cogent | Skills for Science Based Industries

Skills for Science Industries

Skills at work
September 2008

Chemicals
Pharmaceuticals
Polymers
Petroleum
Oil and Gas
Nuclear

The National Skills Academy NUCLEAR

The National Skills Academy PROCESS INDUSTRIES

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Foreword/John Beacham

I'm delighted to introduce Cogent's Skills for Science Industries, Skills at Work report. It provides an up-to-date and far-reaching analysis of how the industries in the Cogent footprint are meeting the challenges they face through the skills and talents of their people.

The report moves us on from our Sector Skills Agreement research, and is designed to provide stimulating debate and the thought-leadership around the future of these key industries. Interviews with key players bring an added perspective to the facts and figures.

Cogent was established by industry to support it in securing the skills needed now and in the future. This state-of-the-nation report contributes to shaping our strategic priorities as a Sector Skills Council and shining a light on where both public and private investment in skills can bring the very best returns.

It is a forward-looking analysis, exploring the collective actions employers need to take if they are to continue to meet their challenges, and the kinds of skills they need to be nurturing now in order to create a firm foothold for the future.

The strategic, science-based industries in the Cogent sector have been sustained over the last century and into this century by the people who work in them, run them and plan their future.

They have faced difficult issues and indeed crises – from health and safety disasters to the very toughest global competition, as well as highs and lows in public confidence.

But above all they've learned from everything that's gone before and continuously developed new models of success. These are the industries that discover and develop new products for myriad supply-chains and make our world comfortable, convenient, clean, and safe.

So where are they now? Succeeding and surviving, but not nearly as productive as they could be; still struggling with skills gaps and shortages compounded by a lack of consistency in standards and a variety of approaches to the recruitment, training and development of their people. And the skills they need are in great demand by other technology-led sectors and indeed around the world.

We know all of this because we asked employers during our Sector Skills Agreement research activities. We have worked with employers to put the solutions in place and these are beginning to take hold across the UK. Our newly developing employer-led products and services are being deployed by our National Skills Academies, which are driving up standards in training through their close relationships with employers.

We can't stand still, though, and we are now fine-tuning and expanding this work. In this report we present the concept of the "Skills Factory" – a stock and flow model of the workforce. We recognise that workforce planning is essential and we are committed to a continuous and iterative process with a regular, annual refreshing of the data. We are putting in place sound data collection processes and modelling techniques as well as working with our industries on scenario planning.

In this report we also put our industries individually under the spotlight. While they have a number of common skills requirements, they each face their own unique scenarios.

The nuclear industry needs finely-honed high-level vocational skills that meet its unique Suitably, Qualified, Experienced Personnel requirements (SQEP); the oil and gas industry has a sustained and challenging recruitment demand; the chemicals industry needs people who can support its continued transition to a higher-value added sector; the pharmaceuticals industry is grasping the challenge of the "Factory of the Future"; the downstream petroleum industry is as ever concerned with the very highest standards of competency, particularly in relation to the contractor workforce, and the polymers industry is getting to grips with efficiency, innovation and the ability to handle the environmental challenge.

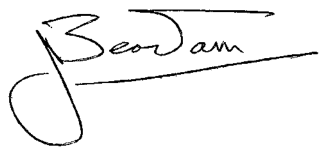
The report also focuses on the young people who are not yet in employment. They are the feedstock of the future. The Government's renewed focus on the 14-19 age group reflects the need to present all careers, but particularly those in science and technology, as attractive and accessible. This is also a key strategic priority for Cogent and its employers.

Finally, higher level skills continue to dominate the Cogent sector skills agenda. The high GVA industries in the Cogent footprint are skills intensive, and are dependent upon the UK science base for the supply of trained scientists and engineers. This means continued close interaction with Higher Education Institutions to stimulate new ideas and promote innovation. New employer-led Foundation Degrees will play a critical part in driving up these skills – both equipping new starts entering the workforce and upskilling existing staff who can build upon their experience.

Employers are clear that they require highly capable people at all levels in their organisations; technology-literate individuals who can operate much more flexibly and across existing skills boundaries.

Cogent is the essential partner in providing the tools its industries need to ensure they get these skills and to plan for their future needs. It is working closely with its employers to support them on their journey towards higher value through skills.

This important report tells a story. It shows where we have come from and how far we've got to go. It also tells us that while there are many employers who have seized this agenda with a sense of urgency, there are still many who have yet to do so.



Dr John Beacham, CBE
Chairman

Cogent/Who we are and what we do

Cogent is the expert, employer-led Sector Skills Council delivering strategic solutions to the skills needs of the chemicals, pharmaceuticals, oil and gas, nuclear, polymer and petroleum industries.

We are licensed by the Government to provide employers in our sector with the opportunity for coherent leadership and strategic action to meet their skills needs. With the backing of employers, we now present a clear and powerful voice, enabling sector employers to influence Government policy development and shape the outputs of training and education providers all around the UK.

Our key national objectives are to:

—Reduce the sector's skills gaps and shortages and anticipate future needs in the Cogent industries.
—Improve productivity and business performance through specific strategic actions, based on our analysis of sectoral priorities.
—Increase opportunities to develop the productivity of the sector's workforce.
—Improve learning supply, including the development of apprenticeships, higher education and of national occupational standards.

Sector Skills Agreement Process

As part of our planning process, we have undertaken in-depth research and analysis to find out what skills employers need their workforce to have in order to remain competitive and how these skills should best be supplied.

The result was the Cogent Sector Skills Agreement (SSA), an extensively brokered deal between employers, employees, trade unions, training providers and the Government. Through the underpinning research, employers have set out their current and future workforce and skills requirements. In return, the relevant agencies are funding and delivering training and qualifications tailored to this need.

Skills Needs

Cogent continues to examine the key drivers for change and the implications for skills and employment. Key factors for the sector include global competition, advancing technology, pressure on resources, and ever-higher expectations around health, safety and the environment. The result is that skills and working practices are changing quickly right across the footprint for new entrants and the existing workforce – where changes in working methods, materials and equipment are all demanding higher level skills.

The statistics do highlight a pressing need for the upskilling of two crucial populations – the managers and the operators – and the gap between skills required and qualifications held prevails throughout the Cogent industries.

Strategic Actions

To deliver the ambitious vision of the SSA, five key programmes for the sector are now being rolled out, each one designed to address the top issues arising from the research:

Cogent Career Pathways: A unique and lively web-based careers information advice and guidance centre with information on career progression, jobs, salaries and training.

Cogent Apprentices: An up-to-date apprenticeship framework to meet the needs of the operating companies in the sector, with the flexibility to meet the specific needs of individual industries. It addresses the unique operations and process management in the highly-regulated Cogent industries.

Upskill: A central programme focusing on addressing the skills gaps identified through the SSA. Upskill is providing the mechanism to take individuals from their current skill level to the Cogent Industry standard, via a modular approach, including through:

—Modular Qualifications
—Approval System for Employer Training (ASET)
—Funding (Sector Compact)
—Passports Information Technology Platform /Training Database

Competence Assurance: A universal competence assurance framework enabling companies to assess their management of risk, to benchmark competence standards against other organisations and to promote best practice internally. It represents a total systems check to reveal what companies do not know about their own procedures and systems. Uniquely, it provides a confidential self-examination of organisation-wide competence without any third-party involvement, allowing the company, rather than the regulator, to identify areas of weakness to be addressed.

The Skills Passport: A web-based initiative that can be tailored to meet the needs of the nuclear and the process industries. It uses a secure IT system to provide employees and contractors with a portable online record of all their industry-specific training and qualifications, allowing them to demonstrate that they have the skills fit for a world-class industry.

Skills Academies

Cogent is in the unique position of having three employer-led Academies in our sector footprint. In late 2007, we received Department of Innovation, Universities and Skills approval for the National Skills Academies for the Nuclear and the Process Industries.

Around the same time, OPITO, The Oil and Gas Skills Academy, was announced by Scotland's First Minister. This Academy was formed around the existing entity OPITO, but with a broader and very challenging agenda to address the skill shortage issues facing the offshore industry.

The Academies, with the support of employers, are now delivering the training to the skills standard for the industry, while ensuring that there is the capacity and capability to deliver the skills needed into the future. Their essential job is to build on existing good provision around the UK, working with current providers to raise the standards and to ensure they are responding to employer demand. They work through a variety of models: for example, existing training centres, Further Education colleges, universities, employer sites, or new purpose-built facilities, depending on what is needed for each region.

The National Skills Academy for Nuclear

The National Skills Academy for Nuclear is assisting employers in tackling the current and future skills challenges facing the industry, not just in relation to the Government's £65bn clean-up programme, but also for waste management, defence, fuel processing and enrichment and power production, to ensure the sector has the skills necessary for the recently announced new build.

The Academy is playing a transformational role for the sector. Using the Nuclear Credit Framework developed in partnership with Cogent, it is developing a standardised and coordinated approach to education, training and skills development in the nuclear sector.

The National Skills Academy Process Industries

The National Skills Academy Process Industries represents a much-needed centre of excellence for employers in learning, training and education. Above all it is ensuring the next generation of highly trained, highly motivated employees, needed to sustain and grow these strategically important industries.

The Academy's central hub at the University of Teesside's Innovation Centre is steering the leadership and accreditation activities, and a network of public and private training centres around the UK is set to deliver the training.

OPITO the Oil and Gas Academy

During 2007, the Oil and Gas Industry's leaders realised their vision to create a single industry Academy owned, directed and funded by the industry to provide employers with a pivotal link between demands of the business and the supply of high quality learning provision.

Cogent will remain the Sector Skills Council for the Oil and Gas industry, as well as retaining a seat on the Board of OPITO. In this way, OPITO and Cogent retain a close working relationship, similar to those with the other two Skills Academies in its footprint.

Qualifications Reform

Cogent serves a diverse industry sector bound together by a number of common skills requirements, but above all it is a sector that needs focused and effective Continuing Professional Development for its employees at every level.

Vital for the sector is Cogent's work to restructure and rationalise existing qualifications into smaller, themed groups of units, targeted at specific training needs. Linked to this will be the accreditation of employer training which meets the standard – another major breakthrough for employers.

This process is forming new, modular qualifications which will ensure that people are trained to world-class standards at a pace that suits them and their employer. Cogent and its awarding bodies are working to ensure these new qualifications are submitted for approval as quickly as possible to meet priority skills needs – while Cogent and the Skills Academies are making sure that they are easily accessible by employers.

Section One – The World of Skills

National and International Context

Cogent sector industries add value through skills-intensive products that support the infrastructure of modern society itself - energy, health, transport and materials. But the intellectual property, the generation of new scientific knowledge and, crucially, the skills and innovation to convert this to tomorrow's solutions to today's problems, are the core assets that will sustain these UK industries on a global platform.

All Roads lead to Science

From oil to pharmaceuticals, all of the sectors within the Cogent footprint are concerned with using science to add value. Through science and engineering we have unlocked value and functional sophistication from carbon in its various forms, and from non-carbon-based material in the case of the Nuclear sector. From chemical sources we have created pharmaceutical and biotechnological advances with valuable practical applications. It is the in-common skills around chemical transformation, separation science, molecular processing and physical containment that link the Cogent footprint.

Oil connects a significant part of the sector – as it connects a significant part of the world economy - primarily because we are intensively dependent on it both as a source of energy and as a raw material. Through oil, the carbon economy has shaped our civilisation. The majority of oil, 70%, is used for energy and energy fuels (petrochemicals); half of the rest is converted to chemicals, plastics and pharmaceuticals. The knowledge of those working in the Cogent sector will be vital to meeting the world's challenges relating to carbon, to ensure the future sustainability of our economy

It is **knowledge with skilled application and transfer** to commercial advantage and wealth creation that has earned the science-using industries in the Cogent sector their strategic platform.

Skills - The Next Industrial Revolution?

Investment in skills is not just a matter of economic prosperity; it also concerns social justice. Skills embody an opportunity for individuals and businesses to improve their prospects, to contribute to improved business performance and national Gross Domestic Product, and to add to the national stock of skills.

The reward of success in this skills challenge is deeper than economic prosperity alone; workforce development opportunity linked to skills qualifications are also about fairness, quality of life and opportunity for all. The price of failure is a second-rate social and economic infrastructure.

The World of Skills – Public Policy *Leitch Review*

Lord Leitch's review of Skills in December 2006 set out a clear challenge for the UK economy. To meet this challenge, his recommendations included specific targets to increase skill attainments at all levels, strengthening the employer voice on skills through their SSCs and launching a new 'pledge' for employers voluntarily to train more employees at work.

Policy Developments across the UK

Since the Leitch review, there have been key skills policy publications in each of the four nations of the UK:

—England policy – World Class Skills – (July 2007)
—Scotland policy – Skills for Scotland - (September 2007)
—Wales policy – Skills that Work for Wales - (August 2008)
—Northern Ireland Policy – Success through Skills (February 2006 with update and Progress Report May 2008)

Each acknowledges and has been influenced by Leitch, with the common factor being their clear intentions to focus public funding on getting young people ready for the labour market, on basic skills for existing workers, and on any areas of market failure. In return for this, the government increasingly expect employers and individuals to meet the cost of acquiring intermediate and higher level skills, since these are the levels where clear economic benefits can be seen to accrue directly to the individuals and firms.

Section Two – The Skills Factory

Projecting the skills demand

Significant efforts have been made in recent years to ensure that the skills needs of the Cogent sector are being met. We are confident that the direction of travel is broadly correct, but in order to be confident that the effort is effective, we need to ensure that the magnitude is also appropriate – in other words, that we are moving far enough, fast enough. To test whether we are on track, we have undertaken the analysis presented in this section.

The Stock and the Flow

To assess the size of the challenge, we have used available data on current and projected levels of employment in the sector ("the stock"), and compared them with information on the expected rate of "flow" of people in and out of the workforce. The outflow will consist mainly of people retiring, but will also be affected by issues such as emigration and labour market mobility. The inflow will consist of university graduates, apprentices and, to a lesser extent, direct entry from schools and further education colleges. The comparison of the projected stock, outflow and inflow will show us whether the current rate of entry of appropriately-qualified people into the workforce will be enough to meet demand, or whether we need to make efforts to increase the numbers.

Summary

At present current forecasts for total employment in the Cogent sector by **2022** will be between approximately **401,000** and **523,000** employees.

Supply	Demand
Total forecast future retirements are estimated to be **145,000** by 2022	Total forecast supply of workers entering the Cogent sector **99,600**
Estimated **72,000** Technicians and Operators needing to be replaced by 2022	Forecast of **31,600** apprentices entering the sector by 2022
Estimated **55,000** Managers and Professionals needed by 2022	Forecast of **68,000** graduates entering the sector by 2022

Shortfall

The evidence presented throughout this section leads to the following shortfall and mismatch in the estimated **SUPPLY** and **DEMAND**.

Employee Group	Forecast Demand	Forecast Supply	
Higher Level Workers (Managers and Professionals)	55,000	68,000	OVER SUPPLY + 13,000
Core Workers (Technicians and Operators)	72,000	31,600	SHORTFALL - 40,400

Conclusions

Comparison of the numbers above suggests that the current inflow of non-graduates (this is, entry via apprenticeship routes and vocational qualification routes) is insufficient to meet replacement demand in processing and technician roles. This deficit will increase significantly in the five-year period to 2017, which coincides with the known lowest point in 16-18 year-olds in the general population, meaning that recruitment will be taking place within the most competitive marketplace. Therefore, alternative sources of skills to meet demand will be required, including a focus on upskilling and re-skilling the current workforce, as well as initiatives to attract more entrants.

The development of National Skills Academies will help to address this gap, by stimulating employer demand for, and supporting the delivery mechanism of, relevant vocational programmes and qualifications.

At higher level, the current level of supply is likely to be sufficient overall, although of course further analysis will be needed to monitor the needs of individual industries and to avoid specific pinch-points.

The forecasts illustrate the need for a concentration on the Technician and Operator workforce through the development of qualifications and vocational training at relevant levels, and through the upskilling of the existing Cogent workforce. Although there is already a range of initiatives to address skills shortages across the sector, the analysis suggests that the emphasis on particular skills levels will need adjusting from current rates if we are to meet the future needs of the sector.

The figures on the left do need to be treated with some caution, given the limitations of the available data, and the simplifications we have made throughout the analysis. In particular, more sophisticated analysis of entry from Further Education, of age cohort changes and of expansion or contraction of individual industries would affect the estimates in various ways. However, the picture they paint does fit with the anecdotal evidence that Cogent regularly receives from employers, and we are confident that the analysis forms a strong basis for action. We plan to continue examining the figures available to improve the analysis further, including through the use of our forthcoming Oracle project, which will provide a detailed longitudinal study of skills needs in the sector.

Section Three – Industry Sectors

Nuclear Industry

The top priority in the nuclear industry is the need for an increase in vocational and technical skills, up to and including level 3. The sector needs to quadruple the number of apprentices over the next five years, and needs clear progression routes through to Foundation Degrees and Higher Education.

In the defence sector, a build programme of submarines continues alongside the studies to replace the national deterrent. This suggests the need for a steady flow of new entrants with the skills to undertake this work.

In the civil sector, the decommissioning of legacy sites continues, and as more nuclear power stations close down at the end of life, the transition into refuelling, de-planting and decommissioning requires a major re-skilling of their workforce. The prospect of new build will also require a new training and education programme. In the early years, many of the skills required will come from the engineering and construction industries, although some specific nuclear skills will be required to ensure safety of new designs. Once the new build programme is established, a new education and training programme will be required to ensure the supply of suitably qualified and experienced personnel to operate these new reactor plants.

The Oil and Gas Industry

New discoveries, ongoing operations, planned lifetime extensions for existing operations, decommissioning activities and retirement of the incumbent workforce, are all factors that mean the oil and gas industry has a sustained recruitment demand with a requirement for skills training and up-skilling of the incumbent workforce.

Keeping the UK Continental Shelf competitive will require exploration and production activities to be carried out, requiring a diversity of people from geoscientist to engineers and from environmental scientists to electricians.

Competition from national and international projects could potentially lead to shortages in oil and gas specialists and those conventional skills required to support the UK. Skills developed in the UK are in demand globally, so the supply of skilled workforce for domestic and international activity requires industry management.

Chemicals Industry

The UK Chemicals industry remains resilient in the face of high energy and raw materials costs and international competition. Through a number of reorganisations, mergers and acquisitions, the industry has achieved a high level of performance in lean manufacturing and process efficiencies.

The industry invests significantly in training and upskilling of its workforce. However, the workforce is getting older and there is a vital need to increase the supply of young people with the right skills and aptitude for the industry. Shortages of technical and engineering skills such as technicians, fitters, operators, and so on, remain a Europe-wide problem. These shortages are intensified by competition for skilled labour by the offshore oil and gas, and increasingly, the nuclear, sectors.

These factors suggest a remaining major need to achieve a cultural step-change in appetite for innovative thinking at all levels from shop floor to senior management. There are opportunities for radical redesign in processes and products. Successful initiatives such as the Chemistry Innovation Knowledge Transfer Network and National Skills Academy for the Process Industries are crucial for the continued prosperity of the Chemicals industry.

Petroleum Industry

The future direction of the petroleum industry appears stable, with a declining need for petrol but a rising demand for diesel. Maintaining this stability, however, will require investment in UK refineries to meet the changing product demand and crude oil supply, and avoid reliance on imports.

Over many years, the refining sector has sought to minimise its impact upon the environment and improvements continue to be made to reduce emissions. Cogent works with the refineries and the regulators to ensure that the correct skills mix is achieved in maintaining the best environmental standards.

Process safety continues to be of the highest priority for the downstream petroleum sector, given the response to high-profile accidents such as that at Buncefield, and further regulations are likely to emerge from continuing reviews of safe working practices.

Pharmaceutical Industry

Research by the Association of the British Pharmaceutical Industry, on over 100 UK Pharmaceutical companies, has revealed that

- More than a third of companies (35%) were expecting to reduce the level of investment in research and development over the next 12 months, currently standing at nearly £4 billion a year.
- Investment in asserts such as buildings and equipment, etc is expected to decline by a similar amount (36%)
- 46% of companies are expected to reduce the number of UK clinical trials
- The level of manufacturing is forecast to drop by 42% of those surveyed
- Almost all the companies surveyed - 97% - said there is now an increasing level of uncertainty within the UK pharmaceutical market environment.

The success of the industry in Britain, and the ability to retain world-class pharmaceutical company investment, are critically dependent on the willingness of the Government to support an environment in which the industry can conduct its research, manufacturing and marketing activities as effectively as in all the other countries that are competing for investment. Recently, the Government has addressed a very broad range of issues relating to clinical research, licensing, intellectual property rights, the science base and the domestic market framework.

The stock of skilled people in this industry is a positive asset for the UK, and the priority for Cogent's sector should be to ensure that this remains the case into the future.

Polymer Industry

The polymer industry companies that prosper in the future will be lean and efficient in both manufacturing and administration, innovative with both design and materials and will ally themselves to winning markets, customers and products. Also in the UK market, locally produced products will be small quantity and higher quality with high volume to price ratio. As with other Cogent industries, there remain skills gaps at higher level, and the polymer industry also requires people with good knowledge of competitive business techniques. Other particular priorities include:

Green Issues – Plastic bag taxes are proposed, recycling has some way to go to happen in a constructive and coherent manner, and in the meantime, waste continues to be dumped into landfill. These issues suggest opportunities in new areas of business, with associated needs for new high-level skills.

The cost of crude oil has a direct effect on the cost of all polymers and as such will have an effect on plastic product prices affecting all other streams, from vegetable and fruit packaging to medical supplies and white goods.

