Closing the Nuclear Skills Gap in the United Kingdom Consultancy Sector - 10432

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ABSTRACT

The safe and cost-effective decommissioning and clean-up of the industry's power stations, decommissioned nuclear submarines and fuel-processing facilities, which are being progressively shut down, are providing technical and engineering challenges for the UK nuclear industry. The industry operators are supported by a wide variety of supply-chain companies, such as consultants, contractors, fabricators of specialist equipment, manufacturers and specialist service providers. Towards the end of 2008, Cogent, the UK's sector skills council (SSC) for the chemicals, pharmaceuticals, nuclear, oil, & gas, petrochemicals and polymers industries, commissioned in-depth research on the nuclear labour market in the sub-sectors of power generation, decommissioning, defence and nuclear new build. Today the combined technical workforce is estimated to be of the order of 44,000. It is estimated that over the next 15 years a shortfall across all skilled categories in the operating workforce will be of the order of 8,000. It is also estimated that there is an additional demand for 6,000 technical people in the specialist consultancy sector.

Whilst these demands are predominantly driven by the new build programme the impact will be felt in all sectors and as the UK's decommissioning programme (including the potential for a future deep geological repository) managed by the Nuclear Decommissioning Authority continues to grow the skills shortage across the industry will create a significant challenge to meet the demand for resources in all sectors. The UK is planning to close this gap by adopting a strategy of government assessment and facilitation together with an industry led programme of recruitment and retraining. One company that has taken a pro-active role in deploying this strategy is Atkins. Atkins is the UK's largest engineering consultancy and a key player in the nuclear sector with a presence in all sectors of the industry. In 2006 it put in place a capability strategy in response to the perceived skills gap subsequently confirmed by the Cogent survey. This was driven by a commercial recognition of the opportunity created by the skills gap and a determination to be a leader in the UK nuclear sector for decommissioning, generation, defence and new build.

In 2007 the UK launched the National Skills Academy for Nuclear and this has led to the creation of a national programme of training and skills provision. These three elements of government assessment and facilitation, national coordination of training provision and positive engagement from the industrial sector is starting to show results in the UK. This paper presents this story and discusses the merits of a nationally coordinated strategy for closing skills gaps in this critical sector of the energy industry.

INTRODUCTION

The UK is experiencing a "renaissance" of its nuclear industry. Following the adverse public perception created by the Three Mile Island accident in 1979 confidence in the UK new build programme was eroded resulting in a protracted public inquiry before planning permission was granted for the construction of the Sizewell B Pressurised Water Reactor (PWR) in 1987. The Chernobyl accident in 1986 was the last straw for public opinion and Sizewell was the last reactor to be built in the UK. However, long periods of safe operation, combined with concern over carbon emissions and energy security has led to a shift in public opinion resulting in the restart of the new build programme [1] with construction due to commence on new reactors in 2011. The decommissioning of the old nuclear power stations and the clean-up of the military and civilian fuel processing facilities has been the focus of the industry in the interim and this is the largest nuclear sector in the UK. This has led to the establishment of a major, integrated programme to remediate all decommissioned nuclear facilities. This major programme places a significant demand on the nuclear skill base. The coincident resurgence in the new build programme and the parallel programmes in the military sector to renew the attack submarine and deterrent fleets means that the demand for skills at all levels over the next 15 years is one of the key risks to achieving all of these programmes simultaneously. This has been recognised centrally and the UK Government has put in place collaborative programmes to assess and stimulate this market. At the same time industry has been investing in the development of skills and capability to

take full advantage of the opportunities presented by this situation. In this paper we will look at the demand in the decommissioning sector and the other nuclear sectors, consider the prospect that this can only delivered with a joined up national approach and look at the actions being taken at national level and by industry to address these issues.

THE DEMAND FROM THE DECOMMSSIONING SECTOR

As one of the pioneers of nuclear technology, the UK has accumulated a substantial legacy of radioactive waste from a variety of different nuclear programmes, both civil and defence related. Some of this waste is already in storage, but most forms part of existing facilities and will only become waste over the next several decades or so as these plants are decommissioned and cleaned-up. The UK has instigated a long term programme to ensure that all forms of radioactive waste are converted into a safe form for secure storage or disposal. This includes the continued provision of a national disposal facility for Low Level Waste (LLW), a programme of interim storage of Intermediate Level Waste (ILW), High Level Waste (HLW) & spent fuel, the development of a new long term national deep geological repository for ILW, HLW & spent fuel and the staged decommissioning, disposal and remediation of nuclear plants at the end of their useful life. In addition the UK still has to decide on its position regarding the reprocessing of spent fuel for re-use in existing and future reactors. This programme and the associated facilities were placed under the control of the newly formed Nuclear Decommissioning Authority (NDA) in 2004.

