

A construction worker wearing a hard hat and a safety vest is looking down at a large crane arm at a construction site. The background shows a hazy sky and some construction equipment.

PART C

Opportunities vs Capabilities

5. Supply Chain Capability Gap Analysis

5.1 UK Nuclear Supply Chain Capability Survey

A recent DTI and Scottish Enterprise study of the UK nuclear industry supply chain has already identified the decommissioning lifecycle and the supply chain capabilities required for a Magnox reactor. The Nuclear Decommissioning Opportunities report can be found on the DTI website www.dti.gov.uk/energy/eid/nuclear_decom.shtml. The assessment of supplier capabilities required at each stage of decommissioning remain valid in areas where they are strong and also where without development the supply chain may not be able to support the UK industry in achieving its stated decommissioning objectives.

A survey of a typical cross section of nuclear industry suppliers drawn from 90 NIA member companies during this study has shown they could all be allocated to one or more of 26 different categories of supply which is based upon and includes those obtained through analysis of capabilities required for nuclear decommissioning in the DTI and Scottish Enterprise study referenced. The survey results are outlined in table 5.1 below and the implications are discussed further.

Table 5.1 Survey of UK Supply Chain Capabilities

Capabilities	No of firms
Project management (HV)	19
Project management (LV)	28
Nuclear design	18
Facilities management	12
HP Services	7
Decontamination Services	6
Nuclear ventilation	3
Safety case services	2
Asbestos removal	4
General construction	9
Conventional design	18
Contam coolant treatment	5
Effluent treatment	3
Mechanical handling	12
Remote mech handling	9
Site remediation	16
Conventional demolition	11
Nuclear demolition	11
IT ECI Measurement	16
ILW process design	7
ILW packaging	7
Utility fabric upgrading	2
Depository design/build	10
Consulting svcs & studies	26
Legal services	6
Others (trng,ins,v/v,s)	6

The results in the table for each of the capabilities need careful interpretation since they need to be balanced in terms of demand (which may differ at different stages in the decommissioning process) and also several additional factors need to be taken into account. Not least of these is the anticipated upturn in decommissioning activities across the board in the UK together

with the recent upturn in companies entering the decommissioning market and the fact that the 90 companies in the survey are the primary UK nuclear industry decommissioning market contractors. Hence the views of representatives from a number of companies working in the sector have also been taken into account.

Reference to table 5.1 above indicates a shortage of companies providing nuclear ventilation, asbestos removal, effluent treatment and utility fabric upgrading services. There also appears to be fewer companies providing Health Physics and nuclear decontamination services, contaminated coolant treatment, remote mechanical handling and ILW process design and packaging. These activities are in demand early in the decommissioning process and as a result development of the supply chain is required in these areas. A distinct shortage of radiochemists has been reported by those involved in servicing the industry and also Radiation Protection Advisors and Health Physics Monitors.

The table indicates relative strength in project management for smaller projects and consulting services and this has implications for global resource diversification.

For capabilities including management of major projects, nuclear and conventional design, safety case services and site remediation the numbers too are higher but careful interpretation and consultation with industry is needed.

For project management, this reflects to some extent the larger overseas companies that have entered the decommissioning market in the UK in recent times that have these capabilities. However, it is generally considered that project management skills for major projects are in high demand and this is an area where significant development could be required.

Whilst there are a number of companies providing nuclear design services the number does not reflect the shortage of specialists involved such as knowledge of how radioactivity affects systems and what process design issues this raises. The shortage of radiochemistry professionals reported above needs to be addressed.

Safety case service providers are reporting having difficulty locating safety case authors with appropriate specialist experience. Hence whilst there are a number of companies providing the service they are all competing in a common pool of resource and this is an area in need of development.

5.2 Global Demand versus Capability Survey

For the UK it has been possible to conduct a demand versus capability analysis for each of the 26 different areas of supply included in table 5.1 above and this is presented in table 5.2 overleaf.

However, little information on skills shortages or strengths in the global nuclear community exists and so a subjective approach has been taken to collate information in this area through discussion with UK and overseas companies and Embassies working in those countries.

