announced that the Landfill Allowance Scheme remains suspended for the remainder of the current parliament. Scotland’s local authorities, therefore, do not need to engage in the trading of landfill allowances and would not be liable for exceeding landfill allowances. Other European Union waste directives and national regulations that are particularly relevant include (but are not limited to):

General and treatment:

- Waste Framework Directive
- Hazardous Waste Directive
- Integrated Pollution Prevention and Control Directive
- Waste Incineration Directive
- Packaging and Packaging Waste Directive

Specific waste streams:

- Waste oils
- Animal by-products regulations
- Agricultural waste regulations
- Batteries

Producer responsibility/ specific waste streams:

- Waste Electrical and Electronic Equipment (WEEE) Directive
- Restriction of Hazardous Substances Directive
- End-of-Life Vehicle Directive

In addition, the Renewables Obligations (England and Wales, Scotland, Northern Ireland) dictate how certain types of waste should be processed and imposes constraints on the amount that can be sent to landfill and sets targets for recycling, regionally and nationally.

There is some evidence that the WEEE and End of Life Vehicle directives are having an impact on the labour market, with new businesses being established both in the private and the not-for-profit sectors. In the short and medium-term, these directives will have a significant impact on the industry supply chain by creating opportunities for new SMEs to be established and for existing waste management companies to enter into new markets.

The Environmental Permitting Regulations which came into force in April 2008\(^{74}\) (England and Wales only) have changed the way in which the requirement for technical competence is dealt with. The Competence Management System (CMS) has been approved as a scheme to demonstrate technical competence. It has been developed through collaboration between operators, EU Skills and the industry’s trade association, the Environmental Services Association (ESA).

The CMS scheme provides operators with a means of demonstrating technically competent management of permitted activities on the basis of both corporate competence and employees’ individual competence. Operators will define their competence requirements based on site operations and business requirements and can embed them in established management systems or as a stand-alone scheme.

The Environmental Permitting Regulations introduced in England and Wales do not apply in Scotland. Instead, Scottish Environment Protection Agency (SEPA) is of the opinion that a range of technical improvements to the Scottish licensing regime can be made without radical change to the entire system, and, therefore, propose improvements through the Better Waste Regulation initiative.\(^{75}\) Northern Ireland may be consulting soon.

The Private Finance Initiative (PFI) is one of the main mechanisms through which local authorities can procure assets in a value for money way in partnership with the private sector. Long-term fixed price contracts are entered into with private sector contractors to deliver services to specified performance standards.

\(^{74}\) The Environmental Permitting (England and Wales) Regulations, (2007).

\(^{75}\) SEPA, (March 2007), Better Waste Regulation.
Significant funding was given to Defra (£2 billion of funding through PFI credits in the 2007 Comprehensive Spending Review) to help local authorities in England and Wales invest in sustainable waste management options. The PFI credits were forecast to rise each year to £700 million in 2010/11. The Scottish Futures Trust has been established in Scotland.

Waste PFI schemes, in theory, should help with meeting targets for European Union Landfill Directive diversion and recycling. There is also the potential for strategic partnership working between neighbouring authorities which can result in greater efficiencies through more integrated waste management solutions.

PFI allows long-term planning for skills and resources, giving stability and confidence to private companies due to longevity of agreements. This enables them to invest in new technologies and the skills associated with installing, commissioning, running and maintenance of such facilities.

Improving health, safety and welfare practices in the waste management industry is high on the agenda of both the HSE and the Waste Industry Safety and Health form (WISH). In 2001/02, it was reported by the HSE that the overall accident incident rate per 100,000 employees for the waste management industry is around four times the national average; for fatal accidents it was around ten times the national average; and for major injuries was around three times the national average.

The latest data\textsuperscript{76} suggests that these ratios have remained constant during the subsequent five years. Health and safety training is the single most prolific topic of training undertaken by employers in the industry, with around one-quarter of all training days spent on this topic alone.

\subsection*{5.4.4 Other external factors}

The reduction in immigration particularly from Eastern Europe (perhaps even a reversal in the trend of past few years) may have an impact upon the availability of labour for low level occupations in the sector. However, again, anecdotally, it has not been a problem recruiting for this level within the industry.

There is potential for local authorities look to charge householders for waste collection services on a ‘pay as you throw’ basis. This will lead to options for ‘reduce and reuse’ as the preferential way to deal with waste.

\subsection*{5.4.5 Consumer demand}

An increase in consumer consumption will increase the amount of wastes and recyclables produced. In turn, the increase in consumer consumption increases demand for raw materials (plastics, metals) which will have an impact on the demand for recyclables, if the price of virgin materials is higher, the market will turn towards recyclables.

This emphasises the need for good quality recyclates to be used in the manufacture of new products and again has implications for the role and skills of the refuse/recycling operatives.

\subsection*{5.4.6 Policy drivers}

Each of the four nations has its own waste strategy\textsuperscript{77}. The main elements of the strategies are to incentivise efforts to reduce, re-use, recycle waste and recover energy from waste and reform

\textsuperscript{76} Update to mapping health and safety standards in the UK waste industry, Health and Safety Executive, 2009.

regulation to drive the reduction of waste and diversion from landfill while reducing costs.

As part of the Waste Strategy for England, the Zero Waste Places initiative was launched in England in October 2008. Zero Waste strategies are currently being consulted upon in Wales and Scotland.

There is also a push from central government and from local authorities to look for efficiencies in waste management services. There are many variations in the services that are offered and some are more effective than others.

The Renewable Energy Obligations will maximise the energy recovered from residual waste (that would otherwise go to landfill) and promote greater energy recovery from food waste (via anaerobic digestion) and waste wood (via combustion) to capitalise on the potentially significant energy and carbon benefits. The aim is to increase energy recovery to about 25% of municipal waste by 2020.

The skills and competences required by the industry are changing as it evolves from one of collection and disposal, to one employing highly technical treatment techniques and sophisticated recycling collection systems. As treatment becomes more sophisticated and the move to new technologies increases, there will be a requirement for higher level skills, particularly in the areas of engineering and processing and less reliance on manual entry level roles.

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78 John Denham speech, World Without Waste Event, 13 October 2009
http://www.communities.gov.uk/speeches/corporate/worldwithoutwaste

79 Anaerobic digestion is the preferred method for treatment of food waste, research shows it has significant carbon and energy benefits over other options for managing food waste (and may be particularly cost effective for food waste if separately collected).
5.5 Water

5.5.1 Recruitment and retention

The water industry currently operates within a very low turnover (3%) and such recruitment levels historically have remained relatively low. Inevitably, there are regional and occupational hotspots, e.g., the south of England and the impact of Olympics. Retention of certain skills (e.g. instrument technicians) is difficult in areas of high competition. Generally, the water companies offer competitive conditions of service and are deemed as upper quartile employers. Additionally, as the industry tends to operate in many rural areas, water companies are deemed as positive and attractive employers. This is consistent across the four nations.

Critically, the UK water industry is inherent to the maintenance of public health. As with the other aspects of the utilities, the water industry is also critical to the commercial and industrial wellbeing of the UK economy. Its services need to be reliable and available 24 hours a day, 365 days a year. Levels of autonomy for key workers outside 'normal' working hours is high and the sophistication of plant, equipment and processes used to deliver services is continually increasing. The demand on skills will continue to grow for these key employees and the supporting organisations.

5.5.2 Economic conditions

Since privatisation of the water industry in 1989 in England and Wales, the industry has seen a steady decline in employer numbers as the companies increase their productivity and efficiency. The industry has also seen a change ownership with many water companies now subject to overseas ownership. Additionally, the industry has seen much transfer of operations and capital investment to outsourced contractors and consultants. In Scotland, Scottish Water, although not privatised, is compared by its own economic regulator to the English and Welsh companies and hence is experiencing similar challenges. The water industry in Northern Ireland is in the process of being separated from the civil service and will operate similarly to the regulated market that is operating in the rest of the UK. However, the assets of the new Northern Ireland Water will remain in public ownership.

The industry has experienced a low turnover of staff during this process of downsizing and consequently the historical investment in skills has remained relatively low. However, the industry is now experiencing an ageing workforce which has forecast to worsen over the next 15 years. Significant extra investment in skills is, therefore, required to refresh the workforce.

There are also a range of programmes underway to replace, grow and operate assets and distribution infrastructures. For example, in Northern Ireland, the Water Service is currently undertaking a mains replacement programme that will upgrade over 1,200km of water mains. Projects such as this are setting new demands on both resource availability and the required workforce skill levels/mix. Although technology has improved the effectiveness of these activities over the last 20 years, increasing environmental demands and cost pressures require a continuous process of re-evaluating asset investments and operation. This process has a direct impact on the workforce at all organisational levels and will continue to do so into the future.
5.5.3 Market and regulatory pressures

Ofwat (in England and Wales), Northern Ireland Authority for Utility Regulation (NIAUR) and the Water Industry Commission (WICS), in Scotland, are responsible for making sure that the water industry provides its customers with a good quality and efficient service at a fair price. Their primary duty is to ensure that the water companies can adequately finance their functions from the prices that they are allowed to charge and to finance the investment programmes needed to improve quality as laid down by the UK and European authorities through a five-year price control review.

Decisions made by the economic regulators have a huge impact on the industry, including having to consider head count targets over and above retention of key skills and expertise. It is only after employees have left that it becomes clear that there has been a loss of skills and knowledge ‘en masse’ that takes a considerable amount of time to replace.

Other regulatory bodies working in the water industry are the Environment Agency, SEPA and the Environment and Heritage Service in Northern Ireland. They monitor water and sewerage standards and grant abstraction licences which allow users to abstract water from rivers and boreholes. The DWI monitors the quality of drinking water in England and Wales, while the Drinking Water Quality Regulator performs this role in Scotland and the Drinking Water Inspectorate (Northern Ireland) in Northern Ireland. Finally, the HSE seeks to ensure that all business activities are undertaken in a manner that will not compromise the safety either the workforce or the public.

Currently, the UK water industry is in a state of considerable flux. The economic regulator for England and Wales, Ofwat, is in discussion with the water companies for the latest price determination through the PCR. The accepted view at this moment in time before the final determinations are published in November is that it will provide a very challenging economic outlook for the water companies. This will provide a direct challenge to the investment in skills required to meet the needs of an ageing workforce.

5.5.4 Other external factors

It must be recognised that the UK water industry is significantly supported by large international infrastructure consultants who operate within a global water investment market. Globally, the demand for water engineers and scientists is increasing as the demands for improved public health within third world countries is increasing. This provides the risk that the UK market may not be able to have ready access to these skills to ensure the economic and efficient management of the continuing large capital investment programmes that the UK water industry continues to experience.

5.5.5 Consumer demand

Consumer demand currently has limited direct implication for skills; however, the role of the economic regulator is to ensure an improved level of service for the domestic and business consumer. With the increasing competitive environment being developed, it is anticipated that there will be an increase in the level of customer service and enhanced investment in innovation. As a result, this will lead to a drive for higher level skills to develop innovative products and services and increased dependency on customer facing skills.
This will be consistent across England, Wales and Scotland. Although the competitive environment will remain as it is today, the performance of Northern Ireland Water will be directly compared to the performance of the mainland companies.

5.5.6 Policy drivers

Legal instruments and regulations that impact upon the labour market include the Water Bill and the Water Framework Directive. The Water Framework Directive is a major piece of European legislation that came into force in December 2000. Defra has brought into force laws and regulations and administrative provisions necessary to comply with the Directive. There are also wide-ranging implications relating to the management of rivers.

The Cave Review supported by the UK government is seeking to introduce more competition within the industry. Increased competition through the establishment of a retail sector in Scotland is being used as a test case. No competition is currently proposed for Northern Ireland.

As result of the above it is anticipated that further legislative changes will occur to enhance competition and this will potentially involve a major restructuring of the ownership and management structures of the industry. Consequently, this will be an additional barrier to the current anticipated increased demand in upskilling, with the addition of new skills to prepare for the differing market conditions.

It is anticipated that an increasing demand will be placed upon the supply chain to recruit, develop and maintain the skills needs to ensure the effective sustainable management of the UK water industry. Hence, there will be greater dependence on systems to ensure demonstration of competence by the supply chain partners. Within the challenging economic outlook, the whole industry will be seeking improved and easier access to public funding to support the investment in skills, especially amongst the lower tier contractors.

In addition to the stiffer economic and competitive climate that the whole UK water industry will face, it will encounter the constraints of reducing its significant carbon footprint. Meeting the government carbon reduction target will require a significant increase in innovative products and systems. This will impact upon the industry and the need to attract, develop and recruit appropriate higher skilled staff.

