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An Investigation into the Skill Needs of the Renewable Energy Sector in North East England

LSC Northumberland

FINAL REPORT

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EXECUTIVE SUMMARY

In August 2005, a partnership of CURDS (University of Newcastle) and GHK Consulting were commissioned by LSC Northumberland on behalf of its regional LSC partners, to undertake an Investigation into the Current and Future Skills Needs of the Renewable Energy Sector in North East England.

Recent years have seen growing regional support for the emergent renewable energy sector - exemplified by the foundation of NaRec (the New and Renewable Energy Centre of Excellence) in Blyth, Northumberland in 2002 and the identification of the strategic potential of the sector by Northumberland Strategic Partnership. Building on an earlier scoping study of skill needs¹, and the subsequent pump-priming of regional skills provision through the TEC Legacy Fund², LSC Northumberland seek to identify and support potential or existing demand for renewable energy skills from regional businesses as part of their wider mission to drive forward demand-led provision of skills.

STUDY AIMS AND APPROACH

The aims of the project were:

- to assess the skill needs, including in to the future, of the renewable energy sector in North East England
- outline current learning provision in place to meet the demands of the sector
- assist in determining future learning provision and support to the renewable energy sector in North East England

The Study approach comprised two parallel strands of activity:

- a review and assessment of the skill needs of the renewable energy sector in North East England, including key informant interviews and a business survey; and,
- a stocktake of potential and existing learning and skills provision for renewable energy in the region through informant interview and document review.

Bringing the findings of each work strand together allowed subsequent analysis of the demand for, and provision of, renewable energy sector skills in North East England.

During the course of the Study, gaining substantial direct input from employers proved difficult, which led to a revision of the methodology and a key finding of the Study on the nature of the sector in the region (see below).

¹ CURDS (2002) The Skill Needs of the New and Renewable Energy Sector in Northumberland. Report to LSC Northumberland

² LSC Northumberland (2006) A Legacy for Success

FINDINGS

The Regional Demand for Skills in Renewable Energy

Growth in the regional renewable energy sector, linked to expanding market demand, has been less than expected in the past 3 years; the sector in the region remains nascent, comprising an estimated 60 firms with a measurable investment of resources in the sector and, at most, between 500-1000 FTEs (full time employees) in the region. **Currently, the aggregate quantitative regional demand for skills in the renewable energy sector remains low.**

The region has significant investment (or proposed investments) in the leading renewables markets of on-shore wind power and biomass and individual companies of international quality in a range of technologies (for example, photovoltaics, off-shore, grid integration). **The skills demand that exists is stratified by the stage of renewable technology (developmental, near to, or in, market) and the particular occupational profile and skills requirements associated with any one sub-market/technology.**

Regional growth reflects national experience. On a broad measure, the renewable energy sector was estimated to comprise only 5,500 FTE jobs in 2004 by the DTI. Major UK government and Devolved Administration initiatives are in place to support development of the market for renewable energy across a range of technologies and overcome barriers to growth including technical restrictions, issues of cost, regulatory (for example, planning), environmental and behavioural concerns. **Growth in market demand can be expected but the appropriate scale and type (industrial, domestic, technology) of demand, and consequent implications for skills demand, is difficult to establish.**

In December 2005, an Occupational and Functional Map of the Renewable Energy Sector was completed by the Energy&Utilities Sector Skills Council. **No major skill shortages were identified but within key occupations (mostly connected to traditional sectors) likely future skills issues were identified** - especially where these are already experiencing a strain on skilled resources. Table 1 (below) provides a summary of key occupations identified.

Of the few other studies in which the sector has articulated skills demands at a national or regional level (including this one) **demand for a broad range of skills** ranging from managerial and project development skills to engineering skills (electrical, mechanical, civil, marine) at professional, craft and technician levels to specialist skills such as installation including the 'offshore ticket' have been outlined.

Where employer demand has been articulated, **the skill demands of wind developers are foremost**, reflecting the sub-sector's position as the main economically scaleable renewable technology in the market at present.

Table 1: Key Occupations by Sub-Sector

Sub-Sector	Occupation
Biomass	Team Leaders, Rate of Burn Technologists, Electrical/Instrumentation Technician; mathematical modelling within IT Skills
Hydroelectric	Engineers – Mechanical, Electrical and Electronic; Civil Engineers (construction); low skilled manual workers
Photovoltaic	Electricians; Electricians with design skills
Solar	Carpenters, Plumbers, Electricians; Electricians with design skills
Geothermal	Electrical Engineers, Electricians; Electricians with design skills, Electronic Technicians; pipe and systems laying; mathematical modelling within IT skills
Heat pumps	Heat Pump Installers, Plumbers, Electricians
Wind	Service Engineers, Fabrication Engineers, Structural Engineers, Site Wardens, Installation Engineers (large scale)

Adapted from Table 1.1, Energy&Utility Skills (2005) Occupational and Functional Map of the UK Renewable Energy Sector

In summary, **the skills demand of the sector is characterised by a broad range of occupations and functions utilised within numerous specialist sub-sectors of low volume demand and with varying growth potential** at the present time. The picture, then, is highly complex.

Regional Learning Provision in Renewable Energy

Audit of regional learning provision provides a picture of a **wide range of courses available to students with a *potential* skill relevance** to the Renewable Energy sector.

A small number of regional courses purposely targeted at the Renewable Energy sector are identifiable. Though small in number, this provision constitutes the **framework of a regional ladder of learning in renewable energy**, although a number of rungs are in developmental or pilot stage.

Regional learning provision includes **innovative pilots of new provision at NVQ Level 2/3 in Biomass and Wind Energy which are of at least national, and possibly international, significance.**

CONCLUSIONS

On a national scale, the renewable energy sector remains both nascent and fragmented across sub-sectors driven by technological paradigm (wind, wave, solar, biomass, geo-thermal, etc.). **The sector presents a picture of complex low volume demand for both generic and specialist skills drawing substantially on traditional sectors such as engineering.** It is clear, nevertheless, that future demand is set to grow although articulating the nature of any such demand will require further work.

This picture of demand is replicated within North East England, but with particular sectoral development within wind energy and biomass. Whilst not comprehensive, this Study has found clear **evidence of employer demand for skills provision within the renewable specialisms of biomass and wind.**

Facilitated by TEC Legacy funding by LSC Northumberland, **new renewable energy learning and skills provision has been developed within North East England across qualification levels** to the extent that the framework of a ladder of learning within renewables is identifiable. Pilot provision at NVQ Level 2 and 3 of training in Biomass and Wind Energy is **of national and even international significance** with further developments in the pipeline.

If this provision is sustained and fully realised - when placed alongside regional initiatives such as the New and Renewable Energy Centre of Excellence and sector specialists already located in the region - **the potential exists for the sustainable development of a regional specialisation of critical mass in renewable energy blending R&D capability, development projects, skills provision and private sector investment.**

Recommendations

EnergyandUtility Skills, in partnership with other relevant Sector Skills Councils, is continuing the process of both standards development and Labour Market Information investigation for the renewable energy sector. Any **development of provision initiatives towards the sector within North East England** must not only be fully aware and involved in these activities but their further progress **is dependent on the successful development of a national framework.**

Set within the current developmental stage of national learning and skills provision for the renewable energy sector, **the emergent framework of provision within North East England should be recognized as at the forefront of training within the sector.** This finding is particularly the case for provision of training within wind skills, the part of the renewables market most expected to develop in the near future. Despite current short term uncertainty in market demand, **skills development support should continue to be forthcoming as part of the broader process of development of a sustainable, dynamic and competitive regional presence in the renewable energy sector.**

1 INTRODUCTION

In August 2005, a joint partnership of CURDS (University of Newcastle) and GHK Consulting Ltd were commissioned to undertake an Investigation into the Current and Future Skills Needs of the Renewable Energy Sector in North East England.

1.1 Study Aims

The overall aims of the project were:

- to assess the skill needs, including in to the future, of the renewable energy sector in North East England;
- outline current learning provision in place to meet the demands of the sector; and
- assist in determining future learning provision and support to the renewable energy sector in North East England.

Demand for skills needs was to be articulated for:

- Levels 2, 3, 4 and 5;
- For a 5 and 10 year period; and,
- Across three segments of the North East England industry:
 - Firms currently engaged in renewables;
 - Existing firms not currently involved in renewables but with potential to diversify in to the sector; and,
 - Firms not in existence but that may be created to exploit new renewable opportunities in the sector.

In summary, the project deliverable would contribute to the evidence base of the demand for skills from employers in the renewable energy sector, the local and regional skills offer, and the potential this offered to place the region at the forefront of skills training in the sector. In particular, it would support future capital investment and revenue decisions to deliver training to the sector in the region.

1.2 Study Methodology

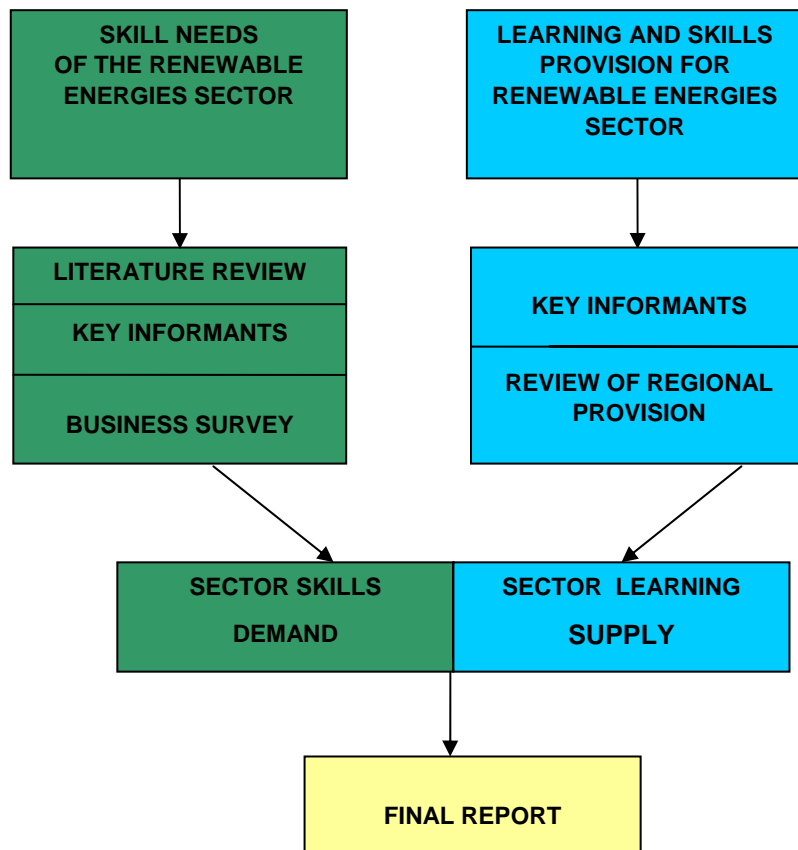
The initial approach to the Study is outlined in Figure 1. In effect, parallel strands of activity were undertaken to:

- outline the renewable energy sector in North East England and its skills demands through initial scoping activity and subsequent survey work; and,
- review the provision of learning and training in North East England for the renewable energy sector.

Bringing the two strands together allowed analysis of the demand for, and provision of, renewable energy sector skills in North East England and the development of conclusions.

During the course of the Study, gaining substantial direct input from employers proved difficult, which led to a revision of the Methodology³. Full details of the Methodology are provided in Annex 1.

Figure 1: Study Methodology



Work began on the Study following an Inception Meeting held on August 25th 2005 at LSC Northumberland, Cramlington.

³ It is worth noting that over the same period the national process of occupational and functional mapping of the sector was being undertaken and experienced similar difficulties with employer engagement. See <http://www.euskills.co.uk/download.php?id=81> Occupational and Functional Map of the Renewable Energy Sector, p.16

2 DEMAND FOR SKILLS IN THE RENEWABLE ENERGY SECTOR IN NORTH EAST ENGLAND

The following section provides the findings of the Study; it begins with a short overview of the UK Renewable Energy sector, including its expressed skills demand (section 2.1), as a context for the regional findings on skills demand for North East England (section 2.2). Section 2.4 outlines the results of the review of learning provision in the region including a Case Study of Northumberland College.

2.1 The UK Renewable Energy Sector

The Renewable Energy sector is growing rapidly at a global scale. At a national level UK government and the Devolved Administrations have put in place a regulatory environment which, combined with some support for pre-competitive research, now provides a secure long term investment environment. By 2010, 10% of UK electricity demand is to be met by renewable sources (the Renewables Obligation); at the end of 2004, a figure of 5% had been reached and a new indicative target of 15.4% has been put in place for 2015. In unison with challenging targets within Europe for the use of renewable sources, this regulatory environment is expected to facilitate long term growth in the renewable energy sector⁴.

Nevertheless, a number of reports on different renewables technologies continue to highlight that whilst numerous developmental and demonstration projects are in place it remains the case that *in the UK, wind power remains the only economically scaleable technology at present*⁵. Furthermore, whilst large numbers of wind power schemes are under consideration nationally, planning restrictions are providing a major barrier to their successful development.

2.1.1 Employment in the UK Renewable Energy Sector

In 2002, a survey by the Electrical Training Association (subsequently Energy&Utility Skills) estimated that there were around 3,800 (FTE) jobs in the UK renewable energy sector, with an expectation of 9,700 jobs by 2010, three-quarters of which would be accounted for by the wind industry⁶.

In 2004, in comparison and using a broader set of technologies, the DTI estimated the sector to encompass 5,500 jobs in the UK, including 1,300 in Scotland.

The sector, as it stands, remains a minor employer – albeit with significant potential - at the national scale.