Table 5.2 – Demand/Capability Analysis

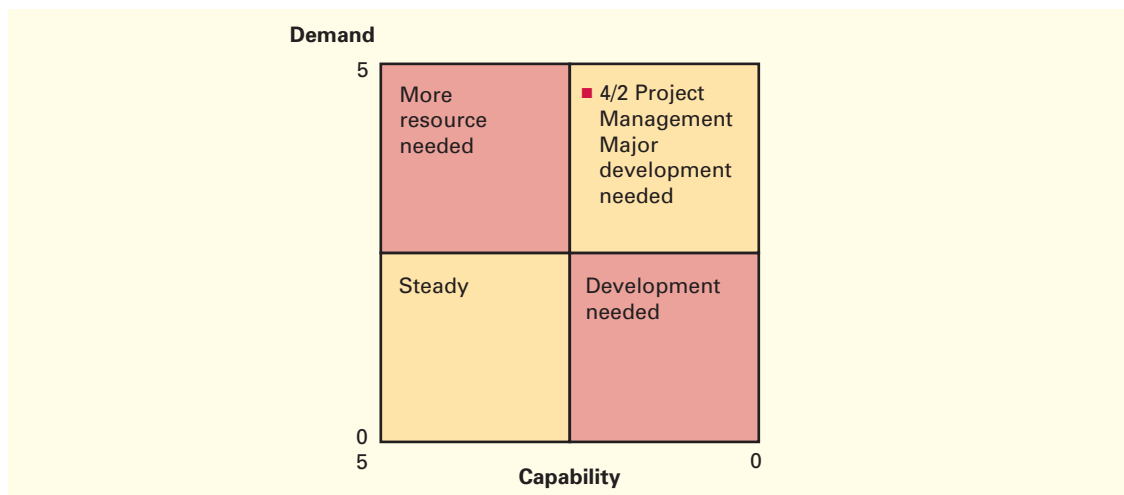
Country	Demand Capability	Project management (HV)	Project management (LV)	Nuclear design	Facilities management	HP Services	Decontamination Services	Nuclear ventilation	Safety case services	Asbestos removal	General construction/dismantling	Conventional design	Contam coolant treatment	Effluent treatment	Mechanical handling	Remote mech handling	Site remediation	Conventional demolition	Nuclear demolition	IT ECI Measurement Cabling	ILW process design	ILW packaging	Utility fabric upgrading	Depository design/build	Consulting svcs studies	Legal Services	Others e.g. trng/insurance/ v/v's
UK	Demand (D) Capability (C)	4 2	3 4	3 2	4 2	4 2	3 3	3 3	4 2	4 3	4 3	3 4	2 2	4 3	4 3	4 3	2.5 4	2.5 3	2.5 3	2.5 4	2.5 3	2.5 3	2.5 4	2.5 3	2.5 3	2.5 3	2.5 3
USA	Demand Vs capability	A fully funded market with a developed decommissioning infrastructure with significant companies providing project management expertise. A study has shown an ageing workforce and that nuclear skill retention measures are required. A shortage of Health Physicists, nuclear engineers, radiochemists and welders has been identified. Based on the size of the decommissioning market and its potential, demand for these skills is likely to remain high. (High demand with high capability with some skill shortages in particular areas).																									
France	Demand Vs capability	A fully funded market with developing decommissioning experience. Significant organisations providing research and project management expertise. Good demand for techniques required for handling waste and decommissioning. However this is largely being met by own resources to date. Demand in these areas is likely to increase as radioactive waste clean up and decommissioning gathers momentum in the near term.																									
Germany	Demand Vs capability	A fully funded market with significant decommissioning experience and infrastructure. Germany has significant companies and organisations providing research and project management capability and has a high demand for radioactive waste management and decommissioning techniques which are largely available to them. This demand is set to increase as radioactive waste clean up and decommissioning gathers momentum in the short to mid term.																									
Canada	Demand Vs capability	A fully funded market with developing decommissioning experience. Significant companies and organisations providing research and project management capability. Some demand for capabilities for waste management and decommissioning which is largely met by in country resources to date. The demand is set to increase but not in the short term.																									
Japan	Demand Vs capability	A fully funded market with developing decommissioning experience. Significant companies and organisations providing research and project management expertise. Some demand for capabilities in waste management and decommissioning technologies which are met by in country resources to date. The demand for these skills and technologies is set to increase in the near term.																									
Sweden	Demand Vs capability	A funded market with some decommissioning experience available but provided in part by international companies. Project management, waste management and decommissioning techniques and technologies will be in demand as the NPP's close, some in the near term. It is likely that decommissioning activities will be performed in close co-operation between the licensees and SKB, a company owned and funded by the licensees. SKB is also planning to build a long term deep disposal facility in Sweden.																									
Russia	Demand Vs capability	Russia is receiving substantial aid under the G8 Global Partnership funding with projects administered by EBRD, TACIS and other organisations. Russia's own resources are not sufficient to deal with the decommissioning and clean up requirements so waste management and decommissioning skills and technologies in all areas are in demand. This will continue to grow as more projects are funded and NPP's retire.																									
Spain	Demand Vs capability	A fully funded market with some decommissioning experience and some significant companies and organisations providing research and project management capability. There is some demand for waste management and decommissioning techniques and capabilities which is set to increase in the near term.																									
Ukraine	Demand Vs capability	Following the USSR break up a considerable part of the nuclear power scientific and technical support functions remained in Russia. Energoatom of Russia provides design, scientific and research support through appropriate Russian facilities until the Ukraine has built up its own resources. The EU has been providing assistance to the Ukraine through the TACIS programme to improve safety at the NPP's and further international safety programmes and assistance have been implemented including the Chernobyl NPP. Waste management and decommissioning skills and resources are in demand and this is set to increase as decommissioning projects are implemented.																									