It is estimated that the total volume of waste that needs to be processed from existing nuclear facilities to the end of their useful lives is: HLW – 1,090m^3, ILW – 236,000m^3 and LLW – 3,190,000m^3 [1]. (Approximately 1,000,000m^3 has already been processed.) The majority of the future waste will be generated by the decommissioning of the current fleet of nuclear power stations and the remediation of the Sellafield site in Cumbria. Waste arising from the planned new nuclear power stations will be subject to a separate funded decommissioning plan that will explain how waste arising from operations and final decommissioning will be managed.

The majority of sites in the UK super-compact their waste and send it to the national LLW Repository at Drigg in Cumbria where it is stored in ISO containers in shallow, below-ground concrete vaults. The NDA and the Low level Waste Repository Ltd. (LLWR) are considering options for future storage requirements and techniques for size-reduction of solid components arising from the decommissioning of the UK's Magnox and Advanced Gas-Cooled Reactor (AGR) fleet of nuclear power stations. There is insufficient capacity at the LLWR to store all LLW arising from the decommissioning of the current fleet of power stations.

Inter mediate Level Waste stores are being constructed by site operators pending the longer term availability of the Deep Geological Repository (DGR). Although some ILW has already been packaged for eventual disposal, the majority will arise when facilities are dismantled, or when wastes are retrieved from those facilities in which they are currently held.

HLW arises from the reprocessing of spent fuel at Sellafield. This is in liquid form, about two thirds of which is held in storage tanks and is waiting to be treated. The other third has already been encapsulated into glass blocks (i.e. vitrified) and put in robust stainless steel containers. There is a systematic approach to reducing the volumes held in storage tanks, which will be completed in 2015. The timeframe for reducing the hazard presented by HLW is, therefore, dependent on the performance of the vitrification plants and future decisions on reprocessing. Treating this material and putting it into glass blocks and stainless steel containers for interim storage is the NDA's overriding waste priority.

In 2008 the UK committed itself to geological disposal of higher level wastes in line with the recommendations of the Committee on Radioactive Waste Management [2]. This will constitute a single facility for ILW, HLW, spent fuel and if necessary the reprocessed uranium & plutonium stockpile. This project is currently at the strategic site assessment stage and invitations have been invited from local communities that wish to host the DGR. Further research & development on the options for the facility itself and the containers to be stored there have been proposed.

The Sellafield site is the biggest focus of the NDA's activity and a number of remediation projects are underway to dispose of legacy fuel processing plant and storage facilities that have accumulated on the Sellafield site since the

1940's. The UK has committed itself to the continued production of MOX fuel at the Sellafield MOX Plant (SMP). The THORP plant at Sellafield will continue to reprocess fuel to deliver its current contractual commitments. This should run to about 2017. The UK has made no commitment to continue reprocessing after this date. The future storage or reprocessing of spent fuel and the management of the uranium and plutonium stockpile is under consideration by the NDA.

There are 9 shut-down reactor sites in the UK and 3 shut-down research reactor sites. These sites are implementing their decommissioning and site remediation plans. This is currently proposed to be a three-stage programme of removal of fuel and liquid wastes, demolition of auxiliary buildings & provision of interim on-site ILW stores, followed by long-term care and maintenance before final removal of the reactor buildings and remediation of the site.

In addition the UK Ministry of Defence (MOD) has 15 decommissioned submarines awaiting disposal and has initiated the Submarine Dismantling Project (SDP). The purpose of the SDP is to develop a solution for the disposal of the UK's nuclear submarines after they have left service with the Royal Navy. This project extends over a 60 year period and includes the provision of facilities to dismantle 27 defuelled nuclear submarines of past and current classes. Most of the material from each submarine will be recyclable; however, there will be some radioactive and non-radioactive hazardous wastes that will need to be dealt with. The project includes the interim storage on land of the resulting ILW until it is transferred to the DGR. It also includes the eventual decommissioning of the dismantling and storage facilities themselves.

The nuclear decommissioning programme in the UK is significant and technically challenging. The NDA programme alone is estimated to cost £75Bn to complete. It is also a technically challenging programme requiring a highly skilled workforce covering management, operation, design and assessment. In response to this the NDA has initiated a skills strategy (see Fig. 1 below), investing in key aspects of the "skills pyramid". Their Nuclear Graduate Programme has received a "Top 100" award from the Times newspaper and they have invested in a state of the art training facility in Cumbria: ENERGUS. However, there are significant challenges to the retention of the skilled workforce in the decommissioning sector and the main threat is in the form of the "nuclear renaissance" in the UK civil nuclear programme and the MOD's "next generation" programme.

