

The Sector Skills Council for  
Chemicals, Nuclear, Oil and Gas,  
Petroleum and Polymers

 cogent

# A Skills Needs Assessment of the **Nuclear Industry**

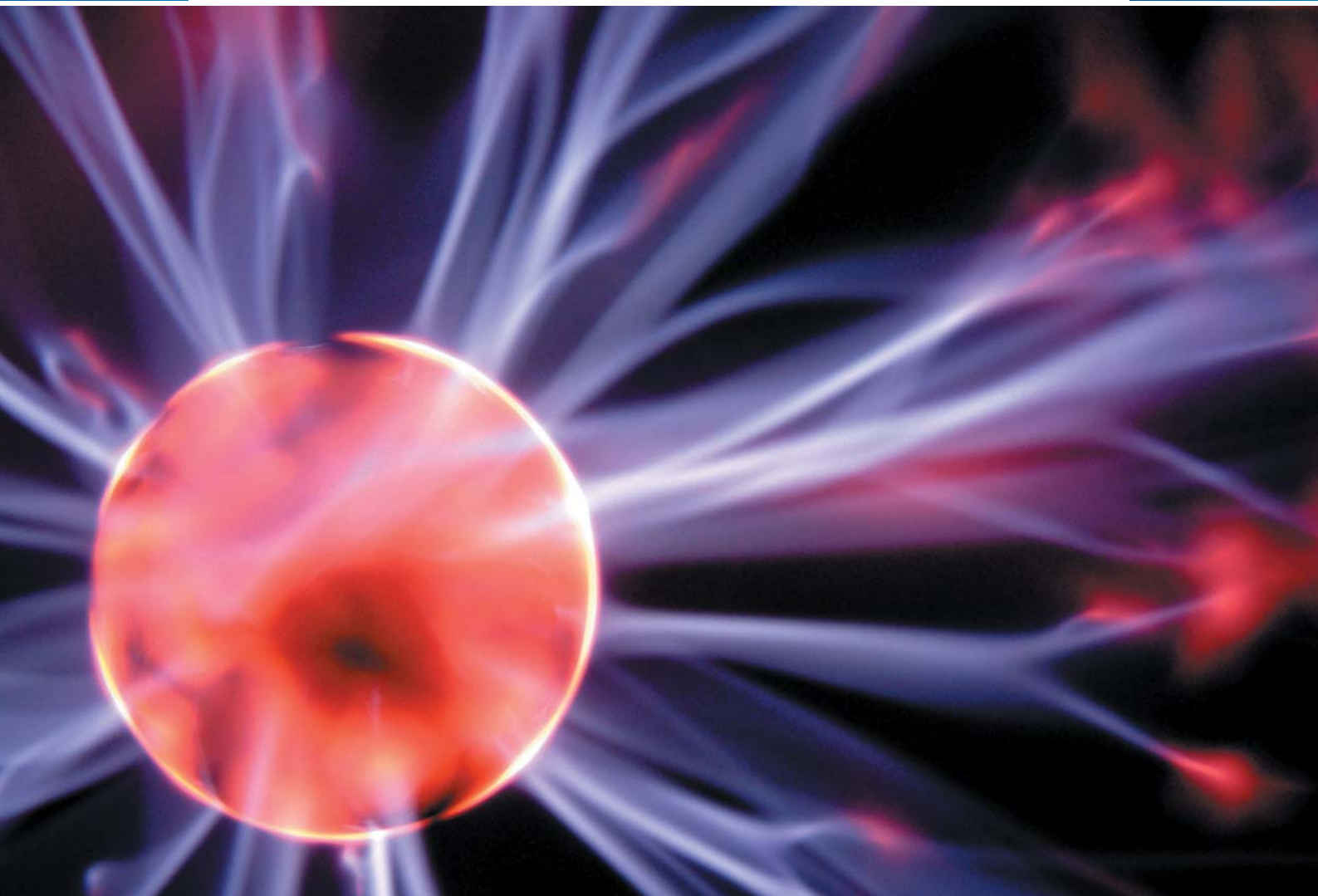
Working to assess and quantify the skills challenges facing the UK nuclear industry through its Sector Skills Agreement Process (SSA).