5.3 Gap Analysis from Table 5.

The results of the demand/capability analysis for the UK can be interpreted using the Chart Fig 5.1 below where:-

1=Very low, 2 =Low, 3 = Medium, 4 = Good, 5 = Strong

Hence for Project Management (High Value) with co-ordinates 4/2, major development is needed to combat shortages in the UK.



From the above exercise it can be seen that for the UK, project management (high value), nuclear design, facilities management, health physics services, safety case services and depository design are all areas where there are likely to be shortages and major development is needed. Development is also needed in the areas of contaminated coolant treatment. Areas requiring more resource and where demand is strong include: decontamination services; nuclear ventilation; effluent treatment; mechanical handling; remote mechanical handling and EC&I.

The UK, USA, France and Germany already have a developed decommissioning infrastructure with significant contracting companies providing project management expertise and the UK, USA and France in particular are taking steps to ensure they have all of the technical skills and expertise they need for their nuclear decommissioning programmes.

However, a DTI study in the UK and a study by the Nuclear Energy Institute in the USA (www.nei.org) shows that nuclear skills retention measures are required and in the USA a survey highlighted shortages of Health Physicists, nuclear engineers and radiochemists together with welders and an ageing workforce in the industry. The skills shortages identified in the UK study are included in Part B section 4.3.5.3.

Discussion with companies working in Western and Eastern Europe indicate that a shortage in a number of skill areas exists in a number of those countries also. However, no definitive studies appear to have been undertaken in this area other than the UK and USA although it is likely they will be in areas of specialist technical expertise required for decommissioning such as those already in limited supply in the UK.

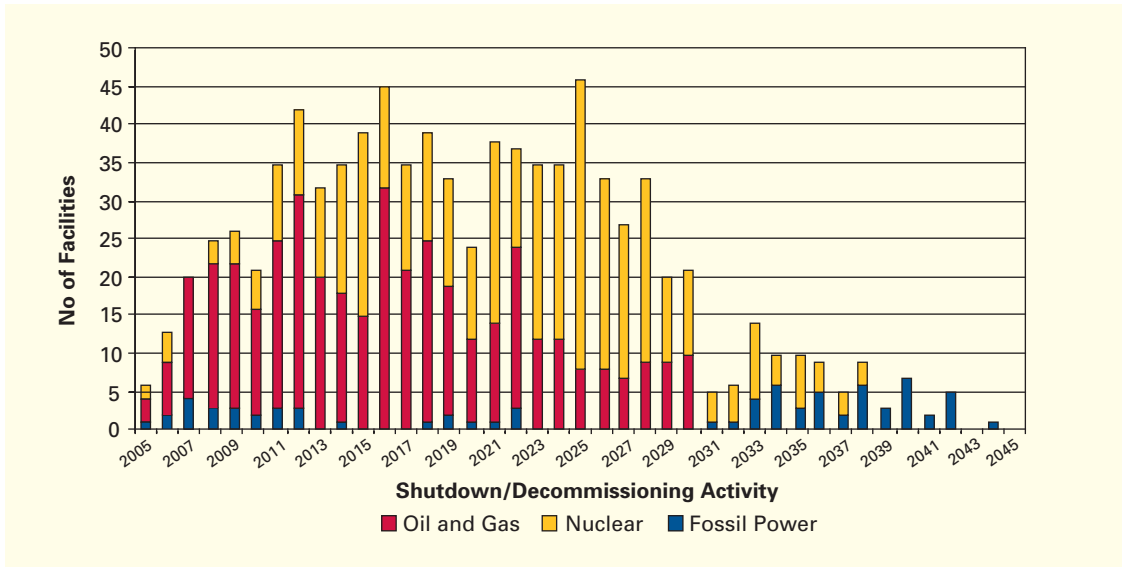
Russia and the Ukraine have significant nuclear legacies that they do not have the resources to deal with alone and are receiving international funding and technological assistance. These countries have significant projects employing European, Japanese and North American companies involved in nuclear clean up and decommissioning work including the UK. These countries and some other FSU and Eastern European countries may provide the best opportunity for a Small or Medium Enterprise wishing to enter the overseas decommissioning market by partnering or alliancing with a UK or foreign company which already has a presence in the market there.