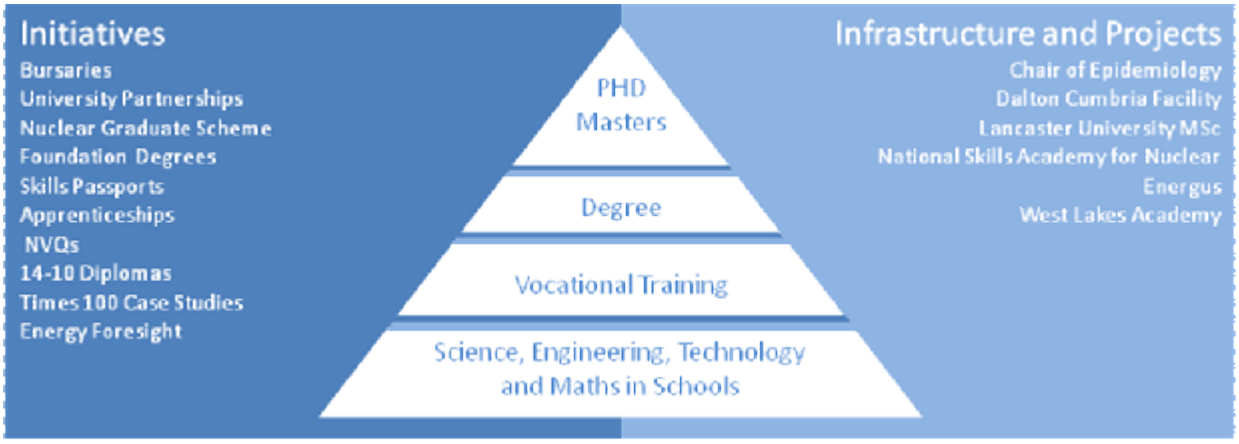

Fig. 1. NDA Skills Strategy [3]

THE DEMAND FROM OTHER SECTORS OF THE NUCLEAR INDUSTRY

Nuclear Power has long been a strategic element of energy policy and electricity generating capacity in the UK. Over half a century ago the skills of scientists and engineers produced the world's first commercial nuclear power station at Calder Hall in Cumbria. These ground-breaking UK developments marked the birth of an industry that has since expanded globally. As the older gas-cooled Magnox and AGR designs have shut down, the nuclear contribution to electricity generation has been in slow and steady decline. Currently there are 11 operating stations with a maximum theoretical capacity of about 11GWe. By 2023, the Sizewell PWR may be in sole operation unless new build nuclear is commissioned in the meantime. The earliest that new build nuclear could now come into

operation is late 2017. Without new build the current generating capacity will decline by 90% to 1.1 GWe by 2023. The industry's applications for 11 new nuclear new build sites have been published. The approval of these sites opens up potential for the private sector to deliver a new nuclear-powered estate with capacity beyond current levels. Three new build consortia have emerged and they have ownership of sites and have made public their plans to operate nuclear generating estates in the future. By 2012 the first new build stations are likely to have completed regulatory approval and site development will have begun. The build-up of the new nuclear operating workforce will be incremental from 2015 onwards and will require new skills for new technology. The stated objective of the UK is to have 12GW replacement capacity in place and generating by 2025.

Fuel manufacture takes place at Springfields, near Preston and enrichment at Capenhurst, near Chester, both in the North-West of England. This is a relatively small sector but has a highly skilled technical workforce. No major developments are planned in this sector.

The MOD has declared a policy to replace the existing fleet of Swiftsure and Trafalgar class nuclear attack submarines with up to 8 new Astute class submarines. This first of this replacement class went critical in October 2009. These submarines will be delivered on an 18 month "drumbeat". The UK has also commenced design on a 3 or 4 boat deterrent class submarine programme to replace the Trident D5 equipped Vanguard class submarines commencing in 2024 and has kept it options open on a successor for the Trident warhead design. The current fleet of 10 attack submarines and 4 deterrent submarines operates out of bases on the west coast of Scotland and the south coast of Devon. Submarines are maintained and overhauled at the Devonport dockyard in Devon adjacent to the naval base. The naval bases and Devonport dockyard have a significant demand for nuclear skilled workers. There is also a nuclear submarine shipyard in Cumbria but the nuclear skills required at this facility are relatively small.