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80 Taken from http://www.publications.parliament.uk/pa/cm200203/cmbills/149/03149.i-viii.html, 26th November 2009.
82 HM Treasury, (April 2009). The Cave Review: competition and innovation in water markets, Cave, M.
Work is still on-going in terms of quantifying the renewable energy industry. While our research acknowledges the importance of renewable energy, detailed quantitative information on the size of the workforce is not currently available in many instances. However, what is clear is that UK Government has set ambitious targets for the contribution of renewable energy to the UK’s energy mix so this aspect of the workforce is likely to grow in size.
6 Current skills needs

15.8% of sector employers have skills gaps in England; 14% in Northern Ireland; 19% Scotland; 21.8% in Wales.

The waste management industry experienced the most difficulty in terms of skills gaps, with 18.4% of establishments in England reporting such a problem.

Across the sector around 12% of the workforce does not hold a qualification at, or above, NQF/SCQF Level 1.

21% of the sector’s workforce hold a Level 3 qualification as their highest attained qualification.

Approximately one-in-five sector employers (21.1%) reported having vacancies that were proving hard-to-fill.

This section of the SSA investigates the nature, extent and some of the causes of skills gaps in the existing workforce and skills shortages that affect the energy and utility sector. It also analyses the qualifications profile of the workforce and the prevalence of the employers to arrange on-and off-the-job training for its workforce.

Much of the data presented in this section is taken from the National Employer Skills Survey (NESS), comparing the findings from the 2005 survey with those of 2007. Due to the make-up of the sample of this particular survey, it is important to treat the data presented below as an indicator of the true picture. This is because in 2007, the survey sample was heavily biased towards the waste management and water industries, with very few interviews undertaken with gas (transmission & distribution) and power employers and no interviews at all with gas (utilisation) employers.

Additionally, it should be noted that the NESS only takes place in England. Data for Northern Ireland, Scotland and Wales is derived from different surveys which can be based on slightly different definitions of the ‘sector’ and are undertaken in differing years. Therefore, where national data is provided, caution should be taken when making comparisons.
6.1 Skills gaps

6.1.1 Skills gaps by nation

Skills gaps are defined as a lack of proficiency within the existing workforce. Due to the way that the data is collected across the UK, it is difficult to arrive at an accurate UK-wide assessment of the extent to which skills gaps are prevalent in the sector. Where data is available, it is displayed and discussed in the following sub-sections.

However, where data is not available for Northern Ireland, Scotland and Wales, England’s NESS has been taken as a proxy for the UK.

Figure 22 below shows the proportion of establishments in each nation that reported a skills gap within their workforce during the last round of surveys.

In England, across the sector, 15.8% of organisations surveyed in 2007 indicated they have a skills gap of some sort.

In 2004, 19% of energy and water organisations in Scotland reported a skills gap (compared to a Scotland all-industry average of 21%). This figure has remained constant since the 2003 survey. However, during the same period the all-industry average fell three percentage points, indicating a general lessening of skills gaps to a certain degree.

This is broadly in line with the England all-industry average of 15.3% and represents a significant improvement from the 25.1% reported in 2005.

Skills gaps across the sector (utilities) in Northern Ireland are slightly lower than the England average at 14%. The ‘all private sector employers’ figure stands at 13%. The sector has experienced a notable increase in the proportion of establishments that have reported a skills gap, from 9% in 2000 to 14% on 2002. However, the small sample size means this finding should be treated with caution.

The definition of Energy and Water in the FSS2003 survey encompassed the following: mining & quarrying of coal, lignite, peat and other solid fuels; extraction of oil & gas, surveying for oil & gas; mining & quarrying of metals, minerals & construction materials; production & distribution of electricity; manufacture & distribution of gas; collection, purification and distribution of water. The figure must therefore be interpreted with caution, as it does not accurately reflect EU Skills’ sector.

Wales has a slightly higher proportion of skills gaps than the other nations, at 21.8% of establishments in 2005, compared to 19% for the all-Wales industry average. This figure has actually increased threefold since the 2003 survey (where 7% of establishments reported a skills gap)\textsuperscript{84}.

### 6.1.2 Skills gaps by industry (England only)

The following sections are based on the NESS and relate to England only as such detailed analysis is not available from the skills surveys undertaken in Northern Ireland, Scotland and Wales. However, as the nature of skills gaps in an industry is unlikely to vary across the nations of the UK, it is felt that this analysis could equally apply across the nations of the UK.

In 2007, the waste management industry experienced the most difficulty in terms of skills gaps, with 18.4% of establishments reporting such a problem. Research undertaken by EU Skills in 2006\textsuperscript{85} shows that skills gaps in the waste management industry appear in the following areas:

- Leadership and management skills including supervisory levels;
- Technical skills (e.g. treatment process options, scientific waste data analysis);
- Communication skills, particularly report writing;
- IT skills, particularly at operator level;
- Basic numeracy and literacy.

![Figure 23: Skills gaps in England by industry](image-url)


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\textsuperscript{84} The definition of skills gaps differed between the 2003 and 2005 FSW survey. In 2003, a skills gaps was defined as where ‘there is a gap between the skills employees have now and those needed to meet current business objectives,’ whilst in 2005 the definition changed to ‘employees not fully proficient at their job’. Therefore, comparisons should be treated with caution.

While the gas (transmission & distribution) industry is the least likely to report a skills gap (14.9% of establishments), it is the only industry of the four which has experienced an increase in skills gaps between 2005 and 2007. The exact nature of the cause of this increase is unclear, but undoubtedly a contributory factor will have been the ageing workforce that the industry employs at the moment. With high levels of retirements affecting the workforce, a significant level of skills and experience are leaving as a result. It is, and will continue to be, a challenge for the industry to replace these skilled workers at a sufficient rate.

The proportion of power industry employers reporting a skills gap in 2007 was considerably lower than that reported in 2005. The reason for this is unclear, but the extremely high figure reported in 2005 is unlikely to have been accurate. The 2007 figure of 15.6% seems a much more realistic figure and is in line with the rest of the sector. The water industry also reported a decrease in the prevalence of skills gaps between 2005 and 2007.

6.1.3 Skills gaps by occupation (England only)

Figure 24 below shows the proportion of sector establishments that reported a skills gap in 2007 within each of the nine standard occupational groupings, compared to the England average.

Across the sector, skills gaps are most prevalent within the plant and machine operatives occupational group. Significant levels of skills gaps also exist within the skilled trades and managers occupations. While skills gaps also exist in professional and elementary occupations, they do not appear to be as prevalent as across the rest of the UK economy.

Figure 24: Skills gaps in England by occupation

6.1.4 Main causes of a lack of proficiency

Figure 25 above shows the causes, as reported by employers, for skills gaps in their workforce as reported in 2005 and 2007.

Lack of experience is by far the most prevalent cause of skills gaps. The underlying reasons for this lack of experience are related to the fast-paced introduction of new technologies and working practices. The investment required from both the employee and employer to keep up with these changes can be substantial and takes time to complete. Therefore, there is a lead time to competency that cannot be bridged immediately.

This situation applies to all occupational groups, although recruitment issues were common to managers and professional occupations. High staff turnover was a reason often given for skills gaps amongst machine operatives.

Figure 25: Main causes of skills gaps

6.1.5 Skills that need improving

Perhaps unsurprisingly, the main skills that require improving are technical, practical and job-specific skills, with 58.7% of establishments reporting this as a weak area. This was followed by problem solving (41%), customer handling (39.5%) and management skills (35.9%).

Table 12: Proportion of organisations reporting specific skills gaps

<table>
<thead>
<tr>
<th>Skills that need improving</th>
<th>Percentage of organisations reporting weakness in this skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical, practical or job-specific</td>
<td>58.7%</td>
</tr>
<tr>
<td>Problem solving</td>
<td>41.0%</td>
</tr>
<tr>
<td>Customer handling</td>
<td>39.5%</td>
</tr>
<tr>
<td>Management skills</td>
<td>35.9%</td>
</tr>
<tr>
<td>Team working</td>
<td>35.0%</td>
</tr>
<tr>
<td>Written communication</td>
<td>32.3%</td>
</tr>
<tr>
<td>General IT</td>
<td>32.3%</td>
</tr>
<tr>
<td>Oral communication</td>
<td>32.3%</td>
</tr>
<tr>
<td>Office administration</td>
<td>27.4%</td>
</tr>
<tr>
<td>IT professional skills</td>
<td>18.8%</td>
</tr>
<tr>
<td>Literacy</td>
<td>17.7%</td>
</tr>
<tr>
<td>Numeracy skills</td>
<td>13.2%</td>
</tr>
<tr>
<td>Foreign language</td>
<td>10.9%</td>
</tr>
<tr>
<td>Personal attributes</td>
<td>6.1%</td>
</tr>
</tbody>
</table>


6.1.6 Impact of skills gaps

In the majority of cases the reported impact that these skills gaps are having on employers is minor, with 60% of establishments in England reporting it as such in 2007. However, around one in 10 establishments did report the impact as major.

Establishments in Wales followed a similar trend with the majority (47.9%)\(^{86}\) indicating only a minor impact. However, nearly one-third of establishments did indicate a significant impact. Establishments in Scotland take a different view, with 69% indicating that skills gaps have no impact on them, 14% reported that skills gaps were having a major impact and 16% a minor impact.\(^{87}\)

The majority of establishments with skills gaps reported an increase in workload for other staff and an increase in operating costs as a result. Other effects include: reduced revenue generation; inability to take on new work and increased timescales to deliver.

Figure 26 on the following page illustrates the impacts in more depth.

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\(^{86}\) WAG (2005), Future Skills Wales.

### 6.1.7 Skills gaps and multi-skilling

Across the sector restructuring and cost rationalisation have resulted in fewer people managing larger workloads. As a consequence 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 now appears to be a greater desire from employers for qualifications that are multi-utility in nature and standardised across organisations and industries. This would ensure that a qualification achieved in one organisation is equally valid when they seek employment elsewhere. EU Skills runs a number of registration schemes on behalf of the sector with the aim of achieving greater transferability and acknowledgement of competencies and skills across the industry.

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**Figure 26: Impact of skills gaps on the organisation**

![Impact of skills gaps on the organisation diagram](image)


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### 6.2 Qualifications

#### 6.2.1 Qualification levels across the sector

This section looks at the highest level of qualification achieved by the sector’s workforce and compares it to the UK average. Figure 27 below shows the proportion of the workforce that hold qualifications at various National Qualifications Framework (NQF) levels across the sector, and compares them to the UK and national averages.

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88 Assessment of the existing potential job market in the gas, electricity and renewable energy sector in Scotland, Jobs in the environmental support unit – Yellow Book Ltd.
Across the sector around 12% of the workforce does not hold a qualification at, or above, NQF Level 1. This compares to the UK average of 9%. Hidden within this data are the industrial differences that exist. For example, the water industry has two primary professional institutions: Chartered Institution of Water and Environmental Management (CIWEM) and Institution of Water Officers (IWO). Approximately one in three of the water industry workforce is a member of at least one professional organisation.

Within the sector, a significant proportion of those that do not hold a Level 1 qualification will be employed in the waste management industry. Due to the nature of the activities undertaken within the gas, power and water industries, very few of the workforce will be similarly lowly qualified.

21% of the sector’s workforce hold a Level 3 qualification as their highest attained qualification. This is higher than the UK average and all of the nations. Again, this is a reflection of the predominantly skilled nature of the work undertaken in the sector.

### 6.2.2 Qualifications levels by occupation

Not surprisingly, the highest held qualification varies by occupational group. 43% of managers, 61% of professionals, and 40% of associate professionals hold a Level 4 qualification, compared to 34%, 50% and 46% respectively across the UK.

51% of skilled trades hold Level 3 as their highest qualification (compared to 34% across the UK), while plant and machine operatives and elementary occupations are dominated by employees whose highest qualification is at, or below, Level 2 (81% and 88% respectively, compared to 77% and 77% across the UK).

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6.3 Training

6.3.1 Training plans

Qualifications are considered essential for elevating the skills levels of the workforce. However, data from the NESS shows that a substantial amount of training is delivered in-house and is not accredited or externally recognised. The following analysis is based mainly on NESS and, therefore, relates to England only.

Approximately 50% of establishments across the sector in 2007 have a formal training plan of some sort, which compares favourably with the England average of 47.6%. However, this varies from a high of 74% of power industry establishments to a low of 46% in the water industry.

Figure 28: Proportion of establishments with a training plan


6.3.2 Assessment of skills gaps and budgets for training expenditure

56% of establishments in England in 2007 formally assess whether individual employees have skills gaps. However, only 40% of establishments actually have a budget for training expenditure.

6.3.3 On and off-the-job training

Around three-quarters of establishments (74.7%) have funded, or arranged, either off-the-job or on-the-job training over the past 12 months. This represents an increase from 63.9% in 2004, but has remained stable since 2005. Establishments were just as likely to arrange off-the-job training (58.8%) as on-the-job (58.5%), while just under...
half of companies (approximately 42.6%) arranged both on and off-the-job training. The power industry (90.1%) is the most likely to have arranged either off- or on-the-job training, whilst the waste management and water industries are the least likely (73%).

