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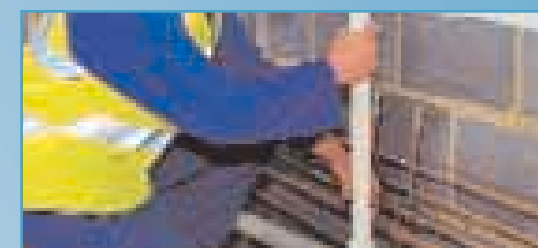
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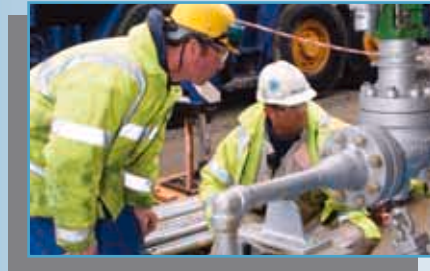


**The challenges facing essential Scottish infrastructure and Building Services in relation to skills, apprenticeships and training in the Engineering Construction, Offshore and Onshore construction, the Plumbing, Mechanical and Electrical Engineering and Contracting sectors.**



**BUILDING SUCCESS FOR SCOTLAND**

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# Foreword by Derek Simpson – General Secretary



Amicus welcomes this opportunity from the Scottish Parliament cross party group on construction to convey our union's views and aspirations in relation to the total construction process in Scotland.

Amicus is the union for technical, professional and skilled people with experience at every level. With over 1.2m members in the public and private sectors, we are a major industrial force. It is our members' skills, protected by the union's agreements and recognised training schemes that ensure they stay at the forefront of industry and technical change.

The development of this document in its current form would not have been possible without the cooperation and valuable submissions made to Amicus by key stakeholders in its preparation, who are listed towards the end. Although a trade union driven document, it has

been our aim to create a dialogue where mutual concerns and aspirations have been shared and highlighted.

Keeping the Scottish built environment and essential infrastructure sustained via new build projects and the refurbishment of existing assets are key to the long term well being and economic stability of Scotland as a nation.

As a trade union our ethos encompasses both the advancement of our Membership's working lives and the progression of Scotland as a whole.

Without world class building services and infrastructure, the visions of a 21st century economy will not be realised. The construction, engineering construction and building services engineering industries are the foundation of any sound economy. They represent the mechanism to make the visions and aspirations of a Smart Successful Scotland a reality.

We look forward to working with all stakeholders to positively develop the issues outlined in this document, Building Success for Scotland, and help safeguard the future prosperity of the nation.

Best wishes

**Derek Simpson**  
General Secretary

# Introduction

The main focus of the Scottish Parliament cross party group on construction has been on the Building and Civil Engineering (B&CE) sector, a key element of the Scottish construction industry. However, a balanced strategy is needed across the total construction process when considering the development of skills and training vital to the nation's infrastructure and long-term economic stability.

This document concentrates on training and skills in other related essential sectors within the total construction process.

These are the sectors of construction in which Amicus members predominantly work, being M&E Contracting and the Engineering Construction Industry (ECI), including its oil and gas related activities, both upstream and downstream.

We put emphasis on the current difficulties facing Engineering Construction in Scotland, particularly in relation to the funding of skills competence accreditation.

Furthermore, we outline the current circumstances facing Mechanical & Electrical contracting (M&E) including Plumbing, Heating & Ventilation and the

Electrotechnical sectors in building services engineering.

Many of the workers in these areas are multi-skilled, possessing the flexibility to cross industry boundaries in search of work. For example, an SJIB approved electrician may be wiring a domestic house for a local authority one week, and then conversely will start commissioning an offshore oil installation the next.

The construction industry in Scotland supports 240,000 jobs directly and indirectly. It is a people and skills industry, with an estimated annual turnover of £8bn representing over 8% of the whole Scottish economy (Source: Scottish Executive). The total construction process is the foundation of the economy.

Amicus trust that this document will stimulate further debate in Building Success for Scotland, contributing to the further development of a cohesive strategy that recognises achievements already made, revitalises the funding regime, and acknowledges the importance of the total construction process for the long-term well being of Scotland as a nation.



# Background to the Engineering Construction Industry



The UK Engineering Construction Industry is responsible for the building, repair and maintenance of key elements of Britain's infrastructure including:

- Energy sources
- Nuclear
- Gas and Coal fired power stations
- Offshore/Onshore upstream and downstream Oil & Gas
- Petro-Chemical refineries
- Chemical plants
- Pharmaceuticals
- Process plants
- Steel and other industrial output centres
- Structural Steel for public and commercial building
- Major water treatment
- Steel bridge construction

The UK engineering construction industry is the largest in the EU and second only to the USA in size.

It represents 1.5 per cent of UK GDP, however, the key economic infrastructure listed above that the industry services represents over 20 per cent of UK GDP.

The stability of the industry is vital to the ongoing well being of this infrastructure and the economy as a whole.

The UK industry employs 60,000 workers in total (both blue and white collar), with a pool of craft labour of around 25,000 workers (Source: ECITB).

The main collective agreement onshore is the NAECI (National Agreement for the Engineering Construction Industry), the constituent parties being the ECIA (Engineering Construction Industry Association) for the employers, with other employer interests represented by TICA (Thermal Insulation Contractors Association) and SELECT, the Electrical Contractors Association of Scotland. Amicus, GMB and T&G represent

workforce interests. The Agreement is administered by the NJC (National Joint Council for the Engineering Construction Industry).

Training for the engineering construction mechanical trades is administered by the ECITB (Engineering Construction Industry Training board) whose apprentice scheme is the NASEC (National Apprenticeship Scheme for Engineering Construction).

The ECITB was created by Act of Parliament in July 1991, Statutory Instruments 1991 No. 1305 and 2003 No. 285, in recognition of the vital role the industry plays in the UK economy. UK contractors pay a statutory payroll levy to the ECITB. It should be noted that the Scottish Joint Industry Board (SJIB) for the electrical contracting industry trains some 750 apprentices for the electrical sector every year including those working in engineering construction, apprentice electricians being under the auspices of the SJIB.

The introduction of the National Agreement in 1981 began an era of continuous stability and improving achievement. In excess of 90 major projects carried out under the National Agreement have been completed on time and within budget. Successful projects have contributed to an enormous rise in site safety standards, which have more than halved serious accidents. For instance, in 2005, BP Grangemouth completed 10 million man-hours with 3,000 people, without a day away from work injury.