Innovation

Competence

Productivity

Sustainability



*Improving business performance through **skills** development*

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 INVESTOR IN PEOPLE

 skills  
FOR BUSINESS

## INTRODUCTION

Phase One of this research is summarised in this document, it is a "here and now" snapshot of skills needs in this industry. Future skills needs will be explored in the next stage of this important work. The full programme of work is outlined towards the end of this summary.

The availability of skilled employees is now recognised as fundamental to productivity and economic success by employers and policy makers alike. For the nuclear industry productivity is just one part of the skills equation: competence of the workforce is also critical for safety and the industry requires Suitably Qualified and Experienced People (SQEP) in all its operations.

The industry plays a critical role in national defence, is essential for the continued operation of existing nuclear power stations and fuel cycle processes as well as the current programme of nuclear sites clean up taking place via the Nuclear Decommissioning Authority.

The industry also supports research and development programmes and the government has made it clear that it may recommend more nuclear power as part of its energy policy review. Skilled employees are therefore critical to the industry's continued success as well as its License to Operate.



## THE SECTOR SKILLS AGREEMENT PROCESS

Sector Skills Agreements are being produced for every sector which is supported by a Sector Skills Council. The aim of these agreements is to secure for each sector the range and level of skills necessary to achieve productivity at internationally competitive levels.

In partnership with employers, the Government and others, Cogent will use the Sector Skills Agreement as a framework for delivery of the skilled workforce which employers in the sector want. The Agreement will:

- lead to better planned and more integrated delivery of skills training;
- help to produce credible, cost effective, quality assured and better-tailored training provision;
- help to target public funding more efficiently;
- encourage employers to invest more in developing their workforce.

This document is an Executive Summary of the **Skills Needs Assessment** for the Nuclear Industry, which was created for the Sector Skills Agreement process. It is abstracted from a much larger report which covers all five industries covered by Cogent.

## NUCLEAR SECTOR COVERAGE

The nuclear sector covers:

- nuclear propulsion
- defence – the nuclear deterrent
- decommissioning and clean-up of nuclear legacy
- the nuclear fuel cycle
- nuclear power (and fusion research)

Industry	Number of Employers	Number of Employees	
		Industry Estimate	ABI+
Chemicals	3,900	170,000	186,976
Oil and Gas	440	185,000	25,661
Nuclear	200	56,000	13,413
Petroleum*	7,400	123,000	63,757
Polymer	7,500	286,000	196,650
<b>Cogent</b>	<b>19,500</b>	<b>820,000</b>	<b>486,457</b>

\*Petroleum industry also includes forecourt retail. Oil and gas and nuclear industry estimates include direct and indirect employment

## DRIVERS OF CHANGE

### The Domestic Market

The nuclear industry provides 20 per cent of the electricity for the UK market. However, this is in decline as the programme of decommissioning redundant nuclear facilities becomes established under the Nuclear Decommissioning Authority (NDA). The NDA is now driving for accelerated decommissioning on all its sites.

Market demand for energy continues to rise while old nuclear power stations move into decommissioning. Opinion is split, however, over the environmental friendliness of nuclear power: it produces minimal carbon emissions, but worries persist over nuclear waste. There is the further question relating to security of supply for domestic energy markets. An increasingly uncertain world with tensions in the Caucasus and the Middle East raises concern over security of energy supply from the international market - particularly over a period where the UK is becoming reliant upon energy imports.

The industry is also examining the potential for extending the life of some facilities. Rising prices for electricity provide cash which can be invested in plant upgrades.

### International Markets

The UK nuclear industry has a significant international dimension providing services in reprocessing of nuclear fuel for European and East Asian markets. As the first generation of nuclear facilities worldwide moves into decommissioning the skills and expertise developed in the UK dealing with the domestic clean-up projects will also be in demand internationally.

In order to keep its role as international service provider, the industry must maintain its skills and expertise in reactor operation, design and construction, maintenance and inspection, the nuclear fuel cycle, waste management and decommissioning technology which are in demand in the international market.