6.3.4 Training in Northern Ireland

The Northern Ireland Skills Monitoring Survey 2002 suggests that approximately 62% of sector establishments provide off-the-job training, compared with 34% that provide on-the-job training.

![Figure 29: Proportion of establishments (by industry) that provide on/ off-the-job training](source: LSC, (2007), National Employer Skills Survey.

On-the-job training is the most common method of training provided by water companies. However, only in exceptional cases is this method of training fully recorded and costed. Contractors, in particular, place a high priority on this type of training.

Most off-the-job training is job-specific (75%) rather than developmental and is often driven by legal requirements such as health and safety legislation. Off-the-job training is offered to over 50% of managerial staff compared to only 24% of operatives and semi-skilled workers.

Most off-the-job training is either delivered by private sector training companies (39%) or Further Education colleges (29%). On-the-job training is mostly provided by experienced staff (57%) or a line manager (52%).

6.3.5 Training in Scotland

Future Skills Scotland 2004 Survey reports that of the 60% of sector establishments that have provided any training, 25% have arranged off-the-job training and 57% on the job training. However, 40% of organisations provided no training at all.

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91 Warning: Only based on a sample of 18 respondents.
92 The definition of Energy and Water includes the following: mining and quarrying of coal, lignite, peat and other fuels; extraction of oil and gas, surveying for oil and gas; mining and quarrying of metals, minerals and construction materials; production and distribution of gas; collection, purification and distribution of water. As it is not possible to disaggregate the data down to
6.3.6 Training in Wales

The 2005 Future Skills Wales survey paints a very similar picture to that of England, with 69.1% of establishments within the sector having arranged off-the-job training in the last 12 months compared with the overall Wales industry average of 57.9%.

6.3.7 Reasons for not providing training in past 12 months

The main reason employers have not provided training to staff over the last 12 months is because they believe that all staff are fully proficient in their role (68.2%). However, 6% of employers did indicate that courses are not available locally.

Despite this, 42.4% of organisations would like to have provided more training to their staff over the last 12 months. The main barrier preventing this was a lack of funds (41.7%), followed closely by employers indicating that they can’t spare more staff time away from the job (40.5%).

6.3.8 Days spent training

Very few establishments provide less than one day of training to staff per year. In fact, the majority of employers provide between two and eight days of training per year (as figure 30 below shows).

Figure 30: Number of days training provided by employers per year

![Graph showing number of days training provided by employers per year]

6.4 Vacancies and recruitment difficulties

6.4.1 Vacancies

A vacancy materialises when either a new position is introduced or as the result of an individual leaving an existing role. Filling vacancies can be problematic for a number of reasons: potential recruits may be lacking in experience, skills or qualifications, or the terms and conditions of employment may mean that an industry is unattractive to potential new recruits. This section looks at vacancies within the sector and considers the nature and extent of the causes of recruitment difficulties.

In 2007, roughly 14.4% of establishments in England reported a vacancy. Many organisations feel that a vacancy only becomes a problem if no suitable applicants can be found during the first phase of recruitment. An on-going, unfilled vacancy will undoubtedly have a detrimental effect on workloads and business performance.

Due to variances in the nature of the surveys involved, the data for Northern Ireland, Scotland and Wales cannot be compared to the analysis for England. In 2002, 6% of Northern Ireland’s utility employers reported having vacancies; a figure somewhat lower than the 14% reported across the Province’s economy as a whole. This figure has remained constant since the 2000 survey.

The vacancy rate in the sector in Scotland in 2004 was approximately 1.8% compared to an industry average of 3.4%. The proportion of establishments in the sector in Wales that were reporting vacancies in 2005 was the same as the all-Wales average at around 21%.

6.4.2 Vacancies by industry

The proportion of employers who were reporting vacancies in 2007 are shown in table 13 below. Within all four industries, this figure has decreased since 2005. In the case of gas (transmission & distribution), it has decreased by around two-thirds. Significant reductions were also reported in the waste management industry.

Table 13: Proportion of sector employers reporting vacancies, by industry

<table>
<thead>
<tr>
<th>Industry</th>
<th>2005</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas (Trans &amp; Dist)</td>
<td>28.2%</td>
<td>10%</td>
</tr>
<tr>
<td>Power</td>
<td>43.1%</td>
<td>35.9%</td>
</tr>
<tr>
<td>Waste management</td>
<td>21.4%</td>
<td>10.9%</td>
</tr>
<tr>
<td>Water</td>
<td>19.3%</td>
<td>13.2%</td>
</tr>
</tbody>
</table>


6.4.3 Vacancies by occupation

As figure 31 below shows, the occupation reporting the highest vacancy rate in 2007 was the elementary group of occupations. The majority of occupational groups experienced a reported increase in vacancies between 2005 and 2007. The exceptions were skilled trades, sales and customer service, and machine operatives, which showed a decline in the proportion of vacancies reported.

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6.4.4 Hard-to-fill vacancies (HTFV)

In 2007, approximately one-in-five sector employers (21.1%) reported having vacancies that were hard-to-fill. This is down from 32.1% in 2005.

The main cause of a HTFV, as reported by 50% of establishments in England in 2007, is the low number of applicants with the required skills. This is generally in line with the proportions identified in the previous two surveys. Employers have noted that many applicants are simply not qualified for the positions on offer. It is believed by employers that competition from other sectors of the economy for skilled staff, where perceptions of career progression and terms and conditions appear better, is a major contributor to this situation.

The attractiveness of the sector is a significant issue. EU Skills industry fora are all taking action to address this situation. In the 2007 NESS, 20.9% of establishments indicated that there were not enough people interested in ‘doing this type of job’ (up from 16.5% in 2005). It is reported that there is a lack of applicants with the required skills, coming out of universities with science, technology, engineering and maths (STEM) skills being a problem reported by many employers across the sector.

All the main reasons cited by employers as causes of HTFVs are shown in figure 32 below.

Figure 32: Reasons cited by employers as the causes of HTFVs, by occupation

<table>
<thead>
<tr>
<th>Reason</th>
<th>Proportion of establishments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of applicants with the required skills</td>
<td>50.0%</td>
</tr>
<tr>
<td>Lack of people interested in doing this type of job</td>
<td>20.9%</td>
</tr>
<tr>
<td>Lack of work experience the company demands</td>
<td>19.2%</td>
</tr>
<tr>
<td>Lack of qualifications the company demands</td>
<td>15.4%</td>
</tr>
<tr>
<td>Low number of applicants generally</td>
<td>5.6%</td>
</tr>
<tr>
<td>Poor terms and conditions offered for the post</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

6.4.5 Hard-to-fill vacancies by occupation

Those occupations that are most likely to be reported as being hard-to-fill by employers in the sector are in the plant and machine operatives (Level 2) and professional (Level 4) occupations. An underlying cause behind these recruitment difficulties is the attractiveness of the sector as a career option amongst new labour market entrants. The sector in general is perceived by many to be stagnant in terms of both career prospects and terms and conditions of employment, while the waste management industry is often seen as a last resort for employment.

All stakeholders involved in the sector need to promote more widely the many attractive aspects of employment in the sector. Recent research undertaken by EU Skills and funded by the East Midlands Development Agency into diversity in the energy industry\textsuperscript{[96]} suggests that many people, young and old, are completely unaware of some aspects of the sector, in particular the distribution of electricity.

An opportunity is available, however, to promote the environmental and ‘green’ career opportunities right across the sector. This aspect of the sector was identified as being key to the successful promotion of the sector and in increasing its attractiveness to potential new entrants of all ages.

6.4.6 Impact of hard-to-fill vacancies

The most widespread impact of a HTFV that was reported by employers in England in 2007 was the increase in workload for existing staff (indicated by 88.5% of organisations). This is by an increase in operating costs (52.7% of organisations).

Figure 33: Impact of HTFV on employers

<table>
<thead>
<tr>
<th>Impact</th>
<th>Proportion of establishments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in workload of other staff</td>
<td>88.5%</td>
</tr>
<tr>
<td>Increase in operating costs</td>
<td>52.7%</td>
</tr>
<tr>
<td>Delay developing new products or services</td>
<td>50.8%</td>
</tr>
<tr>
<td>Outsource work</td>
<td>31.8%</td>
</tr>
<tr>
<td>Lose business or orders to competitors</td>
<td>28%</td>
</tr>
<tr>
<td>Have difficulties meeting quality standards</td>
<td>27.8%</td>
</tr>
<tr>
<td>Have difficulties introducing new work practices</td>
<td>24.5%</td>
</tr>
<tr>
<td>None</td>
<td>5.7%</td>
</tr>
</tbody>
</table>


The proportion of establishments that reported no impact of HTFVs increased slightly from 3.8% in 2005 to 5.7% in 2007.

6.4.7 Action taken to overcome HTFVs

Figure 34 below shows the actions taken by establishments to mitigate the effects of any HTFVs.

A significant amount of work has already been undertaken by EU Skills to expand the diversity of the existing pool of labour.

In trying to address HTFVs, more employers are increasing the amount of training they offer to existing staff. The proportion of establishments increasing advertising/recruitment spend and using new recruitment methods reduced between 2005 and 2007. This may be due to a recognition that the types of people and skills being sought are becoming increasingly scarce in the wider labour market and that developing existing employees is a more attractive and productive option.

A significant amount of work has already been undertaken by EU Skills in relation to expanding the diversity of the existing pool of labour. The Ambition:Energy programme encouraged new entrants into the gas (utilisation) industry to address long-standing vacancies. Women and Work aims to raise the aspirations of women in the sector and ex-offenders are being recruited in the North of England to address the shortage of cable jointers and overhead linesmen.

Figure 34: Actions taken to overcome effects of HTFVs

6.4.8 Employer recruitment and perceptions of young people

Generally speaking, in terms of recruiting young people (i.e., under 24 years of age), employers are more likely to recruit directly from college or university than they are from schools. School leavers are generally believed to lack maturity and real world experience which may prevent them from performing well in highly demanding roles.

Only 15% of employers in the sector in England in 2007 thought that school leavers were ‘very well prepared’ for work, compared to 34.5% that recruited from university or a HE institution.

Just one-third of employers felt that school leavers were very well prepared for the world of work, rising to 69% for 17/18 year-olds and 77% for 24 year-olds leaving HE.

The skills which are perceived to be lacking by employers from the under-24 year-old age group are summarised for each cohort in the table 14 below. Technical, practical and job-specific themes and poor education/general knowledge stand out as common areas of weakness across all three cohorts.

Table 14: Skills lacking in under-24 year-olds

<table>
<thead>
<tr>
<th>Cohort</th>
<th>Top five skills found lacking</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 year-olds</td>
<td>• Technical, practical and job-specific (30.2%)</td>
</tr>
<tr>
<td></td>
<td>• Oral communication skills (29.3%)</td>
</tr>
<tr>
<td></td>
<td>• Time keeping skills (23.9%)</td>
</tr>
<tr>
<td></td>
<td>• Common sense (22.3%)</td>
</tr>
<tr>
<td></td>
<td>• Poor education/ general knowledge (22.3%)</td>
</tr>
<tr>
<td>17 or 18 year-olds</td>
<td>• Technical, practical and job-specific (44.6%)</td>
</tr>
<tr>
<td></td>
<td>• Numeracy skills (17.7%)</td>
</tr>
<tr>
<td></td>
<td>• Lack of motivation (14.7%)</td>
</tr>
<tr>
<td></td>
<td>• Poor attitude (14.2%)</td>
</tr>
<tr>
<td></td>
<td>• Poor education/ general knowledge (12%)</td>
</tr>
<tr>
<td>University/ HE</td>
<td>• Discipline (31.3%)</td>
</tr>
<tr>
<td></td>
<td>• Initiative (22.9%)</td>
</tr>
<tr>
<td></td>
<td>• Lack of motivation (22.9%)</td>
</tr>
<tr>
<td></td>
<td>• Technical, practical and job-specific (22.9%)</td>
</tr>
<tr>
<td></td>
<td>• Poor education/ general knowledge (20.3%)</td>
</tr>
</tbody>
</table>

6.4.9 Skills shortage vacancies (SSV)

SSVs are a sub-set of HTFVs. They relate specifically to recruitment difficulties brought about by a lack of appropriate skills in applicants.

In 2007, 2.5% of all establishments in England in the sector reported having a SSV. This equates to 74.8% of establishments that reported having a HTFV which was caused specifically by a lack of skills. In Wales, in 2005 the reported figure is 1% of establishments reporting a SSV.

Another way of looking at this issue is that 8.2% of vacancies in the sector (in England in 2007) were classified as being SSVs. This compares very favourably to the all-England figure of 21%.

It should be noted however that this finding is not reflected in what employers are reporting to EU Skills and could be caused by a number of factors, not least the survey sample used in the NESS which resulted in 87% of the weighted sample of establishments being in the waste management and water industries. This will seriously under-report the skills issues affecting the power and gas (transmission & distribution) industries.