## Contributing Factors:

- The application of the NJC's philosophies of partnership, consultation and full participation of management, the workforce and workforce safety representatives.
- Under the terms of the National Agreement operatives are employed directly on a PAYE basis. This practice gives a real opportunity for a succession of employers to provide continuity in Health, Safety and Welfare training and best practice.
- The introduction of a Client supported Safety Passport Scheme, a scheme that acted as a model for the Government driven CSCS scheme to follow.
- The introduction of a merit based NJC Award for Safety in Engineering Construction.
- The NJC is constantly finding ways and means to improve on its past achievements, the ACE initiative representing an example of this proactive approach, developing skills competency and accreditation within the industry.

**This performance is an outstanding success.**

At the 2005 construction safety summit, held in London on 24 February, the Engineering Construction Sector via the NJC was delighted to report that it continues to deliver a high level of health and safety performance and suffers less than half as many reportable injuries per 100,000 workers as construction overall and on many Projects better than that by orders of magnitude. Since 1993 there have been no fatal accidents on its major multi-discipline new build projects.

Nonetheless the National Joint Council Partners recognise the need for a continuing focus on best practice to consolidate and extend their current success. (Source: NJC)

**Leading engineering construction clients in Scotland include:**

- BP
- Innovene
- Exxon
- Shell
- Total
- Talisman
- Polimeri
- Rhom & Haas
- BNFL
- British Energy
- UKAEA
- Scottish Power
- Scottish & Southern Energy
- Scottish Water

**Leading engineering construction contractors in Scotland include:**

- Mitsui Babcock (Renfrew)
- Motherwell Bridge (Motherwell)
- Wood Group (Aberdeen)
- Kellogg Brown & Root (Aberdeen)
- AMEC
- Interserve

- Aker Kvaerner
- Shaw Group
- Cape and Hertel
- Watson Norie

(Source: ECIA)

**Skills and Training - Scottish Engineering Construction Workforce**

\*Adult Workforce: 3000  
(1450 working in Scotland)  
(1550 working elsewhere)

\*Apprentices: 220  
(an annual intake of 50-60 per year).

\*(Not including Ardersier and Nigg Bay who previously trained in-house and therefore did not contribute to the ECITB levy).

(Sources: ECITB, ECIA)

As well as static workforces at many key plants in Scotland, the industry employs a highly mobile workforce who can react to labour needs on projects at a moments notice, for instance in the power station 'outage' season. A large number of these transient workers reside with their families in Scotland, bringing capital earned elsewhere back to the Scottish economy.

**Age Profile**

An alarming trend is highlighted when we analyse the age profile of the existing workforce. 61 per cent of the Engineering Construction craft workforce is over 45 years old. Around 40 per cent will retire in the next ten years (Source: NAECI age profile 2004).

A crisis is looming in available skills when we contrast that figure against the current ECITB intake of less than sixty

mechanical engineering construction apprentices per year for the Scottish onshore craft workforce. The industry does not train enough new recruits to tackle this impending crisis, a crisis that if allowed to develop further, will impact on the nation's ability to service its vital infrastructure.

**Adult Apprenticeships**

We also impress on the committee, a strong argument for funding 19-26 year olds in bona-fide adult apprenticeship schemes. The main emphasis of Government to date, is focused on the 16-18 age group, however, individuals who for whatever reason, were unable to enter a traditional apprenticeship scheme should not continue to be penalised in terms of opportunity. The political and economic consequences of disenfranchising this group are unacceptable. Many of these adults possess core skills that could quite easily fill the perceived skills gap and, with the appropriate level of assistance, successfully complete adult Modern Apprenticeships to SVQ Level 3.

The ECITB have previously secured funding in Scotland to deliver an apprenticeship programme for long-term unemployed adults, the ECITB have regretfully had to inform the parties that they have been unsuccessful in their bid to secure a 3rd year of ESF funding for this initiative. The end of this project, which was only in its infancy, has taken away an opportunity for adult development, and a pathway to achievement that surely embraces the very ethos of a Smart Successful Scotland.

**ECI Apprenticeships**

In regard to traditional apprentices, the following grants are payable for ECI

apprentices from 1st April 2005:

	16 – 18 years	19 – 24 years
<b>England (LSC)</b>	£10,604	£5,915
<b>Scotland (SE)</b>	£9,000	£4,500

(Source: ECITB)

In England the ECITB receive £3,000 per learner for the Technical Certificate, plus £157 per key skill. The arrangement in Scotland is structured differently, so that the Further Education establishments claim their own funding known as SUMS to cover the underpinning knowledge of the NASEC programme.

However, even when taking into account these differences in the training delivery structure and regime, the training providers estimate that there is a differential of 18 to 20 per cent to the detriment of Scottish apprentices, when comparing overall ECI apprentice funding between England and Scotland.

Client, contractor and union representatives are working closely together on the ECITB's Scottish Regional Forum to address a range of issues. Of the ECITB's £12 million annual training spend; £4.2 million (over 33 per cent) is allocated to Scotland. However the ECIA have pointed out that:

- For the UK as a whole, the industry needs an extra £24 million to meet its training needs.
- Low profit margins coupled with an irregular workload limits the ability of contractors to increase their training levy contributions to the ECITB and carry out training.

A sustainable skills base must be

re-established in Scotland and the UK as a whole, to stabilise this vital sector and provide long-term security of service to the vital key infrastructure it serves.

### Energy Sector

It is widely anticipated that we will see a substantial change in current UK energy policy. This would include a medium to long-term power station construction programme. This is needed sooner rather than later.

Power generation is the backbone to the long-term sustainability of the Engineering Construction industry. Current uncertainty, particularly in the future of power generation, is eroding the ability of the industry to react when the expected upturn comes. Scotland needs a decision on new fossil fuel power stations or the nuclear option.

Amicus is firmly committed to a balanced energy policy including renewables, clean fossilised, and nuclear. We view the continuing debate on New Nuclear Build with a degree of pragmatism, and would support an early decision on the viability of what will be major construction should work be commissioned.

Notwithstanding the above only two power generation new builds are on the horizon, one in Peterhead which will use waste gases from the St fergus gas plants, and a hydro plant to be constructed at Glendoe. It is forecast that in 2007 Scotland will for the first time in its history become a net importer of electricity. This situation is one of great concern, as the power generation industry is currently in a depressed state.

The last two major coal fired power stations, Cockerzie and Longannet, do

not meet new regulatory environmental requirements. Over the next 3 years Cockerzie faces closure and Longannet is licensed for restricted operation from 2007 to 2015, with only 20,000 hours of productive time allowed in that period. This will further cut capacity in peak periods.

The current Nuclear Generating Stations are also within 10 – 15 years of entering the decommissioning phase of their lives, cutting the current base load generation to zero from 40 per cent.

A bold and courageous stance is needed by Government to address the looming energy crisis. It would be a contradiction to support a scenario where we import energy from abroad to the detriment of our economy, and the major security issues that such a scenario brings.

The Scottish economy should be free from the constraints of overseas cartels and the threat of terrorism on trans European pipelines and infrastructures.