### Government Policy

The Energy Bill 2004:

- Set up the Nuclear Decommissioning Authority (NDA) taking responsibility for all the public sector civil nuclear liabilities and assets and for cleanup of nuclear sites;
- Results in increasing 'contractorisation'. Nuclear decommissioning activities will be opened to competitive tender by the Nuclear Decommissioning Authority (NDA) in two to three years time. Competition is the NDA's primary mechanism for encouraging performance improvement and bringing in new ideas and experience. It is expected that new companies will come into the industry with an increase in demand for project management skills.
- Also established new initiatives for Renewable energy.

The 2003 Energy White Paper:

- sets out targets for reducing carbon emissions (going beyond Kyoto commitments);
- kept open the potential for new build nuclear power stations;

The Energy White Paper means:

- a new focus on renewable energy sources, with significant public investment
- the nuclear industry should maintain its skills. To keep open the option for new build the industry has been charged with maintaining the skills and knowledge required in areas such as reactor design or else be dependent upon attracting international specialists;

The Energy Review 2006

- The future of nuclear power is now in the hands of government. A policy decision on whether to build new nuclear power stations is one of the issues included in the current Energy Review. A decision to proceed with new investment may improve the industry attractiveness to new recruits and serve to alleviate concerns over security of energy supply with the introduction of a new stream of domestic generation.

### Technology drivers

The nuclear industry is continuously developing new technologies, notably in:

- clean-up and decommissioning technologies. Development is progressing in the UK and worldwide, and offers real opportunity for technology applications. The NDA estimates £56 billion as the price for decommissioning and clean-up of domestic nuclear facilities;
- waste disposal. Technical solutions are being developed for ultimate disposal, however, there is uncertainty as to how the UK will manage this pending development of policy on waste disposal;
- enhanced reactor technology. Replacement reactors designs feature increasing levels of safety, which will reduce the complexity and cost of new reactors, produce far less waste than the generation being decommissioned.

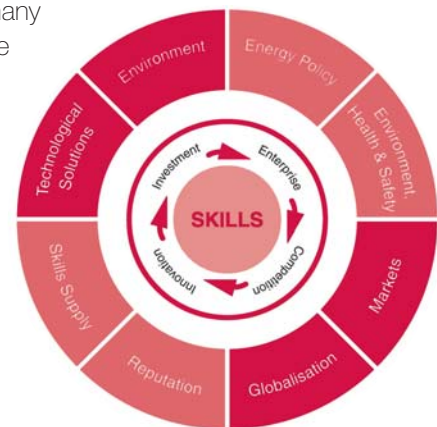
Part of the NDA's remit in overseeing decommissioning and clean-up of nuclear sites is to ensure sharing of good practice and encouraging innovation. Proposals include promotion of the technology centre facility at Sellafield for broader use and a proposal for a nuclear laboratory to facilitate R&D activities, making the link with industry and the skills agenda, and a Waste Management and Decommissioning Research Board to oversee domestic and international developments and identify the potential for collaborative activities. Innovation in R&D is key to improving decommissioning timelines (improving productivity) and reducing costs.

### Environment issues

Waste management is the primary environmental driver. Like the UK, many countries now have operational low level nuclear waste disposal facilities. The UK has not yet developed a disposal policy for medium level or high level waste. CoRWM is expected to make recommendations on waste disposal policy by summer 2006.

The Nuclear Decommissioning Authority has been set up to "lead the development of a unified and coherent decommissioning strategy, working in partnership with regulators and site licensees to achieve best value, optimum impact on local communities, and the highest environmental standards".

A decision to progress with civil new build would provide an ideal opportunity to relaunch the presentation of the industry in a green and sustainable light.



Competitiveness of the Cogent Sector

### Defence Policy

There was a 2005 manifesto commitment to retain the nuclear deterrent, and the government has also given a commitment to making a decision about revising the nuclear weapons system, but only before the next general election – i.e. the decision may still be some time away. A decision to revise the nuclear weapon system would generate extra work. The propulsion programme looks set to continue for at least the next ten years with maintenance, operation and new build nuclear submarines. Meanwhile, the weapons programme will have £1billion invested over three years to enhance capability of the production facility.