Pressures from eastern economies, particularly China and India, which are often seen as an obstacle for the industry, but this may be overstated as they also have the same cost pressures as UK and much the same skills shortages. The main difference, however, is that these countries are investing more in automation and new technologies than is the UK, with major implications for skills investment.

Section Four – Regions and Nations

The Cogent industries are represented in all of the nations and regions of the UK, with varying concentrations and employment. Clustering provides advantages in some areas, and all industries are heavily integrated into their suppliers' and customers' locations. The level of international trade will inevitably vary by company type and size, but global markets for products and for individual employees' skills are strong features across the sector.

The skills issues facing all industries tend not to show large variation across the UK. Common issues that remain a priority for Cogent and for the sector relate to the skills gaps in all industries at level 2 and level 3. There are also specific shortages at higher levels across the UK. This suggests that those people currently qualified no higher than level 1 need to be up-skilled to meet the needs of the sector. In particular, there is a need to improve the supply of entrants qualified in science, technology, engineering and mathematics.

Cogent continues to undertake collaborative measures in each nation and region to improve the understanding of the industries to potential entrants so that they recognise the attractive opportunities available.

Section Five - 14-19 Education

In analysing the data relating to young people, who are potential entrants to the Cogent sector workforce of the future, we found that the number of 16 and 18 year olds is set to decline from 2009-2010 onwards. This will have important implications on the intake to the Cogent industries. A smaller pool of 'new talent' means more competition in attracting young people to a career within the Cogent footprint. The problem of needing a replacement supply, because of the ageing workforce, is exacerbated by a decline in the population of young people and the demand for scientific and mathematical skills across many employment sectors. Accordingly, Information, Advice and Guidance are important to promote the importance of these subjects and the benefits of a career in a related area.

The Department for Innovation, Universities and Skills has confirmed plans to raise the school leaving age in England to 17 years of age by 2013, with an aim of 90% participation in education or training among 17 year olds by 2015. A requirement to participate until 18 years will be introduced at a later stage. These changes will give Cogent the opportunity to raise participation in science and mathematics subjects for 14 to 19 year olds.

The number of young people across the UK studying science to Standard grade (Scotland) or GCSE (elsewhere) has fallen slightly over recent years, perhaps offset to some extent by slight increases in those studying mathematics. However, there have been declines in the proportions of these young people going on to further study at higher levels.

Section Six - Higher Level Skills

Since the Cogent industries are so knowledge- and skills-intensive, we rely heavily on higher level science, engineering and innovation. Graduate recruitment from science and engineering subjects is typically about half of the total graduate recruitment in the sector, and is steadily increasing.

Although current graduate supply would be sufficient to meet the industry's needs for now, there are potential problems caused by entry into other sectors in preference to science-based roles. This indicates a need to increase the attractiveness of Cogent industries to the graduate workforce.

Following the publication of the Leitch review, there has been an emphasis on increasing the number of graduates within the UK to over 40% of the total cohort by 2020, specifically in science and technology areas.

The detailed policies on higher education and higher level skills vary between the nations of the UK, but they share the general approach of increasing collaboration between business and academia at higher levels. Cogent is engaged with partners in all four nations and we expect to continue to discuss policy with each of them over the coming year.

Cogent Higher Level Skills Strategy

Cogent has been developing its Higher Level Skills strategy in recent months, which aims to build and extend frameworks for greater employer engagement with higher and further education institutions. These frameworks will enable providers and the Cogent workforce to identify clearly routes to education and training that meet their needs at a number of levels.

Through this strategy, Cogent will prioritise working with learning providers, in conjunction with planning agencies and professional bodies, to develop new approaches to course delivery that meet a range of employer requirements for the workforce.

Section One/The World of Skills

The performance of Cogent sector affects everyone in the UK. We depend on it for our energy, our healthcare needs and the chemicals and polymers in the products we all use every day.

Maintaining and growing a world-leading position is dependent upon a highly skilled and dynamic workforce to deal with the challenges of tougher global competition and rapidly changing technology.

As this section will show, the pace of change means that the need for ongoing training and development is central. It's a big challenge and one which needs a partnership approach bringing all parties to the table.

National and International Context

Cogent sector industries add value through skills-intensive products that support the infrastructure of modern society itself - energy, health, transport and materials. But the intellectual property, the generation of new scientific knowledge and, crucially, the skills and innovation to convert this to tomorrow's solutions to today's problems, are the core assets that will sustain these UK industries on a global platform.

The World is our Business and our Legacy

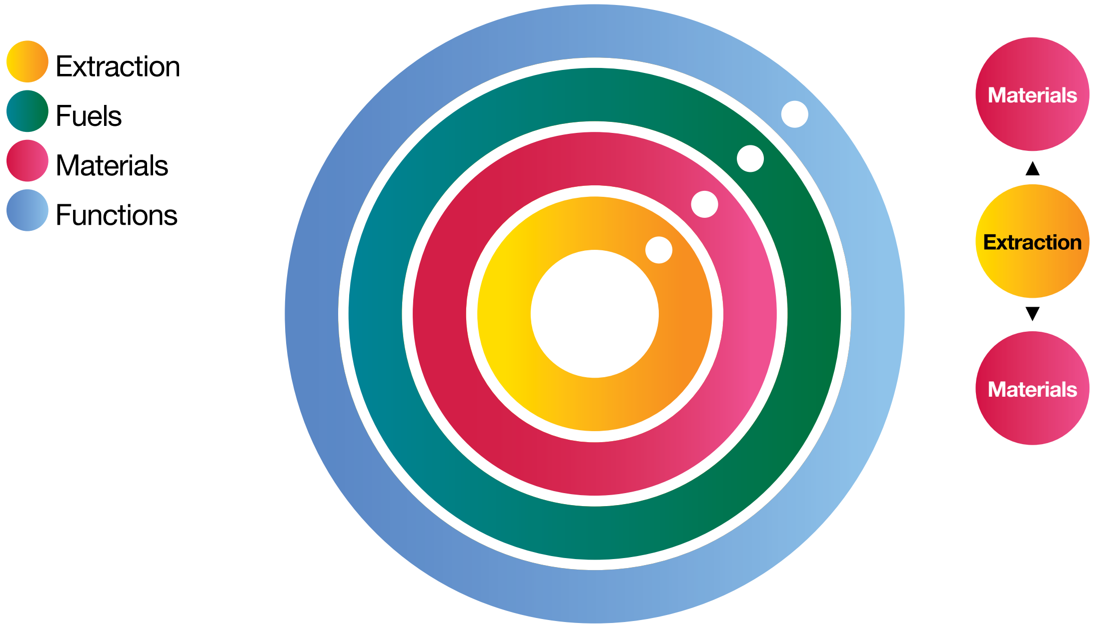
If ever there was a period in economic history when the finite supply of global resources was most acutely felt, it is today. We have reached a stage when the advances of science, digital communications, transport and engineering have raised the interdependence of humans in all parts of the globe. In arriving at this juncture, the pace of economic and social advance has been driven, in the more advanced economies, by coupling success through consumption with socialisation through regulation. But we will threaten the very sustainability of our industries and our society if we have **consumption without the investment** to make ourselves more efficient, innovative, flexible, self-sufficient, responsible, and indeed, **more skilled.**

All Roads lead to Science

From oil to pharmaceuticals, all of the sectors within the Cogent footprint are concerned with using science to add value. Through science and engineering we have unlocked value and functional sophistication from carbon in its various forms, and from non-carbon-based material in the case of the Nuclear sector. From chemical sources we have created pharmaceutical and biotechnological advances with valuable practical applications. It is the in-common skills around chemical transformation, separation science, molecular processing and physical containment that link the Cogent footprint.

Oil connects a significant part of the sector – as it connects a significant part of the world economy - primarily because we are intensively dependent on it both as a source of energy and as a raw material. Through oil, the carbon economy has shaped our civilisation. The majority of oil, 70%, is used for energy and energy fuels (petrochemicals); half of the rest is converted to chemicals, plastics and pharmaceuticals. The knowledge of those working in the Cogent sector will be vital to meeting the world's challenges relating to carbon, to ensure the future sustainability of our economy.

The Cogent Carbon Value Chain



Thus, the place for knowledge without skill is on the leaves of the books in which it is written. In contrast, it is **knowledge with skilled application and transfer** to commercial advantage and wealth creation that has earned the science-using industries in the Cogent sector their strategic platform.

Higher Skills = Higher Value

Altogether these are world-leading industries built on UK strengths in research and development in science and engineering, technological innovation and a highly trained and experienced workforce. But a highly skilled workforce are, or will be, expensive in any part of the world, so it is the leading-edge know-how that will sustain competitive advantage throughout the global skills race. The fact that all six cogent sectors appear in the top 13 of the Department for Business, Enterprise and Regulatory Reform Scorecard (2007), showing Gross Value Added to the economy, testifies to their economic value.

But are skills a cost on employment or an investment?

Higher Value = Higher Return

Skills and education are an investment in which the individual, the state and the employer reap a return in the longer term. The higher the skill levels, the higher that return. For an individual the benefit of higher skills can be an earnings premium of as much as £400,000 in a lifetime. Most employers recognise the return to the business and accept a responsibility for a greater share of the cost as the vocational value of training is enhanced.

Skills Macro-management

A generation ago the ICI conglomerate was the bellwether of the UK economy. In the same era, energy production was a nationalised industry while much of petrochemicals was the domain of a handful of oil companies, so these all-encompassing organisations could manage the whole skills pipeline. Today, break-up and privatisation within these sectors has brought sector renewal and an expansion of enterprises. For example:

The largest private sector business by far in the UK in 2007 was a chemicals/ petrochemicals/ plastics manufacturer with just under 14,000 staff, sales of £19bn and profits of £1.5bn.

Thus, the free market has delivered a sector with flexible, profitable businesses. A downside of this has generally been a reduced skills horizon, a gradual decline in skills investment and a skills macromanagement void – that is, until the Sector Skills Councils and attendant National Skills Academies evolved.

Through Cogent and its two sister National Skills Academies, NSAN and NSAPI, and the industry-owned Oil and Gas academy (OPITO), there has emerged the means for an overview of labour market skills intelligence, a national voice for employers skills needs, the development of skills products and services and the operational aspects of skills development and accreditation with employers and learning providers.

Together Cogent and the academies will grow the skills premium for the sector with the sector – a revolution from within.

Reform of Post-Compulsory Education

From the formation of the Polytechnics in the Wilson era, through the expansion and deregulation under Margaret Thatcher and the subsequent further expansion in the Blair era, we have seen a massive widening of participation to the extent that almost 40% of young people experience some form of higher education. This success has overshadowed the attendant re-branding of Polytechnics as Universities, with many eventually losing their employer focus.

For the Cogent sector, the somewhat freer market in higher education has come at the expense of provision in STEM (science technology engineering and mathematics) and, in particular, a gap in provision of STEM linked to workforce development.

We welcome the latest developments from the Department for Innovation Universities and Skills and the Department for Children, Schools and Families to address this gap in provision in Higher Education and Further Education through the consultations on “Higher Education at Work” and “Innovation Nation”.

Skills - The Next Industrial Revolution?

Investment in skills is not just a matter of economic prosperity; it also concerns social justice. Skills embody an opportunity for individuals and businesses to improve their prospects, to contribute to improved business performance and national Gross Domestic Product, and to add to the national stock of skills. Education through the workplace can release billions of pounds of latent value to the economy. This is a skills revolution that promises to be as profound and wide-reaching as was the industrial revolution that led to the birth of the Cogent industries in the first place - from cotton trade to textile mills to dyes to chemicals.

Skills have a role to play in:
—Increased productivity
—Energy-efficient growth
—Clean processing
—Knowledge creation
—Innovation in the application of science, engineering and technology
—Digital innovation

In France and Germany, substantial proportions of level-3 and higher qualifications are vocational. In the UK the majority of the widening participation in qualifications has been in full-time, first-time courses for young people prior to employment. Those established in employment, typically of age thirty or more, tend to assimilate skills informally and without recognition through qualifications. Unfortunately, relatively few gain a qualification above the level attained when they entered employment, and there is a lack of clear routes to vocational qualifications.

We support expansion of vocational qualifications in the workplace through our skills products. Our industry-led accreditation schemes, and our frameworks for qualifications and apprenticeships, offer a continuum of quality-assured provision for the development of skills at technical, associated professional, and management levels.

A Challenge = An Opportunity

Returning to the initial theme that “the World is our Business and our Legacy”, the challenge of skills for sustainability in the sector is as monumental as the legacy opportunity it presents to government, to industries and their supply chain.

These challenges and opportunities are:
—A globally mobile workforce in some sectors
—A STEM-reliant skills set that is in high demand from other sectors
—A workforce sector served and united by a Sector Skills family
—A fragmented sector with the skills chain unbundled across many employers
—Informal skills are developed on-the-job but not widely accredited
—Traditional skills infrastructure has withered
—Training is seen as employment cost rather than skills investment
—A safety-critical sector requiring skills for compliance
—An ageing workforce in which today’s modal peak will exceed retirement within a decade
—A workforce with latent skills capacity
—Global businesses with global outreach
—Carbon-intensive industries when demand for carbon-based energy and materials are on the verge of exceeding supply
—Meeting the energy requirements of the UK given current issues around energy balance and security
—New phases of pharmaceutical and biotechnological work required as a number of important drug patents expire

The reward of success in this skills challenge is deeper than economic prosperity alone; workforce development opportunity linked to skills qualifications are also about fairness, quality of life and opportunity for all.

The price of failure is a second-rate social and economic infrastructure.

The World of Skills – Public Policy

The Leitch Review

Lord Leitch's review of Skills in December 2006 set out a clear challenge for the UK economy. Given the rapid growth in skills and competitiveness elsewhere in the world, he said,

"Without increased skills, we would condemn ourselves to a lingering decline in competitiveness, diminishing economic growth and a bleaker future for all. The case for action is compelling and urgent. Becoming a world leader in skills will enable the UK to compete with the best in the world."

To meet this challenge, his recommendations were on the same scale, including specific targets to increase skill attainments at all levels, strengthening the employer voice on skills through their SSCs and launching a new 'pledge' for employers voluntarily to train more employees at work. If insufficient progress had been made by 2010, he recommended introducing a statutory right for employees to access workplace training.

One key recommendation of the Leitch report was the creation of the UK Commission for Employment and Skills, to advise Government on the changes needed to the skills and employment systems to deliver the necessary economic ambitions. In particular, the Commission will examine how skills and employment issues themselves can be better integrated. The Commissioners themselves have been drawn from across all aspects of the public and private sectors in the UK, with one Commissioner from each of the devolved administrations.

Government skills policy has been strongly shaped by Leitch, although devolution means that there are effectively separate skills policies and systems in each of the four nations of the UK. As an organisation working across the whole of the UK, Cogent is very familiar with the differences in skills policies, and we understand the need for them in the context of devolved decision-making. We do know, however, that our employers can find these differences confusing and even irritating - this is especially true where they operate at a UK or global level, and find that for example, they cannot have a single apprenticeship framework or qualification at their sites in England and Scotland. Many of our efforts are aimed at developing ways to explain these differences to employers and to minimise their impact at delivery level.

England policy – World Class Skills – (July 2007)

The balance of funding responsibilities has been reviewed, with the Government expressing its clear intention to focus on getting young people ready for the labour market, on basic skills for existing workers, and on any areas of market failure. In return for this, the Government increasingly expects employers and individuals to meet the cost of acquiring intermediate and higher level skills, since these are the levels where clear economic benefits can be seen to accrue directly to the individuals and firms.

The Government is also committed to changing funding systems to ensure that they are led by demand from learners and employers – checked against robust labour market intelligence – rather than by the need to meet inaccurate quotas.

To meet these aims, a number of English policies have been announced, including Skills Accounts to give more choice and control by individuals over their learning, and a strong programme of vocational qualifications reform meaning that only the qualifications really relevant to employers – as determined by their SSCs – attract public funding. To give these policies time to make a difference, the Government has postponed the time at which it will review the potential statutory right to access training, from 2010 to 2014.

Scotland policy – Skills for Scotland - (September 2007)

Scottish policy, while taking account of the Leitch review, also concentrates on a drive to improve basic and generic skills. It remains focused on the needs of individuals, but a stronger role for employers acting through their SSCs is envisaged – as long as they understand properly the Scottish policy context. This role extends to ensuring that, "…employers have a say in the design and development of learning at all levels and in all settings, not just in vocational qualifications".

To deliver upon the skills policy, the Scottish Government has undertaken some significant institutional changes, creating Skills Development Scotland and bringing together the following four partner organisations to deliver comprehensive information, advice and guidance for careers and learning as well as support for skills development:

—Careers Scotland
—Scottish University for Industry
—Key skills elements from Scottish Enterprise
—Key skills elements from Highlands and Islands Enterprise

In Scotland, there has always been a particularly explicit pivotal role for colleges, and the Scottish Government is currently reviewing their formula-based funding to ensure that the investment follows what is relevant for the modern economy.

Wales policy – Skills that Work for Wales - (August 2008)

The Welsh policy focus is also on re-aligning the balance of public and private sector responsibilities so that people pay where they derive most benefit, and the Welsh contributions policy is to be developed to formalise this.

To ensure learning opportunities match economic need, a new Welsh Sector Priorities Fund has been established to fund training providers to deliver the strategic priorities identified through Sector Skills Agreements. All new vocational qualifications and units are required to reflect the Sector Qualifications Strategies developed by the respective Sector Skill Council(s).

In a particularly strong move towards work-related learning at higher levels, the Higher Education Funding Council for Wales is brokering arrangements with universities to develop provision according to needs identified by Sector Skills Councils.

Northern Ireland Policy – Success through Skills (Feb 2006 with update and Progress Report May 2008)

The Northern Ireland administration published "Success through Skills" in response both to the Leitch Review and to the Irish Government's own Skills Strategy published last year, which reached many of the same conclusions as Lord Leitch's. Although they have agreed to move towards demand-led funding, with SSCs having an integral role in approving appropriate vocational qualifications, the details of the systemic changes to make this happen are yet to be announced. They are keen on the local dimension of skills provision, and are looking to SSCs and Workforce Development Forums to identify skills needs at sectoral and local levels respectively.

Medicine gets personal

Derek Willison-Parry, Vice President, Operational Excellence, Global Manufacturing and Supply, GlaxoSmithKline.

Derek Willison-Parry is responsible for performance improvement of the global network of GSK factories and suppliers delivering more than 4 billion packs of medicines each year, worth more than $40bn in sales. Derek is a mechanical engineer who joined GSK from the nuclear industry in 1990 as a project manager in UK and China, since when he has gained experience working in various senior roles in the UK and abroad.

To what extent have skills been a source of strength to the UK pharmaceuticals industry?

Skills are the primary reason the UK industry is a world leader in the global market for pharmaceuticals. Strong scientific and technical capabilities, combined with a strong focus on healthcare, have underpinned the industry's global expansion.

People, together with their skills and intellect, have always been the key component in GSK's strategy, which is constantly evolving to meet the increasing demand for better healthcare worldwide.

What are the significant changes the industry faces in the coming years?

Until the 1990s it was the so-called "blockbuster" drugs for treatment of problems such as heart disease and diabetes that funded our expansion. However, many patents have expired in recent years, providing opportunities for cheaper, generic versions – this is also reinforced by the worldwide drive to get even more value from healthcare budgets.

The major development in recent years has been a move away from "one disease, one drug" to a much more personalised approach to medicine which is fragmenting the pharmaceutical market, bringing a much longer list of drugs with it. A good example is the treatment of breast cancer, where once only a handful of drugs were used. Drug development is now much more sophisticated, and a much broader range of drugs is aimed at treating the specific variants and lifecycles of this disease.

What combination of skills and knowledge are needed to bring these newer products effectively to market?

The discovery of new medicines is a dispersed and diverse activity that very often takes place outside the industry itself – in universities and specialist research and development ventures. The science underpins everything we do, and our people need to understand it in order to manufacture our products effectively and efficiently. We are now making smaller volumes, and this means our people need to get to grips with advanced technology where the parameters of operation are more complex and need more close attention. There is a much greater need to understand pharmaceutical processes rather than to tolerate the "black box" approach to process control.

What do you perceive to be the pharmaceutical industry's biggest challenge?

The manufacture of drugs in smaller quantities, and to extremely exacting standards, is demanding an all-new "factory of the future", where autonomous teams of people with an all-round understanding of the science and the process support the supply of an ever-increasing range of drugs. We need to get research and development closer to manufacturing, and to link science into process operations at the point of manufacture on the shop floor. This is a new challenge in terms of the skills and knowledge required from our people and will demand higher level skills as we move forward.

How do pharmaceuticals employers currently conduct training and development?

Training and development is delivered in a plural way within the pharmaceutical industry. The industry is very heavily regulated and this has encouraged a large amount of specific operational training to be done in-house, with vocational training and development more likely to be available through the traditional external means.

The Government is refocusing higher level skills strategy with its "HE at Work" strategy – what is the industry view of the supply of higher level skills in the UK?

Universities play an important role in supplying skills to our industries. What we need to see is a real focus in terms of meeting our unique needs – and most importantly we need the education to be relevant and up-to-date.

The Government is right to make its investment in high level skills. But it's not just about skills – ideas are the bedrock of the industry and this is where we need to step up. Singapore, for example, has the "bit between its teeth" and there is a real pharmaceutical focus between academia and business, plus there's the recognition that the business environment has got to be right too. It's risky to make comparisons, but we need to learn from this approach.