For example, EU Skills has just successfully presented the case to the MAC that 23 occupations across the power industry should be added to the UK’s Shortage Occupation List.

Within the regulated areas of the gas (transmission & distribution), power and water industries, the relatively stop-start nature of the five year regulatory process has a negative impact on the workforce and skills planning abilities of employers. Examination of spending profiles by the asset owners shows in the 12 month periods either side of the periodic review recruitment and related expenditure decreases, with an intense three year in the middle of each price control period. This pattern makes retaining skilled staff difficult for the network operators and contractors alike. The effect of the regulatory process, plus the higher than average aged workforce, led EU Skills to develop the workforce planning model in 2007 to influence the PCRs.

The skills reported as lacking most in applicants were technical, practical or job-specific skills (indicated by 57.3% of establishments in 2007). Encouragingly, this area appears to be showing a decline from 2005 levels.

![Figure 36: Skills most difficult to obtain](image)

7 What lies ahead?

The main factors shaping the future of the sector relate to the transition towards a low carbon economy and an activist industrial policy, new technologies for the generation of energy, the drive towards the recycling and re-use of waste, ensuring security of energy supply and the legislative and regulatory impacts across the sector.

To address the above factors there are some core actions the sector will need to take in relation to skills, including; more emphasis on workforce planning, raising the profile of the industry, increasing the number of Apprentices, influencing the economic regulator where appropriate, focusing on technical upskilling and higher-level skills development and forecasting the skills needs for new and emerging technologies.

This section builds on the drivers of demand and current skills needs to present the possible future trends for the sector and their associated skills needs.

Using our industry knowledge, data taken from our workforce planning model, Working Futures III\(^7\) and specific developments such as the National Skills Academy for Power (NSAP) we have developed a forecast of what lies ahead for each of our industries.

The main factors shaping the future of the sector relate to the drive towards a low carbon economy and an activist industrial policy, new technologies for the generation of energy and the transition to recycling and re-use of waste, ensuring security of energy supply and the legislative and regulatory impacts across the sector. This is all set within an economic context that is in recovery, post-recession, and leads to changing requirements for the skills needs of the future.

\(^7\) Warwick Institute of Employment Research/ Cambridge Econometrics (2008), Working Futures III, Wilson, R.
7.1 Gas (Transmission & Distribution)

7.1.1 Trends occurring over the next five - 10 years?

In the short-term, new technology and methods for mains and service-laying, including new pipeline materials, are changing the way that work is carried out. There is an increased need for specialisation, where teams concentrate on particular techniques or activities instead of carrying out every type of activity, as has been the case historically. An example of this is the introduction of suction excavators that are able to extract spoil using a powerful air lance and then collecting it in a large vehicle tank. This type of equipment is very specialist and operated only by a dedicated team who are trained specifically for this role.

In addition, with the sell-off of a number of gas distribution networks to other companies and the de-regulation of metering and billing, the metering sector is open to competition with new meter installation, reading and billing companies being established. These companies will need to ensure that they can meet statutory requirements and service level agreements, particularly for the installation and reading of meters from a multi-utility perspective. The job roles for domestic meter operatives have also changed, as a reduction in the workforce and increasing competition have meant that domestic installers can no longer focus solely on domestic meter installations but now must also undertake commercial installations.

In the longer-term, the need for the UK to reduce its carbon emissions in order to meet its climate change commitments is likely to lead to a shift away from gas-fired power stations and towards power generated by other means (e.g., renewable energy and nuclear technologies). Ultimately the supply of gas is limited by its availability and as the UK is now a net importer of gas, there may be future issues around the security of supply that could impact significantly on the industry. To mitigate against this in the medium-term, the UK has invested significantly in infrastructure to facilitate the use of LNG imported via tankers to new onshore terminals such as the Isle of Grain.

The integrity of the 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. As consumers are encouraged to reduce their own carbon footprint and increase their energy efficiency, there could be a shift towards new technologies such as heat pumps, solar panels photovoltaic and thermal, all of which could impact on the volumes of gas for transportation and distribution.

The Working Futures forecast predicts decreases of circa 3,000 jobs over the period 2008-2017 within the gas supply industry, an 18% decrease from current levels. However, over the same period, nearly 6,000 retirements are anticipated, leading to a net demand of circa 3,000 workers.

7.1.2 Likelihood of occurrence

There is a high likelihood of these events and policies impacting on the industry. The only real questions are around when and how quickly they will happen.

Gas demand is forecast to grow at circa 2% per annum after 201098. This assumes that the UK manages to secure more gas supplies from Europe and that more gas storage facilities are created. Work is already underway on building new LNG facilities. Pipelines from Norway and the Netherlands to boost UK supplies are either complete or nearing completion. Further

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98 EU Skills (December 2006), Sector Skills Agreement – Stage 1 Report.
installations are planned but, in some cases, construction is expected to be delayed by local authority planning restrictions. Shell and ExxonMobil are continuing to invest in North Sea gas production using environmentally clean technologies that enables the access and recovery of small pockets of gas that would previously have been deemed uneconomical.

During the Russia-Ukraine crisis in January 2009\textsuperscript{99}, the UK's storage became severely depleted. This is indicative of an increasingly sensitive market place where political decisions and disputes can have considerable knock on effects to UK supplies. The market was forced to drastically adjust by raising prices to encourage more supplies into the country. However, under a low carbon scenario, the UK will be less susceptible to gas shocks generally due to lower levels of gas demand.

In addition, the UK government continues to call for better levels of energy efficiency and higher short-term gas prices are likely to lead to significant efficiency improvements. In Ofgem's Dash for Energy scenario\textsuperscript{100}, the biggest risk appears to be when gas supply is tightest in the middle of the next decade, before new investment in storage progressively improves the position.

\textbf{7.1.3 The implications for skills}

Ensuring the security of supply will help stabilise the market price for gas and ensure that gas remains a viable source of low carbon energy production. In addition, improved technologies and extraction methods may increase the volume of gas that is imported into the UK.

Under the scenarios described, there will be an impact on both recruitment and training. New installations will require more people to enter the industry and undertake the roles, and increasing energy efficiency measures will require employees to become competent in the use of new technologies. This will require the industry to:

- Place more emphasis on workforce planning to highlight and address age profile issue;
- Raise the profile of the industry to attract employees;
- Increase the number of Apprentices to bring new people into the industry;
- Increase collaboration for the training of specialists;
- Ensuring the availability of appropriate training courses for employees;
- Influence the economic regulator to take account of skills needs in the five-year PCR cycle;
- Explore overseas opportunities to transfer skills and knowledge, as countries seek to develop their own gas transmission and distribution infrastructure.

\textsuperscript{99} Ofgem, (October 2009), Project Discovery Energy Market Scenarios, Page 61.

\textsuperscript{100} Ofgem (October 2009), Project Discovery Energy Market Scenarios, Page 69.
7.2 Gas (Utilisation)

7.2.1 Trends occurring over the next five – 10 years

The gas utilisation industry has the highest age profile of all the sector’s industries. Almost half the workforce is aged over 45 years, with just one-quarter aged under 34 years. This represents a significant problem as a considerable share of the workforce is nearing retirement. There are a large proportion of operatives approaching retirement age at 60 to 65; with around twice the number of operatives aged 55+ in 2006 compared to 2000. It appears that operatives are remaining in the industry for longer, although the large number approaching retirement age (over 19,000 in the next 10 years) could be a future cause for concern\textsuperscript{101}.

Recruitment is driven primarily by consumer demand. As new build housing construction and home improvements activities are growing, the need for new heating systems and appliances expands also. There is a direct correlation in that, when these industries are contracting, the demand for new systems, appliances and equipment also reduces. With the UK slowly coming out of recession, it is likely that within the next five to 10 years demand for housing and associated heating systems will rise to pre-recession levels.

Government policy is also a key driver of demand, primarily through the promotion of more energy efficient appliance and controls. For example, recent changes in the Building Regulations in England and Wales require that all new and replacement central heating boiler installations to be using condensing (high efficient) appliances. This in turn often necessitates a system upgrade which generates additional work. Also, the adoption of micro-renewables may be accelerated by the introduction of a Renewable Heat Incentive to be introduced in 2011.

In the longer-term, as detailed in 6.1, security of supply is critical. This will also have implications for the gas utilisation industry. As a net importer of gas, the UK increasingly relies on the purchase of gas from countries that lack political stability. In addition, the use of fossil fuels is declining in favour of electrically powered appliances and heating systems which ironically means some electricity generation might involve more gas-fired power stations in the short-term. The effect of this on the gas utilisation industry would be significant and reduce demand across the whole supply chain (i.e., the manufacture, installation and maintenance of gas burning appliances and related equipment).

However, many new technologies are beginning to emerge, such as hydrogen fuel cells, biomethane and heat pumps. The gas engineer of the future may well be needed to install and maintain some of these micro-generation technologies, as they do the central heating boilers of today.

\textsuperscript{101} Data extracted from CORGI database, October 2006, for registered Installers.
7.2.2 **Likelihood of occurrence**

There is a likelihood that over the medium-term the UK economy will emerge from the recession into a period of sustained economic growth. This will most likely lead to an expansion in new build housing programmes requiring the services of gas operatives, thereby increasing their demand and leading to rapid periods of recruitment. The drive to improve the UK public housing stock, through improved insulation and better heating, is another policy intervention that will generate significant local demand.

If the economy begins to expand and new build housing projects increase there is a strong likelihood that demand for gas operatives would also increase. During research undertaken at the annual Installer Live! Conference in 2006\(^{102}\), it was noted that many interviewees predicted stable or increasing workforce numbers across the industry over the next five – 20 years.

There is also a strong likelihood that the government will continue to drive demand for increased energy efficiency to meet climate change targets. This will ultimately require a renewal of the workforce as well. As will the increased introduction of micro-generation technologies.

If the ageing workforce is allowed to continue without encouraging new entrants into the industry, the implications could be dramatic. With fewer gas engineers operating in the market, prices would increase, leading to consumers delaying energy efficiency improvements. However, entrants are continually being recruited into the industry to generally increase the stock and replace those leaving through retirements. Many organisations, such as British Gas, are often overwhelmed by applications for operative Apprenticeships and this trend is likely to continue well into the future.

7.2.3 **The implications for skills**

In the short-term, a comprehensive competence review, commissioned by the HSE as part of the transfer of Registrar from CORGI to the Gas Safe Register, is likely to identify a number of potential changes to the existing mechanisms. The review is expected to take one year and will produce a series of recommendations to the HSE which could be implemented from 2011.

The industry is likely to continue to embrace new technologies as they emerge, with the demarcation between the once quite separate trades becoming increasingly blurred. For example, there are often more electrical and electronic components within a gas appliance than there are to do with gas itself. Similarly, plumbing equipment, such as pressurised hot water systems, are more sophisticated now than ever before. Engineers, and the businesses they work for, increasingly need to specialise to cope with the plethora of regulations and procedures required, and this is only likely to accelerate over the next decade. Therefore, the requirement to up-skill and cross-skill as emerging technologies are developed will increase; as will the necessity to mainstream such provision through, for example, Apprenticeships.

The industry is slowly changing towards 'smaller', more focused roles. Meter maintenance and repair individuals are increasingly beginning to focus on a specific type of meter which is causing an issue with qualifications (an individual has to achieve a full qualification to work on just one type of meter).

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\(^{102}\) EU Skills (December 2006), Sector Skills Agreement – Stage 1 Report.
In summary, this will require the industry to:

- Place more emphasis on workforce planning to highlight and address age profile issue;
- Raise the profile of the industry to attract employees;
- Sustain the number of Apprentices to bring new people into the industry.
- Ensuring technical upskilling for new technologies is a key focus for training;
- Identify and deliver on key skills needs identified in the competence review.
7.3 Power

7.3.1 Trends occurring over the next 5-10 years

There are three key trends which are likely to impact on the power industry in the short to medium-term; challenging climate change targets requiring the lowering of carbon emissions, ageing power stations and other infrastructure, and an ageing workforce.

"Britain’s ability to meet its demand for gas and electricity is... poised to be tested over the next decade or so... ageing power plant nearing the end of its life, along with the need to tackle climate change, are the central challenges the country faces."

Ofgem, (October 2009)

Project Discovery Energy Market Scenarios

The Ofgem 'Project Discovery' report looks at four different scenarios for the future of the power industry. The report identifies the 2 key drivers affecting the industry over the next 10 years as firstly, the speed of global economic recovery and secondly, the extent of globally co-ordinated environmental action. These global drivers will affect the supply and demand for energy, and influence policy decisions, at the European Union and national levels.

Of these two drivers, 'globally co-ordinated environmental action' is currently at the forefront of public and political debate. In response to the need to maintain diminishing energy supplies and reduce carbon emissions, the government has agreed to binding climate change targets for 2020.

The expansion and extension of the long-term incentive for major renewable electricity developments – the Renewables Obligations – will provide continued support for large-scale, centralised renewable electricity generation. Similarly, the introduction of 'clean energy cash-back' in 2010 should encourage households, industry, businesses and communities to use renewable heat and small-scale clean electricity generation.