For further reading on a balanced energy policy, we refer you to the Amicus publications *'Energy in crisis?'* and *'Distribution Price Review 2005'* which can also be downloaded in PDF at [www.amicustheunion.org](http://www.amicustheunion.org) - once there, click on sectors and then energy.

### The future of BP Grangemouth

Current restructuring plans at the BP Grangemouth refinery, which has been in operation since 1924, are of concern.

The site employs 700 refinery and 600 petrochemical staff, plus very large numbers of engineering construction workers and contractors whose specialist services are detailed within this document.

On April 27 2004 BP announced the consolidation of a large part of the Grangemouth plant into a single entity. This entity is now known as Innovene, and the plan is that they will be put up for IPO on the US stockmarket in the second half of this year.

Our concern is that the plants' presently operating may be dismantled or mothballed. Those concerns are compounded by the recent announcement that there will be no substantial investment in new plant at Grangemouth over the next 3-5 years.

However, there is budgeting for £60 – £70 million investment in refurbishment and long term R&M (Repair & Maintenance) of existing plant.

If continuous expansion and renewal of this key complex declines, the Scottish economy would be dealt a severe blow. Our major concern is that the process of setting up Innovene as a separate entity will lead Grangemouth down the same path as the former ICI, which would be unacceptable.

### Assuring Competence – The challenge for Scottish Engineering Construction

The Engineering Construction Industry is in a unique position when considering its National Agreement and harmonised occupational standards, which enshrine a level playing field and flexibility. These enable joined up thinking when addressing skills.

The ACE initiative (Assuring Competence in Engineering Construction) is a scheme that has the support of all stakeholders in the engineering construction industry. (A full overview of ACE is detailed on pages

14, 15 and 16 of this document).

However, in Scotland there is a serious shortfall in ACE funding. £20 million in funding has been allocated to the ACE initiative by the Learning and Skills Council.

This equates to an allowance of £1000 per craftsperson for assessment, accreditation to NVQ level 3 and the issue of an ACE card, with no cost on the individual or the employer. It must be noted that unlike ECI apprenticeships, there is no difference in the structure and regime of the ACE initiative in England, Scotland and Wales; the entire delivery method has uniformity across all borders apart from funding.

Scottish Enterprise are only part funding the programme for Scotland at 50 per cent of the available funding in England i.e. £500 per operative. Furthermore, in regard to Highlands and Islands the industry is further disadvantaged when compared to the rest of Scotland. There is presently no funding forthcoming from Highlands and Islands, and currently they have declined to provide any funding whatsoever.



However, we note and recognise that discussions are taking place between Scottish Enterprise and Highlands and Islands Enterprise on a number of common issues. It is our hopes expectation that a positive common strategy is forthcoming in the near future.

The Learning and Skills Council in England are currently allowing English based contractors employing indigenous Scottish workers to register their employees for the £1000 of funding available, but this is only allowed up until 31st August 2005, from then on that funding will only be available for workers living and based in England.

The £500 of available funding from Scottish Enterprise will still be available to Scottish workers, working on contracts in England and the rest of the UK.

Lewis Sampson, Director of the NJC told Amicus "Scotland has had a proud tradition of exporting its skills not only within the UK but also globally. These skilled people could be disadvantaged in the future if they do not possess an ACE Card".

The current scenario is inequitable, and serves to undervalue the substantial contribution made by the engineering construction industry to the national economy.

Discussions between Michael Hockey, Managing Director of the ECIA and Amicus have identified a number of points in revitalising Scottish Engineering Construction. As a first step, it would be encouraging if the Scottish Executive could now demonstrate its recognition of the strategic importance of the Engineering Construction industry in

Scotland by:

- Assisting us in our efforts to persuade more clients and contractors to engage actively with supply chain issues;
- to access additional sources of funding for training, apprenticeships, and the ACE initiative;
- and to improve the industry's profile with young people, parents and schools to a level commensurate with the sectors strategic economic importance and the rewards that it is capable of offering.

The UK government and Scottish Executive targets for the production of renewable energy offer both major challenges and massive opportunities for Scottish Industry.

The targets require that renewable energy sources will account for 10 per cent of the UK's generating capacity by 2010, rising to 15 per cent by 2015 and 20 per cent by 2020. To meet these targets Scotland will require a massive capital expenditure programme.

Additionally, a programme to refurbish many of Scotland's existing Hydro schemes is struggling due to a shortage of skilled labour.

This perceived shortage could be compounded by the start of a new build programme in 2006 at Glendoe on the shores of Loch Ness, an ambitious programme that will require an estimated workforce of over 400 Craftspersons over a four-year period.



**The debate surrounding onshore and offshore windfarms has generated objections from environmental and community groups, many of who are citing how few jobs are being created locally. Our arguments for investment in retraining and equipping Scottish workers with the key skills required would reverse these arguments, whilst providing the opportunity to regenerate local areas and create sustainable communities.**

**The Nigg yard on the Cromarty Firth, and the Methil and Burntisland yards would be ideal locations for the fabrication and construction of the infrastructure.**

**Together we need to address the needs of the industry as a matter of priority, particularly when considering the essential infrastructure it serves.**

**Whilst no long-term strategy exists we will continue to see employees and contractors leaving the industry.**

**Training will remain moribund with no optimistic long-term outlook to boost confidence. This would be to the detriment of Scotland and the UK as a whole.**

**Not retaining and developing the skills base would be an opportunity lost, and ultimately will lead to the aforementioned crisis.**

# Assuring Competence in Engineering Construction



**C**ompetence and safety on engineering construction sites are of paramount importance for everyone. ACE has been launched to meet the need for proven competence. The ACE card proves that an individual can perform their job in a safe and competent manner. ACE is an industry initiative supported by all stakeholders in engineering construction in the UK: clients, contractors, the National Joint Council and the unions.



The UK's first ACE cards were presented to 14 Interserve employees at BP Grangemouth – a key event in the evolution of the ACE initiative.



## Background of ACE

Regulatory changes and client expectations now require the vast majority of the people involved in the engineering construction process to have proven competence. Pressure on clients from the industry, unions and HSE led to the development of the ACE initiative and its comprehensive structure.

The health and safety obligations on employers have increased significantly demanding that, at every level, greater attention is paid to ensuring competence.

This has ramifications on the recruitment and selection, training and development of individuals and their subsequent registration and monitoring.

The situation that arose after Piper Alpha in the offshore sector has now, in effect, arisen onshore. Whilst there is a good safety performance within the engineering construction industry, the corresponding poor performance of the civil construction industry has brought about regulatory changes, which impact on the engineering construction sector.

The vision is that within five years the site-based workforce of the engineering construction industry has validated competence across all disciplines against national standards.