Looking ahead to the future together with the role of Cogent and the Skills Academy, will these initiatives fulfil a need for a co-ordinated approach and national platform?

We need relevant and up-to-date vocational qualifications. The developing Foundation Degree in Pharmaceutical Sciences will not just be "nice to have" – it really needs to be in place, to provide the skills and knowledge our industry needs to thrive and innovate.

We must have the right skills applied in the right operational environment in order to guarantee a long term future for UK manufacturing. Cogent and the Skills Academy will play a very important role in ensuring what we get is demand-led. The industry too must play a leading part in these developments as part of its wider strategy to deliver managed and sustained growth and retain its place in the world.

It is clear that demand for higher level skills has been rising and is expected to continue. There will be considerable requirements for graduates with Science, Technology, Engineering and Maths (STEM) qualifications, particularly to replace older workers.

It is important to look at the flow of people potentially entering the industry over the coming years, as well as those likely to leave. This analysis will tell us whether we are on course to meet our sector's needs.

Section Two/The Skills Factory

Projecting the skills demand

Significant efforts have been made in recent years to ensure that the skills needs of the Cogent sector are being met. We are confident that the direction of travel is broadly correct, but in order to be confident that the effort is effective, we need to ensure that the magnitude is also appropriate – in other words, that we are moving far enough, fast enough. To test whether we are on track, we have undertaken the analysis presented in this section.

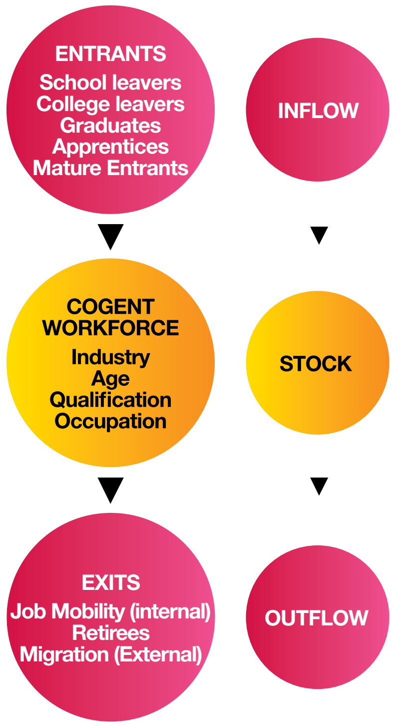
The Stock and the Flow

To assess the size of the challenge, we have used available data on current and projected levels of employment in the sector ("the stock"), and compared them with information on the expected rate of "flow" of people in and out of the workforce. The outflow will consist mainly of people retiring, but will also be affected by issues such as emigration and labour market mobility. The inflow will consist of university graduates, apprentices and, to a lesser extent, direct entry from schools and further education colleges. The comparison of the projected stock, outflow and inflow will show us whether the current rate of entry of appropriately-qualified people into the workforce will be enough to meet demand, or whether we need to make efforts to increase the numbers.

Figures on some of these aspects have been readily available to us, either from existing public data sources or from our own research or projections. Others were less easily available, so in the narrative below we have pointed out where we have had either to make assumptions or to leave some figures out of the analysis for now. We will conduct further research to follow up the areas of simplification and to refine the general analysis over the next few months.

Skills Factory - Stock

The following figures illustrate the Cogent Skills Factory – the stock of people and the flow of skills.



To analyse the STOCK and FLOW of people in the Cogent sector there are many elements to analyse. The flow chart opposite demonstrates the different factors needed to be taken into consideration when determining shortfalls in **SUPPLY** and future **DEMAND** within the sector.

Entrants into the sector come from a variety of sources including graduates and apprentices as major routes into the industries

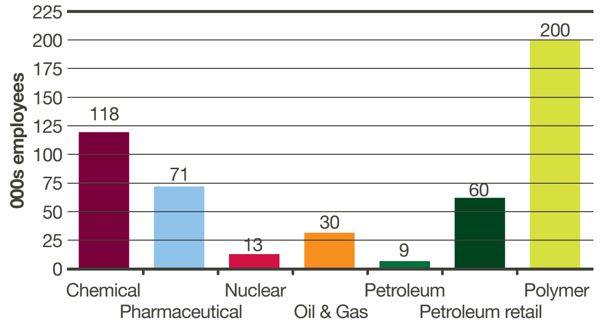
Workers exiting the sector again are through a variety of paths. Exits in the main are from retirements, however migration of workers to other countries or sectors also account for movement and lead to **REPLACEMENT DEMAND**.

The Stock

This first section looks at the current stock in the Cogent sector. It is important to examine the current picture of the sector in order to gauge where pivotal demographic pinch-points may occur.

The sector is shown firstly broken down by industry, to illustrate the levels of employment within the six industries Cogent represents. This highlights the concentration of employment within the Cogent sector. Following on from this initial breakdown there are illustrations of the occupation distribution, age distribution and highest qualifications held.

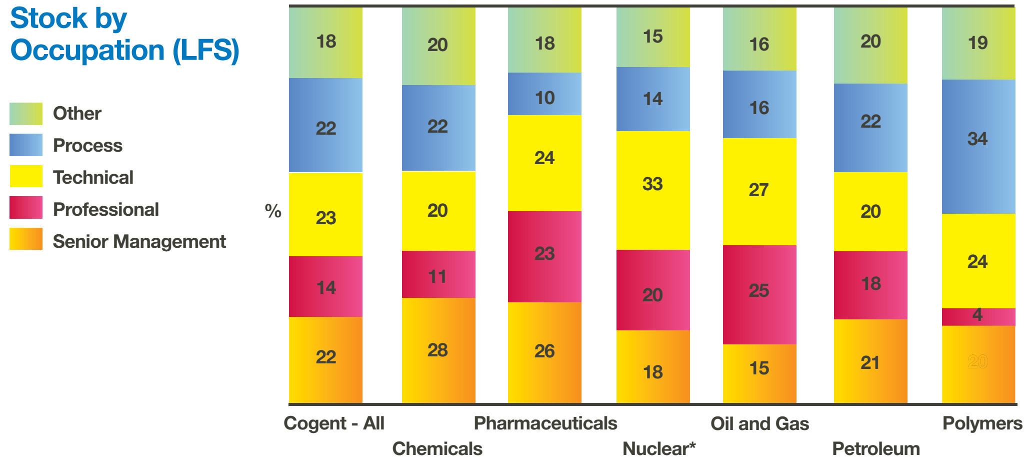
Total Employment by Cogent Industry



Source: Annual Business Inquiry 2006 (November 2007 release)

The total number of employees in the Cogent sector is approximately 500,000 according to the Annual Business Enquiry. The Chemical and Polymer industries employ nearly two-thirds of the sector employees.

Stock by Occupation (LFS)

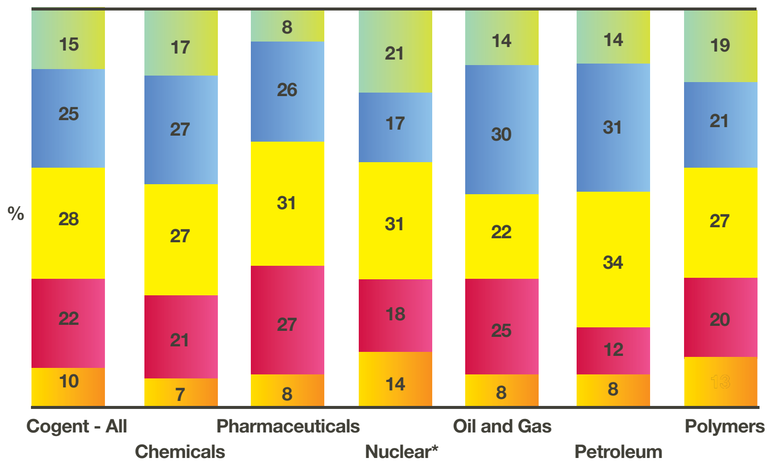


Source: Labour Force Survey 2007
*Nuclear Fuel Processing only

The **CORE** workforce of the Cogent sector overall consists of Technical and Process workers (45%). The Pharmaceuticals industry employs the largest proportion of Senior Management and Professional occupations, at 49%, with the Polymers industry employing the largest proportion of Technical and Process workers, at 58%.

Cogent Industry Age Distribution

- 55+ years
- 45-54 years
- 35-44 years
- 25-34 years
- 16-24 years

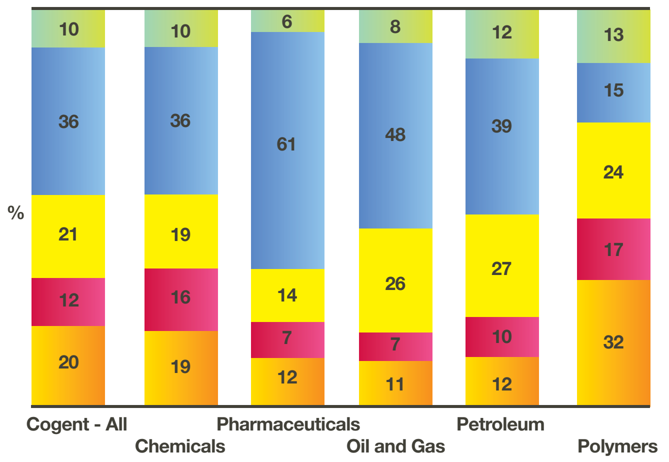


Source: Labour Force Survey 2007
*Nuclear Fuel Processing only

The age distribution of the Cogent sector highlights that the industries with the largest proportion of older workers (over 45 years) are Chemicals, Oil and Gas and Petroleum. In these three industries, approximately 45% of the workers are included in the 45 – 55+ years age group. By contrast, the Nuclear and Pharmaceutical industries currently employ larger numbers of workers under the age of 45, at 36% and 34% respectively.

Industry by Highest Level of Qualification

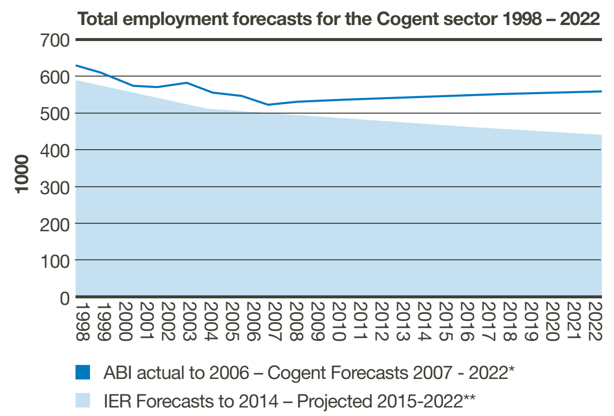
- Other Qualifications
- Level 4 or higher
- Level 3
- Level 2
- Level 1 or lower



Source: Labour Force Survey 2007
*Nuclear Fuel Processing only

Through examining the highest level of qualification by industry it is evident that the Pharmaceuticals and the Oil and Gas industries currently employ the largest majority of higher skilled workers, with 61% and 48% of workers skilled to level 4 or above, respectively.

Stock Projections



Source: Working Futures 2, Annual Business Inquiry 2006
*Cogent Forecasts = 0.25% growth in total employment per annum
**Cogent estimates based on IER Working Futures 2 = 1.25% decline in total employment per annum

Working Futures has projected a steady decline in stock requirement to 2014. If this is projected forward to 2022, an overall decline of around 100,000 is predicted. However, recent evidence from actual employee counts has shown an increase over the past two years – if there is continued modest growth this could lead to an increase of around 25,000.

There is clearly a significant difference between these figures, and it is also worth mentioning that different sources would suggest a different starting point - the industry's own estimate for current employee numbers in the sector, for example, is closer to 900,000. However, for the purposes of analysis this section uses national data as the basis for estimations in the first instance.

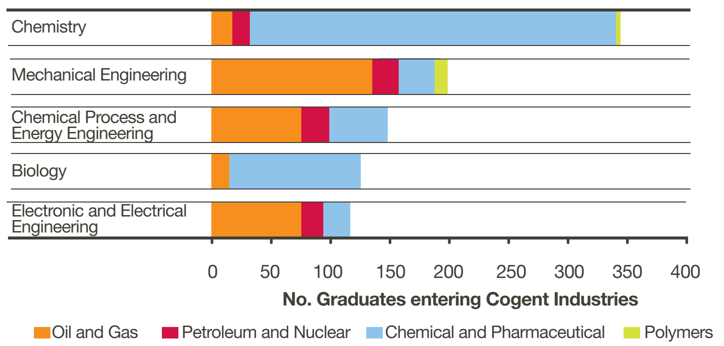
The Inflow

This section looks at the flow of ENTRANTS into the sector from Higher Education and Apprentices. (There are other routes into the industry, including Further Education and mature entrants. However, these cannot currently be quantified with available data sources, and since they do not tend to represent a significant proportion of entrants to the sector, we have not included them here. This is an area we will explore further to develop a more sophisticated analysis in future.)

Flow of Graduates

The flow of graduates into the Cogent sector is dominated by Chemistry graduates. Almost 350 entered the sector from this discipline in 2006. The Chemical and Pharmaceutical industries are the largest recruiters of graduates in the sector, with the Oil and Gas industry also recruiting a large proportion of graduates. The Polymer industry is the lowest recruiter of graduates, but the high level R&D elements of the Polymer industry fall into the Chemical industry classification when analysing HESA data.

Graduate Flow into the Cogent Sector (2005/06)



Forecast Graduate Flow 2005-2022

All Graduates entering Cogent Industries p.a.	Forecast STEM Graduates	Forecast Number of Graduates entering Cogent Industries between 2005 - 2022	Forecast Number of STEM Graduates entering Cogent industries 2005 - 2022
4,000	1,800	68,000	30,600

Source: HESA (based on averaged steady state at 2005-06 figures)

Flow of Apprentices

The data below highlights the flow of apprentices through various frameworks. The major flow into the Cogent industries comes from two frameworks in the sector plus the offshore framework operated by OPITO.

UK Apprenticeships Numbers 2006/2007

Country	Framework	2006/07 Certifications
England & Wales	Cogent Semta ECITB	322 12325 332
Scotland – OPITO data	Oil and Gas (Upstream) (OPITO framework only)	48
Northern Ireland	Mechanical Engineering Electrical Engineering Electronic Engineering	510 481 42

Source: LSC, DECWL, DELNI and SQS

In 2007 Cogent apprentices were approximately 400, however with the introduction of the Cogent Big Ticket Apprenticeship programme and the work of the Skills Academies representing the Process, Nuclear and Oil and Gas industries this figure is expected to rise significantly between now and 2012 and then expected to stabilise from 2012 to 2020.

It is anticipated that the numbers may understate the flow of apprentices from the SEMTA and ECITB frameworks into the sector.

The table below demonstrates that just fewer than 32,000 apprentices are expected to enter the sector between 2007 and 2022. These forecasts are based on figures provided by the Skills Academies within their business plans and have been projected forward in order to ascertain a total cumulative flow to 2022.

Forecast Number of Apprentices 2007 - 2022

	Year (cumulative)				
	2007	2010	2014	2018	2022
Cogent Sector Apprentices	400	3,472	12,607	22,107	31,607

Source: National Skills Academy Process Business Plan, National Skills Academy Nuclear, Oil and Gas Academy and Learning and Skills Council

Inflow projection

Set alongside the numbers above, it is worth bearing in mind that the flow of 16 and 18 year olds is expected to decline by 2020. We have not incorporated this factor into the projections, but it will clearly serve only to exacerbate any shortfall of entrants. The expected decline means that there will be fewer school leavers for potential relevant apprenticeships or further and higher education courses.

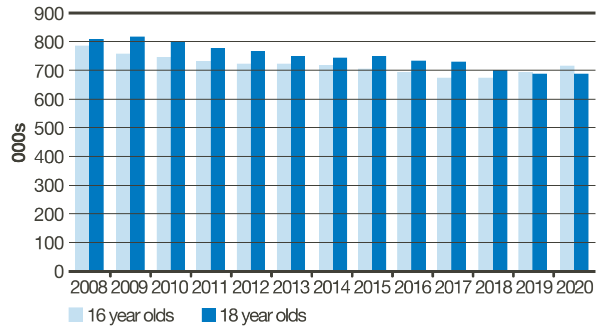
Flow of 16 and 18 year old cohort

Population Projections from 2006 base

	Year				Change 2008 - 2012		Change 2008 - 2016		Change 2008 - 2020	
	2008	2012	2016	2020						
16 year olds	789,000	733,000	686,000	715,000	-56,000	-7%	-103,00	-13%	-74,000	-9%
18 year olds	809,000	770,000	735,000	687,000	-39,000	-5%	-74,000	-9%	-122,000	-15%

Source: Government Actuary Department (2008)

2008 – 2020 forecasts for 16 and 18 year olds



Source: Government Actuary Department (2008)

The Outflow

It is vital to examine the projected number of retirees, since this evidence provides the minimum replacement demand for the sector to maintain current employment levels if the sector remains stable. (This replacement demand can of course also be affected by expansion/decline of the sector and mobility of workers out of the Cogent sector. In addition to this, there will be a flow of people either leaving the sector, or exercising mobility between discrete industries within it (churn). However, we will examine these aspects further in future analyses. For the purposes of this model there has been an assumption of a steady state.)

Forecast Retirees in the Cogent Sector

	Year (cumulative)			
Occupation	2007	2007-2012	2007-2017	2007-2022
All Occupations	4,400	28,000	82,000	144,900
Management and Professional workforce	1,700	10,600	28,400	55,100
Technician workforce	*	6,000	19,300	31,800
Process Operator workforce	*	7,200	24,500	40,200
Other	1,200	4,200	9,800	17,800

Source: Labour Force Survey 2007
Base: employees in the 65-69 age bands projected forward over 15 years
Data rounded
*Data suppressed

The forecast for retirees illustrates that there is likely to be an increased demand for management/graduate occupations by 2022, with a forecast need of over 55,000 managers by that date. The operator workforce also looks likely to face a replacement demand of around 40,000 workers by 2022. The core technician and operator work-force of the Cogent sector is facing a demand of 72,000 employees by the year 2022.

Summary

At present current forecasts for total employment in the Cogent sector by **2022** will be between approximately **401,000** and **523,000** employees

Supply	Demand
Total forecast future retirements are estimated to be **145,000** by 2022	Total forecast supply of workers entering the Cogent sector **99,600**
Estimated **72,000** Technicians and Operators needing to be replaced by 2022	Forecast of **31,600** apprentices entering the sector by 2022
Estimated **55,000** Managers and Professionals needed by 2022	Forecast of **68,000** graduates entering the sector by 2022

Shortfall

The evidence presented throughout this section leads to the following shortfall and mismatch in the estimated **SUPPLY** and **DEMAND**.

Employee Group	Forecast Demand	Forecast Supply	
Higher Level Workers (Managers and Professionals)	55,000	68,000	OVER SUPPLY + 13,000
Core Workers (Technicians and Operators)	72,000	31,600	SHORTFALL - 40,400

Conclusions

Comparison of the numbers above suggests that the current inflow of non-graduates (this is, entry via apprenticeship routes and vocational qualification routes) is insufficient to meet replacement demand in processing and technician roles. This deficit will increase significantly in the five-year period to 2017, which coincides with the known lowest point in 16-18 year-olds in the general population, meaning that recruitment will be taking place within the most competitive marketplace. Therefore, alternative sources of skills to meet demand will be required, including a focus on upskilling and re-skilling the current workforce, as well as initiatives to attract more entrants.

The development of National Skills Academies will help to address this gap, by stimulating employer demand for, and supporting the delivery mechanism of, relevant vocational programmes and qualifications.

At higher level, the current level of supply is likely to be sufficient overall, although of course further analysis will be needed to monitor the needs of individual industries and to avoid specific pinch-points.

While macro analysis of the higher skilled workforce - Managers and Professionals - predicts a stable situation, this conceals workforce development issues in the area of STEM professionals. While further research is required to extract a higher resolution of the higher skilled workforce – management, finance, IT, personnel, STEM etc - it is noted that the professional STEM workforce is of core importance in enabling manufacturing of science and engineering products. Our interim research indicates that there will be an ongoing requirement for 30,000 new graduate STEM professionals in the sector by 2022. In addition, the age profile of the existing professional STEM workforce suggests a significant higher level upskilling requirement. Higher level STEM is treated in detail in Section Six. The supply, attraction and workforce development of STEM professionals is thus of strategic importance to the Cogent sector.

The forecasts illustrate the need for a concentration on the Technician and Operator workforce through the development of qualifications and vocational training at relevant levels, and through the upskilling of the existing Cogent workforce. Although there is already a range of initiatives to address skills shortages across the sector, the analysis suggests that the emphasis on particular skills levels will need adjusting from current rates if we are to meet the future needs of the sector.

The figures above do need to be treated with some caution, given the limitations of the available data, and the simplifications we have made throughout the analysis. In particular, more sophisticated analysis of entry from Further Education, of age cohort changes and of expansion or contraction of individual industries would affect the estimates in various ways. However, the picture they paint does fit with the anecdotal evidence that Cogent regularly receives from employers, and we are confident that the analysis forms a strong basis for action. We plan to continue examining the figures available to improve the analysis further, including through the use of our forthcoming Oracle project, which will provide a detailed longitudinal study of skills needs in the sector.

Lifelong learning is vital to success

Tony Burke is Assistant General Secretary at the UK and Ireland's biggest trade union, Unite the Union. He is a Trade Union-appointed member on the board of Cogent SSC.

To what extent have skills been a source of strength to the Process Industries?