⁴ The recently completed UK Energy Review, DTI (2006) The Energy Challenge has re-affirmed support for the Renewables Obligation. Available at <http://www.dti.gov.uk/energy/review/>

⁵ http://www.dti.gov.uk/renewables/business_pdfs/investingbrochure.pdf

⁶ Skills Intelligence for Electricity (2003) Exploring the Skills Requirements of the UK Renewable Power Industry

2.1.2 *The Skills Requirements of the UK Renewable Energy Sector*

Within a national programme of delivering demand-led provision, recognition of the growth potential of the renewable energy sector has led to a programme to ascertain the skills base and future skills demands of the industry.

In 2003, Energy&UtilitySkills undertook an employment and skills survey of the UK Renewable Power Industry⁷. The aim of the research was to provide an overview of the skills implications of the anticipated expansion of the sector, including skills requirements and potential shortages and how far skills issues might present a barrier to development.

Key findings from the survey were:

- The industry can be characterised as 'low volume' in terms of overall demand for skills.
- Skill requirements focus on engineering skills and project development skills, and there is a concentration of high level professional skills associated with the exploitation of new business opportunities.
- The industry is characterised as having a need for specialist skills - such as project development or installation.
- Growth areas identified (particularly for wind) included:
 - Electrical, mechanical and civil engineering skills, at craft and technician levels;
 - Engineering, environmental and planning skills at professional level;
 - Electrical power engineering and commercial skills at professional level for distribution companies; and,
 - Heavy and marine engineering skills (off shore wind) and R&D (solar PV and wave/tidal).
- Anticipated shortage areas included:
 - Industry specific skills and experience (especially management and professional);
 - Engineering/technical/craft skills (professional/technician);
 - General management skills; and,
 - Multi-disciplinary skills.
- Respondents were experiencing difficulties in recruitment and anticipated future skill shortages but ranked shortages as only the fifth most important barrier to growth.
- Most companies acknowledged the importance of training and development but lacked training infrastructure and expertise.

⁷ Skills Intelligence for Electricity (2003) Exploring the Skills Requirements of the UK Renewable Power Industry

In December 2005, Energy&UtilitySkills produced a functional and occupational mapping of the renewable energy sector⁸. In order to do so, it sub-divided the sector by technology base (Wind - On shore, Off shore; Wave and Tidal; Solar; Photovoltaics; Heat Pumps; Geothermal - District heating; Biomass - Excluding waste to Energy) and provided a detailed mapping for each sub-sector.

No major skill shortages in the renewable energy sectors were identified; although some key occupations were identified within traditional sectors as being of importance in labour market terms. In particular, potential policy decisions and the fact that many of the skill sets of these occupations are experiencing supply problems highlighted potential future skills issues. These occupations were:

- Plumbers (including heat and venting, air conditioning and refrigeration);
- Electricians (with installation and design skills capability); and,
- Civil engineers (construction).

More broadly, a number of structural changes were identified with implications for future skills demands within the sector including:

- More multi-skilling, multi-disciplinary working practices to cover cross-sectoral task opportunities.
- More diagnostic and fault finding skills.
- Greater integration of installation and design skills.
- More leadership/project management skills for those at S/NVQ Levels 2 and 3.
- Greater environmental and legal knowledge/contracting skills.
- More attention to integrating generic skills, particularly team building, communication, product knowledge.
- Attention to succession planning to address, firstly, an ageing workforce and, secondly, the attracting of more young people into the sector. In addition, developing pathways for young people to progress.
- Greater health and safety awareness and practice.

Table 2.1 provides an overall summary of key occupations of renewable energy identified by the mapping.

Table 2.1 Key occupations in Renewable Energy

⁸ Energy&Utility Skills (2005) Occupational and Functional Map of the UK Renewable Energy Sector

Sub-Sector	Occupation
Biomass	Team Leaders, Rate of Burn Technologists, Electrical/Instrumentation Technician; mathematical modelling within IT Skills
Hydroelectric	Engineers – Mechanical, Electrical and Electronic; Civil Engineers (construction); low skilled manual workers
Photovoltaic	Electricians; Electricians with design skills
Solar	Carpenters, Plumbers, Electricians; Electricians with design skills
Geothermal	Electrical Engineers, Electricians; Electricians with design skills, Electronic Technicians; pipe and systems laying; mathematical modelling within IT skills
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Wind	Service Engineers, Fabrication Engineers, Structural Engineers, Site Wardens, Installation Engineers (large scale)

Source: Adapted from Table 1.1, *Energy&Utility Skills (2005) Occupational and Functional Map of the UK Renewable Energy Sector*

2.2 The Renewable Energy Sector in North East England

The recently completed North East Regional Renewable Energy Strategy (2005) outlines that, in line with national development objectives, the region is about to enter a period of unprecedented investment and growth in renewable energy. Starting from a low baseline, with less than 3% of its electricity currently supplied by renewables, the region could see this figure increase to between 13% and 16% by 2010 and to over 20% by 2020.

Numerous proposals are being put forward within this national and regional framework across the full range of renewable technologies:

- Wind developer activity leads the way with 100MW of wind power capacity with planning permission awaiting construction, a further 76MW at the planning application stage, and over 700MW of capacity known about and at the pre-planning/scoping stages;
- The region has a number of significant biomass projects including the Sembcorp wood fired power station on Teeside and the use of woodfuel at the ALCAN power station, smaller scale district and individual building heating applications and the biomass resources of Kielder Forest; and,
- The UK's largest biodiesel manufacturing plant under completion in Middlesbrough.

Nevertheless, the document identifies 'significant challenges ahead' in order to meet the regional renewables obligation and, in particular, that growth remains reliant on the provision of planning consent for wind projects.

More broadly, in the research undertaken for this Study, a variety of data has been collected which supports the argument that, whilst the renewable energy sector in North East England is geared for growth, uncertainty in market demand has constrained, and is constraining, any potential skills demand (see Box 1).

Box 1: Renewable Energy Sector Skills Demand

“The [UK] industry can be characterised as ‘low volume’ in terms of its overall demand for skills. “

(Skills Intelligence for Electricity, 2003, Exploring the Skills Requirements of the UK Renewable Power Industry)

“Analysis of the market indicates that the future potential...will depend on how quickly industrial and domestic markets grow, and as a result of this there was an element of caution expressed about the current demand for the level 2 and level 3 technical skills related to the installation and maintenance of renewables and therefore the supply that should be put in place to meet the demand”.

KPMG, 2005, SE Northumberland 14+ Vocational Centre for Renewable Energies and Environmental Engineering Feasibility Study Final Report, Executive Summary

“A major issue for a number of these technologies is that markets for the technologies on a scale which would fulfil the Energy White Paper do not exist and look unlikely at present... Creating a manufacturing and supply base for any given technology is futile when demand does not exist...”

There is substantial potential for employment linked with meeting the CO2 goal of the Energy White Paper (of the order of 1,200 full time jobs each year for 45 years). Most of this labour requirement could be sourced locally. However, we have also identified difficulties in establishing an appropriate level of market demand for many of the required measures without financial or legislative intervention”.

NES, 2005

“The main issue in the industry is that the promise that was shown three years ago has not really been met, so that the industry is still three years away from taking off at any kind of scale.

The sector is likely to potter upwards for the next decade, held in a low demand/ supply equilibrium, very few things forcing up demand or supply, but then it will hit a tipping point, and then should start to grow more strongly.”

Key Informant 1, Autumn 2005

“The technology base of the sector will continue to develop into the future but it is still very far from market. Many of the companies are working with concepts that need to be proven, then prototypes developed and allowed to generate power to create a business model. This process will take at least five years, but may lead to the creation of a number of companies which have a significant market presence.”

Key Informant 2, Autumn 2005

2.2.1 Employment in the North East England Renewable Energy Sector

An estimate of firms who are core to the renewable energy sector in the region might be thirty firms with a similar number having a measurable investment of resources in the sector. Estimates based on national employment figures suggest that, at most, the sector supports around 500 - 1000 FTEs in the region.

In 2005, a calculation by the Energy Savings Trust in North East England calculated potential employment from the installation of renewable technologies across the region. In total, it was calculated that renewable energy activity would sustain a yearly employment average of 884 people over a 45 year period, including 323 jobs in manufacturing and assembly. Most, if not all, of this employment is expected to be supplied from the local labour pool following varied levels of training as appropriate.

Currently, the sector remains a minor employer in the region.

2.2.2 The Skills Requirements of the North East England Renewable Energy Sector

Evidence for the skill requirements of the North East England Renewable Energy sector remains sparse. Below, we set out four evidence sources:

- CURDS (2002) "The skills needs of the new and renewable energy sector in Northumberland" *Report to Northumberland Learning and Skills Council*, Newcastle upon Tyne: CURDS.
- Key Informant interviews undertaken as part of this study.
- KPMG (2005) "SE Northumberland 14+ Vocational Centre for Renewable Energies and Environmental Engineering Feasibility Study" *Final Report to Northumberland Learning and Skills Council*.
- Northwoods (2004) "Biomass Sector Skills Analysis".

CURDS (2002) "The skills needs of the new and renewable energy sector in Northumberland"

To date, the only major report on the skill needs of the sector in the region remains that produced by CURDS in 2002.

The report interviewed a number of companies in this embryonic sector in order to ascertain the skills that might be predicted if a sustainable, dynamic and competitive renewables energy sector were to develop in the region. The skills needs were developed around five development priorities for the sector. These are summarised in Table 2.1 and are reflected in the subsequent results of national study of skills needs outlined in Section 2.1.2 above. The 2002 report suggests that the removal of barriers to development in the sector could see the further development of up to 400 jobs in the region by 2010.

The report does not provide a baseline for skills in the renewable energy sector in North East England and no such baseline currently exists.

Table 2.1: Identified Skills Needs in the Northumberland Renewable Energy Sector, 2002

Priorities for a successful sector	The skills needs
<p>1. Successfully managing the business growth process</p>	<p><i>Business, managerial, technical</i></p> <ul style="list-style-type: none"> ▪ Technical skills for renewables in novel areas ▪ Networking with partners who can facilitate access to new skills ▪ Development of human resource skills for renewables managers to attract new people and manage growth into new technological areas ▪ Managing funds to ensure that the development of the firms technological assets are sustainable beyond individual projects ▪ Technology foresighting to identify core areas on which to focus
<p>2. Innovators becoming leading manufacturers</p>	<p><i>Organisational, occupational</i></p> <ul style="list-style-type: none"> ▪ Development of new managerial skills associated with a move towards manufacturing ▪ Developments in renewable specialties should reflect developments in original fields (e.g. offshore) ▪ High quality engineers with good technical skills and relevant knowledge ▪ The sector should draw on the existing labour strengths of the engineering sector ▪ Building products to the mass market rather than customer specification
<p>3. Managing relationships with outside partners and investors</p>	<p><i>A greater outside focus for technical staff</i></p> <p>In the public sector:</p> <ul style="list-style-type: none"> ▪ Planning officials adapting to RPG and PPG 22 requirements ▪ Economic development teams making renewable energy a priority ▪ Developing staff learning and skills about the sector <p>In the private sector:</p> <ul style="list-style-type: none"> ▪ Understanding of the market conditions and investment value of the sector by regional financiers ▪ Understanding of regional investment analysts of the operation of the Renewable Obligation buyout, and the capitalisation this has for small generators ▪ Small generators working together within NETA to avoid penalties ▪ Willingness of large power users utilising renewable energy generation as a means of meeting their CCL requirements and energy needs.

<p>4.</p> <p>Developing a critical mass of cutting edge research skills</p>	<p><i>Getting academic research into the user communities</i></p> <ul style="list-style-type: none"> ▪ Complex problem-solving skills, bridging between different expertise ▪ Developing the relevant skills in users ▪ Raising the demand for local firms to engage with universities ▪ Commercial and entrepreneurial R&D skills ▪ Packaging university expertise into usable training courses for less skilled users ▪ Skill in the policy community not to undermine the strengths of the sector.
<p>5.</p> <p>Attracting a flagship/ strategic inward investor</p>	<p><i>Effective workforce with overlap with other businesses</i></p> <ul style="list-style-type: none"> ▪ High level of management training for strategy and inward investment ▪ A responsive local partnership able to support an evolving market ▪ A research centre which inward investors can draw on ▪ Development of collaborative training centres

Key Informant Interviews on Skills Needs of the Renewable Energy Sector in North East England

Two key questions were asked of key informants:

1. *Are there enough suitably skilled employees in the North East England renewables industry?*

Three of the four interviewees were united in their belief that there are too few suitably skilled employees in the region. The fourth was uncertain of the answer.

This view was tempered by one respondent who suggested that the absolute level of skills shortages is low because the industry is moving forward very slowly. To some extent, there are enough skills to meet current needs, but there is no capacity for any kind of increased demand in the sector.

2. *What would you say are the main skills lacking in the sector?*

Responses were structured around three 'skill sets'.

Firstly, all interviewees highlighted the shortage of skills in 'project vision and delivery'. This was conceived as individuals with the range of skills able to put together and subsequently deliver renewables projects. For example:

- **Demonstrator builders/users:** a group, using predominantly higher level skills, to create a set of renewables projects which then stimulate wider sectoral demand;
- **Management of renewables projects:** a real lack of high level skills to win tenders and then pull together project teams that can then deliver projects; and,
- **System integrator skills:** the combined skills to deliver commercially affordable energy to a receptive community.

Following this view, skills within particular occupations were identified as lacking:

- **Managers** lack business skills to assemble finance packages to undertake development projects that produce a 'prototype with a business plan' which can be used to win new finance; also described as a lack of entrepreneurship skills to decide to take an idea and explore the concept (which requires business planning and raising finance);
- **Professional engineers** are too focused on their particular specialisms, such as structural engineering or mechanical engineering, whereas what a growing SME needs is one engineer who can run a whole development project, and can draw on technicians and craft people for additional expertise and support; and,
- **Commercial engineering skills** such as sales engineering, project estimating, business planning, etc.