ACE will run alongside and then replace the ECI skills database. Gill McNally, ACE Project Manager says: 'The ACE project is really gaining momentum and each month, registrations for the scheme are increasing. There is great support from all areas of the engineering construction industry: clients, contractors, the NJC and unions.

The continued support is vital as we drive the initiative forward and comes from recognition that competence and safety on site are paramount for everyone.'

Amicus engineering construction members Jimmy Craigie and Pat Finnan sit on the ACE steering group. Amicus was instrumental in securing ministerial support, which resulted in £20m for the UK in funding via the Learning and Skills Council.

Pat Finnan emphasises how this money is from the taxpayer and must be used for the long-term stability of UK infrastructure: 'It is the people's money', he said.

Jimmy Craigie said: 'there is nothing in the initiative for the workforce to be frightened of, they need to embrace it: 'It's not about testing, it's about establishing skills recognition and incorporating proof of it into one smartcard. This initiative strengthens the position of a highly skilled, motivated and competent workforce, they will be better paid for their skills, and it will help us get away from one big pool of casual labour that can be dipped into at random.'

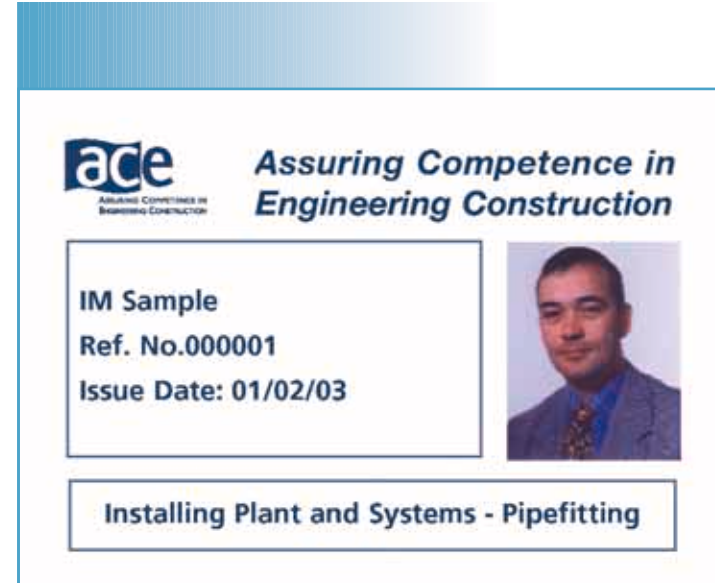
Jeff House of BP, Secretary of the Capital Projects Group and joint chairman of the Industry Steering Group (ISG) told Amicus: 'From a client's perspective ACE is important as we have a duty under legislation to ensure that people who come to work on our sites are competent. More and more clients are using contractors to carry out their repair and maintenance, which means that we must ensure that the contractor personnel are competent both from a trade as well as a health and safety point of view.

'ACE provides us with transferable proof of the competence of an individual that will be accepted across our industry. The process for assessment to ACE standards is relatively easy, compared to previous VQ assessment methods, so should not be a problem for most people, with most of the assessment work being undertaken by the assessor. 'This is the first time that all the stakeholders in the industry have come together to support an initiative in the engineering construction industry. There is nothing to fear from ACE, but a lot to gain for all.'

The unions insisted the principles of ACE include:

- No cost to the worker
- No threat to the status of the worker
- Trade union involvement in ACE process and agreed appeals structures
- Unemployed and short-term workers have free and full access to the initiative
- Regional structures
- An opportunity for the workforce to become assessors and verifiers

ACE now forms part of the blue book National Agreement, enshrined under NAECI Part VII – Competence, Skills Accreditation, Training and Development. Regional groups have been established, and stakeholders must ensure that small and medium sized firms (SME's) are included. Pat Finnan said: 'Members must ensure they utilise these structures to the full potential. We must get involved.'



### ACE Process

An ACE card is available on completion of an ECITB National or Scottish Vocational Qualification Level 3 in the following trades:

- Welding
- Plating
- Erecting
- Mechanical Fitting
- Pipefitting

Candidates are industry assessed by verifiers and assessors, many of whom are trained from the shop floor.

The methods of assessment are work-based and assessor-led and are designed so that productivity is not adversely affected.

## Offshore Oil & Gas construction

The offshore side of the industry works under the auspices of the OCA partnership agreement. The constituent parties to the agreement are Amicus and GMB for the workforce, and the OCA (Offshore Contractors Association) for the offshore engineering construction contracting employers. The principal training provider is the ECITB, working closely with the Sector Skills Council COGENT. The ECITB and COGENT (formerly OPITO) have a combined figure of 382 Offshore Technicians in training.

The oil and gas industry provides some 260,000 jobs in the UK, both directly and indirectly. However, due to the lack of investment/activity in recent years we have seen over 1,500 jobs lost in the drilling sector alone. Many will argue why are we not seeing an increase in unemployment levels within the Aberdeen area? It should be recognised that this industry is a UK-wide industry and the concentration of job losses are spread throughout the UK and not solely concentrated in the North East of Scotland.

It is often stated by many politicians that the oil and gas industry has no bearing on their constituency. Nothing could be further from the truth. As well as the oil and gas dependant constituencies where the industry is a predominant force in the local economy, at present there are some 500 UK parliamentary constituencies that have more than 500 constituents directly or indirectly involved in the oil and gas industry. Amicus rejects any suggestion that the current low levels of unemployment

compensate for the job losses in Oil & Gas. We know that those made redundant or leaving are finding alternative employment. But we are unfortunately seeing highly talented, motivated and skilled engineers, technicians, craftworkers and drilling personnel undertaking casual alternative employment that the union consider to be wholly unsuitable in terms of utilisation of their skills. The fear and concern for all must be the loss of these skills to the industry. Our own members are telling us that they have had enough, there is no longer any stability in the industry job wise and you cannot live and raise a family on such uncertainty. These reasons significantly impact on attracting new recruits and with an average age of 49 years old, given this, it has to be recognised that the status quo is not an option.

For further reading on the need for revitalisation of the UKCS, we refer you to the Amicus publication 'Offshore UKCS: The need for increased exploration drilling' which can also be downloaded in PDF at [www.amicustheunion.org](http://www.amicustheunion.org) – once there, click on sectors and then construction and contracting then offshore.





have seen offshore module and jacket construction tenders being won by Norwegian contractors and others. This includes diversification into contracts for offshore wind farms.

In Scotland however, the skills of workers who were employed in Oil construction yards appear to be disregarded, and under utilised in the drive for renewable energy. The only domestic manufacturer of wind turbines, being located on the Kintyre Peninsula, has often complained of the levels of skilled Craftspersons 'at hand'.