### Public opinion

Despite industry efforts to counter it, the nuclear sector has suffered from an image of secrecy, derived in part from its military origins. Many people associate the sector with danger, pollution and dangerous waste. However, public support for nuclear energy has now increased from 33 per cent to 41 per cent as awareness rises of its value as a low carbon-emitting energy source. A third of people surveyed now see nuclear power as a reliable source of future energy in the face of uncertainty over other sources, so there is increasing public support for new nuclear power stations.

## EMERGING ISSUES FROM THE SKILLS NEEDS ASSESSMENT

Productivity and sustainability of the nuclear sector is dependant upon the availability of suitably skilled, trained and qualified workforce. The nuclear sector needs highly skilled people who are able to contribute, innovate and take organisations beyond their current ambitions and to support organisational goals in an increasingly demanding operational environment.

The results of the assessment can be split across four **strategic themes** as identified below, where the nuclear industry needs to take action in the short, medium and longer term. Cogent will be working with nuclear employers to address these issues and ensure the UK industry has a sustainable future.

	Chemicals %	Nuclear %	Oil & Gas %	Petroleum %	Polymers %
Managers & Senior Officials	22	4	16	23	16
Professionals	16	38	21	16	4
Associate Professional & Technical	17	13	21	20	7
Administration	9	11	9	11	9
Skilled Trades	4	24	16	7	17
Sales and Customer Services	2	0	0	2	2
Process & Machine Operatives	16	5	14	14	33
Elementary Occupations	13	5	3	6	10

\* Labour Force Survey (q1 2004 – q4 2004), Nuclear & Radiological skills Study (2002)

## 1. Innovation

We know that innovation is fundamental to nuclear industry sustainability and economics – and employers tell us it is a high priority. Innovation in operational improvement, process improvement especially in decommissioning and in technology-related R&D are all vital for the industry.

Innovation will be needed in relation to potential revisions to the nuclear deterrent and to new build nuclear power station projects, as well as skills relating to 'lifetime management' (including extension of life) for existing power stations.

Innovation will mean finding new applications for existing technology and changing thinking towards activities to find new approaches. It will also include strategic planning of R&D to identify "technology insertion points" to ensure that funding ties in with the decommissioning programmes and, more specifically, there may be proposals for a technology centre facility and a nuclear laboratory, designed to make the link between industry and the skills agenda.

Innovation in decommissioning and lifetime extension will require the creative transfer of knowledge and learning from nuclear industry activities to date and from other industries going through decommissioning while the demands of nuclear deterrent will place a demand upon development and application of high level skills in physics, high performance computing and mathematical modelling.

Process and quality improvement should focus in the short term and for the future on decommissioning activities that provide best value, with the optimum impact on local communities, and to the highest environmental standards. As the work progresses, it will include improvements to reduce the time which decommissioning takes, and the costs of the process, and investigation of the scope for greater collaboration.

## 2. Management & Leadership

Employers report skills gaps among managers and a need for upskilling at levels 4 and 5. In the nuclear industry, as decommissioning activity increases, a critical project management skills gap is being created among operations focussed managers who need to make the transition to project based working role (i.e. programme managers, planners and programme controllers). Further skills gaps emerging relating to this change in working activities lie in leadership and motivational skills, and effective management skills (for example people management, change management, personal development). Currently this is predominantly a skills gap issue among the existing workforce. This will drive a future demand for project engineers with highly developed management skills.

Both now and in the future managers need to be able to achieve workforce improvements in performance, product and process and quality. Other key areas for upskilling managers in the nuclear sector where gaps have been identified are:

Innovation

Competence

Productivity

Sustainability

- Development of innovative working practices to meet challenges
- As decommissioning activities increase, a greater focus on project management, linking with the NDA model.

For organisations to succeed, leadership is needed at every level in the company. Individuals need to be able to connect their personal visions to those of the organisation, creating the conditions in which their organisation can achieve success.