Secondly, within the core occupational groups of the sector, skills needs identified were:

- **Installation skills in the sector across the various technological areas:** one example cited was in the offshore power generation sector where power generation skills dominate rather than marine technologies and the 'offshore ticket'. Similarly, site construction generally was identified as requiring an upgraded skills base;
- This lack of skills was identified as extending in to the need for a **critical mass of maintenance skills in wind** also to bring full benefits to the region;

Other skills shortages **in trades and technical areas**, identified included:

- - **Technician** occupations are too focused on routine activities, there is not enough commercial emphasis in technician engineer training
- - **Manufacturing operators and semi-skilled craft** who are used to a small firm environment requiring the ability to operate across a spectrum of skills.

Thirdly, a **much broader set of occupations within the economy were identified as lacking the skills sets to deal with the challenges of renewable energies** (and by implication holding back the sector's development). These included:

- - **Planning and procurement** departments: a failure to understand the potentials and liabilities of renewables;
- - **Architects:** opportunities afforded by renewables in relation to new building regulations; and,
- - **PFI financiers:** the role, and financial proposition, of renewables in large public sector projects.

KPMG (2005) SE Northumberland 14+ Vocational Centre for Renewable Energies and Environmental Engineering Feasibility Study

As this study commenced, a feasibility study on the potential for a vocational centre for renewables was near completion. Demand for such a centre formed part of the feasibility study and involved a limited interview programme with a small amount of sector employers within the region.

The Feasibility Study highlighted that the current trend within the sector was to employ small numbers of graduates, often reflecting the developmental phase of activity. Predicted skills reported included predominantly traditional engineering-based disciplines (electrical, mechanical and civil), plus ‘add-ons’ such as offshore survival. Employers recognised a future need for technical staff with Level 2 and Level 3 skills although it was stressed that the market demand for these skills did not exist at the time of the report.

Northwoods (2004) “Biomass Sector Skills Analysis”

Northwoods undertook a study of the skills and training needs of the North East England Biomass Sector. The brief defined the sector as containing businesses working in the supply, harvesting, processing and utilisation for energy of: short rotation coppice; agricultural and energy crops; waste wood; small round wood; forest residues (brush); and sawmill co-products. The sector was also taken to include those businesses involved in the production, distribution, installation and servicing of wood fuelled heaters/boilers.

The report sets out the skills required by those working at all levels, and in all occupations, within the North East’s embryonic biomass sector mapped against the National Qualifications Framework. Its findings outline a lack of training provision for the sector (nationally and regionally), although a range of training courses are identified in allied sectors that may offer opportunities for modification. The Study concludes with recommendations and a 14 point action plan⁹.

2.3 **Summary: The Demand for Skills in the North East England Renewable Energy Sector**

In summary, at a national and regional level much interest exists in the renewable energy sector; This interest centres around three key policy drivers:

- The particular market driver of the UK Energy White Paper and Review and the national and regional targets for renewable electricity generation therein;
- The wide-ranging technological base of the sector encompassing a number of scientific, engineering and technical disciplines (science and technology policy) and the attendant potential for spin-offs and alternative applications; and,
- The economic development potential of a nascent sector including skilled manufacturing and installation activity (industrial/regional economic policy).

Within the context of expected regional market growth in the sector, the overall aims of the Study were set as assessing the demand for skills from employers (and a sector) ‘gearing-up’ to meet these new opportunities, outlining the local and regional skills offer to employers, and identifying any subsequent skills and training requirements.

A critical finding of the Study is that *regional sectoral growth, linked to expanding market demand, has been limited* in the years since the CURDS report of 2002. The nascent sector identified in 2002 has experienced a number of key initiatives and developments (for example, NAREC, a broadening of the technology base including regional networks, demonstration projects, new firm formation, skills initiatives) *but the sector remains nascent*.

⁹ We were unable to ascertain if any analysis of the demand for skills was undertaken within the study.

Furthermore, part of this development has seen *stratification* of the sector in to a greater number of developmental technologies which, in the main, remain as yet commercially unviable yet, in effect, serve to fragment the sector in to a variety of sub-sectors.

Overall, the prevailing view exists that further regulatory and financial intervention, alongside public sector support for demonstration projects, is still required to kick-start demand and overcome barriers to market development within the sector and across its technologies. A business model now exists for wind (and is expected to dominate generation in the near future) and biomass has moved forward within the region in recent times. Other technologies, including new micro-generation initiatives, remain some distance from commercial sustainability.

Barriers to development vary across different technologies but, fundamentally, contribute to the immaturity of market demand for renewable energy products within the region. The range of barriers identified include:

- Unproven technology;
- Uneconomic technology;
- Immature business models;
- Fragmented and niche markets;
- Consumer reticence due to lack of understanding/demonstration projects; and
- Planning regulations

Alternatively, and looking beyond regional market demand, it remains the case that with a handful of exceptions, the sector fails to have global presence and international competitiveness.

The particular nature of sectoral development has several implications for the demand for skills:

- the aggregate quantitative demand for skills from the regional sector remains low;
- the demand that exists is stratified by the stage of renewable technology (developmental, near to, or in, market) and the particular occupational profile and skills requirements associated with any one sub-sector; and,
- overall, this implies a sectoral landscape of skills demand characterised by numerous, specialist niches of low aggregate demand.

3 SUPPLY OF SKILLS AND TRAINING IN RENEWABLE ENERGY IN NORTH EAST ENGLAND

An audit of actual and potential skills training for renewable energy available within North East England was undertaken in late 2005 and early 2006. To gain a view of the landscape of provision, prospectuses from all higher and further education providers in the region were obtained. Section 3.1 details actual provision in existence whilst Section 3.2 notes potential provision. A full list of actual and potential provision is provided in Annex 3.

3.1 Renewable Energy Sector Provision in North East England

Only a small number of courses purposely targeted at the renewable energy sector were identified in the region. The following lists training provision in North East England including a case study of Northumberland College which has begun developing a particular specialism within renewable energies training.

3.1.1 *REFLEX, University of Newcastle*

REFLEX is a new postgraduate programme in renewable energy offered by the University of Newcastle upon Tyne¹⁰. REFLEX provides a fully integrated training programme covering mechanical, electrical, chemical, marine, and environmental engineering, and energy management associated with renewable energy systems. The programme has been developed under the guidance of a Steering Committee, which includes employer representatives (PB Power, NaREC, SMD Hydrovision, Groundwork South Tyneside, and Northumberland Renewable Energy Group). Delivered in a flexible manner, the course is seeking professional accreditation.

3.1.2 *MSc New and Renewable Energy, University of Durham*

The main objective of this programme is to educate students in the key engineering aspects of New and Renewable Energy, enabling them to take responsible, creative, challenging and stimulating posts in industry or research in the existing fields. The programme covers; harnessing renewable energy sources, environmental impact of energy provision, cogeneration systems, network integration issues and electrical generation plants¹¹.

3.1.3 *Northumberland College*

Northumberland College has developed a number of initiatives within renewable energy training and skills provision in unison with regional employers and with support funding from LSC Northumberland (see Box 2).

¹⁰ <http://www.ncl.ac.uk/reflex/reflex.htm> sourced on 29/08/06

¹¹ <http://www.dur.ac.uk/engineering/taughtmsc/mscnew/> sourced on 29/08/06

Box 2: Training Provision in Renewable Energy at Northumberland College

Over recent years, Northumberland College has been developing its learning and skills offer within renewable energy; one vision is to become a hub of industry learning throughout the UK and beyond for this growing sector. Courses have been developed in Biomass and Wind Energy with current plans to create a European standard Foundation Degree in Renewable Energy and a web-site for the delivery of distance learning in renewables. Pilot activity within these courses was developed with the support of TEC Legacy funding from LSC Northumberland.¹²

Introduction

In 2001, the economic development potential of the renewable energy sector had been identified within North East of England. One NorthEast, the Regional Development Agency, established NAREC (New and Renewable Energy Centre) in Northumberland to provide an international centre of excellence for research, development and prototyping within the sector and build on regional potential.¹³ Part of the remit of these centres is to act as a focal point to build regional clusters of industrial activity around their expertise. In parallel, as part of their mission to support skills-led economic development, the regional LSC was seeking to identify and support potential or existing demand for skills from regional businesses. Within renewables much of the workforce was already being drafted in from overseas highlighting an existing skills gap which was predicted to widen with regional market growth.¹⁴ The outcome was funding support for the development of renewable energy skills provision by Northumberland College.

Biomass (wood fuel technology)

In 2004, Northumberland College piloted a renewable energy qualification in Biomass developed in conjunction with Northern Energy Associates. Originally a discrete module set within an NVQ in Countryside Management, funding allowed curriculum development to meet a perceived demand, particularly from individual learners such as heating engineers and plumbers. Covering areas such as biomass boilers and fuels and health and safety, the course has run successfully for two years seeing two groups of students through to the end of the course. Reflecting the expansion of interest in biomass in domestic and industrial energy markets, the course is now seeking to extend its specialisation in wood chip as the base fuel for biomass development to other sources such as through crop rotation. The course is set at NVQ levels 2 and 3.

Wind Energy Training Course

In 2005, Northumberland College piloted the delivery of a Wind Energy Training Course. The initial idea for the course was developed by a regional business, the Northern Energy Initiative (TNEI), who specialise in the creation and delivery of Renewable Energy projects.¹⁵ Involved in the installation, maintenance, decommissioning and refurbishment of wind turbines, the company had identified skill shortages in local contractor organisations to meet demand from a growing market in small wind projects connected with the region's major industrial sites. The aim was for the course to provide a technical and training context around the 'shadowing' of live projects with participants gaining wind turbine experience which would enable them to take

¹² TECs (Training and Enterprise Councils), the precursor to the Learning and Skills Council (LSC), were profit-making organisations and at their closure retained profits were made available to the newly developed regional LSCs to pump prime new or innovative provision of learning and skills activity. See LSC Northumberland (2006) A Legacy for Success. Available at: <http://www.lsc.gov.uk/northumberland/Corporate/default.htm>

¹³ <http://www.strategyforsuccess.info/page/index.cfm>

¹⁴ Skills North East (2006) Innovative Workplace Learning in the North East, p.18. Available at: <http://www.skillsnortheast.co.uk/page/index.cfm>

¹⁵ TNEI (2005) Wind Skills Development Programme: A Proposal to Northumberland Learning and Skills Council

advantage of larger commercial opportunities in the future. The course would be developed as a NVQ level 2 qualification in the first instance with future development of a level 3 pathway.

The pilot was developed as a partnership between TNEI, NaREC and Northumberland College to deliver a programme of skills development covering erection, installation and commissioning; electrical connection; and service and maintenance. Support funding was provided by LSC Northumberland through the TEC Legacy Fund and Business Link supported promotion of the new provision to regional business.

In its first year, a total of 12 local companies and 20 individuals participated in the course.¹⁶ The programme was run in the evenings to minimise the disruption to the participating companies, who came from across the North East (Northumberland, the outskirts of Tyne and Wear and County Durham). Whilst the initial idea of shadowing live projects was not achieved, the course included five site visits. The lack of practical experience meant that the college was unable to implement official assessment procedures. Course participation targets were exceeded and the provision was well received by participants despite the lack of practical training.

Demand for the Wind Energy Training Course is expected to increase in the near future. A number of major regional wind farm developments are in the pipeline and developers such as Scottish Power are keen to engage local contractors. Nevertheless, they recognise the local shortfall in the skills required and view Northumberland College's provision as a key training opportunity. The college itself is seeking to develop practical provision - through securing a second hand wind turbine or equivalent micro system to be housed in a potential sustainability demonstration training and assessment centre and development of field stations. More broadly, the second year of the course will include micro generation as industry forecasting predicts the growth of the market for domestic turbines.

Scottish Power are keen supporters of the skills provision being developed at Northumberland stating that 'provision is unique and there is no other similar provision available anywhere else in the country'¹⁷.

Foundation Degree in Renewable Energy

The most recent initiative is the development of a Foundation Degree in Renewable Energy (although this will require partnership with a university). Clear evidence exists for the continued growth of renewable energy market solutions at the regional, national and international scale with the expected overcoming of development barriers (such as planning restrictions) likely to usher in skill shortages and needs within an evolving sector.

Development of this degree is being undertaken with an international partner, Bremen College in Germany, who are interested in creating a European standard training programme and are aware of little other provision of similar standing within the UK. Initial links were facilitated through the research links of NaREC and the potential exists for further partners in Holland (and possibly Spain).

3.1.4 VRQ2 Ignite Wood Fuel Training, Northwoods

Ignite is the UK's first formal wood fuel training course which has been running since January 2004 and has had 34 students attend the course from the North East. The course is now being rolled out in Yorkshire and the Highlands and Islands of Scotland. The course provides an understanding of the economics of wood fuel supply, the technology that is available to produce wood fuel and the systems that burn it. Ignite

¹⁶ NREG (2006) Windskills Pilot Programme Report (Draft)

¹⁷ Interview with Martin Mathers, Community Relations Manager, Scottish Power, 31st August 2006

Wood Fuel Training has recently been accredited by Lantra Awards as a recognised qualification within land based sectors¹⁸.

Northwoods are also developing ideas around an Energy Crops Training Course, where instead of the usual promotion to eat vegetables in order to obtain a healthy lifestyle, the principle idea behind the course would be to educate people on the advantages of burning them for use as fuel

3.2 A Regional Ladder of Learning in Renewable Energy

Taken in unison, the provision identified in North East England can be viewed as a framework for a regional ladder of learning in renewable energy. Innovative and appropriate new provision at NVQ Level 2/3 in Biomass and Wind Energy has been piloted in response to employer demand and with the support of TEC Legacy Funding; at the highest rungs of the ladder regional universities have created specialist renewable energy higher degrees.

NVQ 2/3 skills provision remains distinctive nationally but slower than expected sectoral development has constrained and delayed expected demand with national frameworks for standards development and accreditation for the sector also still to progress.