The workforce is the key asset of any organisation, and the employees across these industries have contributed to their growth and success through their skills and talents. Developing skills is paramount to creating a strong industry base and Unite is rigorously pursuing this agenda. An important part of this is securing Union Learning Agreements with employers.

We are working through Cogent and with employers to ensure a formal framework where employees develop new skills and gain qualifications that really mean something.

How important are skills to individual members?

Unite sees lifelong learning as a central way of improving our members' working lives. We find our members are looking for additional skills and top quality training that meets their aspirations. They are looking for real skills that equip them to do the technical jobs in the sector. What they are not looking for is a "box ticking" approach to training – and many employers recognise this. These skills must be supported by world-class standards and qualifications.

What is the role and importance of Union Learning Representatives?

Union Learning Representatives (ULRs) are important to raising interest in training and development in the workplace. They give people contact with someone they know who, when they are trained, will treat their concerns in confidence. They provide information about learning opportunities, available inside and outside the workplace. This can all happen on the ground – where people actually work. An important part of this is the activity we are working on with Cogent on the development of the Trade Union Toolkit for union members, which will set out all the opportunities on offer in the Cogent sector.

The Cogent Board is fully supportive of these developments and we feel we've got a real dialogue going in terms of supporting ULRs in the workplace to help people to gain new skills with Cogent.

What part do Apprenticeships and vocational training play in the upskilling agenda?

In the Process Industries, high quality and relevant vocational training is absolutely critical. It underpins health, safety and environmental best practice and gives workers and employers the edge in the global economy. Unite has made it clear it's not just about a commitment to training – it's also about a commitment to paid time off for training. Giving people the time to get on with it and to improve their skills will make a real difference.

We still need to see more apprentices coming through - but we are moving in the right direction. Apprenticeships give young people the chance to develop skills, experience and qualifications and provide a great entry-route into the process sector, especially for school leavers. They also provide a pathway into the higher level skills which are so critical to these industries.

Will Cogent and the Skills Academies fulfil a need for a co-ordinated approach and national platform?

Unite is fully supporting Cogent's relicensing bid and the work of the Skills Academies. Trade Unions and our reps have a very important role to play in supporting the learning and skills agenda, and influencing employers who are not fully embracing this drive to upskill. Some employers still say they haven't got the time to train – a short-sighted view when we consider what needs to be done.

We are particularly keen to ensure, with the Academies, that UK training provision is world-class and that employees right across the sector are able to participate in Cogent's upskilling programmes.

There is now a range of opportunities for those working in these industries to unlock their hidden potential – and for young people starting out to enter a new and exciting profession, through Cogent apprenticeship schemes and Diplomas.

Overall we're making good progress and Unite will continue to work with Cogent to develop workforce skills in the sector.

Section Three/Cogent Industries

Cogent's current research programme is providing the essential intelligence to inform all Cogent's activities.

Its Sector Skills Agreement (SSA), a two year research and analysis programme, was signed off by the Cogent sector (through the Industry Advisory Councils) and with Government, Trades Unions and other stakeholders.

We think it is vital to present key data about the sector in an accessible manner. This is underpinned by detailed and comprehensive research which is ongoing as part of Cogent's key role of collecting up-to-date Labour Market Information.

Section Three/Nuclear

A ground shift in thinking and in the economic picture of nuclear power, as a crucial element of the green solution to security of energy supply, is being driven by the need to reduce carbon emissions and dependence upon hydrocarbons for energy production. Across the world, nuclear power provides 16% of global electricity requirements.

Rising oil prices have led to the Prime Minister's stating that the UK needs to be more ambitious in its plans for nuclear power - indicating that a broader programme of new build may extend beyond replacement of the existing nuclear power stations. This comes at a time when over 30 countries are considering a nuclear power programme for the first time, and internationally there are currently 35 nuclear power reactors already under construction, with a further 91 on order or planned. Coming years will see unprecedented world-wide demand for nuclear expertise. While many of the skills required for the UK can be resourced at home, the engagement of the global supply chain will be essential for the manufacture of key components.

The UK has 19 power generation reactors in operation and 15 nuclear powered submarines, with ongoing demand for operation and maintenance extending to 2035. In the meantime, the growth area of nuclear industry activity in the UK is in decommissioning and clean up, with 21 reactors in decommissioning and two more due to enter this phase in the next two years. Overall costs of managing the nuclear legacy look set to rise to over £73billion.

Source: World Nuclear Association (2008) http://www.world-nuclear.org/

Trends and dates

Year*	Turnover	GVA	GVA per Employee	Balance of Trade	Employment
2006	£1,843 million	£841 million	Average £63,712	£50 million	13,200
2000	£1,552 million	£789 million	Average £60,692		13,000

* Date suppressed for the intervening years

Source: Annual Business Inquiry 2006, HM Revenue and Statistics 2007

Data presented above relates only to Processing of Nuclear Fuels. Total industry employment is approx 50,000.

Key dates in decommissioning and new build:

2006
–Energy policy review – nuclear back on agenda
–HSE propose 2 stage license Process proposed
–Dungeness A
–Sizewell A

2007
–Extended period of public consultation instigated
–First submissions for generic design assessment

2008
–Nuclear Power White Paper – support for new build confirmed
–Oldbury

2009
–Conclusion of siting assessment
–National Policy statement
–Possible Operator decisions in principle

2010
–Planning application processes commence
–Wylfa

2011
–Conclusion of generic design assessment process
–Commence Licensing process
–Hinkley Point B
–Hunterston B

2013
–Operator decision to proceed with build of new plant

2014
–Hartlepool
–Heysham 1

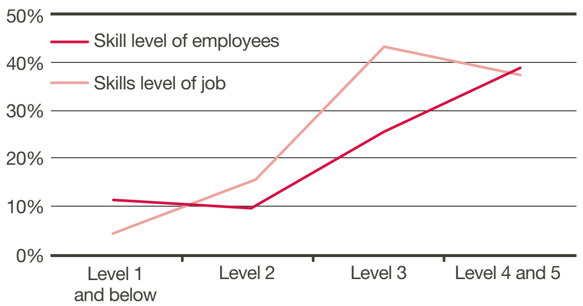
2018
–Potential first new power plant online
Dungeness B

2023
–Heysham 2
–Tomess

2035
–Sizewell B

Denotes facility entering decommissioning and clean-up. Source: Nuclear Industry Association (2008), The UK capability to deliver a new nuclear build programme

The skills gap* (in nuclear fuel processing)



In Nuclear Fuel Processing:

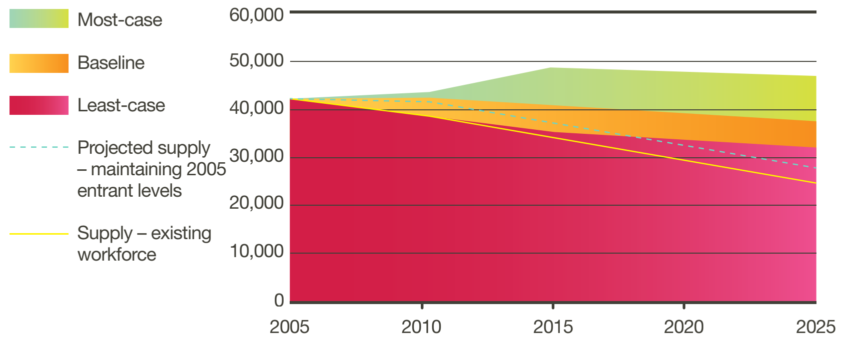
—There is an under supply of people qualified to level 2 and 3 compared to the proportion of jobs
—There is a 20% deficit of people qualified at levels 2 and 3

The skills gap* (in nuclear fuel processing)

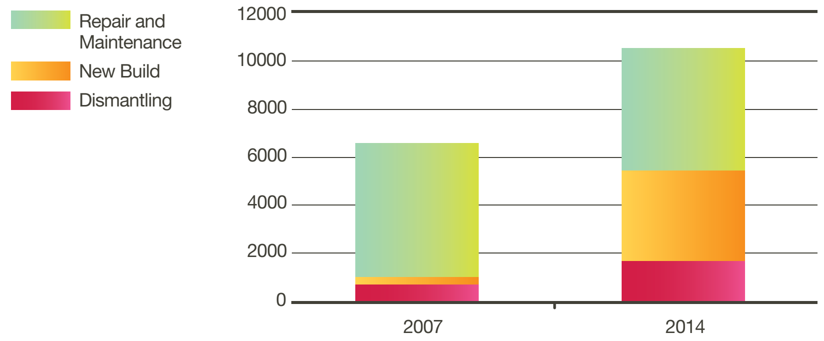
Decommissioning will be the major nuclear sub-industry growth area to 2015. The change from operations will require workforce re-skilling. The National Skills Academy Nuclear estimates that 6,000 workers will undertake decommissioning-specific qualifications over the next five years.

*the data used in the Skills Gap diagram use the 'occupation in main job' and the 'highest level of qualification' held as proxy measures for the 'skills level of job' and the 'skills level of employee' respectively.

The future of the industry



Note: Based on assumption of retirement aged 65 and does not take account of attrition from the industry



Source: ECITB (2008), Securing Engineering Skillls for the Future

The forecast requirement for new entrants to the nuclear industry by 2015 is between 3,400 and 11,500, while if early retirements occur, this could rise as high as 16,500.

Occupation Profile:

—Growth occupations to 2025 are Skilled Trades and Associate Professionals and Technicians;
—Most-case forecasts see a need for: 2,100 Process and Machine Operators; 3,500 Skilled Trades; 2,400 Associate Professional and Technical workers and 8,500 Professionals and Senior Officials between 2005 and 2015, to account for retirements alone.

ECITB research also forecasts the overall power generation sector (including coal, gas, nuclear and renewables) will have an increased demand for its workforce of 3,800 over the period 2007-2014. This is driven by demands of new build and increased need for repair and maintenance of ageing facilities. In addition to this, replacement demand for retirements in the ECITB workforce is estimated to be about 6%.

Priorities

The top priority in the nuclear industry is the need for an increase in vocational and technical skills, up to and including level 3. The sector needs to quadruple the number of apprentices over the next five years, and needs clear progression routes through to Foundation Degrees and Higher Education. The prospect of new nuclear build has increased the number of students on post-graduate programmes, and two new nuclear degree courses have been established. Graduate development programmes are also on the increase.

In the defence sector, a build programme of submarines continues alongside the studies to replace the national deterrent. This suggests the need for a steady flow of new entrants with the skills to undertake this work.

In the civil sector, the decommissioning of legacy sites continues, requiring a major re-skilling of their workforce. The prospect of new build will also require a new training and education programme. In the early years, many of the skills required may come from the engineering and construction industries, once the new build programme is established, a new education and training programme will be required to ensure the supply of suitably qualified and experienced personnel to operate these new reactor plants.

The UK industry operates as one part of a global business and its product is traded internationally, so it is important to consider its place in this wider context. Whether oil and gas reserves of the UK Continental Shelf are recovered, and in what quantities, is decided by a complex set of geopolitical variables.

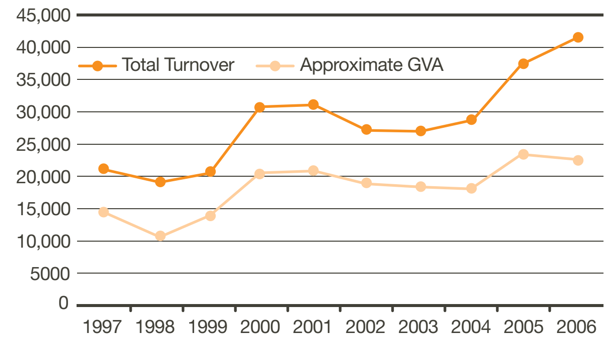
Three offshore provinces (South China Sea, Gulf of Mexico and North Sea) account for half of global industry spending. Growth is forecast to 2011 in all regions except Western Europe, with greater proportions of investment and drilling activity being made in deep water areas in place of traditional shallow waters such as the North Sea.

In 2006, 29 new developments were given approval in the UK Continental Shelf, up from 22 in 2005. Resource constraints saw a 20% increase in costs in 2005/06. In 2007/08, 40 new fields were expected to come on-stream, the majority of which were subsea developments.

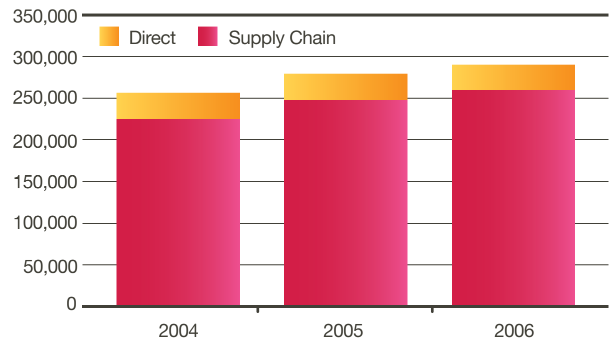
Rising oil prices led the Prime Minister to meet industry leaders in 2008 to discuss how, as a significant producing province, the UK could ease problems being experienced in world oil market balance. The industry and government target for UK Continental Shelf 2010 production is 3million barrels of oil equivalent per day (boepd), up from 2.8million in 2007, but the current 2010 forecast is approximately 2.6million boepd. The target for 2010 investment was £3billion, showing a significant decline from the 2006 figure of £11.5billion. It is estimated over the next ten years that £30 billion investment is required to recover planned oil and gas reserves, of which £17 billion has yet to be secured.

Sources: Douglas Westwood (2008) http://www.dw-1.com/sectors/oil_and_gas/index.php, Oil and Gas UK (2007) http://www.oilandgas.org.uk/index.cfm

Trends and dates



Source: Annual Business Inquiry



Source: Oil and Gas UK, 2007 Economic Report

—Oil and gas Gross Value Added (GVA) represented 13% of all production and manufacturing industries in 2006. GVA per head in oil and gas was £734,000. The industry is highly capital intensive with capital expenditure of £5.6billion.

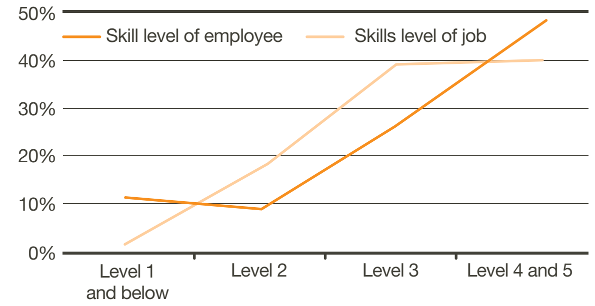
—Balance of trade has been in decline since 2001 and slipped into deficit in 2005, although this is likely to have been affected since then by major increases in oil prices.

—In 2006 there were 30,100 direct industry employees, of which 72% were Scotland-based (the Aberdeen area alone accounts for 38% of industry employment.) The supply chain employs 260,000 across Britain.

Research and development

Research and development expenditure increased 18% from 2005 to 2006 (the latest years from which data are available), representing 1.6% of operating profits. Oil and gas is one of the UK's strongest industry investors in research and development. Sustainability of the UK Continental Shelf is highly dependent upon the development and realisation of new technologies to maximise recoverable reserves.

The skills gap



Source: Labour Force Survey (Q1-Q4 2007)

For direct employment in Oil and Gas

—Elementary occupations such as roustabouts only account for 1% of the overall workforce.

—There is an under supply of people qualified to level 2 and 3.

—Level 2 and 3 occupations such as process operators, technicians, skilled trades and business administrators account for 55% of the workforce.

Priorities

New discoveries, ongoing operations, planned lifetime extensions for existing operations, decommissioning activities and retirement of the incumbent workforce, are all factors that mean the industry has a sustained recruitment demand with a requirement for skills training and up-skilling of the incumbent workforce.

Keeping the UK Continental Shelf competitive will require exploration and production activities to be carried out, requiring a diversity of people from geoscientist to engineers and from environmental scientists to electricians.

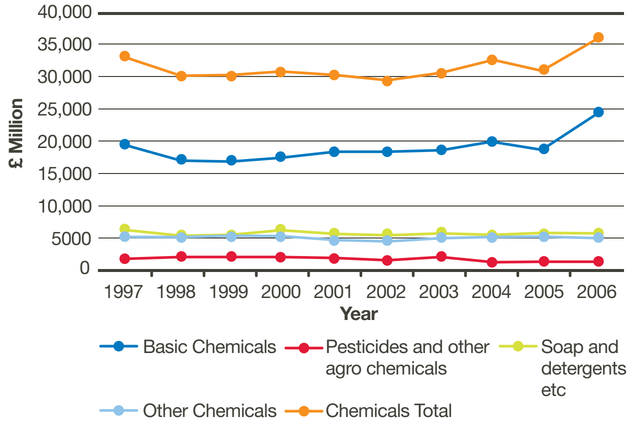
Competition from national and international projects could potentially lead to shortages in oil and gas specialists and those conventional skills required to support the UK. Skills developed in the UK are in demand globally, so the supply of skilled workforce for domestic and international activity requires industry management.

Section Three/Chemicals

The Chemicals industry is one of the UK's largest manufacturing industries. Over the last decade it grew more than five times faster than the average for all industry. It is manufacturing's number one exporter, with an annual trade surplus of just under £5billion. It spends over £2billion a year on new capital investment. All chemicals end up being used in products and services purchased by the consumer. There may be many stages between the processing of a chemical and the final consumer, but it is estimated that each UK household either directly or indirectly spends around £30 per week on chemicals. The Chemicals industry in the UK has a relatively higher proportion employed in medium-sized enterprises when compared to other European countries. On average, full-time employees' hourly earnings are 19% higher than in manufacturing generally. This reflects high skill, productivity and training levels.

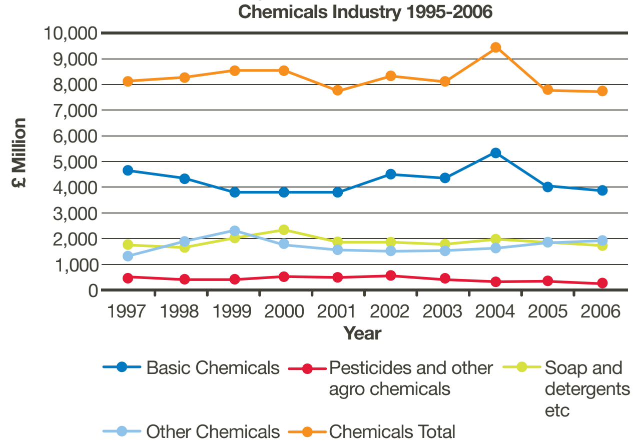
Trends

Total Turnover in the Chemicals Industry 1995-2006



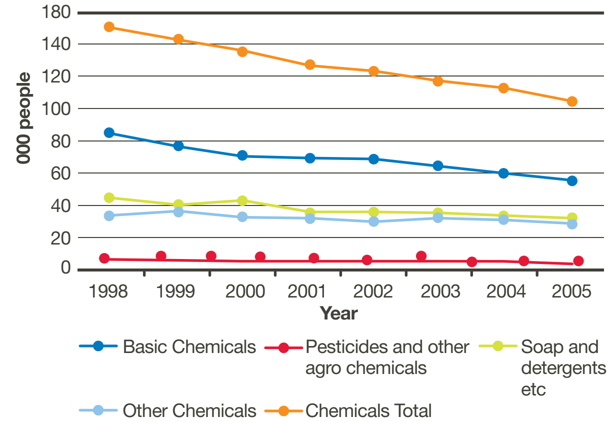
Source: Annual Business Inquiry 2006

Approximate gross value added at basic prices in the Chemicals Industry 1995-2006



Source: Annual Business Inquiry 2006

Total Average Employment in the Chemicals Industry 1995-2005



Source: Annual Business Inquiry 2006

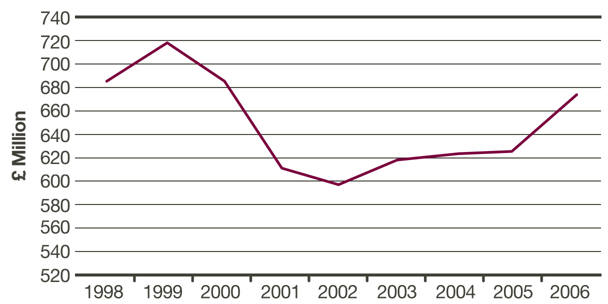
Total turnover in the Chemicals industry remained stable since 1997 and has incurred an increase between 2005 and 2006.

Gross Value Added in the industry has also remained stable.

Total employment in the Chemicals industry has decreased by 53,000 since 1998.

The total number of enterprises has also decreased by 350 since 1998.

Research and development



After a decline in R&D between 1999 and 2002 there has been a steady increase in Chemical industry spend.

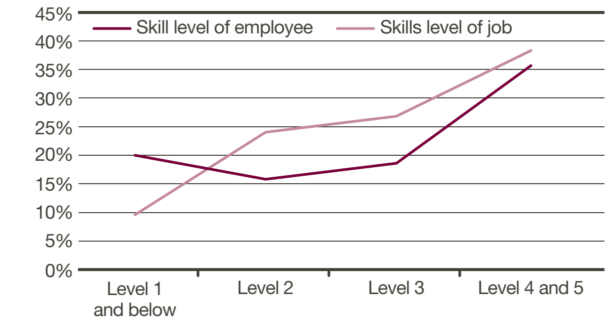
R&D in the Chemicals industry is predominantly (83%) funded by the industry itself rather than the UK government.