The Scottish Executive itself has commissioned work on identifying 'skill requirements' for the renewable energy industry under the FREDS skills working group. The findings must surely support the Amicus contention that the core skills are there. The problem is recognising that fact.

#### Global competition

Norway is a nation dependent upon oil revenues to maintain its high standard of living. A strong perception exists that the social welfare system in Norway, which gives unemployed residents 80 per cent of their wages for two years following redundancy is in fact a hidden subsidy, which makes Norwegian oil related activities more competitive than the UK market.

It is felt that this social policy in some way reduces the capital costs of the oil and gas industry in Norway, therefore making it very competitive. As Norway is part of the EEA (European Economic Area), we believe that the relationship

between the oil and gas industry and Norway in relation to social policy needs thorough investigation.

The Norwegians admitted targeting the BP Clare and the Shell Buzzard Jacket contracts on the basis that the UK is the only European country that allows domestic suppliers to lose out in such a fashion.

The consequence of these lost contracts means that the UK has lost its last major jacket fabricator BARMAC, who employed over 5500 workers at Nigg and Ardersier in 1999. They have now ceased to bid for UKCS new build projects and have retreated into care and maintenance work.

These yards were an industrial hub and skills creator. Amicus' Inverness branch had over 3500 highly skilled members working between Nigg and Ardersier alone.

These displaced workers possess highly sought after skills, many working throughout the UK, offshore or on a Global basis, whilst keeping their residence in Scotland. Other highly skilled workers can now be found working locally in a low skilled economy, stacking supermarket shelves or driving taxis.

There is considerable scope for returning their skills to much more productive use, not only to meet immediate demands, but also to help train the next generation who are presently being denied the opportunity to learn the skills that will be required in the future.

#### The Challenge

The challenge must be to look at future industry needs such as the renewable

market, both on and offshore, and retrain individuals, encouraging diversity, creating employment, and securing skilled engineering construction projects and jobs for Scotland. When the projected upturn comes, a well-trained workforce must be readily available.

Furthermore, the offshore oil and gas industry is calling out for offshore engineers and related disciplines. Retraining individuals would have the positive effect of creating a balanced workforce, which has the core skills requirements and flexibility to carry out all types of work both onshore and offshore.



## Onshore Yards

Fabrication yards serving the offshore industry have sharply declined in recent years. Ten years ago there were seven yards constructing installations and facilities for the offshore industry, we are now down to three – BiFab at Burntisland, the Aker Kvaerner yard at Methil, which is hired out to BiFab, and Nigg, part of which is hired to Isleburn Engineering. This decline is despite continued new build offshore. In the past decade we

# Mechanical & Electrical Contracting

## Recognising Success

The Mechanical and Electrical (M&E) contracting industry designs, builds and maintains building services engineering installations essential to the whole of society, encompassing everything from major infrastructure to domestic dwellings.

Building Services Engineering apprentices represent the highest successful intake and completion of apprenticeships in UK industry, with over 2,500 electrical and 1400 plumbing apprentices currently being trained in Scotland.

This success must not only be recognised, but also increased and developed to meet society's needs now and in the future, the achievements by the M&E industry represent a model that others can follow.

However, the industry is not complacent and realises we need more recruits than current levels to meet demand now and in the future. We trust that this document stimulates debate for changes to apprentice funding mechanisms, which can further improve the successful performance of the M&E sector and take the industry to the next level.

Industry trained craftspeople are trained to the industry's highest standards, and represent some of the most highly skilled and competent workers in the total construction process. Competency and skills have proudly been built up and protected over generations. Our members are involved in all aspects of construction including commercial, PFI,

NHS and local authority construction projects through to the installation of plumbing, heating and electrical systems in domestic dwellings.

Wages, terms, conditions, benefits and professional qualifications in Scotland are enshrined in the SJIB (Scottish Joint Industry Board for the Electrical Contracting Industry), SNIJIB (Scottish & Northern Ireland Joint Industry Board for the Plumbing Industry) and HVAC (Heating, Ventilation, Air Conditioning and Domestic Piping Industry) National Agreements, operated jointly and respectively between the union and SELECT (Electrical Contractors Association of Scotland), SNIPEF (Scottish & Northern Ireland Plumbing Employers Federation) and the HVCA (Heating & Ventilating Contractors Association).



## Electrical engineering and contracting

The Electrical Contracting Industry comprises a great number of private enterprise firms, ranging from tiny firms employing one man to firms employing more than a thousand. It employs a large number of skilled men, with time served, qualified electricians comprising 90 per cent of its labour force.

It is mainly engaged in the Construction Industry and undertakes a wide variety of work, ranging from a simple electrical installation in a private house to the electrical work associated with the construction of a nuclear power station.

All sorts of other specialised installation work, instrumentation, micro electronics, security devices and detectors, computer peripheral equipment including remote terminals, robotics, data communication equipment, and the maintenance of all types of electrical installations, is also undertaken by contracting firms.

The Electrical Contracting Industry Apprenticeship Agreement initially insisted that technical qualifications were required for satisfactory completion of an apprenticeship and guaranteed paid release to attend college.

However, 1983 saw the introduction of a radically new system of training where progress depends upon achievement, both technical and practical, and not upon any age or service criteria. All apprentices in the Electrical Contracting Industry follow a Modern Apprenticeship (M.A.) and obtain an SVQ Level III on completion of their apprenticeship. Completion of apprenticeship is achieved by the Apprentice passing a Final Integrated Competence Assessment.

The Electrical Contracting Industry is the only industry that, due to the inherent dangers of working with electricity, insists on this form of trade test.

The Electrical Contracting Industry endeavours to train sufficient apprentices for its needs, currently there are some 2,500 electrical apprentices undergoing training in Scotland. However, there is a skill shortage looming for the Electrical Contracting industry, despite efforts made by the industry to recover from this situation. A perception exists amongst many in the industry that an over emphasis is placed upon school leavers to take up further and higher education into the traditional academic career paths. This is to the detriment of the construction and engineering trades which are of paramount value to the nation.

Society must take a balanced approach to its skills needs, as a nation with an expanding service sector would not be able to function without the necessary infrastructure, lighting, power, heating, plumbing, sanitation and other essential environmental services and skilled people in place to sustain it.

Looking to the future, the need to avoid skill shortage's must encompass the training of adults including as previously discussed, the development and recognition that a pool of talented engineering labour with transferable skills already exists. The problem however, is the lack of funding available to the industry to encourage both employers and those who desperately wish to improve their lot.

Furthermore the industry has a dedicated assessment scheme for those people who do not possess the academic qualifications or skills that they need to

perform their duties. This scheme, Crediting Electrotechnical Competence, is not funded by Scottish Enterprise and operatives currently have to fund this assessment themselves. Obviously this is a major barrier to the up-skilling of such operatives and is seen as an area for consideration by the Scottish Executive.