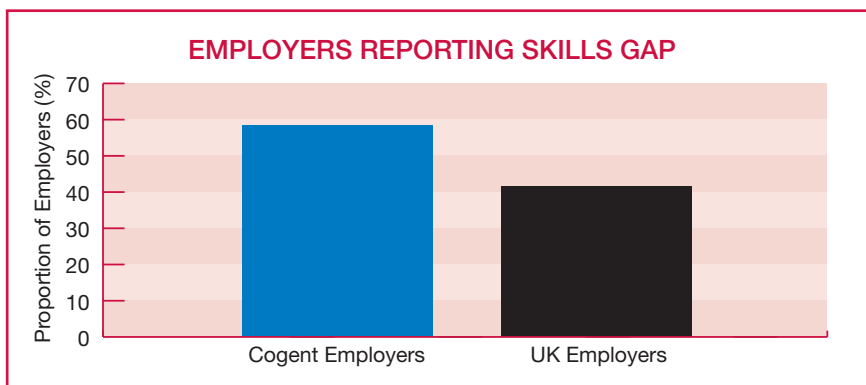
Companies which are dependent upon innovation and continuous improvement are much more reliant on the skills and the contribution of the people who work for them. It is their human capital, allied to the leadership capability within the organisation, which represents the primary source of performance improvement and competitive advantage.

For the longer term, management & leadership improvement is seen as critical in turning the industry vision into a practical reality and for achievement in each of these four strategic themes. Over the next 10 years, it is estimated that the net demand for managers across the whole Cogent sector (not just the nuclear industry) is approximately 24,000. This is in line with demand experienced over the last 10 years.

### 3. The Skills Gap

In the nuclear industry 72 per cent of employers report skill gaps – a higher proportion than for the sector overall. Project management and technical and practical skills were the most frequently cited skill gaps. Over half of these employers found that the gaps hindered their customer service objectives.

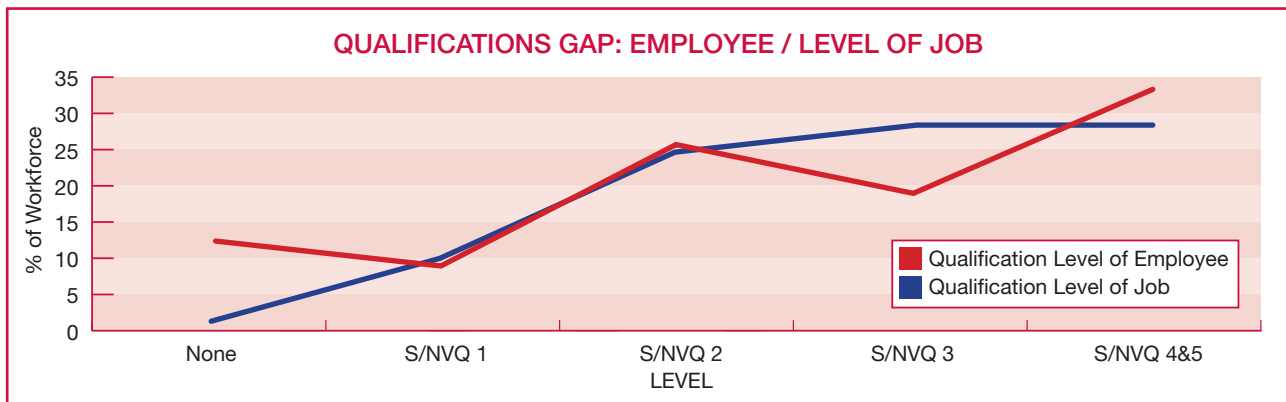
Skill gaps are a greater issue for employers in the Cogent sector than the economy as a whole.



National Employer Skills Surveys 2004/2005

In the nuclear industry skill gaps are being experienced as a direct result of changing company activities. As Tier 1 companies make the transition from being operations and contract management organisations to programme and project management organisations, the incumbent workforce needs to develop different skills for this new operating environment. These are focussed for senior level positions upon project and programme management.

The table below illustrates the profile of the workforce within the Cogent sector (excluding petroleum forecourts). It is striking that a higher proportion of the workforce is qualified to level two than level three within the sector (reflecting the dominance by size of the polymer and chemical industries within the sector).



Source: Labour Force Survey 2004

Performance improvement will remain a longer term issue for the sector, while employers focus on tackling the skill gaps identified above. As the balance shifts from operational to decommissioning activity, there will be greater focus on communication, problem solving skills and project management.