In sum, a learning ladder is identifiable and of national significance but it remains developmental and fragile.

3.3 Potential Training with Relevance to the Renewable Energy Sector in North East England

To provide a comprehensive picture of provision, the audit included the widest range of courses available to students in North East England with a potential skill relevance to the Renewable Energy sector. Courses include, for example, the complete range of engineering, to elements of construction to land based industries. The full, and extensive, list is provided in Annex 3 including an attempt to identify modules of relevance to renewables. The potential exists for renewables to be 'mainstreamed' in to a wide variety of provision.

¹⁸ http://www.northwoods.org.uk/c.php/home/training_&_skills/ignite_woodfuel_training Accessed 31.08.06

4 CONCLUSIONS: SKILLS SUPPLY AND DEMAND IN THE NORTH EAST ENGLAND RENEWABLE ENERGY SECTOR

On a national scale, the renewable energy sector remains both nascent and fragmented across sub-sectors driven by technological paradigm (wind, wave, solar, biomass, geo-thermal, etc.). **The sector presents a picture of complex low volume demand for both generic and specialist skills drawing substantially on traditional sectors such as engineering.** It is clear, nevertheless, that future demand is set to grow although articulating the nature of any such demand will require further work.

This picture of demand is replicated within North East England, but with particular sectoral development within wind energy and biomass. Whilst not comprehensive, this Study has found clear **evidence of employer demand for skills provision within the renewable specialisms of biomass and wind.**

Facilitated by TEC Legacy funding by LSC Northumberland, **new renewable energy learning and skills provision has been developed within North East England across qualification levels** to the extent that the framework of a ladder of learning within renewables is identifiable. Pilot provision at NVQ Level 2 and 3 of training in Biomass and Wind Energy is **of national and even international significance** with further developments in the pipeline.

If this provision is sustained and fully realised - when placed alongside regional initiatives such as the New and Renewable Energy Centre of Excellence and sector specialists already located in the region - **the potential exists for the sustainable development of a regional specialisation of critical mass in renewable energy blending R&D capability, development projects, skills provision and private sector investment.**

Recommendations

EnergysandUtility Skills, in partnership with other relevant Sector Skills Councils, is continuing the process of both standards development and Labour Market Information investigation for the renewable energy sector. Any **development of provision initiatives towards the sector within North East England** must not only be fully aware and involved in these activities but their further progress **is dependent on the successful development of a national framework.**

Set within the current developmental stage of national learning and skills provision for the renewable energy sector, **the emergent framework of provision within North East England should be recognized as at the forefront of training within the sector.** This finding is particularly the case for provision of training within wind skills, the part of the renewables market most expected to develop in the near future. Despite current short term uncertainty in market demand, **skills development support should continue to be forthcoming as part of the broader process of development of a sustainable, dynamic and competitive regional presence in the renewable energy sector.**

ANNEX 1: STUDY METHODOLOGY

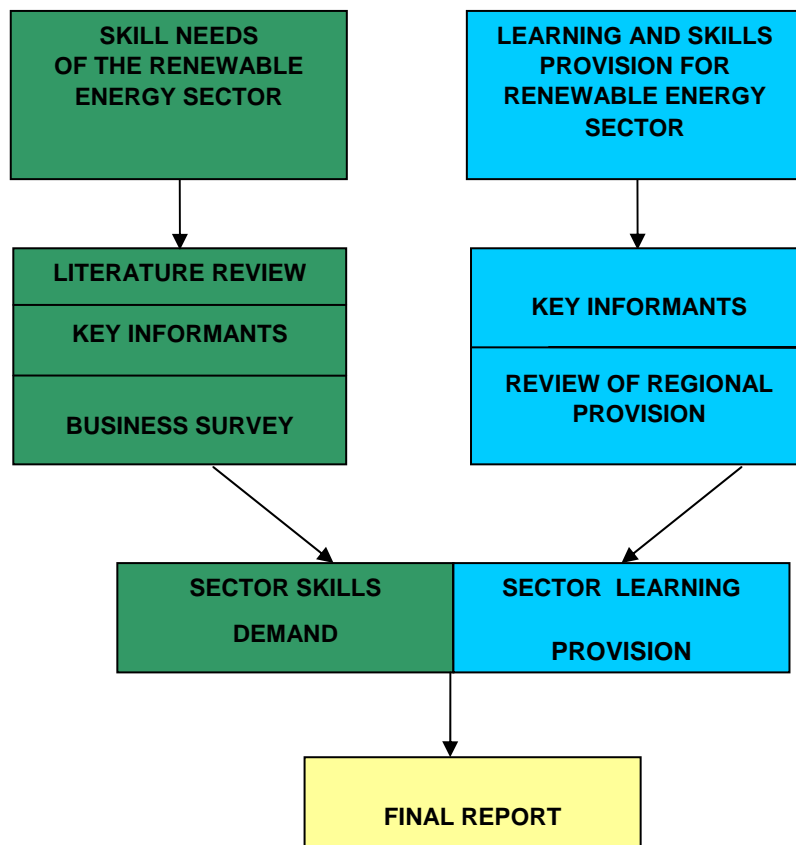
The initial approach to the Study is outlined in Figure 1. In effect, parallel strands of activity have been undertaken to:

- outline the renewable energy sector in North East England and its skills demands through initial scoping activity and subsequent survey work
- review the provision of learning and training in North East England for the renewable energy sector

Bringing the two strands together allows analysis of the demand for, and provision of, renewable energy sector skills in the North East and the development of conclusions.

During the course of the Study, gaining substantial direct input from employers proved difficult leading to revisions to the methodology.

Figure 1: Study Methodology



Work began on the Study following an Inception Meeting held on August 25th at LSC Northumberland, Cramlington.

4.1.1 Scoping the North East England Renewable Energy Sector

This initial Stage involved a literature review and four key informant interviews to confirm understanding of the sector and its constituent segments and members, identify relevant initiatives (especially related to skills development), and provide an overview of current and future industry developments and skills issues.

4.1.2 Business Survey of North East England Renewable Energy Sector: Skill Needs and Training

A survey of the skills needs of the Northumberland Renewable Energy Sector was undertaken. Initially, the aim was to use different survey methods and instruments for the three different target business segments of the sector:

- a web based survey of the core of the sector (firms engaged in renewable energy)
- a telephone survey of 5 potential new entrants to the sector
- interviews with individuals aware of 'pre-birth' activity in the sector.

It was agreed that the basis of the main survey instrument would be that used by Skills Intelligence for Electricity (2003) for a national survey of employer skills requirements in the UK renewables industry¹⁹. Annex 2 provides a copy of the survey instrument.

A survey population was created from industry databases provided by Northern Offshore Federation (NOF) and Renew Tees Valley. In Autumn 2005, these databases were obtained, merged and de-duped. In total, they provided a surprisingly large list of some 260 companies identified within the renewable energy sector in North East England. Expectation had been of some 60-80 companies²⁰.

The survey was e-mailed in late October 2005 but failed. After almost 3 weeks only one response had been received. To ascertain the reasons for this unprecedented initial poor response, 50 companies were telephoned at random from the survey list.

Of those rung, 14% stated they were not in the sector, 8% were not interested in completing the survey and 6% were 'gone aways'. Of the remainder 50% were left a message and 22% re-sent the survey. In other words, over a quarter would not be respondents whether or not they were 'chased' with the response of the remainder still unknown. Furthermore, conversations with several companies highlighted that they may have investigated renewables as a market opportunity (and hence been entered on to the database) but none of them had decided to pursue the market.

This initial failure of the survey, subsequent concerns over the size and accuracy of the survey population database, the resources likely to be required to complete the survey and evidence from other research strands of the Study led to a decision by the Steering Group to halt the survey of the sector and to reappraise the Study methodology.

¹⁹ Skills Intelligence for Electricity (2003) Exploring the Skills Requirements of the UK Renewable Power Industry

²⁰ CURDS/GHK (2005) Proposal for An Investigation in to the Skills Needs of the Renewable Energies Sector in the North East

Alternative solutions to employer engagement were discussed including a regional event with DTI representation. Due to a range of organisational issues, the event did not take place. Further engagement with employers was sought through attendance at the Northumberland Renewable Energy Group Annual Workshop and informal discussion at other regional policy and networking events²¹.

4.1.3 *Review of Current Learning Provision for the Renewable Energy Sector within the Region*

This stage involved additional key informant interviews (see above) and, principally, an 'audit' of current provision of training and qualifications to the sector in the North East of England.

The review included an analysis of the wide range of courses on offer from all of the Further and Higher Education establishments in North East England that may deliver skills or training of relevance to the sector but that are not necessarily labelled as delivering to the sector's skill requirements. Overall, a handful of courses in the region purposely targeted at the renewable energy sector were identified. From these a Case Study of Northumberland College provision was produced.

4.1.4 *The Northumberland Renewable Energy Sector: Demand for, and Provision of, Skills in 2010 and 2015*

The draft Findings provided the basis for an analysis of skills demand by the North East England renewable energy sector and current and future provision in the region to meet this demand.

4.1.5 *Reporting*

An Interim Report and Final Report were produced.

²¹ It is worth noting that over the same period the national process of occupational and functional mapping of the sector was being undertaken and experienced similar difficulties with employer engagement. See <http://www.euskills.co.uk/download.php?id=81> Occupational and Functional Map of the Renewable Energy Sector, p.16

ANNEX 2: SKILLS SURVEY INSTRUMENT



Supported by:



Skill Needs in the North East Renewable Energy Sector

The Centre for Urban and Regional Development Studies (CURDS, University of Newcastle) and GHK Consulting Ltd have been jointly commissioned by the Learning and Skills Council Northumberland to undertake a study into the Skill Needs of the Renewable Energies Sector in the North East.

The region's Learning and Skills Councils recognise the exciting prospects for the renewables sector in the North East and are keen that education and training provision meets the varied demand for skills from employers in the sector.

We would be extremely grateful if you could complete this survey on the current and future skills needs of employers like yourselves. The survey is designed to take approximately 15 minutes and the information provided will act as a key input in to future investment decisions by the LSC.

All information provided will be treated in the strictest confidence, anonymised, and used only for the purposes of this study.

Should you have any queries, please do not hesitate to contact Emily Smith (Project Manager, GHK) on 0121 233 8900 or emily.smith@ghkint.com or Sue O'Hara (Project Manager, LSC Northumberland) on 01670 706 252 or sue.ohara@lsc.gov.uk.

SECTION 1: COMPANY INFORMATION

Q1. Please complete the following contact details:

Company _____ Name

Contact _____

Tel. _____

Email _____

Q2. Please indicate the sector of the industry and type of renewable energy resource your company is involved in. Tick as many as apply.

Owner/Operator/Project development

Engineering services - construction

Engineering services – maintenance

Manufacturing (including components)

Consultancy and R&D

Other (please specify) _____

In relation to:

Biomass (gasification/pyrolysis, energy crops)

Biogas (landfill gas, sewage sludge digestion, anaerobic digestion)

Energy from waste combustion

Water power (hydro, tidal, wave)

Wind energy –

Onshore

Offshore

Solar photovoltaics

Other (please specify) _____

Q3. Within the North East, how many sites do you have and what is your generating capacity?

No. of sites _____

Capacity (MW per annum) _____

Q4. Approximately how long has your business been operating in renewables in the North East? (Please circle)

Under a year 1-5 years 6-10 years 11-15 years 16-20 years 20+ years

Q5. What is the status of the operation at this site? (Tick one only)

A single site organisation with no other establishments

A head office, main, regional or divisional, with branches elsewhere

A branch, subsidiary or division with a headquarters elsewhere in the UK

A branch, subsidiary or division with headquarters outside the UK

Franchise

Other (please specify) _____

Q6. What is the legal status of the operation at this site? (Tick one only)

Single proprietor (Sole Trader)

Partnership

Private limited company

Public limited company

Charity

Co-operative

Other (please specify) _____

SECTION 2: BUSINESS PERFORMANCE

Q7. Approximately what was the renewables turnover for the company for the last financial year?

Less than £50,000

£50,000 - £249,000

£250,000 - £499,000

£500,000 - £999,000

£1million - £3 million

£3million - £5 million

More than £5 million

Don't know

Q8. Approximately how much in percentage terms has turnover changed in the last 3 years?

Q9. Over the next five years do you expect your turnover to? (Tick one only)

Increase significantly

Increase gradually

Stay the same

Decrease

Don't know

SECTION 3: EMPLOYMENT INFORMATION

Q10. Please provide a figure for the total number of employees²² currently working for your company in renewables

Q11. Please provide a breakdown of employee numbers¹ by occupation:

Occupation	No. of Employees
Managers	
Professional (Not included above)	
Technicians	
Skilled craft	
Semi-skilled craft	
Commercial, administrative and clerical	
Graduate trainees	
Craft apprentices	
Other occupations (please specify)	
<i>Total</i>	

Q12. Please provide an estimate of the total number of contractors²³ currently engaged in work for your company:

On Established Sites: _____

On Sites Under Development: _____

Q13. Please provide details of the occupations/types of work you commonly employ contractors for:

On Established Sites: _____

On Sites Under Development: _____

Q14. Please provide an estimate of your total human resource requirements (employees and contract labour) between now and 2010:

¹ Full Time Equivalents (excluding contract labour)

²³ An estimate of Full Time Equivalents not directly employed by you but engaged in contract work

Q15. Please provide an estimated breakdown of your additional human resource requirements for 2010 by occupation:

Occupation	No. of Employees
Managers	
Professional (Not included above)	
Technicians	
Skilled craft	
Semi-skilled craft	
Commercial, administrative and clerical	
Graduate trainees	
Craft apprentices	
Other occupations (please specify)	
<i>Total</i>	

Q16. Please indicate how you plan to meet your future human resource requirements. Tick as many as apply and alongside the tick boxes indicate the likely workforce composition using percentages.