Total Expenditure	UK Government	Overseas	Own Funds	Other UK Businesses
675	4	28	558	85

£ Million

Source: R&D in UK Businesses 2006, ONS, January 2008

The skills gap in the chemical industry

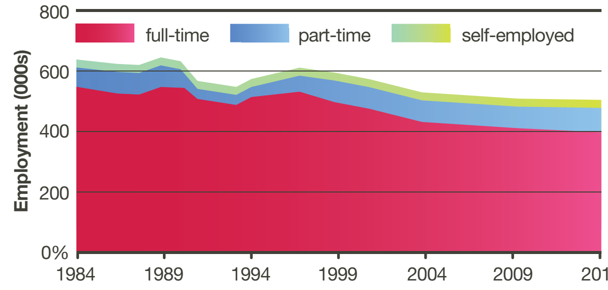


Source: Labour Force Survey (Q1-Q4 2007)

For direct employment in the Chemicals industry

- There is an under supply of people qualified to S/NVQ level 2 and 3 compared to the proportion of jobs at those levels
- There is a 16% deficit of people qualified at S/NVQ levels 2 and 3
- Level 2 and 3 occupations such as process operators, technicians, skilled trades and business administration account for 53% of the overall workforce.

The future of the industry



Source: Working Futures 2004-2014

The industry will need fewer, but more highly skilled and technology literate, employees who will be expected to operate more flexibly and have cross-cutting and change-management skills.

Technology will be the main driver for upskilling the workforce and filling skills gaps.

Competency standards, which individuals must achieve before they are allowed to operate, are likely to extend into the Chemicals industry.

Priorities

The UK Chemicals industry remains resilient in the face of high energy and raw materials costs and international competition. Through a number of reorganisations, mergers and acquisitions, the industry has achieved a high level of performance in lean manufacturing and process efficiencies.

The industry invests significantly in training and upskilling of its workforce. However, the workforce is getting older and there is a vital need to increase the supply of young people with the right skills and aptitude for the industry. Shortages of technical and engineering skills such as technicians, fitters, operators, and so on, remain a Europe-wide problem. These shortages are intensified by competition for skilled labour by the offshore oil and gas, and increasingly, the nuclear, sectors.

These factors suggest a remaining major need to achieve a cultural step-change in appetite for innovative thinking at all levels from shop floor to senior management. There are opportunities for radical redesign in processes and products. Successful initiatives such as the Chemistry Innovation Knowledge Transfer Network and National Skills Academy for the Process Industries are crucial for the continued prosperity of the Chemicals Industry.

Section Three/Petroleum

The Petroleum Industry (also referred to as the downstream sector) includes:

—Stabilising, refining and manufacturing
—Storage, blending and distribution
—Retail sale of automotive fuel

The main products of the downstream sector are transport fuels (aviation fuel, diesel and unleaded petrol), for which the market in the UK amounts to about 50million tonnes per year. The commercial market includes industrial transport (cars, trucks, buses, and trains), marine (marine diesel for ships) and agriculture (tractors etc), as well as public services and military vehicles. The industry is creating new "greener" fuels such as biodiesel and bioethanol, made from renewable sources including vegetables and wheat, to reduce harm to the environment. The UK Petroleum Industry Association (UKPIA) has said that over coming years, vehicles will become cleaner and less polluting. Hybrid vehicles are likely to become more common, particularly in urban areas. (A hybrid car is a vehicle which operates using a mix of petrol and electric power and causes less pollution).

Trends

Refined petroleum products and coke oven products

Year*	Total Turnover	Approximate gross value added at basic prices
1998	£21,652 million	£1,387 million
2006	£27,550 million	£1,873 million

*data not available,.. disclosive data
Source: Annual Business Inquiry 2006

Petroleum Retail

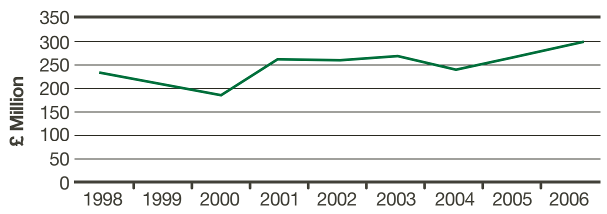
Year*	Total Turnover	Approximate gross value added at basic prices	Total employment average
1998	£14,884 million	£1,240 million	73,000
2006	£19,589 million	£2,001 million	60,000

Source: Annual Business Inquiry 2006

Turnover in the Petroleum industry has increased since 2008 along with gross value added.

Turnover overall in the Petroleum Retail industry has increased since 1995, but employment has decreased.

Research and development



Source: R&D in UK Businesses 2006, ONS, January 2008

There has been an overall increase in R&D spend since 1998.

Total Expenditure	UK Government	Overseas	Own Funds	Other UK Businesses
298	..	..	129	..

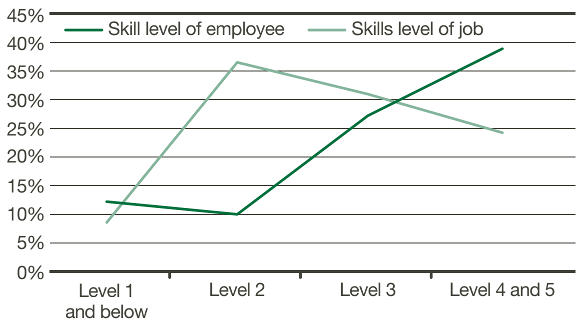
£ Million

.. denotes disclosive figure
Figures include Nuclear Fuel Processing due to SIC.
Source: R&D in UK Businesses 2006, ONS, January 2008

43% of R&D in the Petroleum industry is funded by the industry itself.

1,000 employees are employed in R&D activity in the Petroleum industry.

The skills gap in the petroleum market

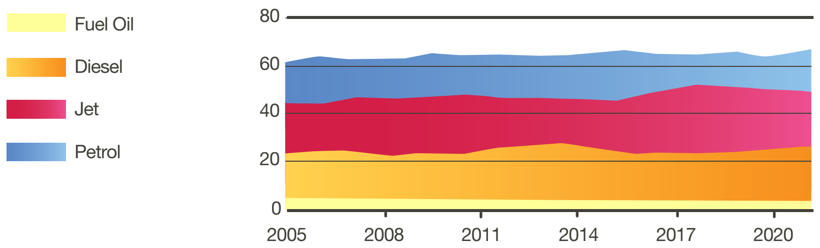


Source: Labour Force Survey (Q1-Q4 2007)

For direct employment in the Petroleum industry:

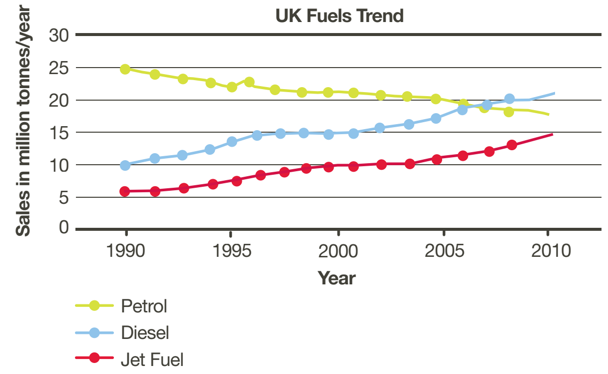
—There is an under supply of people qualified to S/NVQ level 2 and 3 compared to the proportion of jobs at those levels
—There is a 27% deficit of people qualified at S/NVQ levels 2 and 3
—Level 4 and 5 occupations such as senior mangers, scientists and chemical engineers account for 61% of the overall workforce.

The Industry 2020



Note: Based on assumption of retirement aged 65 and does not take account of attrition from the industry

The future direction of the industry remains stable with a declining need for petrol but a rising demand for diesel.



Source: Annual Business Inquiry 2006

Department for Business, Enterprise and Regulatory Reform statistics indicate a growing demand for diesel and jet fuel.

Priorities

The future direction of the petroleum industry appears stable, with a declining need for petrol but a rising demand for diesel. Maintaining this stability, however, will require investment in UK refineries to meet the changing product demand and crude oil supply, and avoid reliance on imports.

Over many years, the refining sector has sought to minimise its impact upon the environment and improvements continue to be made to reduce emissions. Cogent works with the refineries and the regulators to ensure that the correct skills mix is achieved in maintaining the best environmental standards.

Regarding renewable fuels, a major change in the UK during 2008 has been the introduction of the Renewables Transport Fuels Obligation. The industry has been working for some time now to achieve targets and timetables of 2.5% by volume bio fuels content in 2008/9, 3.75% in 2009/10 and 5% onwards.

Cogent has considered the skills impact with regard to the manufacture of bio fuels and has concluded that no new skills are required for such manufacture – but more likely an extension of existing skills will suffice.

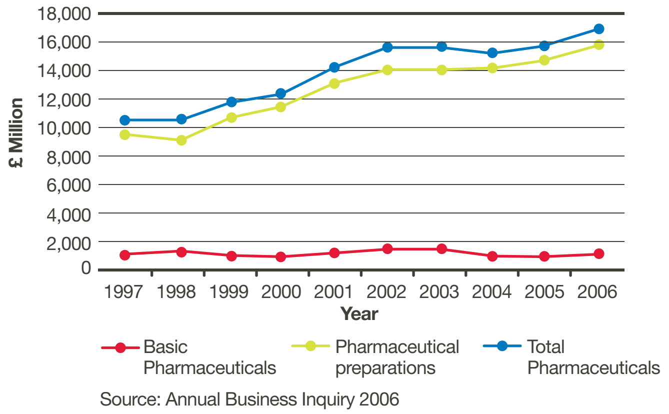
Process safety continues to be of the highest priority for the downstream petroleum sector, given the response to high-profile accidents such as that at Buncefield, and further regulations are likely to emerge from continuing reviews of safe working practices.

Section Three/Pharmaceutical

The industry produces a range of products, from antibiotics to the contraceptive pill, and continues to pioneer new treatments for many serious and life-threatening diseases. In short, this is an industry that enhances and, in some cases prolongs, many lives all around the world. The pharmaceuticals industry is also responsible for the safety and effectiveness of the products it manufactures. In 2005, pharmaceutical companies in the UK spent £3.3billion on pharmaceutical research and development –an investment of around £9million every day. Indeed, around a quarter of all UK industry-supported research and development comes from the pharmaceutical industry. It is also an industry that needs highly skilled people, as it is through their employees' skills and talents that they are able to be innovative and compete internationally.

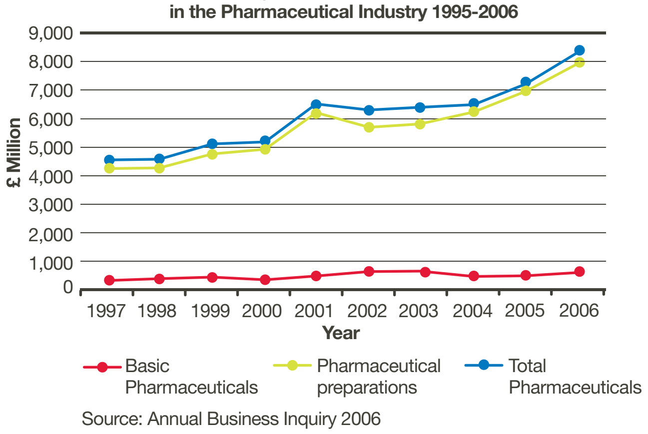
Trends

Total Turnover in the Pharmaceuticals Industry 1995-2006



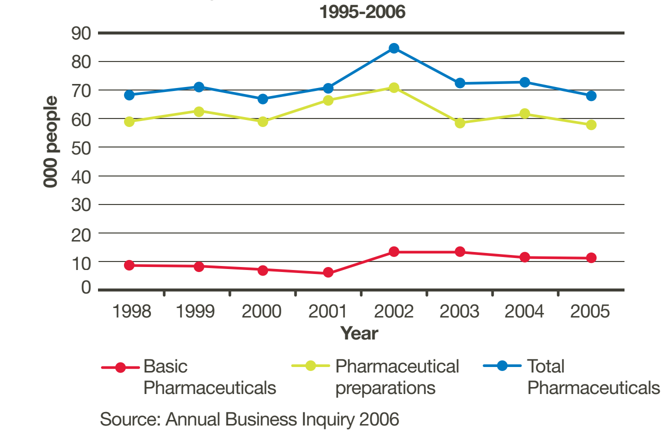
Source: Annual Business Inquiry 2006

Approximate gross value added at basic prices in the Pharmaceutical Industry 1995-2006



Source: Annual Business Inquiry 2006

Total average employment in the Pharmaceuticals Industry 1995-2006



Source: Annual Business Inquiry 2006

Total turnover in the Pharmaceuticals industry has increased by £6.4 billion since 1998.

Gross Value Added in the industry has significantly increased.

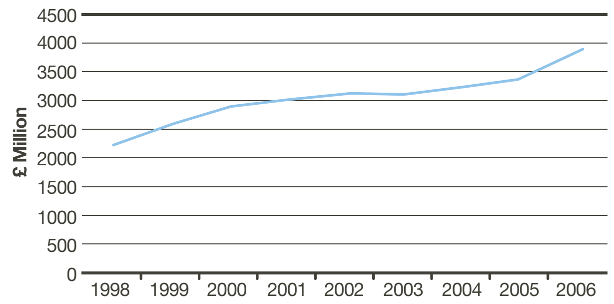
Total employment in the Pharmaceuticals industry has remained stable since 1998.

Research and development

Total Expenditure	UK Government	Overseas	Own Funds	Other UK Businesses
3,949	4	1,533	2,093	319

£ Million

Source: R&D in UK Businesses 2006, ONS, January 2008

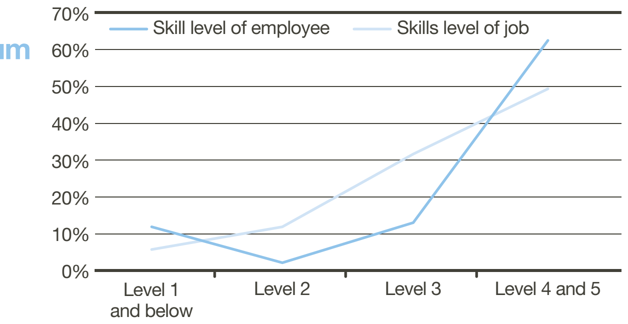


There has been a consistent increase in R&D spend since 1998.

R&D in the Pharmaceuticals industry is predominantly (53%) funded by the industry itself.

28,000 employees are employed in R&D activity in the Pharmaceutical industry.

The skills gap in the petroleum market



Source: Labour Force Survey (Q1-Q4 2007)

For direct employment in the Pharmaceuticals industry:

- —There is an under supply of people qualified to S/NVQ level 2 and 3 compared to the proportion of jobs at those levels
- —There is a 27% deficit of people qualified at S/NVQ levels 2 and 3
- —Level 4 and 5 occupations such as senior mangers, scientists and chemical engineers account for 61% of the overall workforce

The Industry 2020

Research by the Association of the British Pharmaceutical Industry, on over 100 UK Pharmaceutical companies, has revealed:

- —More than a third of companies (35%) were expecting to reduce the level of investment in research and development over the next 12 months, currently standing at nearly £4 billion a year.
- —Investment in asserts such as buildings and equipment, etc is expected to decline by a similar amount (36%)
- —46% of companies are expected to reduce the number of UK clinical trials
- —The level of manufacturing is forecast to drop by 42% of those surveyed
- —And almost all the companies surveyed - 97% - said there is now an increasing level of uncertainty within the UK pharmaceutical market environment.

Priorities

The success of the industry in Britain, and the ability to retain world-class pharmaceutical company investment, are critically dependent on the willingness of the Government to support an environment in which the industry can conduct its research, manufacturing and marketing activities as effectively as in all the other countries that are competing for investment. Recently, the Government has addressed a very broad range of issues relating to clinical research, licensing, intellectual property rights, the science base and the domestic market framework.

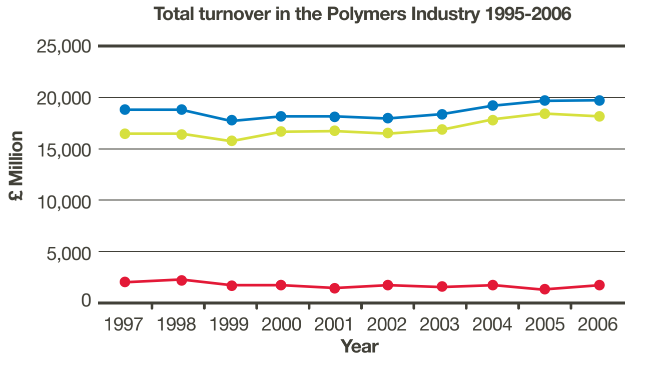
Priorities continue to remain around the training and recruitment of people at very high skill levels to maintain competitive research and production facilities.

The stock of skilled people in this industry is a positive asset for the UK, and the priority for Cogent's sector should be to ensure that this remains the case into the future.

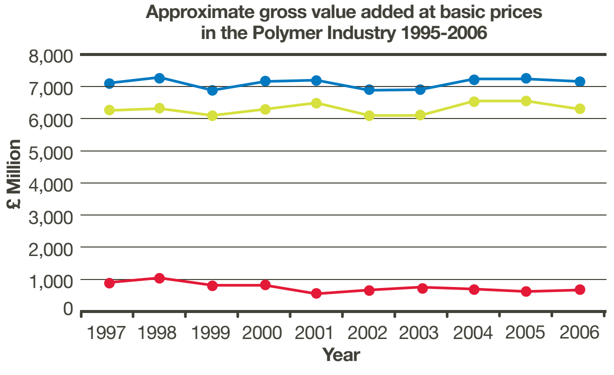
The Polymer industry comprises four discrete processing areas: Plastics processing, Rubber processing, Polymer Composites processing and Signmaking. Over 7,500 companies operate within the sector employing some 286,000 employees. This figure rises to approximately 400,000 employees when secondary operations are taken into consideration. The industry is extremely dynamic, being subject to many changes and opportunities arising from technological change, development of new materials and processing technology; not least, the development of new products and changes in response to consumer requirements.

These industries require innovators, technologists, designers and highly-skilled processing technicians to remain at the forefront of developments and changes in the world demand for more versatile, lightweight, low-cost and energy-saving products and applications.

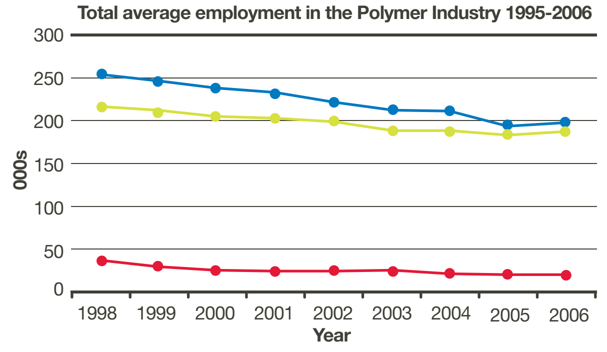
Trends



Source: Annual Business Inquiry 2006



Source: Annual Business Inquiry 2006



Source: Annual Business Inquiry 2006

Total turnover in the Polymers industry has remained stable since 1998.

Gross Value Added in the industry has also remained stable.

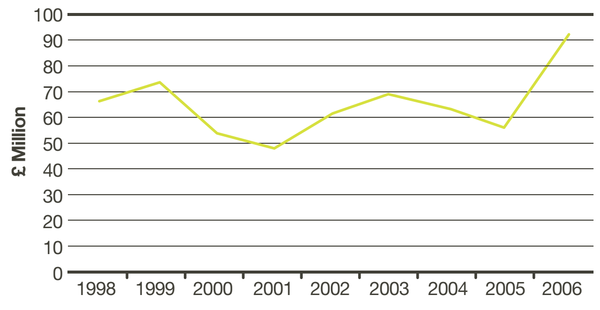
Total employment in the Polymers industry has decreased since 1998.

Research and development

Total Expenditure	UK Government	Overseas	Own Funds	Other UK Businesses
90	1	31	58	1

£ Million

Source: R&D in UK Businesses 2006, ONS, January 2008

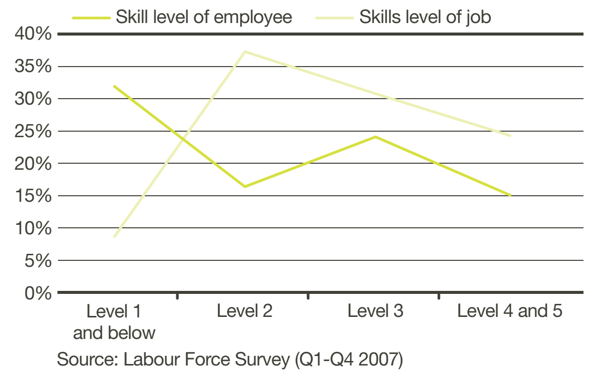


R&D in the Polymers industry is predominantly funded by the industry itself, 64%

1,000 employees are employed in R&D activity in the Polymer industry

There has been an overall increase in R&D in the Polymer industry since 1998.

The skills gap in the polymer market



Source: Labour Force Survey (Q1-Q4 2007)

For direct employment in the Polymer industry:

- There is an under supply of people qualified to S/NVQ level 2 and 3 compared to the proportion of jobs at those levels
- There is a 28% deficit of people qualified at S/NVQ levels 2 and 3

The Industry 2020

The polymer industry companies that prosper in the future will be lean and efficient in both manufacturing and administration, innovative with both design and materials and will ally themselves to winning markets, customers and products. Also in the UK market, locally produced products will be small quantity and higher quality with high volume to price ratio.