The expected increase in renewable electricity generation is not only driven by the need to reduce carbon emissions, but also by the urgent requirement to ensure the security of the UK’s energy supply. Further to the ageing power stations, the transmission and distribution network is also in need of upgrading, particularly as the increasing diversity of generating technologies heightens the need for the development of a 'smart grid' which would react to changes in generation and demand patterns. Government is working with Ofgem and industry to ensure the right grid infrastructure is in place.

Analysis carried out by the NSAP, using the workforce planning model, shows that due to an ageing workforce, over 29,000 people (80% of the current workforce) are expected to leave the distribution, generation and metering businesses over the next 15 years. Further to this, the NSAP states that there will need to be a sevenfold increase in skills needed to meet renewable energy targets.

Working Futures analysis predicts a 15% decrease in jobs in the power industry by 2017, from just over 60,000 in 2008 to just over 50,000. However, it is unlikely that this scenario will have fully taken into account the developments in technology expected to take place over this time. It does not appear to mesh well with the current hopes for increased numbers of 'green jobs'
arising from the expected growth in renewable energy generation.

The NSAP has undertaken a more thorough analysis, with the input of employers and taking into account the likely future developments; their analysis is therefore more likely to provide a more accurate picture of future workforce needs. The Working Futures analysis does, however, echo the NSAP work in setting out a predicted 20,000 retirements in the power industry by 2017. It is clear that, in either case, the issue of an ageing workforce will be critical to the future of the industry.

7.3.2 Likelihood of occurrence

The replacement demand caused by the imminent retirement of existing workers is inevitable. Similarly, it is unavoidable that existing infrastructure will need to be replaced, as demanded by European legislation.

While an increase in renewable energy generation is already underway and further expansion is a certainty, the extent and speed of this increase is highly dependent on government support and investor confidence. Also, the expansion of wind and marine (and biomass to some extent) is very much linked to the success of planning applications, which is a highly complex and uncertain area. Also, the development of suitable on- and off-shore grids will be critical.

While it is clear that the next few years will see a great deal of change and development in the power industry, the impact of these changes will be dependent on the political and financial context. The Ofgem scenario work\textsuperscript{103} shows that demand for electricity, for example, could vary depending on the uptake of new technology and policies. The Green Stimulus scenario shows that, should recovery from the recession remain slow, consumer demand for power could be low, particularly with promotion of energy efficiency measures. This could lead to a global fall in demand in the near term. In contrast, the Green Transition scenario shows that, even with the success of energy efficiency measures, if the economy recovers to a stronger position, higher consumer demand for technology such as heat pumps and electric vehicles could actually drive electricity demand higher.

7.3.3 The implications for skills

The increasing role of renewable energy in the UK’s energy mix will be an additional draw on an already stretched labour market. The expected increase in renewable energy supplies will have implications across the whole power industry supply chain including transmission and distribution.

To ensure a secure energy supply for the future, urgent action is needed now on infrastructure. Tight timescales mean that the UK must construct new power stations and other energy infrastructure at a time when there will be very high demand on engineering construction resources from other sectors, and also from other nations.

\textsuperscript{103} Ofgem, (October 2009), Project Discovery Energy Market Scenarios.
The industry has raised the issue of an expected global demand for power engineering skills as much of the infrastructure around the world is of a similar age to that of the UK’s. With demand for power output increasing the world over, the UK will have to work hard to gain the quantity and quality of skills it needs and even harder to keep it. Consequently, strong global demand for skilled workers with experience of the electricity generation industry is likely to increase considerably in the coming years.

The extent and speed of growth in renewables is highly dependent on government support, and (especially in the case of wind and marine power), the complexities of the planning process. Both of these unpredictable elements will have an impact on both the extent and location of skills that the power industry will need.

Despite the difficulties implicit in predicting the future needs of the power industry, there has been much discussion in government and the media around the number of ‘green jobs’ that could result from a transition to a low carbon economy. Based on differing timescales and assumptions, these predictions vary a great deal, however, the common thread is one of optimism towards the opportunity provided by a low carbon economy. Looking specifically at the power industry as a part of this low carbon economy, the NSAP estimates that current targets of 45GW of renewable energy generation would require a sevenfold increase in skills.

This anticipated increase in demand for skills will be further exacerbated by both the ageing workforce and competing requirements from other industries. As a result, there will be a need for increases in recruitment, training and the underlying training capacity.

Unless measures are taken to deal with them, skills gaps are likely to be increased by the introduction of new, unfamiliar, technologies. The introduction of smart metering, and the possible need for a ‘smart grid’ over the next decade will require significantly higher volumes 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.

In summary, this will require the industry to:

- Place more emphasis on workforce planning to highlight and address age profile issue;
- Raise the profile of the industry to attract employees;
- Increase the number of Apprentices to bring new people into the industry;
- Forecast the skills needs for new and emerging technologies and develop National Occupational Standards (NOS) and Apprenticeships to meet demand;
- Increase the number of engineers entering the industry;
- Increase training capacity across the industry;
- Influence the economic regulator to take account of skills needs in the five-year PCR cycle.
7.4 Waste Management

7.4.1 Trends occurring over the next five - 10 years

With government policy and legislation forcing a focus on a low-carbon and resource efficient economy, it is likely that the waste management industry will need to go through a process of change over the next few years. Carbon reduction targets in particular have increased focus on the potential for energy from waste, and also the importance of reducing emissions from landfilled waste.

In light of this drive for resource efficiency, and to help reduce reliance on landfill, zero waste policies are being considered and introduced across the UK. Budget 2009 increased the cost of landfill and the Waste Strategy for England Annual Progress Report 2008/09 states that:

“Landfill should be the home of last resort for waste. The government is committed to continuing to reduce our reliance on landfill and minimising the impact landfill has on the environment, in particular on greenhouse gas emissions.”

**Defra (October 2009)**


The UK’s Low Carbon Transition Plan states that waste methane emissions will need to be reduced by 13% on 2008 levels by 2020. This cut in emissions will be achieved by reducing the amount of waste sent to landfill, capturing more of the methane produced from existing landfill and increasing the use of new technologies such as anaerobic digestion and bio-energy combustion.

Cutting down on emissions in this way will also contribute to renewable energy generation targets, providing an alternative fuel source for power generating plants. The Renewable Energy Strategy supports this approach by stating that

“waste biomass is an under-used resource which could provide a significant contribution to our renewable energy targets and reduce the total amount of waste that is landfilled in the UK”.

**HM Government, (July 2009), the UK Renewable Energy Strategy, DECC**

The government’s plan is to increase energy recovery to about 25% of municipal waste in 2020.

In addition to the low-carbon factors driving the industry, likely scenarios are:

- Increased mergers, with the biggest companies getting even bigger and even local authorities merging or collaborating;
- Contractual partnerships between private operators and local authorities in relation to new technologies ensured through long-term PFI contracts;
- ‘Pay as you throw’ initiatives being imposed for householders and fortnightly residual waste collection nationally along with increased separate food waste collection;
- Further reforms on permitting, and handling and transportation of waste, including the potential for bans on landfiling of certain wastes.
In terms of trends in the workforce required by the waste management industry, Working Futures III analysis compares 2017 predicted levels with 2008 levels. The findings are reported in the context that:

“Waste management is becoming a higher value-added sector and of growing importance given the focus on green issues”

Warwick Institute of Employment Research/ Cambridge Econometrics, (2008)

Working Futures III, Wilson, R

For waste disposal, the analysis projects increases in employment across all occupations (over 40,000 jobs); an increase of over one third between 2008 and 2017. Further to this, there is an expected replacement demand of over 35,000, as a large proportion of those currently employed in the industry approach retirement age.

Regarding the recycling aspect of the waste management industry, the Working Futures projections show that, overall employment levels in this industry are expected to remain fairly stable over coming years. However, once again, replacement demand will be key, with an ageing workforce leading to around 70,000 workers needing to be replaced over the decade.

It should be noted that it is uncertain to what extent zero waste policies and support for energy from waste have been included in the Working Futures analysis. The projections above should, therefore, be viewed with care. However, they do highlight the significance of the ageing workforce which will lead to the need for high levels of recruitment over coming years.

7.4.2 Likelihood of occurrence

The scenarios presented above have a high likelihood of occurrence with patterns in how the industry operates determining strong trends. In addition, with the publication of the low carbon transition plan and accompanying papers in July 2009, the focus on resource efficiency in waste is unlikely to diminish. As a result, it is very likely that landfill usage will decline and that waste will, therefore, need to be dealt with more efficiently. The introduction and positivity towards the adoption of zero waste policies across the UK lends weight to this.

7.4.3 The implications for skills

In light of the focus on a resource efficient, low carbon economy, the waste management industry will need to focus on new innovative ways to treat and obtain value from waste. The increase in the standard rate of landfill tax is intended to reduce the amount of waste sent to landfill in a sustainable way by encouraging further investment into alternative waste management options. In imposing the increase, government stated that experience from other European countries is that imposing legal restrictions on the types of waste that can be landfilled has encouraged higher rates of recycling and recovery.

This will also encourage the production of energy from waste treated in gasification, pyrolysis, anaerobic digestion and good quality combined heat and power plants. If waste is to be increasingly treated as a resource, there will be a need for advances in collection technology. The waste management industry will need to become more sophisticated, with increased automation.
The skills and competences required by the industry are changing as the industry evolves from one of collection and disposal to highly technological treatment techniques and sophisticated recycling collection systems. This will also result in higher level skills requirements as there is increased automation and less reliance on manual entry level roles.

The move towards automation and new technologies along with the consolidation of organisations may lead to fewer people required overall, but a need for more highly skilled workers. In addition, waste and recycling physical processes may require new skills, for example, the safe handling of different types of collection containers, and the need for waste collectors to also act as customer services ‘ambassadors’, explaining how waste should be dealt with by householders and businesses.

In summary, this will require the industry to:

• Place more emphasis on workforce planning to highlight and address the age profile issue;

• Raise the profile of the industry to attract employees;

• Focus on developing the higher level skills needs of the industry;

• Forecast the skills needs for new and emerging technologies and develop skills products to meet demand.
7.5 Water

7.5.1 Trends occurring over the next five - 10 years

The key factors that will affect the industry over the next five to 10 years relate to the impact of the Cave Review which will result in a more competitive climate of the industry to operate in. The transfer of operations capital investment and out-sourcing to contractors will continue.

The move to a low-carbon economy will drive the development of new technologies in the water industry as it is for the other industries in the sector. This strengthens the need for higher level and specialist skills. The demand for graduates is estimated\textsuperscript{104} to be roughly 900 per year with much higher proportions of graduates demanded, as would be expected, in the manager and professional occupations. Despite much lower rates of graduate concentration, significant demand at the plant and machine operative and elementary levels mean these occupations will still require substantial graduates.

Despite the fall in overall employment numbers, the industry is forecast to have more managers than it currently has, alongside more sales and associated professional (Level 4) workers. In contrast, plant and machine operative workers are expected to continue their trend of a decline and skilled trades and elementary occupations are also projected to lose workers. Thus, over the longer-term the industry is expected to continue to be one dominated by manager and professional occupations, a feature since the turn of the millennium.

In addition to the requirement for higher level skills, the workforce planning model for water estimates\textsuperscript{105} that between 1,100-1,600 employees will be required every year by the industry over the period 2008-24 to replace those leaving through natural wastage, retirements, and also those needed as a result of backfilling and growth. There will be a total requirement of 23,336 over the 17 year period (roughly equating to an average of 1,372 per year) with 47.2\% required at Level 2, 34.8\% at Level 3, 14\% at Level 4, and 4\% at Level 5.

Population growth in the UK is driving demand for both services and structures. Regulation is also providing employment for the sewage industry, which has declined modestly in employment terms since the late 1990s. Infrastructure improvements to an ailing network and response to flooding may lie behind the pick-up in 2006 of employment in the industry, though it is too early to determine this for sure. The extent to which the industry can fund improvements is critical to whether employment can rise in the medium-term (though much of the work may well be outsourced to the construction sector).

The PCR determination for England and Wales in 2009 will have considerable impact on the industry over the next five years. It is likely that the industry will be faced with considerable challenges in ensuring it skills levels and competencies are maintained whilst developing the sustainability of the industry through increased efficiencies, replacement of infrastructure and the development of ‘greener’ technologies.

\textsuperscript{104} Oxford Economics, (June 2008), Workforce and Qualification Forecasts.

\textsuperscript{105} The estimates are based on reported wastage and a 0\% growth rate assumption.
7.5.2 Likelihood of occurrence

The replacement demand caused by the ageing workforce and the imminent retirement of existing workers is inevitable. Similarly, the development and implementation of new technologies and existing infrastructure renewal are unavoidable. The prognosis for the key trends highlighted above, therefore, is rated as high.