Not applicable

Contract labour
_____%

Recruitment of skilled employees
_____%

Recruitment of unskilled employees followed by training
_____%

Training/redeployment of existing employees
_____%

SECTION 4: SKILLS REQUIREMENTS

Q17. Please indicate where you anticipate experiencing difficulties in meeting your human resource requirements to 2010. For each shortage area, please provide comments/examples.

Occupation	Skills Shortage (Yes/No)?	Comments
Managers		
Professional (Not included above)		
Technicians		
Skilled craft		
Semi-skilled craft		
Commercial, administrative and clerical		
Graduate trainees		
Craft apprentices		

Other occupations (please specify)

Total

Q18. Do you anticipate difficulties in meeting your human resource skills requirements in 2010?

If yes, continue on to question 19.

If no, proceed to question 22.

Q19. In terms of skills, which of the following skill categories do you anticipate as being shortage areas to 2010? Please list as appropriate in Column 1. For each shortage area, please provide any comments in Column 2.

Skills Category	(1) Anticipated shortage area	(2) Comments
<u>Management skills</u>		
Business/financial management		
Leadership		
People management		
Project/contract management		
Quality management		
<u>Engineering and Scientific skills</u>		
Electrical engineering		
Electronic engineering		
Control and instrumentation		
Mechanical engineering		
Civil engineering		
Environmental management		
Materials science		
Metallurgy		
Chemistry		
Other (please specify):		
<u>Commercial skills</u>		
(e.g. sales/marketing, business/financial)		

Admin/clerical skills

Key skills

Information Technology

Communication skills

Literacy and numeracy skills

Team working skills

Problem solving skills

Other skills (please specify):

Q20. What do you anticipate to be the main reasons for difficulties in meeting your human resource/skill requirements? Tick as many as apply and alongside the tick boxes indicate the three most important factors with an * sign.

- Shortages of labour in the marketplace ___
- Shortages of appropriately skilled/qualified people in the mktplace ___
- Competition from other companies *within* the power sector ___
- Competition from other companies *outside* the power sector ___
- Poor image of engineering industry ___
- Inadequacies in the UK's education/training system ___
- Inadequate terms and conditions of employment ___
(E.g. low pay, unsociable hours, unattractive location)
- Lack of investment in/commitment to training ___
- Advent of new technologies giving rise to need for new skills ___
- Other (please specify) _____

Q21. What impact do you expect your anticipated human resource/skills shortages to have on your business operation?

No impact on business activities

Minor restrictions to business activities

Significant restrictions to business activities

Details: _____

Q22. Thinking of the position in 2010, will the need for the following qualifications within your workforce have increased, decreased or stayed the same?

(Please tick ✓ for each qualification band)

Broad Qualification Classification	Increased Significantly	Increased	Stayed the same	Decreased	Decreased Significantly
No qualification					
NVQ 1 or equivalent e.g. GCSEs at grades D to G/ CSE other than grade 1/ GNVQ foundation					
NVQ 2 or equivalent e.g. GCSEs at grades A to C/ CSE grade 1/ Foundation Access/ GNVQ intermediate					
NVQ 3 or equivalent e.g. A/AS levels/ GNVQ advanced/ BTEC					
NVQ 4 or equivalent e.g. degree/HND/HNC					
NVQ 5 or equivalent e.g. postgraduate degree					

Q23. Thinking forward to the position IN 2015, will the demand for the following occupations at your establishment have:

(Please tick ✓ for each occupation band)

Occupation	Increased Significantly	Increased	Stayed the Same	Decreased	Decreased Significantly
Managers					

Professional

Technicians

Skilled Craft

Semi-skilled
Craft

Commercial,adm
in, clerical

Graduate
Trainees

Craft
Apprentices

Other
Occupations
(specify)

Q24. For your subsector IN 2015, what do you think the profile of the labour force would be?

	Occupation	Key Qualification	Key Skills	Any Other Comments
1.				
2.				
3.				

SECTION 5: TRAINING

Q25. Who are the major providers of training and qualifications for the employees within your company? Please complete as much of table below as you are able:

Occupation	Provider and Qualification	Comments
Managers		
Professional		
Technicians		

Skilled Craft

Semi-skilled Craft

Commercial, admin,
clerical

Graduate Trainees

Craft Apprentices

Other Occupations
(please specify)

Q26. Are you aware of any new education and training initiatives in the region? If so, which?

Q27. Could you name any provision which has had a particularly significant impact? If so, why?

Q28. Are there any areas of skill/qualifications where you think provision is lacking in the region?

SECTION 6: ANY OTHER COMMENTS

Q29. Are there any other issues you would like to raise or comments you would wish to make which have not been covered?

THANK YOU FOR YOUR TIME

If you would like to return this questionnaire by post, please send it to:

Emily Smith

GHK Consulting Ltd

30, St Paul's Square

Birmingham

B3 1QZ

ANNEX 3: ACTUAL AND POTENTIAL LEARNING PROVISION FOR RENEWABLE ENERGY IN NORTH EAST ENGLAND

An audit of actual and potential skills training for renewable energy available within North East England was undertaken in late 2005 and early 2006. To gain a view of the landscape of provision, prospectuses from all higher and further education providers in the region were obtained.

Renewable Energy Sector Provision in North East England

Only a small number of courses purposely targeted at the renewable energy sector were identified in the region. The following lists training provision in North East England.

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MSc New and Renewable Energy, University of Durham

The main objective of this programme is to educate students in the key engineering aspects of New and Renewable Energy, enabling them to take responsible, creative, challenging and stimulating posts in industry or research in the existing fields. The programme covers; harnessing renewable energy sources, environmental impact of energy provision, cogeneration systems, network integration issues and electrical generation plants²⁵.

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Northumberland College has developed a number of initiatives within renewable energy training and skills provision in unison with regional employers and with support funding from LSC Northumberland.

Biomass (wood fuel technology)

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²⁴ <http://www.ncl.ac.uk/reflex/reflex.htm> sourced on 29/08/06

²⁵ <http://www.dur.ac.uk/engineering/taughtmsc/mscnew/> sourced on 29/08/06

and health and safety, the course has run successfully for two years seeing two groups of students through to the end of the course. Reflecting the expansion of interest in biomass in domestic and industrial energy markets, the course is now seeking to extend its specialisation in wood chip as the base fuel for biomass development to other sources such as through crop rotation. The course is set at NVQ levels 2 and 3.

Wind Energy Training Course

In 2005, Northumberland College piloted the delivery of a Wind Energy Training Course. The initial idea for the course was developed by a regional business, the Northern Energy Initiative (TNEI), who specialise in the creation and delivery of Renewable Energy projects.²⁶ Involved in the installation, maintenance, decommissioning and refurbishment of wind turbines, the company had identified skill shortages in local contractor organisations to meet demand from a growing market in small wind projects connected with the region's major industrial sites.

The pilot was developed as a partnership between TNEI, NaREC and Northumberland College to deliver a programme of skills development covering erection, installation and commissioning; electrical connection; and service and maintenance. Support funding was provided by LSC Northumberland through the TEC Legacy Fund and Business Link supported promotion of the new provision to regional business. The course is to be developed as a NVQ level 2 qualification in the first instance with future development of a level 3 pathway.

Foundation Degree in Renewable Energy

The most recent initiative at Northumberland College is the development of a Foundation Degree in Renewable Energy (although this will require partnership with a university). Development of this degree is being undertaken with an international partner, Bremen College in Germany, who are interested in creating a European standard training programme and are aware of little other provision of similar standing within the UK. Initial links were facilitated through the research links of NaREC and the potential exists for further partners in Holland (and possibly Spain).

Ignite Wood Fuel Training, Northwoods

Ignite is the UK's first formal wood fuel training course which has been running since January 2004 and has had 34 students attend the course from the North East. The course is now being rolled out in Yorkshire and the Highlands and Islands of Scotland. The course aids an understanding of the economics of wood fuel supply, the technology that is available to produce wood fuel and the systems that burn it. Ignite Wood Fuel Training has recently been accredited by Lantra Awards as a recognised qualification within land based sectors.

Northwoods are also developing ideas around an Energy Crops Training Course, where instead of the usual promotion to eat vegetables in order to obtain a healthy lifestyle, the principle idea behind the course would be to educate people on the advantages of burning them for use as fuel. This course is still in the early stages of development, with no final decisions having been made as yet.

²⁶ TNEI (2005) Wind Skills Development Programme: A Proposal to Northumberland Learning and Skills Council

Courses with Content of Potential Relevance to Renewable Energy Skills Provision in North East England

The following lists generic courses where some evidence of course content of potential relevance to the Renewable Energy sector is identifiable. Courses are listed by level of provision and educational establishment with description of relevant content provided where available.

Level 1 Provision

Educational Establishment	Course/Skill	Course Level
Bishop Auckland College	Foundation Degrees <ul style="list-style-type: none"> ▪ Engineering Technology 	1
	Performance Engineering Operations This course is ideal for students wishing to develop a career in engineering. It is designed so students will learn how to do routine servicing of mechanical and electrical/electronic equipment and systems. They will also achieve an introductory certificate in engineering.	1
Darlington College of Technology	Foundation in Construction (PT)	1
	Technical Certificate in Plumbing for Mature Students (PT)	1
	Basic Plumbing TROCN Level 1 (PT)	1
	Creative Brickwork Level 1	1
	Foundation Construction Award – Brickwork (FT)	1
	Foundation Construction Award – Carpentry and Joinery (FT)	1
	Plumbing Technical Certificate (FT)	1
	Performing Engineering Operations Level 1 (FT)	1
East Durham and Houghall Community College	Engineering NVQ Levels 1-3 <ul style="list-style-type: none"> ▪ Mechanical ▪ Fabrication/ Welding 	1
	Foundation Construction Apprenticeship in: <ul style="list-style-type: none"> ▪ Wood Occupations ▪ Brickwork Studies ▪ Decorative Applications 	1
Gateshead College	Higher Education Foundation Course Chemistry	1
Hartlepool College	Foundation Electrical & Electronic Engineering This course introduces students to the safe working practices required in a modern electrical or electron engineering environment. In addition, many aspects of the engineering industry are introduced including design and materials, as well as specialised vocational skills in a variety of areas.	1
	Foundation Fabrication & Welding This course introduces students to the safe working practices required in modern fabrication and welding engineering.	1
	Foundation Manufacturing & Mechanical Engineering	1

	<p>This course introduces students to the safe working practices required in a modern manufacturing or mechanical engineering environment. In addition, many aspects of the engineering industry are introduced including design and materials as well as specialised vocational skills in a variety of areas.</p>	
	<p>Foundation Craft Award in Construction Disciplines (Carpentry, Joinery and Brickwork)</p>	1
Middlesbrough College	<p>Foundation Construction Award (FCA)</p>	Entry
	<p>BTEC First Diploma in Manufacturing/ Mechanical Engineering</p> <p>This course is designed to provide students with a range of skills and knowledge essential for careers within the industry. As part of this course, students are given the opportunity to work towards a City & Guilds Progress Award (Applying Engineering Principles – Mechanical & Electrical)</p>	1
	<p>Level 1 Performing Engineering Operations in Fabrication & Welding</p> <p>This course prepares the student for all aspects of basic welding, thereby, allowing them to pursue a career in the industry. Welding skills are required in many industries including Shipbuilding, Oil, Gas, Chemical, Construction and the Power Industry.</p>	1
	<p>BTEC First Diploma in Electronics</p> <p>This course is designed to provide students with a range of skills and knowledge, qualities and attitudes that are essential for careers within the Electrical, Electronics and Communications industries.</p> <p>On completion students can progress onto the BTEC National Certificate or Diploma in Electrical/Electronics Engineering</p>	1
Northumberland College	<p>Work based Learning for Adults and New Deal (E2E)</p> <ul style="list-style-type: none"> ▪ Engineering (mechanical, electrical, welding and motor vehicle) ▪ Construction (joinery, tiling, painting and decorating, highways maintenance, plastering and brickwork) 	Entry
	<p>GNVQ Foundation</p> <p>Students will undertake 3 Compulsory units, design and graphical communication, application of new technology in engineering and make engineered products. Plus 3 optional units including, applied science and mathematics for engineering, health and safety and preparing for employment.</p>	1
	<p>BTEC First Diploma In Manufacturing Engineering</p> <p>Engineering processes, electronic principals, Maths and Science, working practice, engineering drawing, and electronic construction.</p>	1
Redcar & Cleveland College	<p>BTEC Introductory Diploma Construction</p>	1
South Tyneside College	<p>BTEC First Diploma in Operation and Maintenance Engineering</p> <p>This course covers the knowledge and technical skills students would need to gain a good foundation for a career in engineering.</p>	1
	<p>CITB (City and Guilds) Foundation Certificate in Building</p>	1

	<p>Craft Occupations</p> <p>This introductory course is ideal if students would like to gain a recognised qualification and basic skills to seek a career in construction. Students will develop their skill through working with wood, brick plaster and paint materials.</p>	
Stockton Riverside College	<p>BTEC First Diploma in Operations and Maintenance Engineering.</p> <p>Core units include:</p> <ul style="list-style-type: none"> ▪ applied science and mathematics for technicians, ▪ working practices, ▪ operation and maintenance for engineering. <p>Specialist units include:</p> <ul style="list-style-type: none"> ▪ mechanical maintenance fundamentals, ▪ electrical maintenance fundamentals, ▪ electronic maintenance fundamentals, ▪ fluid power maintenance fundamentals, ▪ engineering, drawing and marking out and engineering materials. 	1
Tyne Metropolitan College	Advantage Access to Skills Plumbing (Foundation)	1
	Electrotechnical Technology Certificate Year 1	1
	IEE 16th Edition Electrical Regulations	1
	Welding: Arc Welding Introductory 3267 (City & Guilds)	1
	GNVQ Foundation Engineering	1
	BTEC First Diploma in Manufacturing Engineering	1
	Performing Engineering Operations NVQ 1	1