THE DEMAND FOR A SKILLED WORKFORCE[1]

The net effect of these burgeoning nuclear programmes is a significant demand on the UK nuclear skills base. In response, Cogent, the UK's Sector Skills Council has undertaken labour market research to establish the current state of skills in the industry and to model the future skills requirements. The analysis completed to-date is the first stage in a process that leads to training and skills interventions to prevent predicted skills gaps arising and to ensure that the industry has a sustainable skills base, and is in a position to take advantage of the new build opportunities. The research addresses a major gap in national data and provides the evidence base for the authoritative voice on skills needs. Three skills drivers are analysed: an ageing workforce driving replacement demand; a shift in skills to decommissioning; and, demand for skills to operate a new fleet of nuclear power stations. While, the sector may have been aware (anecdotally) of these drivers, the defining contribution of Cogent analysis is in the robustness of the figures, the in-depth primary data and the peer-reviewed analysis.

For the civil nuclear workforce, the skills legacy is a positive position to grow from. Be it electricity generation, decommissioning or fuel processing, the workforce has current capability. This is a resource to be nurtured for a secure and sustainable energy future for the UK, for UK employment, and for UK interests globally. In contrast to the wide range of econometric data collected nationally for various economic sectors, there is a paucity of discrete national and international data that does justice to the labour market of the civil nuclear industry. This places great emphasis on the primary labour market research reported in the "Renaissance" series. The first report in the series [5], provides the most comprehensive industry-wide evidence to-date of skills in the civil nuclear industry of any nuclear-generating country, together with an outlook on the shape of skills to come.

A skills classification system, applied to labour market returns from all the operating companies, has allowed the workforce to be mapped by region, nation, skill level, age, sector, and job context. The civil nuclear industry today provides employment for 44,000 people. Of these, 24,000 are employed directly by the nuclear operators across three sectors – electricity generation, decommissioning, and fuel processing. The remainder is employed in the direct supply chain to the nuclear industry. The sectors are split across both public and private ownership, with the latter being prevalent in electricity generation. Of the 24,000 employed directly by the nuclear operating companies, decommissioning (12,000) is by far the largest sector, followed by electricity generation (7,500) and fuel processing (4,500). The North West of England has the largest employment, with 53% of the workforce overall, comprising 14% of electricity generation, 62% of decommissioning and 73% of fuel processing. The South West of England

[1] All data in this section has been obtained from [5]

(12%), Scotland (11%) and the South East of England (9%) are the next largest in employment. The North East of England, the East of England and North Wales have a 3% share, each, of the national employment of the sector. However, much of this picture will change within the decade.

The skill levels of the workforce are high, as would be expected for a safety critical industry. The combined technical, professional and senior management skill levels are typically close to, or in excess of, 70% in any of the sectors.

The core job contexts of energy production operations, decommissioning operations, processing operations and maintenance operations, make up 43% of the workforce. In balance, supporting and value-adding job contexts, such as project management, engineering design, safety and security, and business make up the bulk of the remaining employment (42%).

In order to assess the demand from new build nuclear a general reactor model has been developed using historical data. Each unit creates operating employment for up to 500 people. At least 350 are employed on site, with up to a further 150 employed elsewhere in the company. Future demand for skills depends on the model adopted for decommissioning and new build nuclear. The former is the largely predictable shift from electricity generation to decommissioning associated with the ageing AGR fleet; the latter is, to some extent, opaque and has been analysed using a replacement generating capacity scenario of 12 GWe at 2025 and lifetime extensions to existing fleet. Without new build the workforce is set to decline by 58% by 2025; with new build, the model projects new demand for 4,600 jobs in the electricity generating sector by 2025 with a sizeable impact on the supply chain as well.

The workforce is older than, and retires earlier than, the UK workforce in general. This lends a considerable level of complexity, urgency and flexibility to skills planning. The profile acts most harshly on the higher skilled and more experienced parts of the workforce. Here, up to 70% of current employees will retire by 2025. The age profile is the main determinant in the replacement generating capacity scenario; driving a general skills gap of up to 14,000 by 2025 (see Fig. 2 below). This converts to an industry requirement of the order of 1,000 new recruits per year, mainly as new apprentices and graduates. However, the new build driver of demand will draw in suitably experienced personnel from other sectors and possibly globally.