The outcome of the PCR is critical in what happens next in the industry in relation to investment in skills. The outcome could prevent the early investment in skills, with competition for investment from infrastructure renewal and new technologies. This could have serious consequences for the industry as it would continue to face the loss of critical skills and knowledge, leading to inefficient management of the industry.

7.5.3 The implications for skills

Increasing competition, innovation, and rising consumer demand will require organisations to become more lean and efficient in their operations. This may require a step change in the type of skills required with a drive for higher level skills to develop innovative products and services and increased dependency on customer facing skills.

Similarly, meeting carbon reduction targets will require a significant increase in innovative products and systems. This will impact on the industry and the need to attract, develop and recruit appropriate higher skilled staff.

All of this will only be possible if the capacity of provision is geared towards addressing increasing workforce requirements. There are some early indications that capacity will need to expand to cope with anticipated demand and the situation will need to be monitored carefully to avoid any gaps.

Regulatory funding will allow companies to invest in skills to address the urgent replacement-demand needs. However, the funding will need to be allocated in the most effective way to ensure gaps in skills are being addressed and having a positive effect on the industry.

Ultimately, the worst case scenario is that the potential lack of appropriate skills will lead to a reduction in water quality, an increase in service incidents and potential pollution incidents to our water courses.

In summary, this will require the industry to:

- Place more emphasis on workforce planning to highlight and address age profile issue;
- Raise the profile of the industry to attract employees;
- Focus on developing the higher level skills needs of the industry;
- Forecast the skills needs for new and emerging technologies and develop skills products to meet demand;
- Increase training capacity across the industry;
- Influence the economic regulator to take account of skills needs in the five-year PCR cycle.
For each industry, an action plan has been developed. These action plans relate to the five strategic objectives in EU Skills’ Strategic Plan. Within each industry’s action plan, there are core elements of delivery that support our strategic objectives.

These are:

- Employer engagement to drive intelligence gathering through the application of the workforce planning model and strategic collaborative action.

- Qualifications and skills development pathways that open up the market for skills so that businesses can evidence this investment, and also show an industry-wide approach to competence including license to operate and endorsement of approved training and bespoke qualifications.

- Quality and capacity of training provision that is sufficient to meet the needs of the sector.

EU Skills’ Strategic Plan 2009 – 2012 identifies five strategic objectives to drive action to address the issues the sector faces. These five strategic objectives and the supporting deliverables are being delivered within the context of each of our industries. Detailed in this section at 7.2 – 7.5 is an industry action plan for each of gas (transmission & distribution), gas (utilisation), power (including renewables), waste management and water.

8.1 Core elements of delivery

Within each industry action plan, there are core elements of delivery that support our strategic objectives. These are:
**Employer engagement** - intelligence and collaborative action driven through our industry groups will increasingly provide a strategic basis for employer leadership in EU Skills’ activities. Action plans determine the agreed action for each industry with our workforce planning model providing data and intelligence to support effective collaboration. We have translated the workforce planning model into a technology based tool that will enable employers to forecast their long-term skills needs. We have collated data for the gas (transmission & distribution), power and water industries. We will prioritise the further development and roll-out of the model over a three year term.

**Qualifications and skills development pathways** - the sector historically has focused on competence for its workforce, vital in a safety conscious and highly regulated sector. This focus has not necessarily been evidenced by the uptake of recognised National Vocational Qualifications. However, where employers have found the vocational market slow, bureaucratic and unresponsive, they have invested in in-house training and bespoke qualifications.

We are keen to open up the market for skills so that businesses can evidence this investment, and also show an industry wide approach to consistent competence that allows the industry to operate and compete on a level playing field. In our view, this market for skills does not solely relate to qualifications, but may include; registration of competence (licence to operate); endorsement of approved training; and endorsement of bespoke qualifications.

In addition, the young person’s agenda through work on the new 14-19 Diplomas and ongoing development of Apprenticeship frameworks for all ages is a key strand of our approach to qualifications development.

**Training provision** - the NSAP, driven by key employers in the power industry, will have a significant impact on training provision. It will create a strong platform for the industry to deliver real solutions to its skills issues and a tool for governments across the UK to work closely with the industry. Addressing the quality and capacity of training provision is critical, as is employer collaboration and leadership.

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106 Although National Skills Academies are an English initiative, the NSAP Board has agreed an aspiration to develop the model across the UK.
<table>
<thead>
<tr>
<th>Action</th>
<th>What progress has been made to-date?</th>
<th>What action is required by employers, government/s or other stakeholders</th>
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</thead>
<tbody>
<tr>
<td>Apply the workforce planning model to collate skills data and deliver industry skills intelligence</td>
<td>An early version of the model was used to support the business case made to Ofgem at the time of the PCR earlier this year. The approach led to a PCR allowance of £80m for skills investment.</td>
<td>Employers are being engaged to participate in a roll-out of the latest workforce planning model, including where possible their alliance contractors in the spring of 2010.</td>
</tr>
<tr>
<td>Facilitate a strategic, collaborative view of skills needs across the industry to drive delivery</td>
<td>Minimal progress to-date on a collaborative basis, although good progress has been made on some aspects such as a replacement qualifications framework for introduction in 2010.</td>
<td>Potential support from Ofgem and the HSE for collaboration will facilitate progress. EU Skills will continue to work with individual employers as necessary.</td>
</tr>
<tr>
<td>Support the industry forum and create the tools the industry needs to address its skills needs</td>
<td>Two fora are established: one is operated by the Networks themselves (the Gas Network Collaboration Forum GNCF) and deals with operational issues; the other (Network Forum) is chaired by EU Skills and deals with skills and related issues.</td>
<td>Employers need to continue to support these fora, with EU Skills facilitating the outcomes through practical application and sourcing funding as appropriate.</td>
</tr>
<tr>
<td>Understand the industry’s performance against the economic regulator’s expectations</td>
<td>Each regulated asset owner has developed plans and approaches to meet their PCR allowance requirements.</td>
<td>Support from Ofgem to encourage sharing and increased collaboration.</td>
</tr>
<tr>
<td>Develop an employer supported approach to the confirmation of competency</td>
<td>Good progress made through collaboration with networks, utilisation employers, Gas Safe Register and HSE. New structure for competence standards setting has been agreed, with EU Skills established as the body to determine the requirements for registration.</td>
<td>Continued employer support needed. Gas Safe Register to undertake wide-ranging competence review in 2010.</td>
</tr>
<tr>
<td>Develop a modular suite of competence units to sit within the UK credit frameworks</td>
<td>NOS units submitted and approved. Engagement with awarding bodies underway to create new qualification framework.</td>
<td>Awarding body support is essential, as is continued employer support. UKCES support for new QCF will be needed for implementation.</td>
</tr>
<tr>
<td>Create new entry/ upskilling pathways, with training capacity and funding</td>
<td>New Supervisor Programme developed. Safety, Health and Environment Passport is now well established and successful.</td>
<td>Employer participation in and funding body support of, appropriate initiatives. HSE support for new innovations.</td>
</tr>
<tr>
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<tr>
<td>Provide an endorsement framework to improve training quality</td>
<td>Framework in place with first programmes recognised and operational.</td>
<td>Asset owner support is essential. HSE support would also help wider roll-out.</td>
</tr>
<tr>
<td>Develop a training supply strategy to increase both quality and capacity of provision</td>
<td>Linked to previous action but lower priority at this stage.</td>
<td>Wider implementation planned for 2010.</td>
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8.3 Gas (Utilisation)

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<th>Action</th>
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<tr>
<td>Apply the workforce planning model to collate skills data and deliver industry skills intelligence</td>
<td>Draft implementation plan in development, with in-principle agreement with Gas Safe Register to assist with the supply of existing data.</td>
<td>Gas Safe Register support will be essential given demographic spread of businesses and SMEs.</td>
</tr>
<tr>
<td>Facilitate a strategic, collaborative view of skills needs across the industry to drive delivery</td>
<td>New Strategic Management Board and supporting structure is now in place involving EU Skills, SummitSkills, HSE, Gas Safe Register and awarding bodies.</td>
<td>Support from Gas Safe Register and HSE essential for successful implementation.</td>
</tr>
<tr>
<td>Increase the strategic engagement of employers including SMEs</td>
<td>New Consultation Forum has been established with representation from all sections of industry. This forum is chaired by an employer.</td>
<td>Employer support and participation is essential. Support of Gas Safe Register and HSE also important.</td>
</tr>
<tr>
<td>Support and facilitate the industry forum and create the tools the industry needs to deliver its skills needs</td>
<td>In addition to the new Forum above, the existing Industry Liaison Group (ILG) continues with revised terms of reference to reflect the new overall structure.</td>
<td>Participation and involvement of employers from all sections of the industry is essential.</td>
</tr>
<tr>
<td>Develop an employer supported approach to the confirmation of competency</td>
<td>EU Skills established as the body to determine, through consultation with industry, the competence standards for registration.</td>
<td>Support of HSE and Gas Safe Register essential.</td>
</tr>
<tr>
<td>Develop a modular suite of competence units to sit within the UK credit frameworks</td>
<td>New phase one NOS submitted for approval with Phase Two planned. Awarding bodies involved in development of new QCF units.</td>
<td>UKCES approval of NOS essential. Awarding Body collaboration also key and has been positive to-date.</td>
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<tr>
<td>Act as a standard setting body for the Gas Safe Register working with Capita</td>
<td>Established through Contractual Agreement signed by EU Skills in October 2009. New structure and processes have been established and are operational, although at early stages.</td>
<td>Support of HSE, Gas Safe Register, SummitSkills and awarding bodies essential. Employer participation and involvement also critical.</td>
</tr>
<tr>
<td>Create new entry/upskilling pathways, with training capacity and funding</td>
<td>Two new potential entry routes supported and in final stages of development.</td>
<td>Support of HSE, Gas Safe Register, SummitSkills and awarding bodies essential. Employer participation and involvement is also critical.</td>
</tr>
<tr>
<td>Provide a learning recognition framework to improve quality training</td>
<td>The framework has been established and is operational.</td>
<td>Initiative needs wider dissemination across the gas (utilisation) industry. All stakeholder involvement and support will be essential.</td>
</tr>
<tr>
<td>Develop a training supply strategy to increase both quality and capacity of provision</td>
<td>A strategic approach to training provision across the industry is in the development stage.</td>
<td>All stakeholders’ participation and support will be needed to achieve successful outcome.</td>
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8.4 Power

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<th>What progress has been made to-date?</th>
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<tr>
<td>The development, utilisation and maintenance of an effective workforce planning tool and analysis of the skills issues facing the industry over the next 20+ years</td>
<td>Workforce planning model developed and data from over 50% of industry inputted. Analysis of outputs have informed the DPCR5 process and the development of the NSAP.</td>
<td>Employer participation is essential to the success of the model and the quality of the outputs.</td>
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| The development of industry-wide thinking on the development of craft, technical and engineering skills in light of new technology and new demands in generation, transmission, distribution, metering and renewables | PSSSG Stakeholder Influence Working Group will lead this activity.  
Foresight research has commenced and a project to embed 'future thinking' is in development.                                                                                                                                  | Employer, government and stakeholder input will be central to the production of foresight and scenario development.                                                                                           |
| A continued focus on how best we can jointly promote attractive careers in the power sector | PSSSG Marketplace for Skills will lead this activity – A sector attractiveness strategy has been developed along with a high-level action plan; both of which will be delivered through the NSAP.  
Sector value proposition work has started.                                                                                                                                         | Partnerships between all parties (e.g. employers, stakeholders, government(s), education providers, careers guidance, parents) need to be identified and established – all have a role to play in promoting the power industry as an attractive career option. |
| The development of education, training and retraining activities for the industry across the UK in conjunction with the NSAP and the Power Academy | NSAP Business Plan is in its final stages of development.                                                                                                                                                                               | LSC to accept business plan and fund NSAP and stakeholders in Northern Ireland, Scotland and Wales to agree how best to address training capacity and quality.                                           |
| The development of relevant standards, qualifications and career progression routes in conjunction with EU Skills, educational establishments and training providers | PSSSG Skills Frameworks Working Group has been tasked with delivering this action (in conjunction with the NSAP).  
Significant progress has been made in all power sector industries over last 12 months to develop occupational and functional maps, NOS and qualification frameworks. | Employers, educational institutions, training providers and awarding bodies to work collaboratively to develop appropriate standards and qualifications.                                                                 |
| An increased focus on how best the industry improves its attractiveness to traditionally under-represented groups to develop a more diverse workforce | An Equality and Diversity Strategy has been developed that will be delivered through NSAP.                                                                                                                                                | All stakeholders to ensure that promotional activities are appropriate for all sections of the community.  
Employers to ensure that their working and training practices are 'diversity friendly'.                                                                                                              |
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<tr>
<td>Detailed assessment of the skills required by the industry to complete planned investment programmes, including an assessment of training requirements in IT, commercial awareness and management of staff</td>
<td>This work is being undertaken by the PSSSG Stakeholder Influence Working Group.</td>
<td>Employer, government and stakeholder input will be central to the production of skills assessments.</td>
</tr>
<tr>
<td>Input into the Ofgem review of both distribution and transmission charges (DPCR5 and TPCR5 respectively) and the overall review of regulation</td>
<td>Successful DPCR5 initial proposals on skills resourcing for distribution networks have been made as a direct consequence of our activity on this key priority. A review of RPI-X@20 is underway in the PSSSG Stakeholder Influence Working Group.</td>
<td>Employer support and input into the review.</td>
</tr>
<tr>
<td>Improving the profile of energy policy and the importance of a coherent long-term skills policy and influencing all major political stakeholders</td>
<td>PSSSG evidence materials and a storyboard has been produced. High focus on lobbying and stakeholder influence through NSAP Business Plan development.</td>
<td>Employers to support the production of materials. Stakeholders to be receptive to approaches from, and on behalf, of the industry.</td>
</tr>
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</table>

### 8.4.1 Renewable energy

The following table sets out the strategic actions as identified to support the renewable energy industry and are, in the main, linked to the work of British Wind Energy Association (BWEA) at his stage.