Level 2 Provision

Educational Establishment	Course/Skill	Course Level
Bishop Auckland College	<p>Apprenticeships</p> <p>Apprenticeships combine National Vocational Qualifications (NVQ's) with Key Skills (literacy, numeracy and IT) to form a vocational training package for people aged 16 -24 and are increasingly recognised as progression routes into Higher Education.</p> <ul style="list-style-type: none"> ▪ Electrical Installation ▪ Plumbing ▪ Brickwork 	2
	<p>Construction Apprenticeships</p> <ul style="list-style-type: none"> ▪ Plumbing ▪ Brickwork 	2
City of Sunderland College	<p>Electrical Installers (Domestic) Level 2</p> <p>Modules and topics covered include:</p> <p>Applicable Building Regulations for Domestic Electrical Installation,</p>	2

	Electrical Safety legislation, Regulations Standards and Terminology, Domestic Electrical Installation – PRE-WORK Survey/Inspection, Domestic Electrical Installation – Safe Isolation Procedures, Identifying unsafe electrical situations, Domestic Electrical Earthing and Bonding Requirements, Electrical Test Procedures, Selecting Domestic Electrical Cable and Components, Checking the correct and safe operation of installed electrical components, recording of electrical test results and completing certificates ,installing and/or rerouting domestic electrical cables, Domestic Electrical Installation – Special Locations, Understanding of New Domestic Electrical Circuit Requirements, Installing Domestic Lighting Circuits, Maintaining Domestic Electrical Installations.	
	Electrical Installation C&G 2330 Level 2 All aspects of Electrical Installations including: Domestic Commercial & Industrial Electronics, Electrical Science Theory Study Electrical Plant Theory in Year 2.	2
	Plumbing NVQ Level 2	2
Darlington College of Technology	Work Based Learning – Apprenticeships <ul style="list-style-type: none"> ▪ Engineering Maintenance – Apprenticeship ▪ Engineering Production Fabrication & Welding – Apprenticeship ▪ Engineering Production Mechanical/Manufacturing – Apprenticeship ▪ Installing Electrotechnical Systems – Apprenticeship ▪ Engineering Maintenance – Advanced Apprenticeship ▪ Engineering Production Fabrication & Welding – Advanced Apprenticeship ▪ Installing Electrotechnical Systems – Advanced Apprenticeships 	2
	City & Guilds Certificate in Electrotechnical Technology 2330 Level 2 (PT)	2
	City & Guilds Certificate in Electrotechnical Technology 2330 Level 2 (PT)	2
	City & Guilds Progression Award in Applying Engineering Principles – Welding & Fabrication 6983 Level 2 (PT)	2
	National Certificate in Mechanical Engineering & PEO 2 (Combined)	2
	Certificate in Electrotechnical Technology Level 2	2
	Engineering Maintenance – Apprenticeship	2
	Engineering Production Fabrication & Welding – Apprenticeship	2
	Engineering Production Mechanical/ Manufacturing – Apprenticeship	2
	Installing Electrotechnical Systems – Apprenticeships	2
East Durham and Houghall Community College	Engineering NVQ Levels 1-3 <ul style="list-style-type: none"> ▪ Mechanical ▪ Fabrication/ Welding 	2
Hartlepool College	Apprenticeships in: <ul style="list-style-type: none"> ▪ Plumbing ▪ Brickwork 	2
	Intermediate Electrical & Electronic Engineering This course will introduce students to the fundamentals of the	2

	<p>electrical and electronic engineering needed to understand the operation of modern electrical devices. In addition, specialist units will allow students to gain theoretical and practical skills in areas such as PC Configuration, maintenance of electrical systems and circuit construction and testing. Additional practical skills will be developed through a range of workshop sessions.</p>	
	<p>Intermediate Fabrication and Welding</p> <p>This course introduce students to the fundamentals of fabrication and welding technology needed to understand the operation of modern fabrication and welding processes and techniques. In addition, specialist units will allow you to gain theoretical and practical skills in areas such as engineering drawing and marking out, materials and quality control. Additional practical skills will be developed through a range of workshop sessions.</p>	2
	<p>Intermediate Manufacturing & Mechanical Engineering</p> <p>This course will introduce students to the fundamentals of manufacturing and mechanical engineering technology needed to understand the operation of modern manufacturing and mechanical devices and techniques. In addition, specialist units will allow students to gain theoretical and practical skills in areas such as engineering drawing and marking out, materials and quality control. Additional practical skills will be developed through a range of workshop sessions.</p>	2
	<p>Apprenticeships</p> <ul style="list-style-type: none"> ▪ Electrical ▪ Fabrication & Welding ▪ Electrical & Electronic 	2
Middlesbrough College	<p>Level 2 Performing Engineering Operations in Fabrication & Welding</p> <p>This course prepares the student for all aspects of basic welding, thereby, allowing them to pursue a career in the industry. Welding skills are required in many industries including Shipbuilding, Oil, Gas, Chemical, Construction and the Power Industry.</p>	2
	Electrical Installation	2
	Apprenticeships (Level 2) Plumbing	2
	Intermediate Construction Award (ICA)	2
	Advanced Construction Award (ACA)	2
	Certificate in Basic Plumbing Skills	2
Northumberland College	<p>Intermediate Construction Award (ICA) in Plastering, Painting and Decorating, Floor Covering, Tiling, Drylining, Brickwork, Carpentry and Joinery and Highways Maintenance</p>	2
Northwoods	<p>Rural Development Initiatives – Northwoods</p> <p>Northwoods provide Vocation Renewables Qualifications (VRQs) in renewable energy (woodfuel) Level 2 and some technical certificates such as short rotation coppice. They also provide general awareness raising to break down barriers and some Continuing Professional Development for those involved in the industry.</p>	2
Prior Pursglove College	GCSE Science	2
Redcar and Cleveland College	Apprenticeship Plumbing Level 2	2

	BTEC First Diploma Construction	2
	Student Engineering Programme Level 2	2
Stockton Riverside College	City and Guilds 2330 Level 2 Electrotechnical Certificate The aim of the course is to provide knowledge and awareness of techniques, craft skills, technology and related science required for electrical installation work.	2
South Tyneside College	BTEC Introductory Diploma in Engineering This course is described in the college prospectus, as having a good introduction to the different aspects of Engineering.	2
Tyne Metropolitan College	Electrotechnical Technology Certificate Year 2	2
	Performing Engineering Operations NVQ 2	2

Level 3 Provision

Educational Establishment	Course/Skill	Course Level
Bede College	BTEC National Diploma in Construction Building construction and environmental science are two modules that will be covered during this course.	3
	Geography AS (one year) A Level (Two Years) AS: Students will investigate natural environments such as rivers and flood management, weather and climate, ecosystems and environment. They will also study human environments, focusing on population distribution and change, economic activity and settlements. A2: Students will study coastal processes and problems, geomorphological processes and hazards, cold environments and the resulting landforms and ecosystems. They will also consider how cities are managed and consider issues relating the human and natural environments to each other.	3
Bishop Auckland College	A Level (AS and wA2) Physics	3
	Electrical Installation City & Guilds The course will develop students skills of basic electrical installation e.g. wiring lights, sockets and electrical appliances.	3
City of Sunderland College	Electrical/Electronic Engineering BTEC National Certificate This course covers topics such as, Business Systems, Communications for Technicians, Science, Maths, Project, Electrical and Electronic Principles, Electronics, Electrical Applications, Programmable Controllers, Industrial Robotics, Digital Electronics, Inspection/Testing of LV Elect. Systems.	3
	IEE Wiring Regs 16th Edition The course covers: System Earthing, Calcs of Cable Sizing, Conduit, Trunking, Earth Loop Impedance and diversity.	3
	Electrical Inspection and Testing C&G 2391 Testing procedures. Certification Process. Inspection Methods.	3

	Engineering (Electrical Installation) BTEC National Certificate Business Systems, Communications for technicians, Science, Maths, Project, Electrical and Electronic Principles, Electrical Applications, Inspection/Testing of LV Elect. Systems, 3 Phase Systems, Electrical Technology, Electrical Installation, Electrical Safety & Standby Systems.	3
	Engineering Advanced Diploma Level 3 To Achieve the EAL VRQ the candidate is required to complete the common mandatory units, followed by the required number of units from their choice pathway. (A,B,C,D or E) Common mandatory units for all pathways: (both units must be completed) Engineering and Environmental Health and Safety, .Organisational Efficiency and Improvement. Pathway a: (Electrical /Electronic) / Pathway code: ETA (must complete mandatory unit) Electrical and Electronic Principles. Plus a choice of 5 from 12 units. Advanced Electrical and Electronic Principles (for those wishing to enter HE). Advanced Engineering Science 9 (for those wishing to enter HE) Pathway B: (Fabrication and Welding)/ Pathway code ETC (must complete the pathway mandatory unit) Fabrication and Welding Principles Plus A choice of 5 from 12 units. Pathway C: (Maintenance) Pathways code ETC (Must complete the pathway mandatory units) Maintenance Engineering Principles. Plus a choice of 5 from 15 units. Pathway D: (Mechanical) Pathway code ETD (must complete the pathway mandatory unit) mechanical Engineering Principle Plus a choice of 5 from 15 units. Pathway E: (Multi Skill) Pathway code ETE (A choice of 6 from 48 units must be completed)	3
	Inspection and Testing of Electrical Equipment Level 3 A series of modules and practical tasks designed to give students a basic knowledge of electrical appliance testing. An indication of the types of modules covered is given below: Management of Electrical maintenance, Inspection and Testing of Electrical Equipment.	3
	Plumbing NVQ Level 3	3
Darlington College of Technology	Work Based Learning – Advanced Apprenticeships ▪ Construction Technician	3
	National Certificate in Construction (PT)	3
	Site Supervision NVQ Level 3 (PT)	3
	Brickwork NVQ Level 3 (PT)	3
	National Diploma in Construction	3
	CEC Scheme – Electrotechnical Services	3
	City & Guilds Certificate in Electrotechnical Technology 2330 Level 3 (PT)	3
	City & Guilds Certificate in Electrotechnical Technology 2360 Pt 2 Level 3	3
	Electrotechnical Services NVQ Level 3 (PT)	3
	City & Guilds Certificate in Engineering – Fabrication & Welding 2800 Level 3 (PT)	3
	National Certificate in Electrical/Electronic Engineering (BTEC) (PT)	3
	National Certificate in Manufacturing Engineering (BTEC) (PT)	3
	National Certificate in Operations & Maintenance Engineering (BTEC) (PT)	3

	First Diploma in Manufacturing Engineering (FT)	3
	Engineering Maintenance – Advanced Apprenticeships	3
	Engineering Production Fabrication & Welding – Advanced Apprenticeship	3
East Durham and Houghall Community College	Engineering NVQ Levels 1-3 <ul style="list-style-type: none"> ▪ Mechanical ▪ Fabrication/ Welding 	3
	Advanced Construction Apprenticeship: <ul style="list-style-type: none"> ▪ Wood Occupations ▪ Brickwork Studies ▪ Decorative Applications 	3
Gateshead College	City & Guilds 2381 16th Edition Health & Safety at Work Act and Electricity Regulations	3
	City & Guilds 2391 Inspection, Testing & Certification of Electrical Installations	3
	City & Guilds 2377 Code of Practice for In-Service Inspection and Testing of Electrical Equipment (Portable Appliance Testing) The course consists of two qualifications based on the IEE code of practice for in-service inspection and testing of Electrical Equipment	3
Hartlepool College	Physics AS (one year) A Level (two years)	3
	Advanced Electrical & Electronic Engineering Core subjects range from the science and principles necessary to understand the operation of all equipment to business concerns relevant to design of a product and the materials used, and analytical techniques needed to solve electrical and electronic system problems. Optional units explore a range of electrical and electronic specialist design subject to give a detailed knowledge of the approaches used in the design, building and operation of modern equipment and systems.	3
	Advanced Fabrication and Welding Core subjects range from the science and principles necessary to understand the operation of fabrication & welding equipment to business concerns relevant to the design of a product and the materials used, and analytical techniques needed to solve fabrication and welding problems. In addition to the core subjects, optional units explore a range of fabrication & welding specialist design subjects to give a detailed knowledge of the approaches used in the design, building, manufacture and operation of modern equipment and structures.	3
	Advanced Manufacturing & Mechanical Engineering Core subjects range from the science and principles necessary to understand the operation of mechanical equipment to business concerns relevant to the design of a product and the materials used, and analytical techniques needed to be solve manufacturing and mechanical system problems. Optional units explore a range of manufacturing and mechanical specialist design subjects to give a detailed knowledge of the approaches used in the design, building, manufacture and operation of modern equipment and systems.	3
	Applied A Level in Engineering At AS Level students study the influential engineering materials, processes and techniques used in engineering today. They will investigate the role of the professional engineer and their impact on the	3

	design and manufacture of products and services. Other aspects of the course include examining the principles of design, planning, and prototyping using state of the art Computer Aided Engineering and rapid prototyping equipment. Progressing to A2 Level (in addition to the above) students study applied engineering systems, the engineering environment and advanced design, computer modelling and prototyping.	
	Advanced Construction and the Built Environment Core subjects range from design, construction methods, material selection and performance and environmental issues.	3
Middlesbrough College	AS and A2 Level Geography	3
	BTEC National in Manufacturing/ Mechanical Engineering This course provides a specialist work related qualification in the manufacturing engineering sector. Developed to prepare people for employment and to relate to the occupational standards in the manufacturing engineering sector.	3
	BTEC National Diploma in Electrical/ Electronic Engineering This course will give students the opportunity to acquire skills in a world that is full of fast moving technology. Upon successful completion students may progress to a BTEC Higher National Qualification or a degree course in Electrical & Electronic. Engineering/Instrumentation & Control, other related science degrees, or directly into employment in areas such as; PC Gaming Industry, Domestic Electrical/ Electronic Operations, Instrument Sector-Oil Rigs, and the Chemical, Steel and Manufacturing Industries.	3
	Apprenticeships (Level 3) Plumbing	3
	Technical Certificate in Plumbing	3
Northumberland College	AVCE Engineering (Single and Double Award) Engineering in business and the environment, applications of new technology, engineering materials, applied science for engineering, applied mathematics for engineering and design development, plus optional units.	3
	Advanced Apprenticeships in: <ul style="list-style-type: none"> ▪ Manufacturing or Maintenance Engineering ▪ Plumbing ▪ Construction (including Highways Maintenance) ▪ Construction Technician 	3
	Advanced Construction Award (ACA) in Plastering, Painting and Decorating. Wall and Floor, Floor covering, Drylining, Brickwork, Carpentry and Joinery and Highways Maintenance	3
Prior Pursglove College	A/AS Level Geography	3
	A/AS Level Environmental Science In the first year of this course, students will cover three units: <ul style="list-style-type: none"> ▪ Energy, The Atmosphere and Hydrosphere ▪ Lithosphere and ▪ Biosphere This makes up the AS award. And in the second year, they will cover:	3