The Scottish Joint Industry Board (SJIB) determines the training schemes for the industry. The principal objects of the SJIB are to regulate the relations between employers and employees engaged in the Industry and to provide all kinds of benefits for persons concerned with the Industry, in such ways as the Scottish Joint Industry Board may think fit.

The purpose is to stimulate and further the improvement and progress of the Industry for the mutual advantage of the employers and employees engaged therein, and, in particular, in the public interest, to regulate and control employment and productive capacity within the Industry and the level of skill and proficiency, wages and welfare benefits of persons concerned in the Industry.

The aim of the Board is, therefore, far reaching in seeking to generally improve the Industry, its status and its productivity in the interests of the Employer, the Employees and the nation. It goes far beyond a normal Industrial Agreement, and the parties to the Board seek at all times to develop a common approach to all the problems, which are encountered not only in their own interests but in the public interest as well.

### **The Electrotechnical Modern Apprenticeship**

The Electrotechnical Modern Apprenticeship in Scotland is delivered

under a successful ethos of partnership and best practice. This strong training tradition within the electrical contracting industry has been fostered over many years by SELECT the Electrical Contractors Association of Scotland, and Amicus the trade union (the parties). The scheme accounts for at least 550 new apprenticeship entrants year on year, with some 750 for the year 2004/05. This is testimony to the commitment shown by the both employers and the trade union in acknowledging the importance of "new people" to the industry.

The Modern Apprenticeship is administered through the SJIB, which as described determines the industrial relations framework and training requirements of operatives in the industry. The SJIB has equal representation on its board from both SELECT and Amicus.

The Scottish Electrical Charitable Training Trust (SECTT) was formed in 1990 as a not for profit registered charity, with the sole purpose of managing the SJIB training scheme for candidates who wish to become electrical operatives. The board of SECTT is similar in structure to that of the SJIB, again with equal representation from SELECT and Amicus. SECTT liaise with the employers, union and SummitSkills the sector skills council for Building Services Engineering and manage the training of apprentices.

This established structure leads to nationally recognised SVQ level 3 electrical qualifications for successful candidates. In managing the SJIB training scheme, SECTT contract with 24 colleges throughout Scotland, and will assess 3,500 applicants per year through the electrical contracting industry's selection process, resulting in some 900 suitable

candidates and the aforementioned 750 apprentices in training for the academic year 2004/05 all as Modern apprentices, in the electrical industry.

With an apprentice completion rate of 85 per cent the Scottish electrical apprenticeship system run by SECTT outperforms the Scottish apprentice completion rate in general, which averages at just over 50 per cent, and the overall apprentice completion rate in England of just over 30 per cent for all industries. However, SECTT have not been complacent in realising that 15 per cent of learners are still leaving.

SECTT commissioned studies to find out why apprentices leave before completion. This has led to initiatives to increase numeracy via mathematical and e-learning support.

As a case study for the electrical contracting industry, the reader should consider that many of the issues highlighted here apply equally to the entire M&E sector including plumbing, heating, ventilation, air conditioning and refrigeration.

Of major concern to the parties are the differences in the Scottish Enterprise funding model between different occupations. Alan Ross, Chief Executive of SECTT, has drawn attention, rightly, to how getting a qualification generally is relatively easy in contrast to the same level of qualification in the electrotechnical sector, a sector which has to be, by its very nature, considerably more intensive and demanding on students.

For example, an M.A. in Business Administration will receive £5,000 and the candidate may complete the qualification in 9 months without ever

attending college. This is in stark contrast to the Electrotechnical Modern Apprenticeship, which attracts £7,500 of funding with a completion time in excess of four years including over 30 weeks of college attendance. Alan told Amicus that due to colleges in Scotland receiving further education funding support, he does not believe there is a valid argument for Scottish Enterprise to match the LSC funding levels in England. However, he says that there is 'a most logical and justifiable argument for the funding model used in England to be imported to Scotland. This model pays a standard rate for the Modern Apprenticeship based on average completion times, with a supplement then added to reflect the amount of time spent off-the-job at college'. Alan further reiterated the fact that compared to the M&E sector, M.A.'s in other less stringent and demanding sectors can be delivered very rapidly with no college at all. For instance the M.A. in 'Business Administration' which can be completed in 35 weeks. 'A Training Provider will have delivered nearly six groups of business administration M.A.'s in the time it has taken SECTT to deliver one group of electricians.' Alan said.

SECTT and the parties have identified the following issues in relation to funding disparities and issues:

- Some sectors receive additional funding from their statutory levy, whilst also receiving similar funding to SECTT.
- Age banding of funding is a major concern to the parties. The current structure of funding allocates maximum funding to the 16-18 age group, and reduced funding to the 19-24 age group. Those over 25 may receive even less, or in the case of Highlands and Islands none at all.

The Scottish Executive deems Lifelong Learning as essential to the future economic well being of the nation which we fully support. However, the reality is that age discrimination and regional disparities confuse and block this vision. The challenge must be a move to transparent and equitable funding levels, addressing the way funding is disproportionately allocated.

- The M.A. Electrotechnical apprenticeship requires significant time spent in college as previously discussed. A large proportion of the funding allocated by Scottish Enterprise pays college fees, and problems have been identified on the ability of colleges to expand provision for training demand due to the college funding council capping so dissuading colleges from expanding apprentice provision. Furthermore, in the Highlands and Islands constraints are being experienced by the construction, electrical and plumbing sectors, leading to a lack of adequate college provision.
- The Scottish Enterprise budget, as determined by the comprehensive spending review, has been frozen over the past three years, and under present guidelines remains fixed for the next three years.

Taking into account inflation, this represents real value deterioration in funding over the six-year period of approximately 12 to 15 per cent in the SE contribution to vocational funding.

This scenario requires careful reconsideration.

Scottish Enterprise is the agency for delivering a Smart Successful Scotland, backed up by key documents including Futureskills Scotland. We recognise that a move to fixed budget funding will create winners and losers, however Scotland must support best practice training providers in delivering the skills required, not supporting an 'industry' of commercial training providers who we feel put their commercial and own employment interests before the best interests of Scotland.

Funding must be targeted at training people in bona-fide skills for the future prosperity and sustainability of the economy.

Any strategy needs increased joint co-operation and participation between all bodies, a joined-up approach between all the stakeholders' and the sector skills council to identify regional and national needs, forthcoming workloads and projects.

Working together in partnership, SummitSkills the sector skills council, the building services employers associations, union and best practice training providers, can then effectively address specific situations, and practically deliver the skills over a measurable period, seeking help and funding when appropriate.