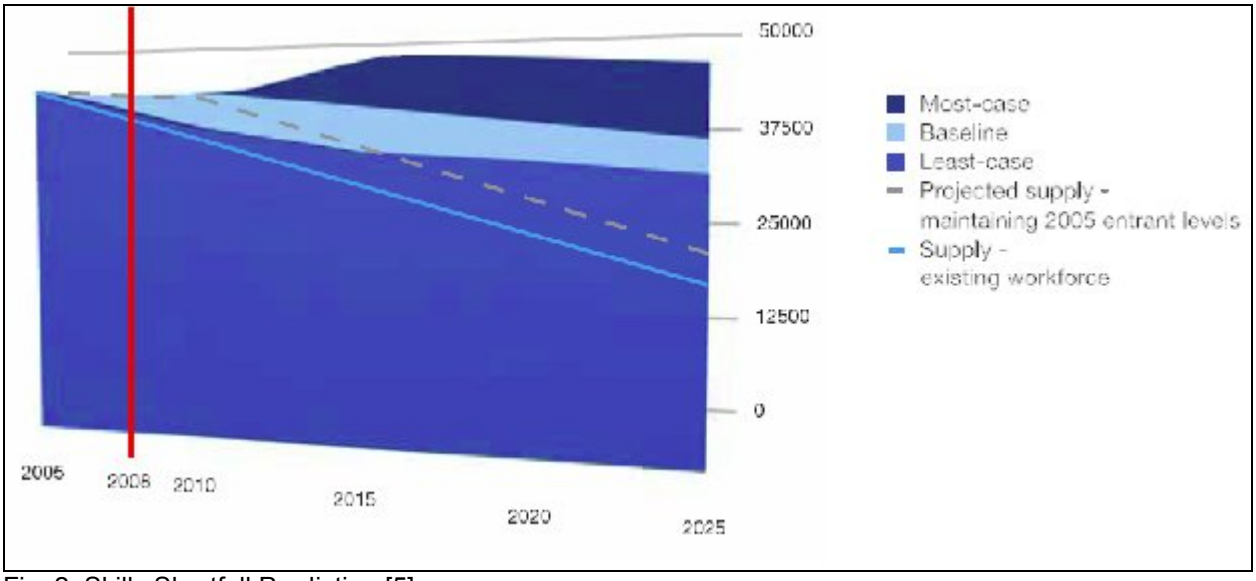

Fig. 2. Skills Shortfall Prediction [5]

The year 2015 appears to be a watershed year for skills. At this point many of the drivers of skills converge. By 2015, the retirement profile of the workforce begins to diverge significantly from that of the UK workforce; by 2015, the decommissioning of the old fleet will have taken hold; and, by 2015, recruitment and training for the new fleet must begin if the first are to commence operations from 2017.

The skills demand will follow the change in landscape by sector. This will be: stable numbers in decommissioning; decline in old electricity generation followed by expansion of new electricity generation; and, finally, decline in fuel processing. The most striking demand statistic is the demand without new build. In this case, regardless of scenario, the UK faces a reduction of 90% in the workforce employed in nuclear electricity generation. At the macro level, the skills challenge will be in managing skills supply and skills transitions. There will be locations where 'old' and 'new' generation nuclear may crossover. The regions concerned will hold nuclear literate workforces and communities. But the skills involved in new generation operations will have changed, with new technologies, new processes, new practices, new regulations and new owners.

In addition to the demand for technical skills to support the operations of nuclear facilities, there is the need for a skilled consultancy sector to support the Tier 1 companies (i.e. operators, designers and the new build consortia). This is driven by two factors: firstly the extent of the new build programme and secondly the supply chain strategies adopted by the Tier 1 companies. Over the last 10 years there has been a trend in the UK for the Tier 1 companies to adopt a more inclusive approach to partnering with strategic suppliers in the technical arena. A number of commercial approaches have been adopted, including outsourcing, strategic alliances and design and build contracts for construction of new facilities. This has created a demand for approximately 3,000 engineers in the consultancy sector, rising to 3,500 as the Tier 1 companies reach the full capacity of their outsourcing strategies. Using the replacement generating scenario of 12GWe this is likely to create an additional peak demand around 2013 of approximately 2,500 engineers. This requires the consultancy sector to provide approximately 6,000 engineers into the nuclear sector. The skill levels of these workers will be high, generally graduate, professional engineers.

NATIONAL SKILLS STRATEGY

In recognition of the need to adopt a national approach to addressing the skills gaps emerging in the nuclear industry the UK Government launched an employer led National Skills Academy for Nuclear (NSAN) in January 2008. This is a wholly owned subsidiary of Cogent and is jointly funded by UK Government (through the Learning and Skills Council) and its industry members. NSAN is currently delivering the following objectives:

- To develop the Nuclear Skills Passport for implementation in a secure environment, by the end of 2009.
- To appoint 40 new employers to the Associate Membership scheme.
- Further strengthen and develop the Provider Network in terms of both numbers and quality, appointing an additional 13 Providers to the Quality Assured Network.
- Achieve the learner registration targets of: 786 National Vocational Qualifications (NVQs) and 50 Foundation Degrees.
- Work with Cogent to establish a clear picture of future skills demands incorporating: New Build Programme and the Deep Geological Repository as well as the existing areas of focus of: The Fuel Cycle, Power Generation, Decommissioning, Defence and Waste Management.
- To develop a Five Year Strategic Plan to ensure the industry can meet its aspirations for 2020 having a suitably skilled, competent and safe workforce to achieve this vision.
- Ensure representation (via the CEO membership) of the Skills agenda into the Nuclear Development Forum, this key Employer Forum supports the Office of Nuclear Development.
- Work with employers and Cogent to ensure the right Career progression opportunities are in place across the Skills Pyramid.
- Further develop and strengthen international links to facilitate the sharing of best practice and the dissemination and embedding of the best international standards.
- Develop a 'Certificate of Nuclear Professionalism' a modular, post graduate framework, that will lead to the development and recognition of the right behaviours, skills and competencies in new graduate entrants to the sector and for those transferring into the nuclear industry from other sectors.
- Develop a Leadership and Management Action Plan to identify Associate Members training needs, requirements and solutions.

NSAN is working throughout the entire spectrum of the skills pyramid (see Fig. 3 below). Working with the Department Business, Innovation and Skills to improve schools provision of science, technical, engineering and mathematics (STEM) education right through to higher level post-graduate qualifications.