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<tbody>
<tr>
<td>The development, utilisation and maintenance of an effective workforce planning model and analysis of the skills issues facing the industry over the next 20+ years</td>
<td>Workforce planning model to be extended to include large-scale renewable energy and a data gathering exercise to commence. Analysis of outputs will inform the National Skills Academy for Power Business Plan.</td>
<td>Employer participation is essential to the success of the model and the quality of the outputs and links with BWEA will be critical.</td>
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</tr>
<tr>
<td><strong>The development of industry-wide thinking on the development of craft, technical and engineering skills in light of new technology and new demands in generation, transmission, distribution, metering and renewable energy</strong></td>
<td>Continue to work with BWEA on an occupational and functional map, National Occupational Standards and qualifications linking into their Skills and Education Strategy Group (SESG) and sub-groups as outlined in the Skills Accord.</td>
<td>Engage with BWEA’s SESG and expand employer engagement across the industry.</td>
</tr>
<tr>
<td><strong>The development of a cross-sector, four nation Renewable Energy Skills Strategy (RESS)</strong></td>
<td>Work collaboratively with relevant SSCs/ SSBs on the development of a UK-wide Renewable Energy Skills Strategy.</td>
<td>SSC/ SSB, government and employer input will be central to delivering the RESS and the development of foresight and scenario development.</td>
</tr>
<tr>
<td><strong>A continued focus on how best we can jointly promote attractive careers in the power industry</strong></td>
<td>Develop links between BWEA, their Sector Recruitment and Attractiveness sub-group and their Skills Accord with the work of the PSSSG’s Marketplace for Skills sub-group.</td>
<td>Partnerships between all parties (e.g. employers, stakeholders, government(s), education providers, careers guidance, parents, etc.) need to be identified and established – all have a role to play in promoting the power industry as an attractive career option.</td>
</tr>
<tr>
<td><strong>The development of education, training and retraining activities for the sector across the UK in conjunction with the National Skills Academy for Power (NSAP) and the Power Academy</strong></td>
<td>Continue to work with BWEA and the wider industry to develop appropriate interventions. Work with NSAP to establish an implementation plan for the Wind Turbine Operation and Maintenance Apprenticeships across the UK.</td>
<td>As above</td>
</tr>
<tr>
<td>Action</td>
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</table>
| The development of relevant standards, qualifications and career progression routes in conjunction with EU Skills, educational establishments and training providers | Work with BWEA in the development of additional routes within the Renewable Energy Apprenticeship Programme identified in the OFM workstream.  
Links with the PSSSG Skills Frameworks Working Group established to deliver this action (in conjunction with the NSAP).  
Significant progress has been made in the wind industries over last six months to develop Occupational and Functional Maps, National Occupational Standards and qualification frameworks. | As above                                                                 |
| An increased focus on how best the industry improves its attractiveness to traditionally under-represented groups to develop a more diverse workforce | Developing links between BWEA’s Skills Accord and the Equality and Diversity Strategy which has been developed and will be delivered through NSAP. | As above                                                                 |
| Detailed assessment of the skills required by the industry to complete planned investment programmes, including an assessment of training requirements in IT, commercial awareness and management of staff | This work is being undertaken as part of the ongoing renewable energy OFM and aligns with stakeholder commitment to support the Skills Accord. | As above                                                                 |
| Improving the profile of energy policy and the importance of a coherent long-term skills policy and influencing all major political stakeholders | BWEA’s SESG now linking with the PSSSG and evidence materials and a storyboard to be produced.  
High focus on lobbying and stakeholder influence through NSAP Business Plan development. | As above                                                                 |
### 8.5 Waste management

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</thead>
<tbody>
<tr>
<td>Workforce planning model for waste management industry</td>
<td>The introduction of concept of the model has been made to employers.</td>
<td>Commitment, by employers, to develop a workforce planning model for the waste management industry. EU Skills Members only in the first instance.</td>
</tr>
<tr>
<td>Develop solutions to address skills needs for new technologies</td>
<td>Research has been undertaken into the likely demand for waste management engineering Apprenticeships.</td>
<td>EU Skills to work with employers to quantify and qualify requirements for an Apprenticeship. EU Skills to engage with National Apprenticeship Service (NAS) and other stakeholders to promote and explore funding opportunities.</td>
</tr>
<tr>
<td>Sector attractiveness and recruitment</td>
<td>Research has indicated that this is a key area of concern. Development of draft Waste and Recycling Apprenticeship Framework has begun.</td>
<td>All stakeholders to work towards developing attractive recruitment opportunities (e.g. Apprenticeships).</td>
</tr>
<tr>
<td>Implementation of Competence Management System (CMS) for industry. Need to ensure the regulator, the Environment Agency (EA), is involved with the process to ensure its sustainability</td>
<td>The CMS has been approved by Defra and Welsh Assembly Government as a scheme to demonstrate technical competence for environmental permitting conditions.</td>
<td>Lobby the EA to ensure the CMS is a viable and sustainable alternative for demonstrating technical competence.</td>
</tr>
<tr>
<td>Work to address the industry’s poor health and safety record</td>
<td>Development of a suite of interactive health and safety CDs focussed upon the high risk occupational areas. Development of a waste management safety registration scheme (waste management SHEA).</td>
<td>To work towards the adoption of the registration scheme industry-wide and incorporating the health and safety CDs to be part of it. Work with HSE to explore how this scheme can be embraced by the whole industry.</td>
</tr>
<tr>
<td>Development of a senior engagement mechanism within the waste management industry, to help identify skills needs and manage priorities</td>
<td>Establishment of Waste Industry Skills Initiative (WISKI); comprised of senior management level representatives from across the private industry.</td>
<td>EU Skills and employers to explore options for broadening WISKI Membership to include public sector and third sector representatives.</td>
</tr>
</tbody>
</table>
### 8.6 Water

<table>
<thead>
<tr>
<th>Action</th>
<th>What progress has been made to-date?</th>
<th>What action is required by employers, government/s or other stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing the workforce planning model to embrace the supply chain and regional models</td>
<td>The model has been used with companies at a national level to inform price control review submissions. Some water companies have agreed to participate in regional pilots from late-2009.</td>
<td>Government acceptance and understanding of the model is required to inform and support policy and funding strategies. Employers need to maintain their commitment to ensure the currency and accuracy of the model data and outputs.</td>
</tr>
<tr>
<td>Understanding and building the training capacity for higher level skills and Apprenticeship structures</td>
<td>Bids submitted to Higher Education Funding Council for England (HEFCE) for the development of a higher skills consortium. On-going discussions with BIS to secure funding. Bid submitted to LSC to develop pilot Group Training Association and Apprenticeship Training Agency. Discussions to be held between National Apprenticeship Service and EU Skills to discuss how we move forward in building these models.</td>
<td>Support from HEFCE and BIS is required in order to establish consortium in line with government policy. Employers need to demonstrate their commitment to the consortium though both financial and in-kind support.</td>
</tr>
<tr>
<td>Establish the future direction of EUSR</td>
<td>A review of EUSR was launched in November 2009.</td>
<td>Government needs to understand the role that EUSR has in demonstrating competence outside the qualification framework and should accept it as part of the UK funding strategy for vocational training. Employers need to maintain their involvement and leadership in the on-going development of EUSR.</td>
</tr>
<tr>
<td>Building upon the industry action planning process to establish senior level engagement, national and local planning and setting key performance indicators.</td>
<td>On-going discussion with Water Industry Skills Steering Group (WISSG) and Water UK to develop the most appropriate engagement model for the water industry.</td>
<td>WISSG and Water UK have to accept their strategic role and potential involvement to ensure a joined-up approach to the skills agenda within the UK and water industry. Government and regional stakeholders need to recognise how these action plans can be reflected within their own strategies and plans.</td>
</tr>
<tr>
<td>Action</td>
<td>What progress has been made to-date?</td>
<td>What action is required by employers, government/s or other stakeholders</td>
</tr>
<tr>
<td>--------</td>
<td>------------------------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>Development of an industry skills funding strategy</td>
<td>The development of an EU Skills funding and influence strategy is in its early stages.</td>
<td>A clear agreed approach is needed between EU Skills, our employers and all governments on how investment in skills in the UK water industry can be appropriately funded and supported. Government and regional agencies should agree to develop joint funding strategies with EU Skills and our employers. Employers need to provide robust data to ease the forecasting difficulties and improve budget allocations.</td>
</tr>
<tr>
<td>Maintaining the skills frameworks, such as competent operator, CMS and developing further qualifications to meet industry need identified through a skills mapping tool</td>
<td>The development of a standards and qualification plan for 2010/12 will be produced by December 2009.</td>
<td>Clear financial support for EU Skills in required in order to implement the identified programme. Employers need to maintain their commitment to release staff to contribute to effective Working and Development Groups.</td>
</tr>
</tbody>
</table>
ANNEX A

Standard Industrial Classification (2003 and 2007)

Based on the description of the sector within this SSA, the complete list of relevant SIC 2003 and SIC 2007 codes, on which research is based, is set out in the table below:

<table>
<thead>
<tr>
<th>SIC 2003 Codes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>37.10</td>
<td>Recycling of metal waste and scrap</td>
</tr>
<tr>
<td>37.20</td>
<td>Recycling of non-metal waste and scrap</td>
</tr>
<tr>
<td>40.11</td>
<td>Production of electricity</td>
</tr>
<tr>
<td>40.12</td>
<td>Transmission of electricity</td>
</tr>
<tr>
<td>40.13</td>
<td>Distribution and trade of electricity</td>
</tr>
<tr>
<td>40.21</td>
<td>Manufacture of gas</td>
</tr>
<tr>
<td>40.22</td>
<td>Distribution and trade of gaseous fuels through mains</td>
</tr>
<tr>
<td>41.00</td>
<td>Collection, purification and distribution of water</td>
</tr>
<tr>
<td>60.30</td>
<td>Transport via pipelines</td>
</tr>
<tr>
<td>90.01</td>
<td>Collection and treatment of sewage</td>
</tr>
<tr>
<td>90.02</td>
<td>Collection and treatment of other waste</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIC 2007 Codes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.21</td>
<td>Manufacture of gas</td>
</tr>
<tr>
<td>35.22</td>
<td>Distribution of gaseous fuels through mains</td>
</tr>
<tr>
<td>35.23</td>
<td>Trade of gas through mains</td>
</tr>
<tr>
<td>35.11</td>
<td>Production of electricity</td>
</tr>
<tr>
<td>35.12</td>
<td>Transmission of electricity</td>
</tr>
<tr>
<td>35.13</td>
<td>Distribution of electricity</td>
</tr>
<tr>
<td>35.14</td>
<td>Trade of electricity</td>
</tr>
<tr>
<td>SIC 2007 Codes</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>38.11</td>
<td>Collection of non-hazardous waste</td>
</tr>
<tr>
<td>38.12</td>
<td>Collection of hazardous waste</td>
</tr>
<tr>
<td>38.21</td>
<td>Treatment and disposal of non-hazardous waste</td>
</tr>
<tr>
<td>38.22</td>
<td>Treatment and disposal of hazardous waste</td>
</tr>
<tr>
<td>38.32</td>
<td>Recovery of sorted materials</td>
</tr>
<tr>
<td>39.00</td>
<td>Remediation activities and other waste management services</td>
</tr>
<tr>
<td>36.00</td>
<td>Water Collection, treatment and supply</td>
</tr>
<tr>
<td>37.00</td>
<td>Sewerage</td>
</tr>
<tr>
<td>49.50</td>
<td>Transport via Pipelines</td>
</tr>
</tbody>
</table>