Priorities

As with other Cogent industries, there remain skills gaps at higher level, and the polymer industry also requires people with good knowledge of competitive business techniques. Other particular priorities include:

Green Issues – Plastic bag taxes are proposed, recycling has some way to go to happen in a constructive and coherent manner, and in the meantime, waste continues to be dumped into landfill. These issues suggest opportunities in new areas of business, with associated needs for new high-level skills.

The cost of crude oil has a direct effect on the cost of all polymers and as such will cause an increase in plastic product prices affecting all other streams, from vegetable and fruit packaging to medical supplies and white goods.

Pressures from eastern economies, particularly China and India, which are often seen as an obstacle for the industry, but this may be overstated as they also have the same cost pressures as the UK and much the same skills shortages. The main difference, however, is that these countries are investing more in automation and new technologies than is the UK, with major implications for skills investment.

Working together on Workforce Development

Professor Cliff Hardcastle, Deputy Vice Chancellor (Research and Enterprise),
Laura Woods, Director of Academic Enterprise,
University of Teesside

How important are Sector Skills Councils to the delivery of higher level skills?

The University of Teesside is extremely keen to engage with the Sector Skills Councils and benefit from their industry expertise and relationships. We are wholeheartedly committed to the workforce development agenda and have one of the best track records in the sector for working innovatively alongside employers to create a highly-trained workforce. However, we realise that building an understanding of industry needs isn't simple. This is where Cogent has some key roles to play: in helping to define skills needs and in providing the all-important facilitation between academia and business.

We are delighted that the National Skills Academy for the Process Industries is up and running. It's playing a critical intermediary role here in the North East, where the Process Industries are a vibrant sector, representing the largest chemicals complex in the UK in terms of manufacturing capacity. It depends on a highly skilled workforce – so it's critical that we understand exactly what those skills needs are and how to respond to them.

What does the Higher Education Funding Council for England (HEFCE) need to do in support of this agenda?

HEFCE is already playing a proactive role, and is encouraging Higher Education Institutions to bid into its Strategic Development Fund to develop employer engagement capacity. Teesside was one of the first to win such funds – an award of £5.1m which will lever in over £13m over the next three years.

The HEFCE funding will also help us to develop courses that are co-funded with employers. It is linked to some stretching learner number targets, equating to 855 full-time equivalent students over the next three years, and of course a significant number of those are in the process industries. This is an exciting development and reflects the increased demand for skilled people in the sector.

HEFCE has made it clear that employer engagement is not just for those universities known for their business orientation – but for the whole higher education sector. The projects they are funding demonstrate a real step-change in employer engagement, which must be part of the core business of higher education.

How much does the higher education system need to change?

Historically there has been a supply-driven approach to education, but we're seeing a sea change in higher education in recent years. At Teesside, we're certainly listening to employers and seeking to respond to their needs. Many employers are coming to the table for the first time and haven't truly experienced this kind of dialogue before. It's important that we're able to develop good relationships with them so that they can make clear their needs.

Here at the University, we're going through nothing less than institutional and cultural change in order to sharpen our response to employer demand. From course development to marketing and communications – everything we do is part of this change process.

What does Industry need to do?

Business clearly has obligations too. We need to see a move away from the idea that it is purely the Government's responsibility to fund higher education and deliver the workplace skills that are needed now and in the future. The far-sighted businesses are already doing this. They don't stop at short courses but go much further, funding learning over time and growing the talent they need to compete.

There are some parallels with what happened in generations past when much of the vocational learning took place in the workplace. People became articled and gained professional status whilst in employment.

How big is the task we face on skills?

People often talk of a skills crisis, although we believe we're not there yet. However, we need to act fast – turning the vision into a reality. It's an exciting time for universities – bringing academic knowledge and business needs together to create applied knowledge, new skills and business solutions.

The aim is to be able to make a comprehensive "offer" to industry that tackles skills gaps and shortages. It's a two-way street: universities need to become easier to talk to, and more responsive, and employers need to recognise the need for higher skills and contribute to the costs. This kind of engagement is not just another new "initiative", but a new way of working and thinking about how we engage with business right across society.

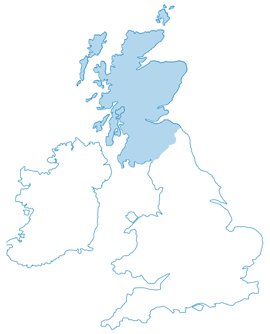
Everybody has a role to play in this agenda: Government, educators, industry and of course the learners themselves. We're entering a new phase and we look forward to working with Cogent and the Academy in delivering what industry truly needs.

Section Four/ Regions and Nations Factsheets

Cogent has a UK-wide focus, taking account of the distinctive political structures, economic development and unique education and training systems in the devolved administrations.

Cogent, and its sector's employers, are committed to playing their part in the delivery of the skills strategies for Scotland, England, Northern Ireland and Wales. In each case, they are ensuring that the skills needs of the sector are taken into account.

Section Four/Scotland



The Cogent industries are widely spread across Scotland, with clusters in the central belt (polymer and chemicals manufacture) and in Aberdeenshire (the oil and gas extraction industry), as well as around the Ineos Refinery at Grangemouth with its associated storage and distribution network. Extending from this the Petrochemical and Polymer industries stretch across Stirlingshire up to Fife and across into Strathclyde and Ayrshire. North Ayrshire and Falkirk chemical and pharmaceutical cluster employers include several well known companies such as Glaxo SmithKline, Ciba Geigy, Roche, Syngenta, Avecia and McFarlan Smith. The nuclear industry has presences in the far North at Dounreay which is being decommissioned; in Ayrshire, East Lothian and Dumfriesshire where there are nuclear power stations and the Ministry of Defence base at Faslane. In the Highlands and Islands, key oil and gas employer clusters are in Orkney and Shetland for oil storage and processing, and in the Cromarty Firth as the premier port for oil rig inspection, repair and maintenance plus the leading service base for the sub-sea industry.

Economic indicators

	Cogent Scotland	Cogent UK
Turnover	£28bn	£156bn
Cogent GVA	£18bn	£49bn
Cogent GVA per employee	£407,159	£98,394
Number of employees	50,400	500,00
Mean weekly pay**	£577.88	£381.50

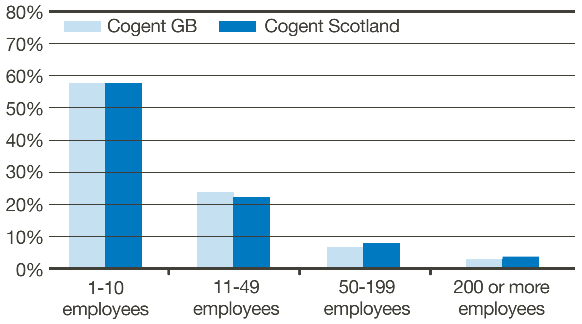
Source: Annual Business Inquiry 2005
*UK GVA average per employee £31, 419
*Industry estimate of total Cogent employment 906,000
**Annual Survey of Hours and Earnings 2007

18% of turnover in the Cogent sector is generated in Scotland.

Scotland contributes 37% or the sector Gross Value Added.

The region employs 10% of the Cogent workforce.

Business size

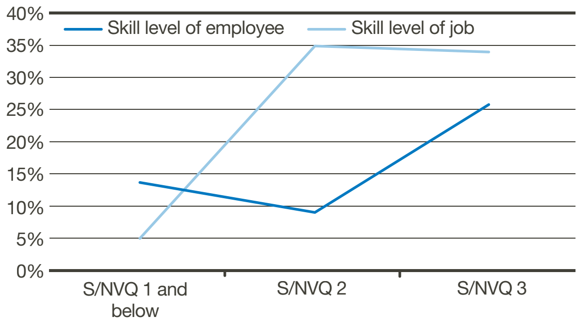


Source: Annual Business Inquiry 2006

The Cogent sector in Scotland has a slightly higher proportion of and large companies (3%).

67% of companies in the region employ one to ten staff.

The skills gap



Source: Labour Force Survey 2007

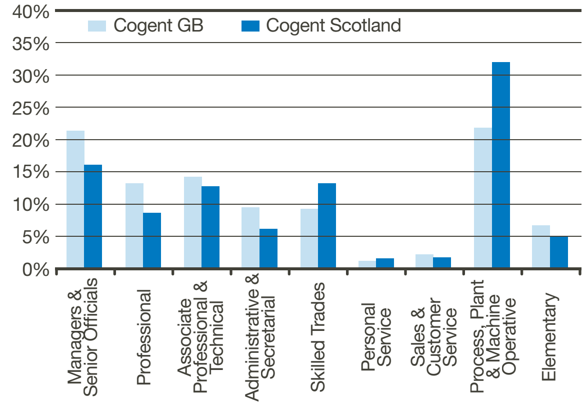
Key skills issues for the Cogent industries in Scotland:

26% deficit of the workforce qualified to Level 2

8% deficit of the workforce qualified to Level 3

Technicians and Operators are key roles in the region and these roles exist at levels 2 and 3.

Occupational profile

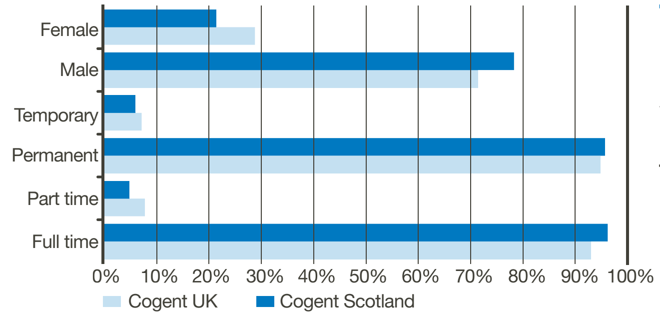


Source: Labour Force Survey 2007

Scotland has a larger proportion of Process Operators and Skilled Trades occupations than the UK Cogent sector.

33% of the Cogent workforce in Scotland is employed in Process Operator roles.

Workforce distribution



Source: Labour Force Survey 2007

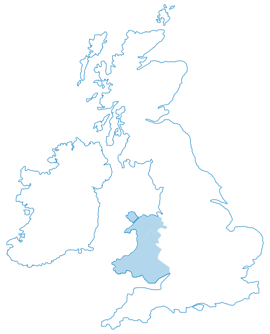
The sector in the region employs a larger proportion of males than the Cogent sector in the UK. 79% of workers are male.

The region employs more part time and temporary workers than the Cogent sector in the UK.

Cogent actions in Scotland

—A significant piece of work underway is the review of Modern Apprenticeships in Scotland with employers.
—Cogent is working with Skills Development Scotland to develop the Scottish elements of the Career Pathways tool.
—We are working with the Scottish Executive to develop an environmental science skills competition, to promote science and the issues around energy development in schools.
—For the Chemical industry, Cogent is working closely with Chemical Sciences Scotland to deliver a strategic plan for the sector in Scotland using our labour market intelligence.

Section Four/Wales



Each of the sector's industries is active in Wales, although the presence of Nuclear and Oil and Gas industries is small. In South West Wales, the Milford Haven and Pembrokeshire refineries, owned by Chevron and Total, support a supply chain of chemical and polymer employers across the South of the country. There are also two nuclear facilities in Wales. In Gwynedd, Trawsfynydd Power Station is a decommissioned reactor where the decommissioning programme is advanced; the next three years will see a concentration on the retrieval and storage of intermediate level waste. On Anglesey, Wylfa Power Station continues to operate and will continue to generate til 2010 when it will permanently shut down.

The employee numbers in Wales account for 6% of chemicals, 4% of pharmaceuticals, 6% of polymers and 9% of petroleum industries in the UK. There are numerous Polymer and Chemicals companies situated around Cardiff, Newport and Swansea to the South and Wrexham in the North. The North Wales industries border with the concentration of Chemicals companies in the North West of England.

Economic indicators

	Cogent Wales	Cogent UK
Turnover	£3.4bn	£156bn
Cogent GVA	£1.0bn	£49bn
Cogent GVA per employee	£38,888	£98,394
Number of employees	26,700	500,00
Mean weekly pay**	£440.00	£381.50

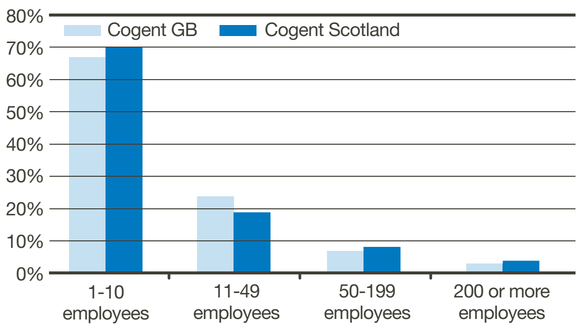
Source: Annual Business Inquiry 2005
*UK GVA average per employee £31,419
*Industry estimate of total Cogent employment 906,000
**Annual Survey of Hours and Earnings 2007

2% of turnover in the Cogent sector is generated in Wales.

Wales contributes 2% of the sector Gross Value Added.

The region employs 5% of the Cogent workforce.

Business size

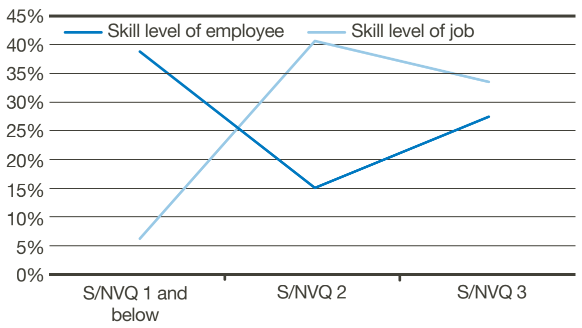


Source: Annual Business Inquiry 2006

The Cogent sector in Wales has a higher proportion of micro, medium and large companies than the Cogent sector in the UK.

70% of companies in the region employ one to ten staff.

The skills gap



Source: Labour Force Survey 2007

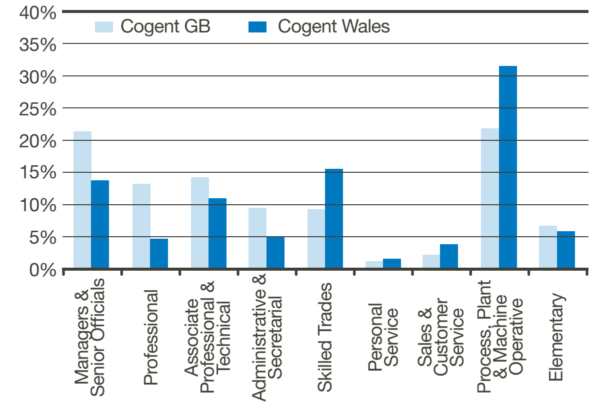
Key skills issues for the Cogent industries in Wales:

25% deficit of the workforce qualified to Level 2

5% deficit of the workforce qualified to Level 3

Wales is experiencing significant skills gaps at level 2 and has a potential pool of workers at level 1 to fill this gap.

Occupational profile

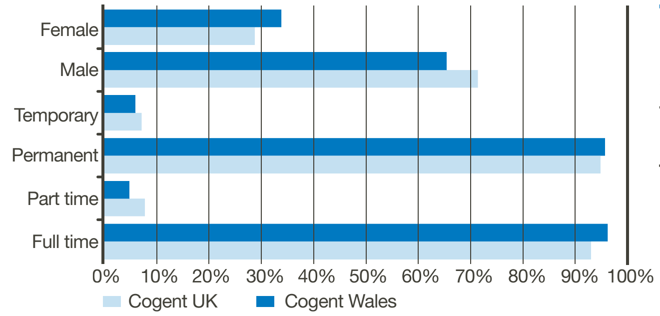


Source: Labour Force Survey 2007

Wales has a larger proportion of employees in Process Operator and Skilled Trade occupations than the UK Cogent sector.

37% of the Cogent workforce in the region is employed in Process Operator roles.

Workforce distribution



Source: Labour Force Survey 2007

The sector in the region employs a larger proportion of females than the Cogent sector in the UK. 34% of workers are female.

The region also employs more full time and permanent workers than the Cogent sector in the UK.

Regional actions

Cogent has recently contributed to official economic policy in Wales through our submission of comments to the Welsh Assembly Government's economic assessment, and to the Welsh Affairs MPs' committee on cross-border issues.

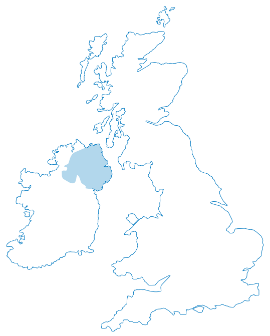
We are developing employer cluster groups specifically concentrating on Wales, to support the National Skills Academies for Nuclear and for the Process Industries.

Working through the Welsh Human Resource Development Advisors network, we are providing assistance to employers in skills needs assessments and funding opportunities.

As a key action to improve sector-specific advice to students, we are collaborating with CareersWales West in developing engineering careers advice and events.

Currently in the development stage is a manufacturing alliance "Sector Step-up" project, which will provide £1.5m over three years for workforce upskilling.

Section Four/Northern Ireland



The distribution of employers in Northern Ireland is heavily loaded to Belfast and areas with quick access to it, to make use of the transport and freight infrastructure. In the Polymer industry, 53% of the employers are located in the Co Armagh and Co Antrim areas, with a further 23% in Co Down. This reflects not only the areas of population, but the transport infrastructure to deliver their goods to the UK and European Markets. Petroleum products are spread over Northern Ireland in line with the population statistics. However, many local distributors are increasingly joining a larger organisation through acquisition or alliance, especially in fuel distribution where they can benefit from an economy of scale. Chemical and Pharmaceutical industries are, again, located close to the main transportation links within and leaving NI with 87% of employers located in Co Down, Co Antrim and Co Armagh. However the two main pharmaceutical employers in the province are located in Newry and Portadown.

Economic indicators

	Cogent NI	Cogent UK
Turnover	£1.3bn	£156bn
Cogent GVA	£0.6bn	£49bn
Cogent GVA per employee	£37,695	£98,394
Number of employees	15,000	500,00
Mean weekly pay**	£459.00	£381.50

Source: Annual Business Inquiry 2005
*UK GVA average per employee £31,419
*Industry estimate of total Cogent employment 906,000
**Annual Survey of Hours and Earnings 2007

Turnover in Northern Ireland has increased by £187 million since 1998.

Gross value added has increased in the country by £77million since 1998.

Cogent average mean weekly salary in Northern Ireland is £77.50 more than the UK.

Industry breakdown

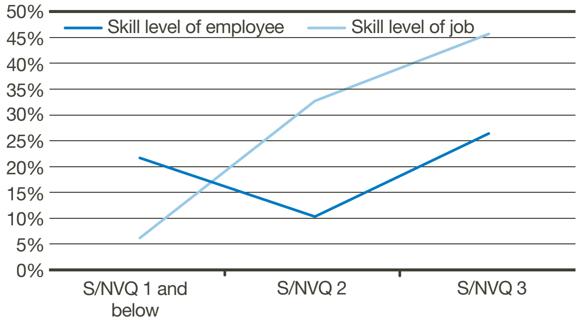
Industry	Total Employment
Chemical	1,561
Pharmaceutical	1,541
Polymer	7,258
Petroleum	4,602
TOTAL	14,962

Source: Census of Employment 2005
* Only includes Retail Sale of Automotive Fuel

49% of employment in the Cogent sector in NI is within the Polymers industry and the 31% of the sector employment is based in retail sale of automotive fuel.

Chemical and Pharmaceutical industries each account for 10% of the sector workforce.

The skills gap



Source: Labour Force Survey 2007

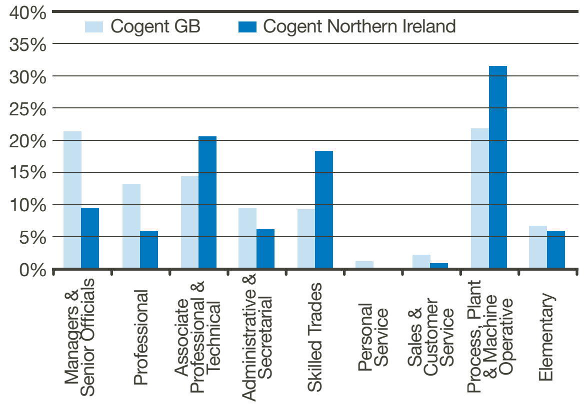
Key skills issues for the Cogent industries in Northern Ireland:

23% deficit of the workforce qualified to Level 2

19% deficit of the workforce qualified to Level 3

Technicians and Operators are key roles in the region and these roles exist at levels 2 and 3.

Occupational profile

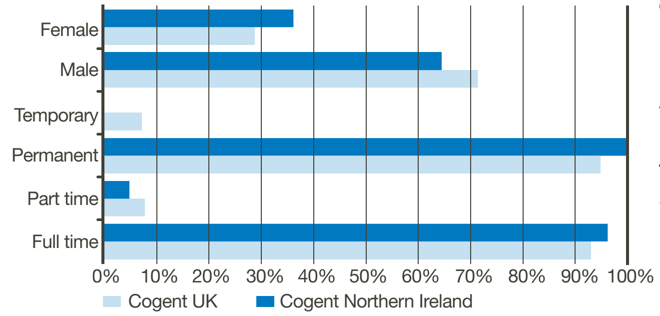


Source: Labour Force Survey 2007

Northern Ireland has a larger proportion of Associate Professional and Technical, Skilled Trades and Process Operators occupations than the UK Cogent sector.

32% of the Cogent workforce in Northern Ireland is employed in Process Operator roles.

Workforce distribution



Source: Labour Force Survey 2007

The sector in the region employs a larger proportion of females than the Cogent sector in the UK. 36% of workers are female.