## Plumbing Mechanical Engineering Services

Our colleagues at SNIPEF and the SNIJIB have further pointed out that inequity of funding is of major concern to the Scottish Plumbing Industry. This imbalance and lack of transparency is detrimental to the training aims of the building services engineering sector. There are currently 1030 apprentices in training under the plumbing SNIJIB apprenticeship scheme.

The Plumbing employers are to be commended for buying into the training ethos despite inequity and low levels of funding, taking their apprentices through to SVQ level 3. However, this success must be sustained, and the industry's criticisms of the current regime, detailed below, need to be taken on board and addressed.

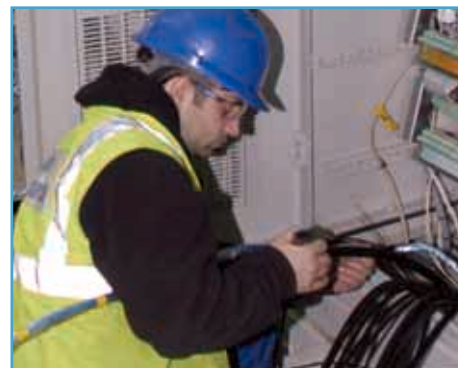
### Background to training in the Plumbing Industry

SNIPEF Training Services Ltd. is the training subsidiary company of The Scottish and Northern Ireland Plumbing Employers' Federation (SNIPEF), which has over 800 plumbing firms in membership. Established in 1983, SNIPEF Training Services Ltd. is based in Edinburgh and acts as the Managing Agent and Training Provider offering the Modern Apprenticeship in Plumbing to young persons in Scotland.

It is a non-profit making organisation. The Company meets the requirements of the Scottish Quality Management System (SQMS) and is also a quality assured BS EN ISO 9002 company.

Recruitment into the Plumbing Industry is by direct employment by a plumbing and heating firm. SNIPEF Training train all apprentices who wish to undertake the Modern Apprenticeship in Mechanical Engineering Services: Domestic Plumbing and must be employed by a plumbing firm. Information regarding employment can be sought from Careers Scotland, local Colleges and Schools, SNIPEF Training Regional Officers or directly from SNIPEF Training Services Ltd. There are currently 1400 modern apprentices undertaking the plumbing MA programme.

Training includes attendance at one of the 19 local Colleges of Further Education (off-the-job training) and also at an employers' premises/sites (on-the-job training). SNIPEF Training Services' Regional Officers, who are qualified in Health & Safety to the NEBOSH National General Certificate in Health & Safety, assess all firms and their premises to ensure they comply with Health & Safety requirements. Employers and apprentices are monitored by a Regional Officer on a quarterly basis during the first 3 years.



Each Modern Apprentice will gain practical job training in the domestic plumbing and heating industry. The plumbing Modern Apprenticeship will last 4 years and offers a lifelong career in an increasing technological and fast changing industry. The Modern Apprenticeship (MA) in Plumbing programme offers the opportunity to gain practical work experience whilst undertaking training at College and working towards a SVQ Level 3 in MES: Domestic Plumbing - a recognised vocational qualification. All assessments and course units are delivered at College.

The MA programme is designed to train apprentices in all aspects of domestic plumbing and heating. Each apprentice will be required to meet 102 Performance Indicators delivered through 10 Units during the 3 year College based training programme. The programme consists of modules such as Work Safety, Cold Water Systems, Site Procedures, Heating Technology, Drawing and Design and ACS Gas Courses.

All apprentices will be governed by the Grading Scheme and Working Rules set by the Scottish and Northern Ireland Joint Industry Board (SNIJIB) for the Plumbing Industry.

#### Equity of funding

Plumbing employers are playing their part in training the plumbers of the future and the industry is currently concerned about the level of funding available for the 19+ age groups. With the prospect of fewer 16 year olds and more mature individuals wishing to enter plumbing the funding bodies need to achieve equity of funding to meet the cost of training, which are equal to, or more for mature entrants.

There is a need to make available routes to those in the existing work force who do not have formal qualifications to upgrade their skills to the required N/SVQ Level 3.

The Industry is currently lobbying for a APL arrangement which will need sufficient funding to achieve its aims. In addition access to the plumbing qualifications must only be possible through direct employment in order to avoid individuals undertaking 'rogue training' provision with no on the job experience.

Only the bona fide recognised plumbing qualifications with the accompanying and necessary practical work experience laid down by the Plumbing Industry can deliver the plumbers of the future.



## Heating, Ventilation, Air Conditioning and Refrigeration

Discussions with key players in the HVAC sector again highlighted a lack of transparency and a general imbalance in funding when comparing other sectors, time frames, and the situation in England. In discussions with our colleagues from the HVCA (Heating & Ventilating Contractors Association) a major issue identified was again, funding for older apprentices.

The HVCA identified that at present candidates between the ages of 20 – 24 only attract 40 per cent of funding. Problems obviously occur when employers wish to recruit over the age of the "Guarantee Group" which is currently 19

years old. HVCA Scotland Executive Officer Bob Dyer said: "The age restriction for funding in Scotland for older apprentices creates problems with recruitment. If this imbalance was removed, employers would be more responsive to training. Many of our members have indicated a preference to recruiting older apprentices.

The problem of the number of recruits being available to satisfy demand does not exist at present, as there are more than enough candidates available. The problem now is the number of companies recruiting; full funding for older apprentices would go a long way to resolve this."



# Building Success for Scotland

The maintenance of the overall construction workforce is vital to Scotland, the UK and economy as a whole. As previously described, Scotland has a proud tradition of exporting its skills not only within the UK but also globally. Skilled people cannot be disadvantaged, and our proud traditions must be sustained for the future.

Industry must react to the challenges we face, looking at the overall big picture rather than quick fixes. Short-term monetary gain must be weighted against the long-term social responsibilities that we as key industry stakeholders should provide to society, ensuring continuity in quality world-class building services and infrastructure for generations to come.

Demand for places has not been matched by the supply of jobs for apprentices. There is clearly an appetite amongst the young to become skilled craftworkers. Furthermore, a rich seam of talent exists in the adult labour pool, not only do many adults who want a second chance in life demonstrate the commitment to completing their training, but further the continued haemorrhage of British manufacturing jobs means that a large number of skilled workers, with transferable skills exist in the UK today. Many of these workers have fundamental engineering skills, which could be without doubt transferred to the skills required in the construction sectors, with successful S/NVQ level 3 advanced craftspeople emerging at the end of training.

Unfortunately many are not given the opportunity, and as a union we see skilled manufacturing workers now performing menial tasks, when they have so much more to offer society.

What we need is the will to recruit adult trainees, and government funding Modern Apprenticeships to S/NVQ level 3 for adults. The S/NVQ level 3 is an issue very close to the heart of the union and our membership, representing an advanced craft standard protecting the memberships skills and offering true mobility in future employment prospects.