### SIC CODES OF INTEREST

<table>
<thead>
<tr>
<th>Industry</th>
<th>SIC codes and description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas (Transmission &amp; Distribution)</td>
<td>SIC2003 51.51, <em>Wholesale of solid, liquid and gaseous fuels and related products</em> relates to the sale and distribution of LPG while SIC2003 51.55 covers the <em>Wholesale of Chemical Products</em>. However, these codes also cover a wide range of other activities outside of EU Skills’ remit making them inappropriate for inclusion in the core sector definition. SIC2007 codes allow for further analysis of trade and distribution.</td>
</tr>
<tr>
<td>Gas (Utilisation)</td>
<td>The main source of data is the Gas Safe database of registered gas installers. Where this source has been unable to provide the data needed (e.g. when looking at skills needs) SIC2003 45.33, <em>Plumbing</em> has been used as a proxy (even though SummitSkills SSC has overall responsibility for this SIC code).</td>
</tr>
<tr>
<td>Industry</td>
<td>SIC codes and description</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Power</td>
<td>The operation of nuclear power stations is outside of our remit and is the responsibility of Cogent SSC. However, there will be some overlap between the occupations employed in nuclear power stations and those employed in other areas of electricity generation, particularly in terms of connecting to the national grid. There is no SIC code specifically relating to the generation of electricity through renewable energy sources. It is included within the overall production of electricity, SIC 2003 40.11, Production of electricity. Activities related to the erection of electricity overhead line transmission towers that are sub-contracted out are likely to be covered by SIC 2003 45.25, Other construction work involving special skills. However, this code also covers a wide range of other activities outside of EU Skills’ remit making it inappropriate for inclusion in the sector definition. SCI 2007 allows for separation of distribution from the trade of electricity.</td>
</tr>
<tr>
<td>Waste Management</td>
<td>SIC 2003 45.11, Site preparation – a significant proportion of all waste produced within the UK is from the construction industry. However, it is extremely difficult to estimate the proportion of employees employed solely on this activity. Also, as it is believed that many of the specialist contractors who undertake this activity will be classified within SIC 2003 90.02, it has been decided to exclude this code from the core sector definition.</td>
</tr>
<tr>
<td>Water</td>
<td>SIC codes that are also of interest to EU Skills are 40.30, Steam and hot water supply and 45.24, Construction of water projects (e.g. marinas, dams, etc.). However, as these activities lie at the periphery of the core industry and employ relatively few employees (circa 3,000 between them) they are not included in the core footprint definition.</td>
</tr>
<tr>
<td>Industry</td>
<td>SIC codes and description</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Network construction contractors</td>
<td>Many of the installation, repair and maintenance activities of the power, gas and water network asset owners (e.g. National Grid, British Gas, etc.) are carried out by contractors. In many cases, the same contractor base also operates within the telecommunications industry, laying ducts, cables, etc so it is difficult to ascertain their skills levels in relation to our sector. As there is no specific SIC code relevant to these activities, it is extremely difficult to get skills data from national surveys. Network contractors are the biggest single mismatch between our contractual and actual sector definitions.</td>
</tr>
<tr>
<td>Manufacturers, wholesalers and retailers</td>
<td>While we have no direct accountabilities for the skills issues affecting equipment manufacturers, wholesalers or retailers, we recognise that there may be a proportion of this workforce that do fall within EU Skills’ remit (e.g. installers and fitters). Therefore, while no particular account is taken of these employers’ skills and competency requirements, they are often involved in activities, groups and consultations in terms of market forecasts and the associated demand for a skilled and competent workforce.</td>
</tr>
<tr>
<td>Trade and supply of services</td>
<td>An inherent problem with any definition of EU Skills’ sector and its industries is the inclusion, or otherwise, of occupations such as customer services, supply, billing and metering reading. These activities can be either undertaken ‘in-house’ or outsourced to a third party, depending upon the business strategy of the individual organisations. Where these activities are undertaken in-house, by a directly employed workforce, they would generally be included within the workforce estimates (as it is not possible to separate them out from the industry-specific, ‘technical’ occupations). However, throughout the rest of the report their skills needs are not considered as EU Skills is unlikely to play any practical role in terms of their skills development.</td>
</tr>
</tbody>
</table>


Throughout this report, references are made to occupations and occupational groupings; these are defined by SOC 2000. Each occupational group (e.g. professionals) contains a cluster of occupations which, generically, require a similar level of skill and operate at a similar level. These generic categories of occupations are used for macro-level analytical purposes.
Examples of occupations within each group which are relevant to the work of EU Skills’ are:

1. **Managers and Senior Officials** – e.g. production managers, functional managers, etc. These provide strategic direction and co-ordination to the business and/or are responsible for the operation of specific functions. Significant knowledge and experience is needed.

2. **Professionals** – e.g. chemists, biochemists, physicists, civil engineers, mechanical engineers, electrical engineers, chemical engineers, design engineers, etc. These employees are highly skilled (degree or equivalent) in a particular field of expertise and often apply extensive theoretical knowledge.

3. **Associate Professionals and Technical** – e.g. electrical technicians, engineering technicians, building and civil engineering technicians, draughtspersons, etc. These roles require experience and knowledge of principles and practices necessary to assume operational responsibility and to give technical support to Professionals and Managers and Senior Officials.

4. **Administrative and Secretarial** – e.g. secretaries, receptionists, credit controllers, book-keepers, stock control clerks, telephonists, etc. A good standard of general education is required, while certain occupations require further additional vocational training or professional occupations to a well-defined standard.

5. **Skilled Trades** – e.g. welders, pipe fitters, tool makers, production and maintenance fitters, electrical fitters, telecommunications engineers, lines repairers and cable jointers, plumbers, etc. These roles involve performing complex physical duties that normally require a degree of initiative, manual dexterity and other practical skills. The main tasks of these occupations require experience with, and understanding of, the work situation, the materials worked with and the requirements of the structures, machinery and other items produced. Most occupations in this major group have a level of skill commensurate with a substantial period of training, often provided by means of work-based training programme.

6. **Personal Service** – involves the provision of a service to customers, whether in a public protective or personal care capacity. There are no occupations in this group which are relevant to the EU Skills footprint. Therefore, this group is largely excluded from the analysis.

7. **Sales and Customer Service** – e.g. telephone salespersons, call centre operators, customer care occupations, etc. These occupations require the knowledge and experience necessary to sell goods and services, accept payment in respect of sales, and provide information to potential clients and additional services to customers after the point of sale.
8. **Process, Plant and Machine Operatives** – e.g. energy plant operatives, substation attendant, water and sewage plant operatives, sewermen, turncock, riggers, HGV/lorry/tanker drivers, mobile machine drivers, etc. These roles require the knowledge and experience necessary to operate and monitor industrial plant and equipment and to drive and assist in the operation of various transport vehicles and other mobile machinery. Most occupations in this group do not specify that a particular standard of education should have been achieved but will usually have an associated period of formal experience related training. Some occupations require licences issued by statutory or professional bodies.

9. **Elementary** – e.g. labourers, recycling operative, refuse collector, etc. These occupations require the knowledge and experience necessary to perform mostly routine tasks, often involving the use of simple hand-held tools and, in some cases, requiring a degree of physical effort. Most do not require formal educational qualifications but will usually have an associated short period of formal experience-related training.

The SOC 2000 codes for which EU Skills has exclusive responsibility are:

<table>
<thead>
<tr>
<th>SOC 2000 code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1235</td>
<td>Recycling and refuse disposal managers</td>
</tr>
<tr>
<td>2123</td>
<td>Electrical engineers</td>
</tr>
<tr>
<td>3112</td>
<td>Electrical &amp; electronic technicians</td>
</tr>
<tr>
<td>5243</td>
<td>Lines repairers and cable jointers</td>
</tr>
<tr>
<td>8124</td>
<td>Energy plant operatives</td>
</tr>
<tr>
<td>8126</td>
<td>Water and sewerage plant operatives</td>
</tr>
<tr>
<td>9235</td>
<td>Refuse and salvage occupations</td>
</tr>
</tbody>
</table>
The occupations for which EU Skills has primary responsibility (a leadership role) are:

<table>
<thead>
<tr>
<th>SOC 2000 code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1121</td>
<td>Production works &amp; maintenance managers</td>
</tr>
<tr>
<td>1123</td>
<td>Managers in mining and energy</td>
</tr>
<tr>
<td>5216</td>
<td>Pipe fitters</td>
</tr>
<tr>
<td>5249</td>
<td>Electrical &amp; electronics engineer n.e.c.</td>
</tr>
<tr>
<td>5314</td>
<td>Plumbing, heating &amp; ventilating engineers</td>
</tr>
<tr>
<td>8119</td>
<td>Process operatives n.e.c.</td>
</tr>
<tr>
<td>8129</td>
<td>Plant and machine operatives n.e.c</td>
</tr>
<tr>
<td>9139</td>
<td>Laboratory process &amp; plant operations nec</td>
</tr>
</tbody>
</table>

The occupations for which EU Skills has a shared responsibility with other SSCs/sector bodies are:

<table>
<thead>
<tr>
<th>SOC 2000 code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1112</td>
<td>Directors &amp; chief execs of major organisations</td>
</tr>
<tr>
<td>1134</td>
<td>Managers in construction</td>
</tr>
<tr>
<td>1136</td>
<td>Info &amp; communication technology managers</td>
</tr>
<tr>
<td>1137</td>
<td>Research and development managers</td>
</tr>
<tr>
<td>1141</td>
<td>Quality assurance managers</td>
</tr>
<tr>
<td>1142</td>
<td>Customer care managers</td>
</tr>
<tr>
<td>1161</td>
<td>Transport and distribution managers</td>
</tr>
<tr>
<td>1162</td>
<td>Storage and warehouse managers</td>
</tr>
<tr>
<td>1212</td>
<td>Natural environment and conservation managers</td>
</tr>
<tr>
<td>1231</td>
<td>Property housing and land managers</td>
</tr>
<tr>
<td>2111</td>
<td>Chemists</td>
</tr>
<tr>
<td>2112</td>
<td>Bio scientists and biochemists</td>
</tr>
<tr>
<td>2113</td>
<td>Physicists geologists &amp; meteorologists</td>
</tr>
<tr>
<td>SOC 2000 code</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>2121</td>
<td>Civil engineers</td>
</tr>
<tr>
<td>2122</td>
<td>Mechanical engineers</td>
</tr>
<tr>
<td>2124</td>
<td>Electronics engineers</td>
</tr>
<tr>
<td>2125</td>
<td>Chemical engineers</td>
</tr>
<tr>
<td>2126</td>
<td>Design and development engineers</td>
</tr>
<tr>
<td>2127</td>
<td>Production and process engineers</td>
</tr>
<tr>
<td>2128</td>
<td>Planning and quality control engineers</td>
</tr>
<tr>
<td>2129</td>
<td>Engineering professionals n.e.c.</td>
</tr>
<tr>
<td>2422</td>
<td>Scientific researchers</td>
</tr>
<tr>
<td>2433</td>
<td>Quantity surveyors</td>
</tr>
<tr>
<td>3111</td>
<td>Laboratory technicians</td>
</tr>
<tr>
<td>3113</td>
<td>Engineering technicians</td>
</tr>
<tr>
<td>3114</td>
<td>Build &amp; civil engineering technicians</td>
</tr>
<tr>
<td>3115</td>
<td>Quality assurance technicians</td>
</tr>
<tr>
<td>3119</td>
<td>Science &amp; eng technicians n.e.c.</td>
</tr>
<tr>
<td>3539</td>
<td>Business &amp; related associated professions nec.</td>
</tr>
<tr>
<td>3551</td>
<td>Conservation &amp; environmental protection officers</td>
</tr>
<tr>
<td>3568</td>
<td>Environmental health officers</td>
</tr>
<tr>
<td>5215</td>
<td>Welding trades</td>
</tr>
<tr>
<td>5224</td>
<td>Metal working production &amp; maintenance fitter</td>
</tr>
<tr>
<td>5241</td>
<td>Electricians &amp; electrical fitters</td>
</tr>
<tr>
<td>5319</td>
<td>Construction trades n.e.c.</td>
</tr>
<tr>
<td>8114</td>
<td>Chemical and related process operatives</td>
</tr>
<tr>
<td>8133</td>
<td>Routine inspectors and testers</td>
</tr>
<tr>
<td>SOC 2000 code</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>8138</td>
<td>Routine laboratory testers</td>
</tr>
<tr>
<td>8219</td>
<td>Construction operatives n.e.c.</td>
</tr>
<tr>
<td>8229</td>
<td>Mobile machine drivers &amp; operatives</td>
</tr>
<tr>
<td>9129</td>
<td>Laboratory other construction trades n.e.c.</td>
</tr>
</tbody>
</table>
ANNEX B

Workforce planning model

Figure 37 below shows the proposed programme plan for the implementation of EU Skills’ workforce planning model across the four industries.

Figure 37: Workforce Planning Model proposed programme plan

It must be noted that this programme is only provisional at the time of writing and is subject to change following further discussions between EU Skills and industry representatives.