	<ul style="list-style-type: none"> ▪ Biotic and Physical Resource Management ▪ Pollution 	
	A/AS Physics	3
Queen Elizabeth Sixth Form College	AS/A Level Chemistry This course is linked with biological and medical science and has important connections with engineering and earth sciences.	3
	AS/A Level Physics	3
Redcar & Cleveland College	As/A Level Science The course includes elements of Biology, Chemistry, Physics, Earth Science and Environmental Science. It covers units with different environmental themes such as ecology in tropical rainforests, transmission of electrical and development of more environmentally friendly chemical processes, in the AS course and sustainable agriculture, management of water quality and genetic engineering at A2 level.	3
	Geography AS - 1 year A2 – 1 year	3
	Physics AQA AS – 1 Year A2 – 1 Year	3
	Advanced Apprenticeship Plumbing Level 3	3
	Design and Robotics BTEC National Certificate Level 3	3
	BTEC National Diploma Construction	3
St. Mary's College	A Level (AS and A2) Geography	3
	AS Environmental Science	3
South Tyneside College	BTEC National Diploma in Operations and Maintenance Engineering This course covers core skills and knowledge which students will need to work as a technician – such as Business Systems, Communication, Science and Maths. Students will also study more specialist engineering subjects, such as Electro, Pneumatic and Hydraulic Systems; Electronics; Data Communications and Networking; and Mechanical Principles.	3
Stockton Sixth Form College	Installing Electrotechnical Systems – Advanced Apprenticeship	3
	Geography AS/A Level	3
	Physics – AS/A Level	3
Tyne Metropolitan College	Electrical and Electronic Eng Higher National Certificate	3
	Electrical Engineering National Award	3
	Manufacturing Engineering Higher National Certificate	3
	Mechanical Engineering Higher National Certificate	3
	Mechanical Engineering National Award	3

	Occupational Safety and Health National Certificate	3
	Operations and Maintenance Eng National Certificate	3
	Requirements for Electrical Inst 2391(City & Guilds)	3
	BTEC National Award in Engineering (Mechanical or Electronic)	3

Level 4 Provision

Educational Establishment	Course/Skill	Course Level
City of Sunderland College	<p>Construction HNC</p> <p>This part-time programme is designed for people employed in the construction industry at a technical or craft level, who are looking to enhance their career prospects in the professional and management fields.</p>	4
	<p>Building Services HND (Top Up)</p> <p>This part time programme is designed for people employed in the construction industry at a technical or managerial level, who are looking to enhance their career prospects in the professional and management fields and have successfully completed the HNC</p>	4
	<p>Building Services (Electrical) HND (Top Up)</p> <p>This part time programme is designed to provide the technical knowledge required for employment in senior positions in Building Service Engineering to students who have successfully completed the Building Services HNC.</p>	4
	<p>Building Services (Electrical) HNC</p> <p>This part time programme is designed to provide the technical knowledge required for employment in senior positions in Building Service Engineering.</p>	4
	<p>Electronic/Electrical Engineering HND (Top Up)</p> <p>This part time programme is designed to provide the technical knowledge required for employment in senior positions in electronic/electrical and allied industries to students who have successfully completed the Electronic/Electrical Engineering HNC.</p>	4
Darlington college of Technology	<p>HNC in Building Services</p> <p>Optional Units Including:</p> <ul style="list-style-type: none"> ▪ Electrical Installation ▪ Lighting Applications ▪ Fire and Intruder ▪ Power supplies for buildings ▪ Control systems and electronic principles 	4
	<p>Foundation Degrees (PT)</p> <p>Foundation degrees are a brand new and exciting higher education qualification introduced by the Government and is more career-focused than traditional degree courses. They have been developed with employers and industry professionals to meet the country's need for a trained and knowledgeable workforce.</p> <p>Foundation Degrees offered are:</p> <ul style="list-style-type: none"> ▪ Manufacturing Engineering 	4

	<ul style="list-style-type: none"> ▪ Engineering design ▪ Manufacturing maintenance engineering ▪ Construction 	
	HNC Building Services (PT)	4
	Site Management NVQ Level 4 (PT)	4
	HNC In Manufacturing Engineering (PT)	4
	HNC in Mechanical Engineering (PT)	4
	HNC in Mechatronics (PT)	4
	HNC in Electrical/Electronic Engineering (PT)	4
	HNC in Communications Engineering (PT)	4
	Foundation Degree in Manufacturing Engineering (PT)	4
	Foundation Degree in Manufacturing Engineering (Mechanical) (PT)	4
	Foundation Degree in Manufacturing Engineering (Electrical) (PT)	4
	Foundation Degree in Engineering Design (Mechanical) (PT)	4
	Foundation Degree in Engineering Design (Electronic) (PT)	4
	Foundation Degree in Manufacturing Maintenance Engineering (FT)	4
Gateshead College	<p>HNC In Electrical Engineering</p> <p>Core Units:</p> <ul style="list-style-type: none"> ▪ Business Management Techniques ▪ Analytical methods for Engineers ▪ Engineering Science ▪ Engineering Design ▪ Electrical & Electronic principles <p>Core Units Including:</p> <ul style="list-style-type: none"> ▪ Control systems and automation ▪ Electronics ▪ Programmable logic controllers ▪ Operational Amplifiers ▪ Digital & Analogue devices and circuits ▪ Electrical Power ▪ Power Electronics ▪ Utilisation of Electrical Energy ▪ Microprocessor based systems ▪ Robot Technology ▪ Quality Assurance & Management ▪ Advanced computer aided design techniques 	4
	<p>HNC in Mechanical Engineering</p> <p>Core Units:</p> <ul style="list-style-type: none"> ▪ Business Management Techniques ▪ Analytical methods for Engineers ▪ Engineering Science ▪ Engineering Design 	4

	<ul style="list-style-type: none"> ▪ Mechanical Principles Optional Units: <ul style="list-style-type: none"> ▪ Quality Assurance & Management ▪ Quality Aided Machining ▪ Programmable logic controllers ▪ Robot Technology ▪ Managing the work of individuals & teams ▪ Materials engineering ▪ Project Management ▪ Advanced computer aided design 	
Hartlepool Sixth Form College	Electronic/Electrical Engineering HNC This part time programme is designed to provide the technical knowledge required for employment in senior positions in electronic/electrical and allied industries.	4
Northumbria University	Foundation Degree - Building Services Engineering Studying Building Services Engineering, students can be expected to be involved in the design and operation of environmental and building services systems within buildings. These systems include the heating, ventilation and air conditioning, plus electrical power, lighting and public health.	4
	Foundation Degree – Building Surveying Building surveying is concerned with buildings in use, including the maintenance, alteration, repair, refurbishment and restoration of existing buildings as well as working with new buildings.	4
	Foundation Degree – Construction Management Currently, there is a shortage of well qualified managers of the construction process. The foundation degree gives students a level of qualification that allows students to work on site and gain vast experience.	4
University of Sunderland	Foundation Degree (FdEng) in Maintenance Engineering This foundation degree boasts the provision of expertise in: <ul style="list-style-type: none"> ▪ analytical methods ▪ maintenance strategies and practices ▪ fluid systems ▪ engineering science ▪ electrical and electronic principles ▪ electrical power ▪ mechatronics ▪ project management ▪ instrument and control systems 	4
University of Teeside	FdEng Engineering	4
	HND Building Studies	4
	HND Civil Engineering Studies	4
	HND Fabrication and Welding	4

	This qualification covers topics such as welding metallurgy, the strength of welded joints, arc-based welding processes, welding procedures, the high-energy technologies of electron beam welding, as well as adhesive bonding and the joining of polymers. Modules include Fabrication Technology, Welding Technology, Fusion Welding Metallurgy, Business Management Techniques and Production & Integrity of Welds.	
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Higher Educational Provision

Educational Establishment	Course/Skill	Course Level
City of Sunderland College	HND in Engineering (Mechanical) This course covers engineering subjects – such as analytical methods, engineering science and design, and planning and scheduling principles – before moving on to subjects such as machine tools, computer-aided machining and design for manufacture.	Higher
	Building Services (Electrical) HND (Top Up) This part time programme is designed to provide the technical knowledge required for employment in senior positions in Building Service Engineering to students who have successfully completed the Building Services HNC.	Higher
	Building Services (Electrical) HNC This part time programme is designed to provide the technical knowledge required for employment in senior positions in Building Service Engineering.	Higher
	Electronic/Electrical Engineering HND (Top-Up) This part-time programme is designed to provide the technical knowledge required for employment in senior positions in electronic/electrical and allied industries to students who have successfully completed the Electronic/Electrical Engineering HNC.	Higher
	Electronic/Electrical Engineering HNC This part time programme is designed to provide the technical knowledge required for employment in senior positions in electronic/electrical and allied industries.	Higher
	Manufacturing Engineering HND (Top Up) This part time programme is designed for students who have a HNC in Engineering or equivalent and are in the engineering industry at a technical or managerial level looking to enhance their career prospects in the professional field.	Higher
	Manufacturing Engineering HNC This part time programme is designed for students who have a national certificate in Engineering.	Higher
Durham University	BSc (Hons) Earth Sciences Course content includes: The location of oil, gas and minerals. The environment and its management.	Higher
	BSc (Hons) Environmental Geosciences	Higher
	BSc (Hons) Natural Sciences This course is for students who are looking for a broadly based science degree with a mathematical flavour, Durham University offer several Mathematics modules under the Natural Sciences programme. They also	Higher

	offer a combination of Mathematics and one other subject as a Joint Honours degree in the Natural Sciences programme, leading to an Honours BSc in Mathematics and one of the following: Anthropology, Chemistry, Computer Science, Earth Sciences, Economics, Geography, Philosophy, Physics or Psychology.	
	BSc in: Biology with Earth Science Chemistry with Earth Science Geography with Earth Science Mathematics with Earth Science Philosophy with Earth Science Physics with Earth Science	Higher
	<p>The following research groups offer opportunities leading to research degrees.</p> <p>New and Renewable Energy:</p> <ul style="list-style-type: none"> ▪ permanent magnet electrical machines ▪ power systems ▪ power applications of super conductors ▪ hybrid electrical machine engine configuration ▪ power electronic converters for renewable energy systems ▪ condition monitoring of offshore wind turbines ▪ modelling of renewable energy systems ▪ photovoltaics and applications ▪ biomass applications <p>MSc's in: Engineering Geology Geo-Environmental Engineering Geotechnical Engineering Manufacturing (also in Dip/Cert)</p>	Higher
	MEng's in: General Engineering Civil Engineering Mechanical Engineering Electronic Engineering Manufacturing Engineering with Management General Engineering	Higher
	MSc Earth Science	Higher
	PhD Earth Science	Higher
Newcastle College	HND in Electrical and Electronic Engineering <p>This course covers general engineering subjects, such as engineering design and engineering principles, and then move on to specific electrical subjects – such as electrical and electronic principles, operational amplifiers and electrical power.</p>	Higher
Northumbria University	BEng (Hons) Electrical and Electronic Engineering <p>The core material of this course amongst more general topics covers power engineering, signal processing and product development. Some specialisation in the light and heavy current areas is provided by options in the final two years in the areas of power engineering and instrumentation and control embedded systems and VLSI.</p>	Higher

	<p>BEng (Hons) Mechanical Engineering</p> <p>When taken, this course equips students with a wide range of the necessary academic and intellectual tools and personal skills to pursue a career in many diverse engineering fields – design, manufacture, research and development, CAE, health and safety, environmental issues, oil and offshore, insurance, automotive, etc.</p>	Higher
	<p>MSc Electrical Power Engineering</p> <p>This programme is designed to allow students to update, extend and deepen their knowledge on a flexible programme to enhance their career opportunities in industry or to progress to undertake further research in the Electrical Power field.</p>	Higher
	<p>MEng (Hons) Civil Engineering</p> <p>There are five main areas of civil engineering in this course, for students to choose from: environmental engineering, geotechnical engineering, structural engineering, transport engineering; or water resource engineering.</p>	Higher
	<p>BEng (Hons) Civil Engineering</p> <p>This course focuses on engineering in context, professional skills, individual project work and design skills.</p>	Higher
	<p>MEng (Hons) Environmental Engineering</p> <p>This course focuses on the professional skills of risk management, economics, construction and business management, as well as in-depth studies of the practice of environmental engineering.</p>	Higher
	<p>BEng (Hons) Environmental Engineering</p> <p>This course focuses on professional skills, individual project work and design skills.</p>	Higher
	<p>MEng (Hons) Electrical and Electronic Engineering</p>	Higher
	<p>BEng (Hons) Electrical and Electronic Engineering</p>	Higher
	<p>MEng (Hons) Electronic Engineering</p>	Higher
	<p>BEng (Hons) Electronic Engineering</p> <p>The first stage of this course is broadly based on introducing students to the main principles of the subject and includes modules in electromagnetism, circuit theory, analogue and physical electronics. The second stage of the course is designed to develop students knowledge base as well as their analytical and practical skills.</p>	Higher
	<p>MEng (Hons) Electronic Communications</p> <p>In the third stage of this course, students are required to take compulsory modules which include digital signal processing, analogue systems, radiowave engineering, telecommunications (SDN networks) and introduction to business management.</p> <p>In the fourth stage of the course, students are required to complete modules in data communications and signals, advanced communications systems, as well as a group design project and report, and an industrial research project.</p>	Higher
	<p>BEng (Hons) Electronic Communications</p> <p>The study pattern of Electronic Communications degree programmes is similar to that of the Electronic Engineering, and Electrical and Electronic Engineering degrees. Many of the modules are identical, however in the second stage, students are given the opportunity to take a specialised module in information theory and coding in place of electrical systems and machines.</p>	Higher