A potential shortage has also been noted for technicians and technician managers. The decline of apprenticeships within the industry and the general trend of increasing volumes of young people going to university exacerbates the shortage.

#### 4. Attraction, Supply and Age Profile

Workforce demand across the sector is currently being driven by replacement demand (ie leavers, retireals and promotions), particularly among senior management and process operators in nuclear power generation. The sector faces a number of recruitment issues focused on demand for:

- Industry experienced personnel
- Graduate Engineers (Mechanical, Project, Instrumentation and Operations) & Scientists (health scientists, RPA, environmental scientists, safety analysts)
- Apprenticeships

### PROJECTED NET REQUIREMENT

#### ACROSS THE COGENT SECTOR CORE WORKFORCE, 2004–2014

(000s)	2004 Employment Level	Expansion Demand	Replacement Demand	Net Requirement
Corporate Managers including: Production Managers, Maintenance Managers Research & Development Managers, Site Managers	66	2	22	24
Science & Technology Professionals including: Chemists, Physicists, Mechanical Engineers, Electrical Engineers Chemical Engineers, Design & Development Engineers, Production & Process Engineers	24	-1	7	6
Science & Technology Associate Professionals including: Laboratory Technicians, Electrical/Electronics Technicians, Engineering Technicians, Building & Civil Engineering Technicians, Quality Assurance Technicians, Draughtspersons (usually hold HNC or HND)	18	-1	5	5
Process Plant & Mach Operatives including: Process Operator, Plant Operator, Field Operator	119	-18	43	24
Skilled Trades including: Electricians, Electrical Fitters, Machine Setters, Riggers & Welders (tend to have followed craft apprenticeship route)	34	-11	11	-1

Table based on data from Working Futures 2, 2004-2014 (IER). Nb. – Five core Cogent occupations have been selected.

Initial outputs from industry led scenario planning events confirm that the primary driver for recruitment over the next 10 years will be replacement demand driven (i.e. retiring workforce) while the industry also reduces in size. The changing focus of activities into decommissioning will also lead to a slight shift in occupational structure where process and machine operative and associate professional and technical occupations will make up an increased proportion of the workforce with a reduced demand for professional level occupations.

Future workforce demands will be estimated by industry foresight groups as part of the third phase of the Sector Skills Agreement process taking account of such factors as:

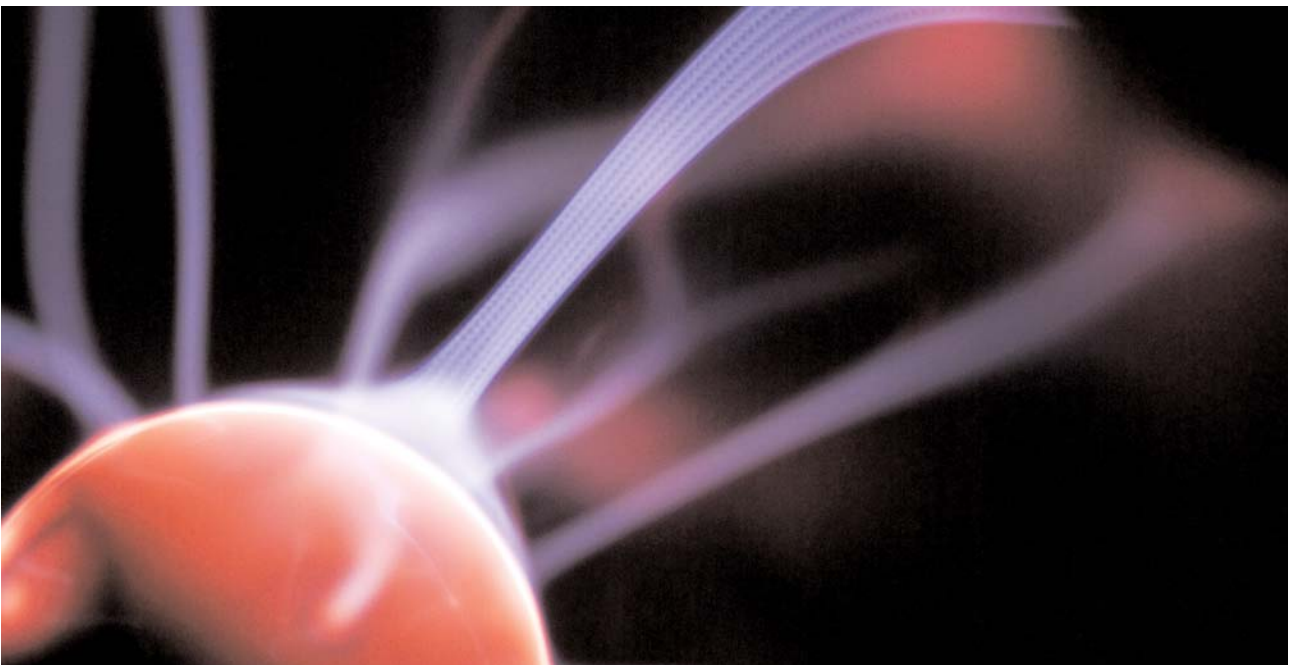
- new build of power stations;
- construction of waste disposal facilities;
- life extension of existing power stations;
- technology developments in decommissioning;
- changes in the nuclear weapon programme;
- national research demand;
- fusion technology – realisation;
- export demand.