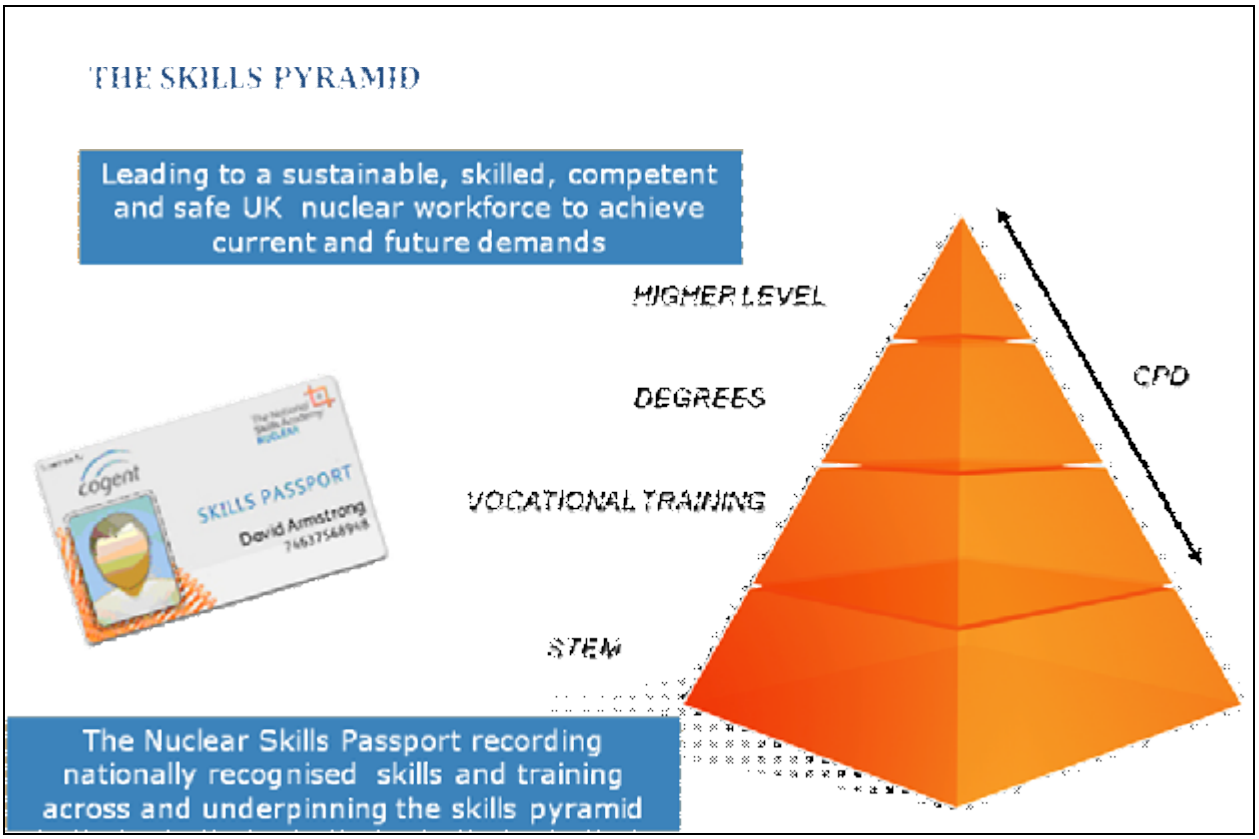

Fig. 3. The Nuclear Skills Pyramid

NSAN's plan is to facilitate the provision of appropriate training to apprentices, graduates, existing employees and people transferring into the sector by identifying the provision required and quality assured suppliers and courses to meet this provision. To some extent NSAN is a "meeting place" where members (i.e. employers) meet quality assured providers who can meet their training needs. In addition to this "virtual" academy NSAN has been instrumental in the launch of a bespoke nuclear training facility in Cumbria, ENERGUS, which has the modern standard facilities required for excellent provision of nuclear training. 2009 saw the first intake of apprentices into ENERGUS, increasing the number and quality of apprentices available to the nuclear sector; principally decommissioning and waste management.

A key concept of the NSAN provision is that skills and training are recorded on a *Skills Passport* that is common to all employers and is accepted by them enabling a greater flexibility of resource across the sectors and individual employers. This is particularly important for the supply chain, enabling suppliers in critical skills to demonstrate their capability to customers when they have not previously worked for them before. Essentially this is creating a nationally recognised record of Suitably Qualified and Experienced Persons (SQEP). The longer term aim is to prevent *churn* in the employment market avoiding the constant lay-off, recruitment and retraining of staff as one employer reduces their demand for SQEP as another increases their demand. The Skills Passport will be an IT based solution accessible to all members, enabling qualifications entered by one employer to be accepted by another. This will create a more mobile workforce enabling the UK to get maximum effectiveness out of its limited resources. Clearly this requires the employers to act in a *grown up* way accepting they may lose some staff as another sector starts to *boom* but equally they will benefit from this as their demand increases and it will also enable them to deal with *bust* scenarios as their demand reduces; hopefully eliminating the need for costly redundancy programmes. Some interest has already been expressed at the European Nuclear Education Network (ENEN) about this concept being rolled out on a pan-European basis.

At the higher level NSAN provides access to foundation degrees and is developing the concept of a Certificate of Nuclear Professionalism. A modular Continuing Professional Development (CPD) programme being developed in

conjunction with the distance learning specialists: the Open University, combining external provision and accredited employer programmes and placements. This will enable professional engineers to gain a nationally recognised post-graduate certificate in nuclear engineering aligned to the entry requirements of the Nuclear Institute (NI). Initially this will focus on behavioural skills, commercial, project management with a relatively small element of scientific skills.

INDUSTRY INVESTMENT IN SKILLS STRATEGIES

In response to the perceived nuclear skills gaps a number of companies have been systematically reviewing their own potential skills shortages and putting in place recruitment and training programmes to close these gaps. These have tended to be the Tier 1 companies but Atkins, the UK's largest engineering consultancy, has also been reviewing this market and taking action to take advantage of the opportunity presented by the potential growth in the market. Atkins first looked at the market with a view to taking action in 2006 before any national studies had been undertaken by Cogent and before the formation of NSAN. At that time training provision in the UK market was very poor with limited availability of some masters modules from academia but generally there was very little that was usable and available to a company such as Atkins that needs to maintain high productivity of its staff and therefore needs a more flexible approach to learning. Tier 1 companies had their own nuclear training plans but they were unavailable on the open market and very difficult for supply chain companies, such as Atkins to access. For this reason Atkins took the decision to invest in the creation of its own training delivery programme: the Atkins Training Academy (ATA). Initially this was to focus on nuclear training but over time would also provide training for the other energy related sectors of the company, i.e. oil & gas, power generation and electrical transmission & distribution.

The ATA was managed by the Human Resources (HR) group and a sponsor for the nuclear *curriculum* was attached to take an overview of the content and quality of the provision. The concept was that courses would be developed at introductory, intermediate and advanced level to cover the requirements of all staff and new recruits. Development of materials and delivery would be via a combination of universities, external subject matter experts (SME) and an internal SME. This was done with a view to being able to access the latest thinking on the topic with a pragmatic bent, utilising examples relevant to Atkins' nuclear business. Where possible existing externally provided training would be used, although this was limited to the advanced level where, for example, modules from the Nuclear Technology Education Consortium (NTEC)[2] masters programme in nuclear engineering were available.