	MEng (Hons) Computer Systems Engineering	Higher
	<p>BEng (Hons) Computer Systems Engineering</p> <p>Both courses above provide an almost unique understanding of the link between hardware and software in modern information systems.</p> <p>The first part of the course is designed to introduce students to the main principles of the subject, including circuit theory, analogue electronics, communication studies, programme design and problem solving, object-oriented programme design and implementation, digital electronics, linear systems and signals, computer engineering, engineering mathematics, and basic manufacturing techniques.</p> <p>During the second part of the course student's knowledge base, analytical and practical skills are extended considerably through the study of modules in automatic control, communications, advanced programming, digital electronics, linear systems and signals, microprocessor system design, project management, computer networks and communications.</p>	Higher
	<p>MEng (Hons) Marine Technology</p> <p>During this course, all students take part in an identical first stage. During the second part of the course, students study marine production technology and engineering applications, in addition to modules in computing, mathematics and management. Over half of students time at this Stage is spent studying for one of the four specialized areas: marine engineering, naval architecture, offshore engineering or small craft technology.</p>	Higher
	<p>BEng (Hons) Marine Technology</p> <p>After an identical first stage, students will study towards their specific Honours Option that they have applied for, from marine Engineering, Naval Architecture, Offshore Engineering or Small Craft Technology. The Options allow students to specialise in design production, propulsion or offshore applications.</p> <p>All students take a common Stage 1. In Stage 2 they study marine engineering, powering and production technology and structures, in addition to related mathematical, computing and materials modules. You also take modules in management.</p>	Higher
	<p>MEng Marine Technology</p> <p>Students take modules in marine engineering and design, stability of marine vehicles and naval architecture, dynamic modelling and simulation and internal combustion engines.</p>	Higher
	<p>Offshore Engineering</p> <p>MEng (Hons) Offshore Engineering</p> <p>These degrees have been developed in consultation with the offshore industry in order to meet its increasingly specialist demands. Successful students will have the education and skills to design fixed and floating offshore oil and gas production installations and vessels, and to work in other sectors such as thermal energy conversion or seabed mineral recovery. They will also have gained knowledge applicable to all areas of engineering.</p> <p>Course Content:</p> <p>Students will take the same first and second stages of the degree, where they will study marine engineering, dynamics and production technology, in addition to offshore mechanics, marine structures (including composite materials), powering marine vehicles and soil mechanics. Students are also required to take related modules in mathematics, computing and management.</p> <p>MEng</p> <p>Students undertake modules in offshore engineering analysis, marine structures and offshore design, drilling engineering and offshore vehicle</p>	Higher

	design. BEng Students Students undertake modules in offshore vehicle design, offshore engineering analysis, marine structures, drilling engineering and offshore design.	
	PhD Environmental Science	Higher
	MSc and Diploma in Clean Technology	Higher
	MSc and Diploma in Process Automation	Higher
	MPhil and PhD in Environmental Engineering	Higher
	MSc, Diploma and Certificate in Environmental Engineering	Higher
	MSC Engineering Geology	Higher
	MSc and diploma in Geotechnical Engineering	Higher
	MSc and Diploma in Structural Engineering	Higher
	MSc and Diploma Structural Engineering and Construction Management	Higher
	MSc and Diploma in Applied Hydrogeology	Higher
	MSc Diploma Sustainable Management of the Water Environment	Higher
	MSc Flood Risk Management	Higher
	PhD Electrical and Electronic Engineering	Higher
	EngD Power Electronics, Drives and Machines	Higher
	MSc and Diploma Automation and Control	Higher
	MSc and Diploma Electrical Power	Higher
	Postgraduate Certificate Electrical and Electronic Engineering	Higher
	MSc and Diploma Microelectronics	Higher
	MSc, Diploma and Certificate Power Distribution Engineering	Higher
	MSc and Diploma Power Electronics, Machines and Drives	Higher
	MSc Mechatronics	Higher
	MSc Marine and Offshore Power Systems	Higher
	MSc Marine Electrical Power Technology	Higher
	MSc Marine Engineering	Higher
	MSc Offshore and Environmental Technology	Higher
	MSc Offshore Engineering	Higher
	MSc and Diploma Environmental Biogeochemistry	Higher
	MSc and Diploma Agriculture and Environmental Science	Higher
	MSc Environmental Consultancy	Higher

	MSc and Diploma Environmental Resource Assessment	Higher
	BSc (Hons) Agri-Business Management	Higher
	BSc Agriculture	Higher
University of Newcastle upon Tyne	<p>BSc (Hons) Countryside Management</p> <p>Course Content:</p> <ul style="list-style-type: none"> ▪ Countryside Management issues ▪ Environmental science ▪ Business Management ▪ Agriculture ▪ Ecology and Statistics <p>With additionally specialised intermediate theory, with modules based on:</p> <ul style="list-style-type: none"> ▪ Landscape ▪ Culture and heritage ▪ Law and land use ▪ Population Ecology ▪ Countryside Interpretation and management planning 	Higher
	<p>BSc (Hons) Rural Studies</p> <p>Course module content:</p> <ul style="list-style-type: none"> ▪ Rural Studies ▪ Business Management ▪ Economics ▪ Communications and culture and statistical methods <p>Optional modules can also be chosen from:</p> <ul style="list-style-type: none"> ▪ Land Resources ▪ Marketing ▪ Ecology ▪ Politics ▪ Sociology ▪ Landscape Assessment ▪ Heritage Management ▪ Law and Land Use ▪ Accountancy ▪ Environmental Economics ▪ Communication Techniques 	Higher
	BA (Hons) Geography	Higher
	<p>BSc (Hons) Geography</p> <p>The modules available on this course provide students with an introduction to the range and variety of geographical study, and include an introduction to geographical practice, geographical study skills, quantitative analysis, environmental issues and urban, regional and world development.</p>	Higher
	<p>BA (Hons) Geography and Planning</p> <p>This course provides students with basic training in study skills and introduces the four main themes of the course: environmental management; social and cultural development; urban and regional development; planning and urban design.</p>	Higher

	There is the option to choose modules within two of these themes and specialise to develop an in-depth knowledge of the issues and a practical understanding of public policy.	
	<p>BSc Joint Honours In Science</p> <p>Geography and Mathematics</p> <p>Geography and Statistics</p> <p>Geography and Surveying and Mapping Science</p> <p>During the first stage of this course, students will spend time following geography modules, mainly from within the physical geography and environmental science themes.</p> <p>They will also be required to take part in compulsory modules in quantitative analysis and environmental issues.</p> <p>In the second stage of the course, students are also encouraged to choose options, such as, physical geography and environmental science themes, which include biogeography, land, water and development, geomorphological techniques, recent environmental change, river conservation and management, Quaternary climate change and physical geography field courses.</p>	Higher
	<p>BSc (Hons) Environmental Science</p> <p>This degree equips students taking part with an understanding of contemporary issues in environmental management, backed up with ecological principles and an awareness of the legislative and ethical framework within which environmental scientists operate.</p> <p>Students are able to choose from one of the programme's two study streams. In the science stream they can choose land, freshwater and marine environments, pollution and ecology, while the policy stream covers the economic, political and legislative framework for environmental management.</p>	Higher
	BSc Joint Honour In Science, Geography and Mathematics	Higher
	BSc Joint Honours in Science, Geography and Statistics	Higher
	Engineering Degrees With a Foundation Year	Higher
	Engineering with Foundation Year MEng Honours	Higher
	Engineering with Foundation Year BEng Honours	Higher
	Civil Engineering with Foundation Year MEng Honours	Higher
	Civil Engineering with Foundation Year BEng Honours	Higher
	Electrical and Electronic Engineering with Foundation Year MEng Honours	Higher
	Electrical and Electronic Engineering with Foundation Year BEng Honours	Higher
	Mechanical Engineering with Foundation Year MEng Honours	Higher
	Mechanical Engineering with Foundation Year BEng Honours	Higher
	<p>Chemical and Process Engineering MEng Programmes</p> <p>The MEng courses is aimed at giving students the opportunity to take a four-year degree where they follow modules that cover various aspects of chemical engineering, including the design of a complete plant.</p>	Higher
	<p>Chemical and Process Engineering MEng</p> <p>Modules in this course cover all the main areas of chemical and process engineering, such as process control, separation processes and biochemical. Optional modules students to study areas such as computer – aided engineering, data management and management of new product introduction.</p>	Higher

	Chemical and Process Engineering (Europe) MEng	Higher
	<p>Bioprocess Engineering MEng</p> <p>This course is concerned with the 'green' drive for products made from renewable resources and the rapid progress of post- genomic research which requires an increase in the number of chemical engineers capable of contributing to the bioprocessing area. The course aim is to emphasise the biological aspects of processes and their effective design, modelling, monitoring and control.</p>	Higher
	<p>Intensified Processing MEng</p> <p>The Intensified Processing Honours Option deals with radical step-change technologies, which will revolutionize the way process plants are designed and operated. Using the concepts developed in the modules, it will be possible to design the process plants of the future, which will deliver improved product quality, be responsive to market needs and create a sustainable environment.</p>	Higher
University of Sunderland	<p>BEng (Hons) Engineering Design and Manufacture</p> <p>Power generation has been specified as a choice of career following this course. It boasts of gaining expertise in:</p> <ul style="list-style-type: none"> ▪ design and practical skills ▪ engineering mathematics ▪ manufacturing and materials ▪ applications of computers ▪ engineering principles – applied mathematics and thermodynamics ▪ engineering principles – electrical and electronics ▪ manufacturing technology ▪ computer aided engineering (CAE) ▪ product life cycle management ▪ industrial studies ▪ engineering design ▪ instrumentation and measurement ▪ engineering management ▪ material selection ▪ manufacturing systems ▪ human factors ▪ modern maintenance practice 	Higher
	<p>BEng (Hons) Mechanical Engineering with Design</p> <p>This course specified power generation as a choice in career following its completion. It boasts of gaining expertise in:</p> <ul style="list-style-type: none"> ▪ engineering mathematics ▪ design and practical skills ▪ applications of computers ▪ engineering principles – applied mechanics and thermodynamics ▪ engineering principles – electrical and electronics ▪ manufacturing and materials ▪ thermo fluids and engines ▪ industrial studies ▪ computer aided engineering (CAE) 	Higher

	<ul style="list-style-type: none"> ▪ product life cycle management ▪ engineering mechanics ▪ design for manufacture ▪ instrumentation and measurement ▪ mechanical design ▪ mechanical and thermo fluid systems ▪ engineering management ▪ material selection ▪ manufacturing systems ▪ human factors 	
	<p>BSc (Hons) Health, Environment and Society</p> <p>This course looks at the links between human health, environmental issues and social problems.</p>	Higher
University of Teeside	<p>BEng Extended Engineering (preliminary course)</p> <p>Subjects covered include mathematics, physics, chemistry, communications and learning skills and engineering science. Laboratory work is widely used to underpin the engineering principles studies and a series of small laboratory-based projects provide a practical introduction to a range of engineering disciplines.</p>	Higher
	<p>BSc Extended Science (preliminary course)</p> <p>Subjects covered include mathematics, biology, physics, chemistry and learning skills. Practical sessions introduce laboratory techniques for various science disciplines. Specialist studies are developed in the areas of food science, microbiology and forensic applications of science.</p>	Higher
	<p>BEng (Hons) Chemical Engineering</p> <p>Students taking part in this course should find employment opportunities in a wide range of sectors, from utilities, construction and defence to petrochemicals, agriculture and pharmaceuticals.</p>	Higher
	<p>BEng (Hons) Civil Engineering</p> <p>The modules of this course cover topics such as field surveying, mechanics of structures, structural design and water engineering.</p>	Higher
	<p>BEng (Hons) Control and Process Engineering</p> <p>Students taking part in this course are promised to gain a sound knowledge of chemical engineering, gain an understanding of how to develop control systems that keep process plants working at optimal conditions and respond to the economic, safety and environmental demands that many industries face today.</p>	Higher
	<p>BEng (Hons) Electrical and Electronic Engineering</p> <p>In the electrical theme of this course, students can be expected to carry out studies in 3-phase systems and electrical machines, which are then applied to the study of electrical power systems and electrical machine control.</p>	Higher
	<p>BEng (Hons) Mechanical Engineering</p> <p>This degree focuses on three key areas: mechanics of solids, dynamics and thermofluid mechanics. The first two years of the course is aimed at providing students with the necessary grounding in the core disciplines of mechanical engineering: design and manufacture, material science, and four mechanical engineering sciences (fluid mechanics, strength of</p>	Higher

	materials, dynamics and thermodynamics).	
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