This work should result in long term projections of change to workforce demand including occupational and functional spread.

Other issues include the difficulty which most employers face filling engineering and scientist vacancies, and the lack of required skills and qualifications shown by many applicants. The industry will also need to ensure awareness of its career opportunities by young people (and encourage at least as many to study science, engineering and technical subjects), by those in mid-career situations and by those who influence them. It will also need to improve numbers of females entering the industry, particularly in science, engineering and technical job roles.

A future decision on a civil new build programme, concurrent with other demands on engineering resources for high profile projects (for example the 2012 Olympics, construction of new naval warships etc), may provide the impetus the industry needs to take action to stimulate an increase in incentives and industry attractiveness, aimed at reversing the decline in engineering graduates taking up engineering positions.

In any event there is a need to ensure the long-term supply of well trained operating staff for nuclear power stations and long-term availability of production staff for weapons provision.



## Next Steps

Nuclear employers are key to the development of the Sector Skills Agreement and Cogent is acting as their voice, under their guidance and input, in ensuring that the UK skills supply meets their current and future needs.

The SSA process takes place over five important phases. We are asking employers to get involved at every stage.

- ||| This document is a **summary** of phase one, the **Skills Needs Assessment (SNA)** which provides an overview of the Cogent SSC sector in relation to workforce size and shape and current skills needs both now and in the future. The full Skill Needs Assessment report is available on the Cogent website. This will be further supported by the publication of the Nuclear Employer Skills Survey 2005.
- ||| The next phase is the **Assessment of Current Provision** which will report very soon on both the quantity of training and qualifications provision and the quality and relevance to employers.
- ||| The third phase in this process is the **Gap Analysis**. This will use the findings from the first two reports, as well as a study of future scenarios as agreed with employers, to identify gaps in current training and qualifications provision. Already Cogent has been working with the Nuclear Advisory Council on identifying the gaps and prioritising activities to address these. Furthermore during this stage Cogent will be consulting more widely with employers via its website, telephone surveys and through further work with the Nuclear Advisory Council to prioritise a series of possible solutions to be developed as the basis for the action plan.
- ||| Stage Four is the **Assessment of the Scope for Collaborative Action** and this will build upon the solutions suggested within the Gap Analysis. We will be joining with Employers and Stakeholders to look at how these deficiencies can be tackled and what form action might take. This process will take the form of workshops carried out across our industries during May.
- ||| The final phase, **Developing An Action Plan** completes the SSA process, and results in the development of a resourced plan. This will include the contribution of each partner (private and public), quantified outputs, estimated impacts on productivity and competitiveness and an evaluation mechanism.

The resulting **Sector Skills Agreement** will fundamentally alter the way skills demands are assessed, delivered and developed throughout the UK and Employer contribution is vital to their success.

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Feedback and comment on this Executive Summary is very welcome. Please email your views to Carol Sinclair.  
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