A market assessment was carried out to identify the key skills required to support the nuclear industry. This identified 48 skills in 10 subject areas. To cover this demand, 13 in-house courses were developed and 16 external courses (all at the advanced level) were identified. The 13 introductory and intermediate courses developed were:

- Introduction to the Nuclear Industry
- Radiological Protection Pathway
- Nuclear Safety Case
- Engineering Substantiation
- Introduction to Nuclear Physics (with Surrey University – see Fig. 4)
- Nuclear Conversion Course (with Surrey University)
- Decommissioning and Radioactive Waste Management
- Introduction to Contaminated Land
- New Generation Reactor Technology (with the Nuclear Department at HMS Sultan)
- AGR Familiarisation
- Fissile Materials – Systems and Processes
- Control & Instrumentation in the Nuclear Industry

[2] NTEC is a consortium of universities and higher education establishments with nuclear schools

Fig. 4. Introduction to Nuclear Physics (Surrey University)

These courses are generally two to three days long to ensure they are compatible with existing business commitments in an already stretched sector. In addition two further courses are being developed covering nuclear safety culture and high integrity lifting & handling.

To-date over 550 engineers have used the ATA to develop their nuclear skills. Many of these are engineers from Atkins' businesses outside the nuclear sector but with related skills, such as building service engineers from the design industry, systems engineers from defence and stress engineers from oil & gas. This ability to access relatively large numbers of engineers with the relevant technical skills but with no knowledge of the nuclear sector and convert them into capable nuclear engineers is considered to be a significant source of SQEP staff to support the ambitious demands of the UK nuclear industry over the next few years.

The ATA is now being offered to clients and other partner organisations and Atkins is starting to discuss the potential for third party organisations to take over the delivery of the curriculum creating the possibility for it to be offered commercially on an open basis.

A JOINED UP APPROACH

The NDA, Cogent, NSAN and industry programmes are coming together in a single programme; a national programme with common goals, making the most efficient use of the limited resources available. The extent of collaboration and joint planning is impressive. The Office for Nuclear Development (OND) has produced a common framework for the development of the nuclear industry; putting in place the key enabling factors that will allow the industry to grow and embrace the new build programme whilst delivering its existing commitments. Reform of the planning system, overhaul of the regulatory system, a policy on funding for decommissioning at the point of build all come together in a single coherent programme. The approach to identifying and resolving the skills shortage is another example of this joined up approach to facilitating the development of the nuclear industry. A number of

meetings have been established for government and industry to plan the way forward. The Nuclear Development Forum brings together all the key players to agree the strategic approach at national level, a number of employer steering groups at NSAN and Cogent set the scene for the development of skills. The open approach of industry making their own skills assessments and training provision available to the wider community is impressive in a competitive marketplace.

RISKS

A number of risks threaten the delivery of this joined up approach and they are:

- The global challenge and world-wide capacity in nuclear skills: A number of countries are investing in new nuclear programmes and more are expected to follow. Ultimately there is only so much capacity world-wide. If this is not managed the foreign investors in UK nuclear may have to choose between investment in one country or another. The UK is addressing this by making the UK attractive to foreign investment with obvious Government support and a fully engaged and capable indigenous industry. NSAN has also been pro-active in suggesting a joint European programme modelled on the UK approach may be beneficial.
- The new build programme depends upon the timely approval of the new reactor design submitted by EdF/Areva and Toshiba-Westinghouse. The early submission of these applications is a key mitigating action; as is the staged approach to the assessment of the designs.
- The need for industry to invest in developing its skill base before the work is actually available. The Tier 1 companies have done this as they have a vested interest. Atkins has shown significant commitment to the programme by doing this in the consultancy sector. Others will need to follow to meet the likely demand on-time.
- The simultaneous release of major programmes for decommissioning, new build and replacement submarines places a significant peak in the resource demand. This will be difficult to cope with.
- The “drumbeat” for the subsequent placement of orders for power stations and submarines will be critical to ensuring the investment in training has a long term pay-off with no long periods of down-time waiting for the next order to come through.

These risks are being managed through the various forums that have been established. However, the risks are very real and contingency actions will be required should prove to be impossible to mitigate all the risks effectively.

THE FUTURE

The UK now has a well developed infrastructure for ensuring it has the skills available to meet the energy and defence challenges laid down by Government. The OND are setting the overall programme, the NDA are delivering a major part of that programme with the ultimate aim of providing a modern waste management and decommissioning sector based on deep geological disposal, the new build consortia are finding the UK a good place to do business and the ambition of bringing on stream an additional 12GWe seems realistic. Cogent are identifying the skills demands arising from these programmes and NSAN and industry are working together to develop the additional SQEP resource required to meet the challenge. The UK has never had a single nuclear programme since Calder Hall went critical in 1956 and created the civil nuclear programme. It still not quite there yet, but the combined efforts of Government and industry to achieve this suggests it is not far off. The benefits of a single programme in the context of specialised, scarce resources are that a flexible and mobile intelligent workforce gives the UK the best opportunity to deliver all its energy and defence objectives. It may have taken some time to get to this position but the reality of this achievement will be genuinely impressive.

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