The region employs fewer part time workers than the Cogent sector in the UK.

Regional actions

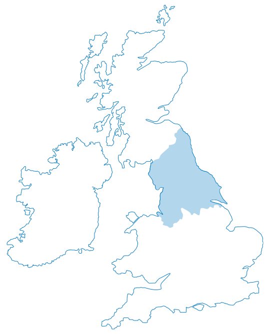
Cogent has developed a new Polymer Apprenticeship, in association with the Northern Ireland Polymers Association.

We have recently completed the sector elements of our Northern Ireland Sector Skills Agreement and we are close to completing the action plans with public partners.

In conjunction with our partner organisations, we are developing cross-sectoral management and leadership courses to bring managers from different sectors together.

A key current development is to pull together a petroleum distributors forum in Northern Ireland to explore a common qualifications structure.

Section Four/Northern England



North East: Northumberland, County Durham and Tyne and Wear have a concentration of pharmaceuticals and specialty chemicals companies, and there is a focus on petrochemical and oil and gas industries around the Tees Valley area. The petrochemical cluster at Wilton, Billingham and Seal Sands is the largest integrated chemicals complex in the UK in terms of manufacturing capacity. The region has a strong company base in sub-sectors such as power generation, oil and gas, nuclear and, more recently, renewables and low carbon technologies. The development of bio-fuels and bio-refining is becoming increasingly focused in the area.

Northwest: Sellafield, Springfields, Capenhurst, Windscale and Calder Hall nuclear facilities are all located in the North West as well as the headquarters of the Nuclear Decommissioning Authority and many supply chain companies. The Shell Stanlow Petrochemical complex is situated in the Wirral with an associated storage and distribution network. The chemical, pharmaceutical and polymer industries are spread across the North West. Hydrocarbons (oil, natural gas and petroleum) are produced in areas of the Irish Sea, including Morecambe and Liverpool Bays.

Yorkshire and Humber: Cogent sector employment within the region is dominated by the Chemicals and Polymer industries. The Chemical and Polymer industries are clustered in the Humberside area with a further cluster in North Yorkshire. Two oil refineries and a number of distribution terminals are also based in the region, importing and processing approximately 20 million tones of crude oil. Yorkshire and Humber also imports up to 20% of UK gas and therefore hosts some offshore workers. The region has suffered a fall in employment, most notably in chemicals where employment has fallen by around 20% between 2000 and 2004. There is also considerable cross-fertilisation between clusters, for instance most firms in bioscience are rooted in the agri-food, environmental and especially healthcare sectors.

Economic indicators

	Cogent North	Cogent UK
Turnover	£18.85bn	£156bn
Cogent GVA	£5.3bn	£49bn
Cogent GVA per employee	£68,463	£98,394
Number of employees	77,600	500,00
Mean weekly pay**	£459.00	£381.50

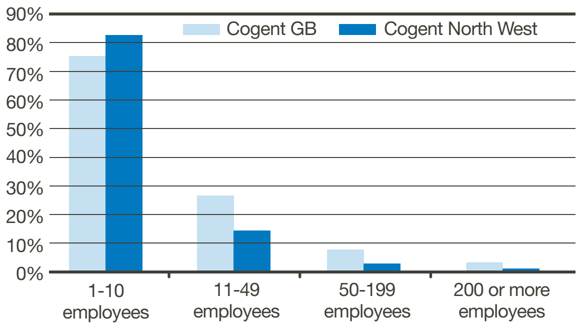
Source: Annual Business Inquiry 2005
*UK GVA average per employee £31,419
*Industry estimate of total Cogent employment 906,000
**Annual Survey of Hours and Earnings 2007

12% of turnover in the Cogent sector is generated in the Northern region.

The Northern region contributes 11% of the sector GVA.

The region employs 16% of the Cogent workforce.

Business size



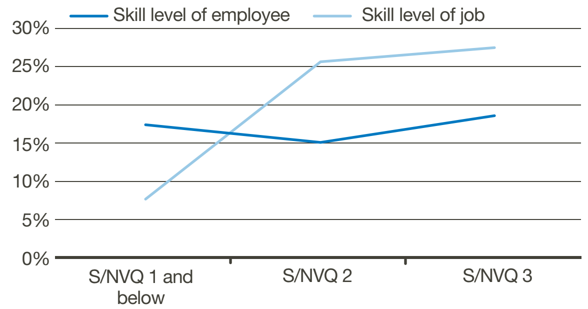
Source: Annual Business Inquiry 2006

The Cogent sector in the North region has a lower proportion of micro companies (64%) than the Cogent sector in the UK.

3% of companies in the region employ 200 or more staff.

45%

The skills gap



Source: Labour Force Survey 2007

Key skills issues for the Cogent industries in the North of England:

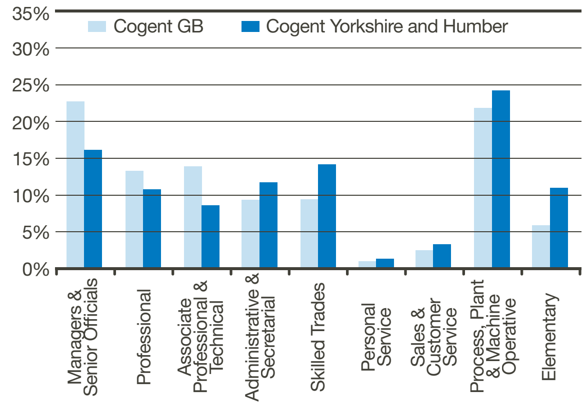
12% surplus of the workforce qualified to Level 1 and below

12% deficit of the workforce qualified to Level 2

9% deficit of the workforce qualified to Level 3

Technicians and operators are key roles in the region and these roles exist at levels 2 and 3.

Occupational profile

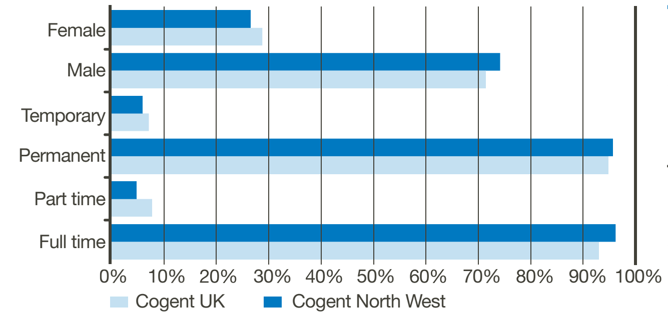


Source: Labour Force Survey 2007

The Northern region has a larger proportion of Managers and Process Operator occupations than the UK Cogent sector.

24% of the Cogent workforce in the region is employed in Process Operator roles.

Workforce distribution



Source: Labour Force Survey 2007

The sector in the region employs a larger proportion of males than the Cogent sector in the UK. 78% of workers are male.

The region also employs more full time and permanent staff than the Cogent sector in the UK.

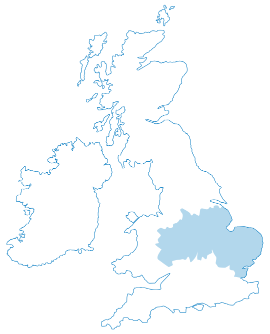
Regional actions

Cogent has provided information and training for brokers delivering Train to Gain and Business Link services in the North. The systems vary across the three regions, but we are ensuring that the services employers receive are more geared towards their sector-specific needs. We are, for example, a key source of research data for the Chemicals and Pharmaceutical specialist broker in the North East.

We have established stakeholder groups in each region to ensure joined-up services for the sector. Wider membership of these groups varies across the regions depending on the needs of each region (for example, the Nuclear industry is less well represented in Yorkshire and the Humber).

A major North East chemicals employer, SABIC, has recently agreed to pilot Cogent's products such as the Gold Standard and National Occupational Standards with its workforce, and will continue to be supported by the National Skills Academy for Process Industries.

Section Four/Central England



West Midlands: The Cogent sector in the West Midlands has a heavy concentration of polymer processing companies with a significant cluster of chemical businesses. Polymer employers are spread across the region but as a result of significant inward investment in the past 20 years, Telford in Shropshire has been dubbed "plastics valley" with well over 50 companies based there. Polymer businesses supply a large number of end user industries to include automotive components and food packaging products and are an important part of region's manufacturing sector.

East Midlands: There is a concentration of Cogent industries in the East Midlands which is dominated by the Polymer industry. Recent studies have confirmed continued growth in the Polymers sector. The Cogent sector is a primary element of the supply chain for key regional sectors including high technology engineering and food and drink. The region has a concentration of plastics and rubber processing including packaging and extrusion molding companies. The region also has a significant concentration of chemical and pharmaceutical companies.

East of England: There are clusters of pharmaceuticals and bioscience companies in the Cambridgeshire area and a significant number of polymer companies across the region including composites. The East is a significant centre for the offshore oil and gas industry with approximately 2,100 jobs directly dependent and 10,000 jobs indirectly dependent upon the industry. Activity is focused around Norfolk – a major landfall site for North Sea Gas production. Lowestoft and Great Yarmouth provide the onshore support base for the Southern North Sea gas fields. There is a refinery and petrochemical facility in the region with numerous marketing operations. The nuclear industry employs people in Sizewell Power Station and Bradwell. Cogent also plays a strategic role in the East of England Manufacturing Alliance working with other Sector Skills Councils.

Economic indicators

	Cogent Central	Cogent UK
Turnover	£18.7bn	£156bn
Cogent GVA	£6.4bn	£49bn
Cogent GVA per employee	£56,507	£98,394
Number of employees	113,800	500,00
Mean weekly pay**	£463.00	£381.50

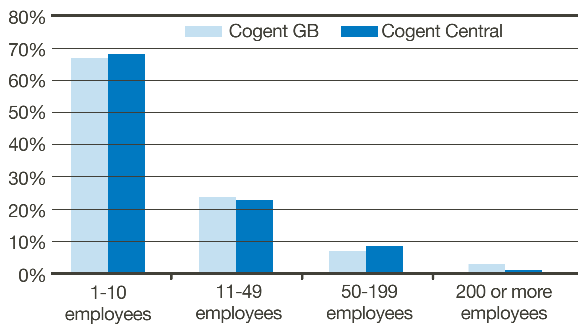
Source: Annual Business Inquiry 2005
*UK GVA average per employee £31,419
*Industry estimate of total Cogent employment 906,000
**Annual Survey of Hours and Earnings 2007

12% of turnover in the Cogent sector is generated in the Central region.

The Central region contributes 13% of the sector GVA.

The region employs 23% of the Cogent workforce.

Business size

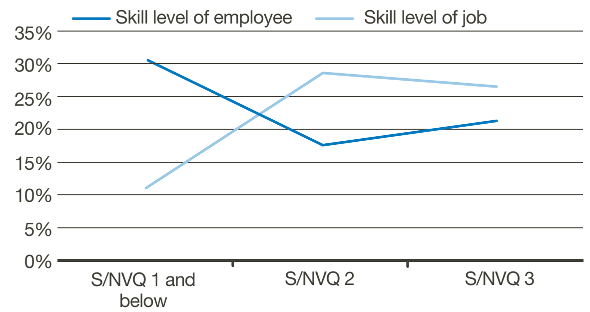


Source: Annual Business Inquiry 2006

The Cogent sector in the Central region has a higher proportion of micro companies (68%) than the Cogent sector in the UK.

Only 1% of companies in the region employ 200 or more staff.

The skills gap



Source: Labour Force Survey 2007

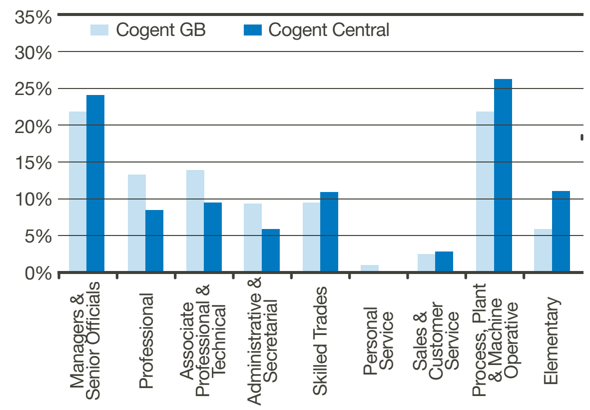
Key skills issues for the Cogent industries in Central England:

There is a 11% deficit of the workforce in the Central region qualified to Level 2

There is a 2% deficit of the workforce qualified to Level 3 compared to the percentage of jobs at the same level.

Technicians and operators are key roles in the region and these roles exist at levels 2 and 3.

Occupational profile

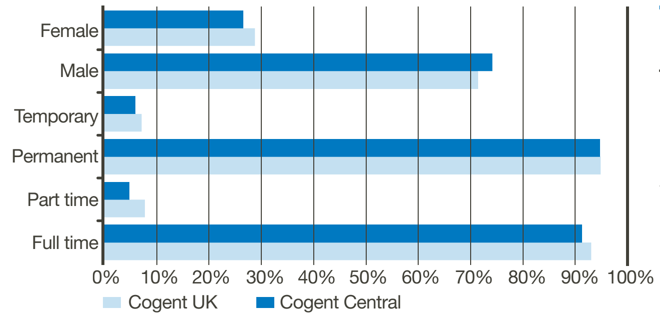


Source: Labour Force Survey 2007

The sector in the region employs a larger proportion of males than the Cogent sector in the UK. 75% of workers are male.

The region also employs more part-time staff (2%) than the Cogent sector in the UK.

Workforce distribution



Source: Labour Force Survey 2007

The Central region has a larger proportion of Managers and Senior Officials, Skilled Trades, Process Operator and Elementary occupations than the UK Cogent sector.

27% of the Cogent workforce in the region is employed in Process operative roles.

Regional actions

Supported by LSC, Cogent has implemented Train to Gain projects, partnering the skills brokerage organisations that has resulted in several hundred employees in the sector undergoing NVQ Level 2 programmes.

A proportion of employees registered on Train to Gain, as part of the projects referred to above, is undergoing Level 3 programmes. These are principally aimed at management and technical qualifications.

In addition, a pilot programme, involving sector employer sponsorships has resulted in expansion of apprenticeship numbers in the region. All the apprenticeships incorporate NVQ Level 3 awards.

Promotion of the Foundation Degree in Polymer Technology in the region has resulted in expansion of sector employees registered on the Level 4 programme.

Section Four/Southern England

South East: The prominent pharmaceutical industry is at the forefront of international research and development. Kent already accommodates four of the world's top ten pharmaceutical companies. Bioscience is also a major and cutting-edge activity in the region, although most are small businesses. The South East has the largest European onshore oil field at Wytch Farm, along with the largest refinery in the UK at Fawley Southampton, linked to a significant petrochemical complex. On the nuclear side the region has two power stations at Dungeness. The demand for road fuels is high in the region, and the UK's major airports are in the South East, requiring significant quantities of jet fuel. The Liquefied Natural Gas plant at Isle of Grain will become a significant input point for the national grid. For the polymer industry, there is a cluster of companies on the Isle of Wight supplying composite materials for producing wind turbine blades and aerospace applications.

South West: Sector employment in the region is dominated by Nuclear and Polymers. Only two nuclear power stations are still generating power, so the remaining activities are focused upon decommissioning of facilities, apart from Devonport dockyard where nuclear submarines are serviced. The region has a focus upon travel and tourism, so the rural filling station infrastructure is vital in supporting this key sector. The pharmaceutical and biomedical industry in the South West is dynamic, constantly exploring opportunities for partnering, licensing and forging collaborations.

London: Employment within the region is centred on company headquarters activities, although petrol forecourt retail is the predominant sectoral employer in the area. London shows the highest proportion of micro employers of all areas of the country, reflecting the high volume of forecourt retail operations in the region.

Economic indicators

	Cogent South	Cogent UK
Turnover	£18.8bn	£156bn
Cogent GVA	£6.6bn	£49bn
Cogent GVA per employee	£57,878	£98,394
Number of employees	114,600	500,00
Mean weekly pay**	£875.00	£381.50

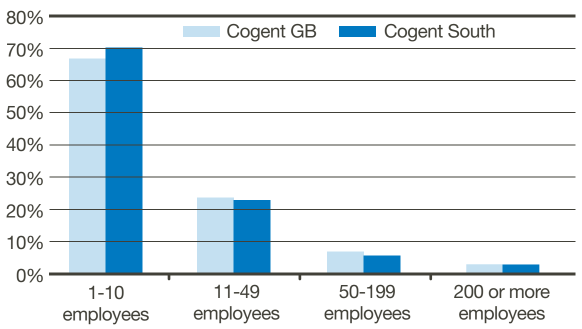
Source: Annual Business Inquiry 2005
*UK GVA average per employee £31,419
*Industry estimate of total Cogent employment 906,000
**Annual Survey of Hours and Earnings 2007

12% of turnover in the Cogent sector is generated in the Southern region.

The Southern region contributes 13% of the sector GVA.

The region employs 23% of the Cogent workforce.

Business size

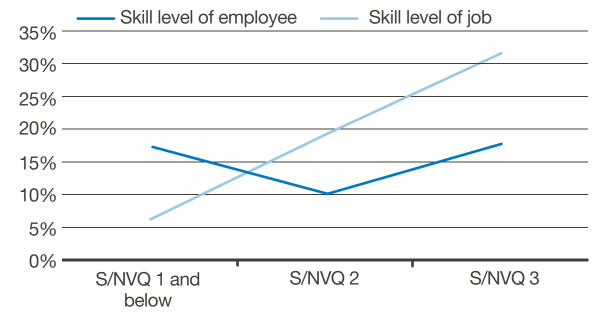


Source: Annual Business Inquiry 2006

The Cogent sector in the South region has a higher proportion of micro companies (70%) than the Cogent sector in the UK.

2% of companies in the region employ 200 or more staff.

The skills gap



Source: Labour Force Survey 2007

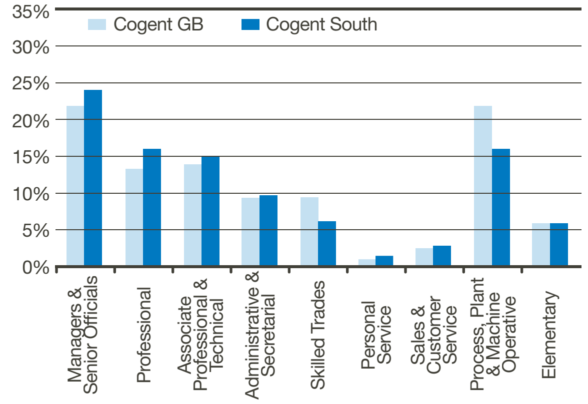
Key skills issues for the Cogent industries in the South of England:

9% deficit of the workforce qualified to Level 2

14% deficit of the workforce qualified to Level 3

Level 4 and 5 occupations are also key to the region as the majority of the workforce are employed and qualified at this level. 42% and 41% respectively.

Occupational profile

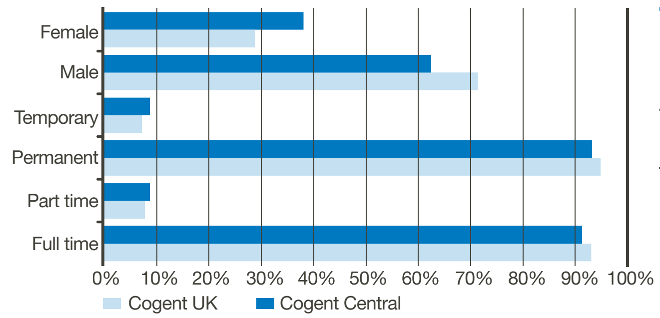


Source: Labour Force Survey 2007

The South region has a larger proportion of Managers and Senior Officials and Professional occupations than the UK Cogent sector.

42% of the Cogent workforce in the region is employed in Manager/ Senior Official and Professional Occupations.

Workforce distribution



Source: Labour Force Survey 2007

The sector in the region employs a larger proportion of females than the Cogent sector in the UK. 38% of workers are female.

The region also employs more part time and temporary staff than the Cogent sector in the UK.

Regional actions

As part of the Learning and Skills Council's Train to Gain initiative, Cogent has launched Business Improvement Techniques training in the South West.

We are working with groups of schools in the region on developing an Engineering diploma to be launched this year.

Cogent is leading a project to develop a programme-led Apprenticeship for the energy sector, designed to increase the number of new young and mature entrants.

Cogent is offering competence masterclasses to companies in the East of England designed to provide managers with effective competence management systems.

Cogent is working with partners to develop an Energy Foundation Degree, to provide a work-based progression route from the Energy Apprenticeship.

Section Five/14-19 Review

To sustain a dynamic environment for economic growth, it is imperative that the teaching of science, technology, engineering and mathematics (STEM) subjects and provision of skilled scientists and engineers are made central to the UK's strategy on skills.

However, we know that the largest proportion of drop-out from potential employment in STEM occupations occurs at age 16 when young people have completed their GCSEs or Standard Grades and make choices regarding further study.

New developments such as the English Diplomas in schools are designed to address issues related to this. Cogent is working in conjunction with partner Sector Skills Councils to develop three of the Diplomas and related initiatives.