And it must not stop there, chances for S/NVQ level 4 and academic qualifications through to Incorporated and Chartered Engineer status, addressing the aspirations of today's workforce through Lifelong Learning.

The industry is attempting to tackle the issue of diversity in the workplace, and this must be an onward goal so that it truly reflects the diverse make up of today's UK society. As we have outlined, with such interest demonstrated amongst the young, and the existing seam of talent previously described, the question has to be asked is the 'skills shortage' a perceived one? It can be argued that an actual 'skills shortage' does not exist. Skilled and potential skilled labour is out there and ready to be tapped into. What does exist is the lack of a cohesive strategy to cater for the skills requirements coupled with equitable funding.

**FIRSTLY**, new build engineering construction, energy and public projects like new schools and hospitals are crucial for the sustained growth of the construction sector, the bedrock of the economy. Employer federations inform us that unless there is significant government new build announced soon, the Scottish M&E sector and related industries would go into decline in 2006.

**SECONDLY**, issues of inequitable funding in regard to ACE, apprenticeships and Accreditation via Prior Learning (APL) constantly referred to in this document must be addressed. A transparent and fair funding regime is the catalyst for the revitalisation of the skills base.

**THIRDLY**, the strategy needs increased joint co-operation, a joined up approach, between all the stakeholders and the sector skills councils to identify regional and national needs, forthcoming workloads and projects. Working together in partnership, SummitSkills, COGENT, the employers associations, union and best practice training providers like ECITB, SECTT, SNIPEF and BEST can then effectively address specific situations, and practically deliver the skills over a measurable period, seeking government help and funding when appropriate through Scottish Enterprise & Highlands and Islands Enterprise.

**FOURTHLY**, all companies must buy into the ethos of apprentice training. Many Small to Medium Sized Enterprises (SME's) must be commended for commitment to apprentice training; they represent the backbone of current numbers training in building services engineering. Unfortunately some of the majors do not reflect this example, and their apprentice training is sparse or non-existent. The challenge must be that the majors must face up to their responsibilities in the delivery of apprenticeships.

**FIFTHLY**, Government must lead by example, as previously described with some major contractors, public bodies such as local authorities must increase their apprentice training, sadly lacking at many authorities, whether their maintenance and building divisions have been outsourced or not. Also Public, PFI and PPP projects, nationally and at local authority level must stipulate apprentice participation and the national agreements

as part of overall contract compliance from contractors, an estimated 45 per cent of current construction work originates from the public purse. Such a move would be a catalyst for behavioural change within the sectors. Furthermore, Local authorities pursuing the lowest tenders fail to address the issue required in the sustainability of our communities, and further this low cost approach undermines genuine contractors who are trying to do their best.

Best value must enshrine best standards, quality and best practice, not the lowest price for a job. Amicus has met with Ministers on this issue and we have had productive discussions, we reiterate, Government departments and local authorities should insist on apprentice intake and the national agreements being applied, as part of procurement and overall contract compliance. For major Government projects, the NAECI for structural steel and the Major Projects Agreement (MPA) for the M&E industry, plus the established national agreements and training frameworks for projects of all sizes, already have the systems in place to deliver for a new era of socially sustainable procurement.

**Scotland must succeed in the 21st century economy. This success will not come to pass without essential and necessary infrastructure, buildings and facilities to realise the hopes, aspirations and goals for the Scottish people as a whole – we must address the challenges ahead - Building Success for Scotland.**



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**BP** – British Petroleum

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**ECIA** – Engineering Construction Industry Association

**ECITB** – Engineering Construction Industry Training Board

**HVCA** – Heating & Ventilating Contractors Association

**Innovene** – Grangemouth

**NJC** – National Joint Council for the Engineering Construction Industry

**SECTT** – Scottish Electrical Charitable Training Trust

**SELECT** – Electrical Contractors Association of Scotland

**SJIB** – Scottish Joint Industry Board for the Electrical Contracting Industry

**SNIJIB** – Scottish & Northern Ireland Joint Industry Board for the Plumbing Industry

**SNIPEF** – Scottish & Northern Ireland Plumbing Employers Federation

**SNIPEF** Training Services Ltd

**SummitSkills** – The sector skills council for Building Services Engineering

## Internet Resources

[www.amicustheunion.org](http://www.amicustheunion.org) - The official Amicus website

[www.ecia.co.uk](http://www.ecia.co.uk) - Engineering Construction Industry Association

[www.ecitb.org.uk](http://www.ecitb.org.uk) - The Engineering Construction Industry Training Board

[www.ace.uk.net](http://www.ace.uk.net) - Assuring Competence in Engineering Construction

[www.njceci.org.uk](http://www.njceci.org.uk) - National Joint Council for the Engineering Construction Industry

[www.tica-acad.co.uk](http://www.tica-acad.co.uk) - Thermal Insulation Contractors Association

[www.select.org.uk](http://www.select.org.uk) - SELECT – the Electrical Contractors Association of Scotland

[www.sjib.org.uk](http://www.sjib.org.uk) - Scottish Joint Industry Board for the Electrical Contracting Industry SJIB

[www.sectt.org.uk](http://www.sectt.org.uk) - Scottish Electrical Charitable Training Trust

[www.connected4life.org.uk](http://www.connected4life.org.uk) - SECTT Apprenticeships website

[www.snipef.org](http://www.snipef.org) - Scottish & Northern Ireland Plumbing Employers' Federation

[www.plumbingpensions.co.uk](http://www.plumbingpensions.co.uk) - Plumbing Industry Pension Scheme

[www.bpec.org.uk](http://www.bpec.org.uk) - British Plumbing Employers Council Training Website

[www.phia.org.uk](http://www.phia.org.uk) - Plumbing & Heating Industry Alliance

[www.hvca.org.uk](http://www.hvca.org.uk) - Heating & Ventilating Contractors Association

[www.best-ltd.co.uk](http://www.best-ltd.co.uk) - BEST Building Engineering Services Training Ltd

[www.mpaforum.org.uk](http://www.mpaforum.org.uk) - Major Projects Agreement

[www.summitskills.org.uk](http://www.summitskills.org.uk) - The Sector Skills Council for Building Services Engineering

[www.summitskillstrainers.org.uk](http://www.summitskillstrainers.org.uk) - Internet resource for training in Building Services

[www.net-works.org.uk](http://www.net-works.org.uk) - National Electrotechnical Training

[www.oca-online.co.uk](http://www.oca-online.co.uk) - Offshore Contractors Association

[www.cogent-ssc.com](http://www.cogent-ssc.com) - The Sector Skills Council for Chemicals, Nuclear, Oil and Gas, Petroleum and Polymers

Links to external sites are provided here for information. Amicus has no editorial control over these sites and can take no responsibility whatsoever for their content or any views or opinions expressed therein.

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