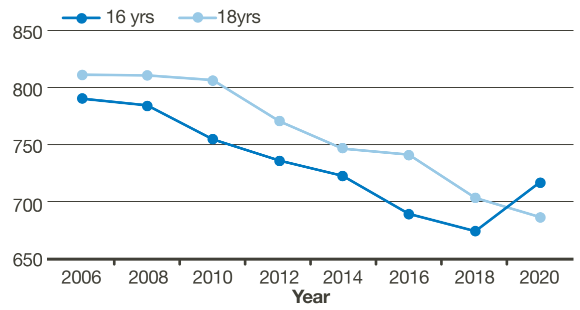
Section Five/14-19 Review

Entry into the Sector

Vital to the continued success of businesses in our sector is a good supply of well-educated and trained young people. We have reviewed the available information on the potential flow of young people into the sector, and the public policy factors affecting this age group, and the key issues are highlighted below:

Population Projections

Population Projections for 16 and 18 year olds[6]



Mid-2006 Population Estimates[5]

	Population	Percentage of total UK population
England	50,762,900	83.8
Wales	2,965,900	4.9
Scotland	5,116,900	8.4
Northern Ireland	1,741,600	2.9
United Kingdom	60,587,300	

Numbers of 16 and 18 year olds are set to decline from 2009-2010 onwards. This will have important implications on the intake to the Cogent industries. A smaller pool of 'new talent' means more competition in attracting young people to a career within the Cogent footprint.

Key Challenges

STEM Subjects

The flow of Science, Technology, Engineering and Mathematics (STEM) subjects is very important to Cogent's future workforce. The problem of needing a replacement supply, because of the ageing workforce, is exacerbated by a decline in the population of young people and the demand for STEM skills across many employment sectors. According to recent research (Cogent, 2007) there is a projected decline in the population of 16 and 18 years olds between 2006 and 2016. Accordingly, Information, Advice and Guidance are important to promote the importance of STEM subjects and the benefits of a career in a STEM area.

Actions have already been set in place by Cogent to overcome this challenge. The Cogent web-based careers information and guidance tool, Careers Pathways, has been developed and is being used by individuals to improve understanding of careers in the sector.

School Leaving Age: Changes to the Law

The Department for Innovation, Universities and Skills has confirmed plans to raise the school leaving age in England to 17 years of age by 2013, with an aim of 90% participation in education or training among 17 year olds by 2015. A requirement to participate until 18 years will be introduced at a later stage. These changes will give Cogent the opportunity to raise participation in STEM subjects for 14 to 19 year olds.

[5]Source: Office of National Statistics
[6]Source: Government Actuaries Department – Population Estimates Base 2006
[7]Cogent (2007), STEM Choices, Destinations and Intake to the Cogent Sector

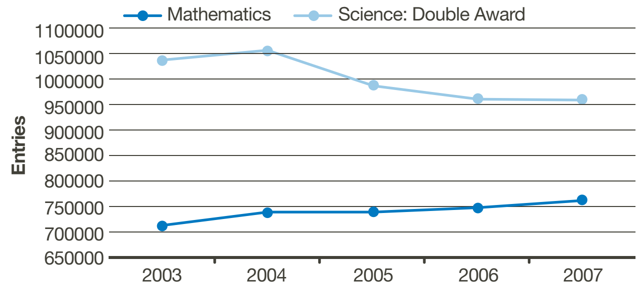
14 – 16 Education

GCSEs in England, Wales and Northern Ireland[8]

Sum of Mathematics and Science GCSEs entries in 2007: **1,995,658**
Mathematics: 760,299 and Science (All Awards*): **1,235,359**

In England, Wales and Northern Ireland, Science (Double Award) has suffered a decline from 2003 to 2007, with a slight increase in the number of pupils taking their Mathematics GCSE from 2003 to 2007.

GCSE Entries – All UK Candidates



NB – Science Double Award candidates are counted twice.
*All Awards refers to: Biology, Chemistry, Physics, Science: Double Award and Science: Single Award

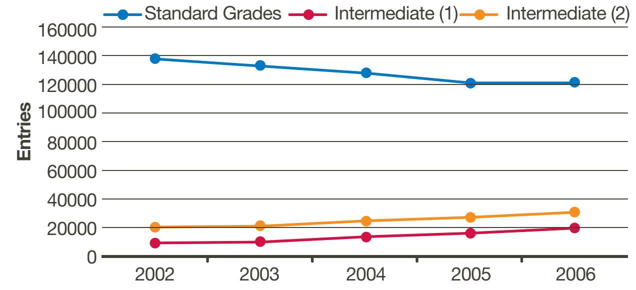
Standard Grades and Intermediates 1 and 2[9] in Scotland

Sum of Mathematics and Science Standards and Intermediates (1 and 2) entries in 2006: **407,267**
Standards: Mathematics: **294,012** and Science: **66,693**
Intermediate (1): Mathematics: **10,317** and Science: **7,749**
Intermediate (2): Mathematics: **16,789** and Science: **11,340** and Engineering: **367**

Intermediates are a growing proportion of the Scottish 14 – 16 curriculum.

Both Standard grades and Intermediates are available to 14- to 16- year-olds in Scotland. Intermediates parallel Standard Grades, with Intermediate 1 being equivalent to the General Level Standard Grade and Intermediate 2 being equivalent to Credit Level Standard Grade.

Standards and Intermediates (1 and 2) Entries



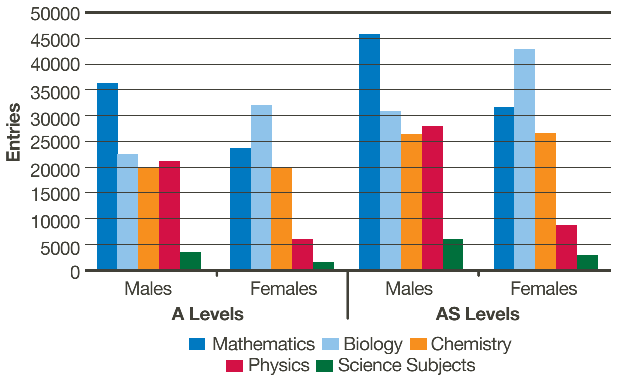
[8]Source: Joint Council for Qualifications
[9]Source: Scottish Qualifications Authority – Annual Statistical Report, 2006

16 – 18 yrs Education and Skills

A and AS levels in England, Wales and Northern Ireland[10]

Sum of Mathematics and Science A and AS Levels in 2007: **437,411**
A Levels: Mathematics: 60,093 and Science: **126,858**
AS Levels: Mathematics: 77,387 and Science: **173,073**

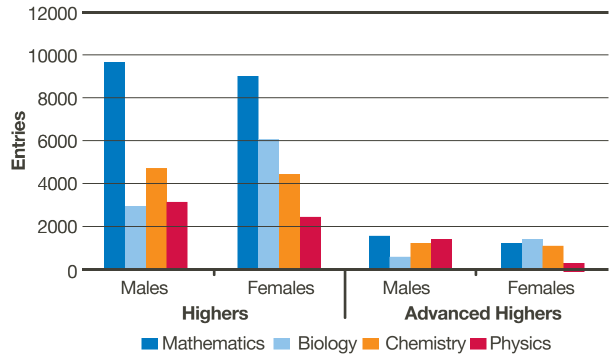
A and AS Leves Entries – All UK Candidates



Highers and Advanced Highers in Scotland[11]

Sum of Mathematics and Science Highers and Advanced Highers entries in 2006: **53,389**
Highers: Mathematics: 18,623 and Science: **26,829**
Advanced Highers: Mathematics: 2,598 and Science: **5,339**

Highers and Advanced Highers Entries 2006



Twenty-one per cent of all UK pupils sitting GCSEs (and equivalent) in 2006/07 chose to study Mathematics and Science at A-level (and equivalent). This indicates a departure of two-thirds of students taking Mathematics and Science as an "academic" subject.

Other Qualifications

Diplomas

A key element of the 14 – 19 vocational reform agenda in England is the development of Diplomas. Cogent has taken the lead on the Gateway 2 process, employer engagement and scoping of content for the Engineering and Manufacturing and Product Design Diplomas. Cogent has also taken the lead in engaging with Higher Education in the strategic development of the Science Diploma. The Engineering Diploma will be offered from 2008, via a consortium of schools, colleges and work based learning providers. The Manufacturing and Product Design and Science Diplomas will follow in 2011.

[10]Source: Joint Council for Qualifications
[11]Source: Scottish Qualifications Authority – Annual Statistical Report, 2006

Foundation Diploma	Higher Diploma	Advanced Diploma
Level 1: - Principal Learning - Extended Learning - Additional Specialist Learning - Equiv: 5 GCSEs	Level 2: - Principal Learning - Extended Learning - Additional Specialist Learning - Equiv: 7 GCSEs	Level 3: - Principal Learning - Extended Learning - Additional Specialist Learning - Functional Skills (Maths, English, ICT) - Personal, Learning and Thinking Skills - Work Experience - Equiv: 3.5 A levels

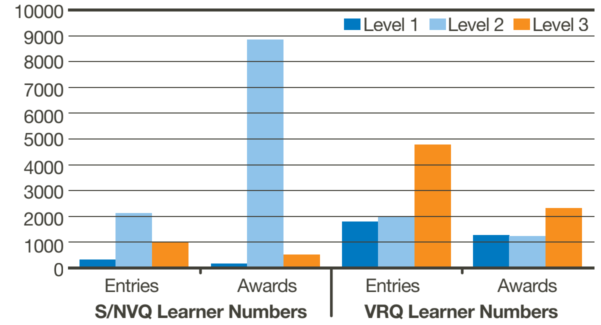
Further Education, Vocational Education and Training

S/NVQs and VRQs Learner Numbers

Registration and certification data (2006) for further education learners in the UK was obtained from the Awarding Bodies offering qualifications related to the Cogent footprint, i.e., Science and Engineering qualifications.

Science and engineering Further Education learner numbers: Registrations and certifications in England, Wales and Northern Ireland, 2006[12]

Science and Engineering FE Learners – S/NVQ and VRQ Entries and Awards in England, Wales and Northern Ireland, 2006

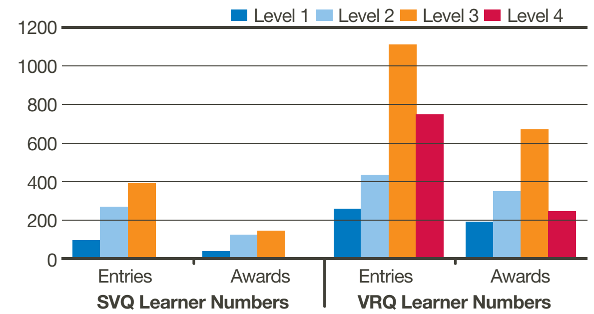


Science and Engineering S/NVQs:
—The largest number of entries and awards was Level 2

Science and Engineering VRQs:
—The largest number of entries and awards was Level 3

Science and engineering Further Education learner numbers: Registrations and certifications in Scotland, 2006[13]

Science and Engineering FE Learners – SVQ and VRQ Entries and Awards in Scotland, 2006

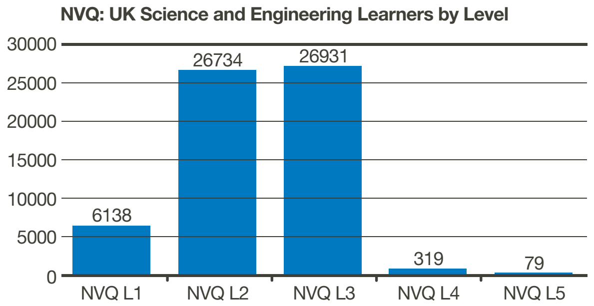


Science and Engineering SVQs:
—The largest number of entries and awards was Level 3

Science and Engineering VRQs:
—The largest number of entries and awards was Level 3

[12]Source: City and Guilds; EDEXCEL; PAA/VQSET and Skills Assurance Services Limited
[13]Scottish Qualifications Authority (SQA), 2007

Funded 'Further Education' Learner Provision[14]



Funded 'Further Education' learner data refer to learner numbers per qualification, obtained from the agencies responsible for distributing funding in England, Wales and Northern Ireland. This data is not available for Scotland, as funding is distributed by individual college.

Clearly the largest number of learners are studying Level 3 Science and Engineering NVQs, followed by Level 2 Science and Engineering NVQs.

Apprenticeships

With the support of employers, Cogent has developed Apprenticeship Frameworks for: Chemicals, Petroleum, Polymers, Signmaking and Nuclear industries. As well as the frameworks above, the Oil and Gas Upstream (OPITO Framework only) lies within the Cogent footprint.

Summary of Apprenticeship certifications per framework and level from 2003/03 to 2007/08[14]

Framework	Level	02/03	03/04	04/05	05/06	06/07
Chemical Manufacturing and Processing	L2 L3	6 105	19 72	14 91	34 71	28 50
Polymer Processing and Signmaking	L2 L3	31 15	20 9	47 4	44 6	43 4
Oil and Gas Upstream (OPITO Framework only)	L3	12	17	34	64	43

[14]Source: Learning and Skills Council 2005/06, Department for Education, Culture and Welsh Language 2005/06, Department for Education and Learning Northern Ireland 2005/06 (Included in this figure is Further Education and Work Based Learning figures for England and Wales, but not Northern Ireland)

Section Six/Higher Level Skills

The Cogent sector needs people who have pursued the Science, Technology, Engineering and Maths (STEM) educational route. The high value-adding industries in the Cogent footprint are skills intensive, and are dependant upon the UK science base for the supply of trained scientists and engineers. They also need close interaction with Higher Education to stimulate new ideas and promote innovation

Cogent is working in partnership with employers, Higher Education Institutions and Colleges to transform a fragmented network of provision into a responsive, accessible higher level skills offer throughout the UK.

Section Six/Higher Level Skills

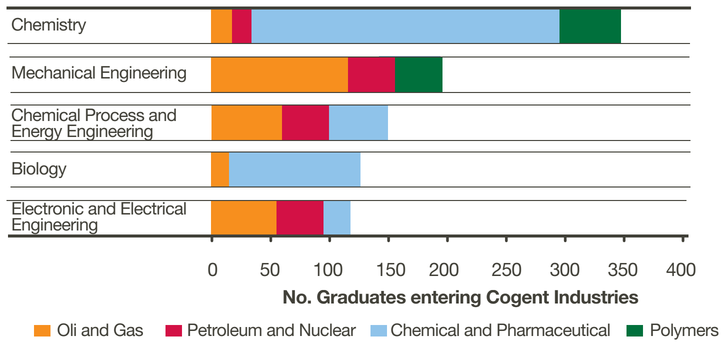
Higher Level Skills in the Cogent Sector

Higher Level skills are classed as those at Level 4 and above, and apply to those partaking in Higher Education, and some sections of Further Education. Since the Cogent industries are so knowledge- and skills-intensive, we rely heavily on higher level science, engineering and innovation. Graduate recruitment from science and engineering subjects is typically about half of the total graduate recruitment in the sector, and is steadily increasing.

Focus on Science and Engineering

Analysis of data from the Higher Education Statistics Agency shows the following:

The proportion of Science or Engineering graduates typically entering the Cogent workforce accounts for between 45-50% of the total graduate recruitment within the sector.



- —Of these graduates, the largest proportion of graduates entering the Chemicals and Pharmaceuticals industry had studied Chemistry or Biology;
- —Of those entering the Oil and Gas industry, the largest proportion were from Mechanical Engineering and Chemical, Process and Energy Engineering;
- —The most popular non-science subject was Business Studies.

Although the graduate supply in science and engineering has risen, based on an average steady state supply of 4,000 graduates per annum, a minimum further 60,000 graduates are required between 2005 and 2020 to meet the Leitch target.

Cogent Higher Level Skills

Typical Destinations for science and engineering graduates within the Cogent Sector*

Typical Job Titles:	Cogent research shows:
- Production Managers - Site Managers - Maintenance Managers	- 8% of graduates from Cogent-relevant science and engineering subjects entered Manager and Senior Official Occupations in 2005-06 - Manager and Senior Official occupations are typically Level 5 positions
- Chemists, Physicists, Biochemists, Biologists - Mechanical Engineers - Production and Process Engineers - Chemical Engineers	- 46% of graduates from Cogent-relevant science and engineering subjects entered Professional Occupations in 2005-06 - Professional Occupations are typically Level 4 positions
- Laboratory Technicians - Engineering Technicians - Quality Assurance Technicians	- 21% of graduates from Cogent-relevant science and engineering subjects entered Associate Professional and Technical Occupations in 2005-06 - Associate Professional and Technical occupations are typically Level 3/4 Positions

* Defined by standard occupational classification (SOC)

Cogent Higher Level Skills Strategy

Cogent has been developing its Higher Level Skills strategy in recent months, which aims to build and extend frameworks for greater employer engagement with higher and further education institutions. These frameworks will enable providers and the Cogent workforce to identify clearly routes to education and training that meet their employer needs at a number of levels. Cogent will be concentrating on:

- —Advancing employer-led frameworks for Foundation Degrees in key sectors
- —Cultivating post-graduate level training and continuing professional development provision
- —Encouraging skills for innovation within higher level training programmes
- —Increasing careers guidance and information for higher level skills, through the development of careers pathways and interaction with careers services

Through this strategy, Cogent will prioritise working with learning providers, in conjunction with planning agencies and professional bodies, to develop new approaches to course delivery that meet a range of employer requirements for the workforce. This will include:

- —Developing short courses with bite-sized credit accumulation
- —Incorporating modular, flexible and blended delivery (e-learning, academic and workplace learning)
- —Accreditation of bespoke programmes, prior learning, and in-house training
- —Identification and marketing of employer-led courses to customers through Cogent and the National Skills Academies
- —Introducing co-funded places with clearer presentation of the costs associated with higher education courses

Workforce Development

In 2005-06, the supply of graduates with a Science and Engineering qualification broke down as:

950 Foundation Degrees **34,230 First Degrees** **18,020 Higher Degrees**

Although current graduate supply would be sufficient to meet the industry's needs for now, there are potential problems caused by entry into other sectors in preference to science-based roles. This indicates a need to increase the attractiveness of Cogent industries to the graduate workforce.

- —78% of HE provision for the top 5 subjects illustrated is from traditional full time courses
- —Part-time HE provision is scarce in Science and Engineering
- —The expected graduate supply to 2020 matches the retirement rate in our sector, but is variable
- —There is a skills gap that requires 85,000 employees to be up-skilled from the current level 3 workforce

Government Policy on Higher Level Skills

Following the publication of the Leitch review, there has been an emphasis on increasing the number of graduates within the UK to over 40% of the total workforce by 2020, specifically in science and technology areas.

In England, the Department of Innovation, Universities and Skills (DIUS) is working with the Department for Business, Enterprise and Regulatory Reform and the Technology Strategy Board to take forward the recommendations of the Lord Sainsbury review to maximise innovative capacity through the identified pathways detailed in the Innovation White Paper of March 2008. This details the issues and routes to overcoming the longstanding weakness in the skills base and in the numbers of employers investing in training.

DIUS Consultation Process

In England, DIUS recently undertook a consultation process that aimed to assess employer engagement with Higher Education Institutions. Cogent actively took part in this, and sought feedback through its industry and academic links, in order to aid in the delivery of a Higher Level Skills strategy. From this process, Cogent aims to improve and influence engagement between employers and higher education, and will focus on:

—How employers value broad employability skills, such as communication, motivation, independence, analysis, confidence and problem solving;
—Increasing graduate numbers in science, technology, engineering and mathematics;
—Developing better national, regional and sectoral problem solving;
—Testing of national, regional and sectoral approaches to employer co-funding, including a co-purchasing role for Sector Skills Councils in the expansion in employer co-funded places.

Working with Higher Education

Higher education has a vital role in increasing UK competitiveness through the promotion of knowledge based aspects of the economy, driving up productivity and growth, and improving skills levels. However, Higher Education Institutions needs to collaborate more effectively with employers to maximise the benefits for learners, employers, employees and, the economy and society. Across the UK, all funding councils are encouraging business engagement activity, in order to develop the employer-responsiveness of the higher education sector.

Although the detailed policies on higher education and higher level skills vary between the nations of the UK, they share the general approach of increasing collaboration between business and academia at higher levels. Cogent is engaged with partners in all four nations and we expect to continue to discuss policy with each of them over the coming year.

Section Seven/Action for the future

The future for Cogent's sector is potentially very bright, but it can only be maximised by action on behalf of employers, employees and public sector organisations to raise the level of skills to remain on the cutting edge and to ensure sufficient supply to meet future demand.

In writing this report, we have sought to continue the approach taken when developing our Sector Skills Agreement over two years ago, when we analysed the labour market and skills provision to determine the major issues affecting our sector, before designing our "Big Ticket" initiatives, in conjunction with the industry, to address them.

The next steps for Cogent are to take this new analysis and revisit our activities, including the Big Tickets, to ensure that they continue to help the sector to achieve its potential as far as possible.

Our analysis shows that the Big Ticket actions continue to address the most important issues, (for example, Careers Pathways addressing attraction of new graduates, and the Competence Assurance programme addressing issues of operational safety standards). However, we are keen to ensure that the impact will be big enough and fast enough to meet the size of the challenge. The upcoming process of relicensing Sector Skills Councils is allowing us to focus on our priorities through our strategic and business plans, and this new analysis gives us the foundation to do so in response to the needs of the sector.

We also know that we need to get a more detailed level of understanding of some of the issues we have examined – for example, drilling down under the headline numbers of projected skills demand to see what particular levels of skills are needed, in which industries. We will continue our research and analysis work to address these gaps in the data, including through our new Oracle project, which will survey a significant consistent sample of employers in each of the industries over time, to produce a barometer for economic, skills, training and turnover trend tracking.

This will be the basis of our future action, and we know that the analysis will also be useful to employers and to our partner organisations, in setting out the opportunities and challenges that face the science-based industries into the future.

Section Ten/Acknowledgements

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