For all countries it is clear that the demand for the techniques, technology and skills required for decommissioning is set to increase greatly over the next 10 to 15 years and it is by no means clear that sufficient capability will exist in these areas of supply at the appropriate time. This is heightened when one considers the future worldwide demand for a number of potentially similar skills across the whole industrial arena in areas such as new nuclear power plant construction, nuclear waste repositories, defence, oil, gas, shipbuilding, conventional power plant, rail, aerospace, mining etc. Capacity issues are discussed in the following section.

5.4 UK Supply Chain Capacity

Results from the study show there is scope for capability transfer between nuclear and non-nuclear industries. However, decommissioning in nuclear and non-nuclear industries combined with wider sectoral activity e.g. new power station construction, MOD shipbuilding, transportation etc; in the UK and overseas over the next 40 years could result in acute skills and capacity shortages. For example, the combined decommissioning timelines for the energy sector alone suggests a sevenfold increase in decommissioning over the next 12 years.

Figure 5.4 Forecast Energy Decommissioning Activity (2005-2045)



The previous results identified a number of current gaps and weaknesses in decommissioning supply chain capabilities in the UK to meet current demand. The above growth forecasts suggest that the UK will have to substantially increase its supply chain capacity as well as capability to meet future UK and global market demand. There is a risk that supplier capacity weaknesses could impact on planned decommissioning targets, lost export opportunities and increased competition from overseas companies. This strongly suggests action will be required by government and industry to increase UK supplier capability and capacity through skills transfer and development; technology and capability transfer from other sectors is needed to develop the existing supply industry.

6. Opportunity/Capability Mapping

6.1 Opportunities/Areas for Capability Transfer in the Nuclear Industry

6.1.1 Nuclear

Table 6.1 overleaf provides an analysis of potential for capability transfer from the nuclear decommissioning supply chain into other sectors of industry in the UK.

Table 6.1: UK Nuclear Supply Chain Capability Transfer

	Other (Insure/Training /valves)							
	Legal Services							
	Consulting svcs studies							
	Depository design/build							
	Utility fabric upgrading							
	ILW packaging							
	ILW process design							
	IT ECI Measurement Cabling							
	Nuclear demolition							
	Conventional demolition							
	Site remediation							
	Remote mech handling							
	Mechanical handling							
	Effluent treatment							
	Contam coolant treatment							
	Conventional design							
	General construction/dismantling							
	Asbestos removal							
	Safety case services							
	Nuclear ventilation							
	Decontamination Services							
	HP Services							
	Facilities management							
	Nuclear design							
	Project management (LV)							
	Project management (HV)							
	Typical Supplier Opportunity	Drill cuttings Footings Pipelines Platforms Removal/treatment Disposal Encasement Project Man.	Project Man. Remediation Dismantling Disposal Recycling	Project Man. Waste management Remediation Dismantling Demolition	Project Man. Demolition Waste management Site rehabilitation Monitoring & Main	Project Man. Asbestos removal Waste management Site remediation Demolition Dismantling General Const. Disposal	As above	As above
Sector	Oil/ gas offshore							
	Ship breaking							
	MOD/Defence							
	Mining							
	Power Generation Plant							
	Refineries							
	Industrial plant							

The analysis carried out in table 6.1 above shows there is good potential for transfer of some of the capabilities existing in the nuclear industry supply chain into other sectors of industry in the UK.

Other sectors include oil/gas offshore, ship breaking, MOD /defence, mining, fossil power generation plant refineries and other industrial plants, e.g., pharmaceuticals, district heating etc.

Capabilities that could be transferred into these sectors include project management, asbestos removal, decontamination services (chemicals etc), general construction, conventional design, conventional demolition, mechanical handling, site remediation (conventional), IT and IC&E, measuring instruments (conventional), fabric upgrading, consulting, legal and insurance services and conventional component supply.

6.1.2 Non Nuclear

A review of the current UK supplier capability was undertaken by identifying the number of companies supplying 29 categories of goods and services to seven non-nuclear decommissioning markets in the UK. Overall supplier capability was rated either strong e.g. >5 suppliers (■) or weak e.g. 1-5 (▶) where this is demand for the service.

Table 6.2 UK Non-Nuclear Supply Chain Capabilities

Sector	Project management (HV)	Project management (LV)	Nuclear design	Facilities management	HP Services	Decontamination Services	Nuclear ventilation	Safety case services	Asbestos removal	General construction/dismantling	Conventional design	Contam coolant treatment	Effluent treatment	Mechanical handling	Remote mech handling	Site remediation	Conventional demolition	Nuclear demolition	IT ECI Measurement Cabling	ILW process design	ILW packaging	Utility fabric upgrading	Depository design/build	Consulting svcs studies	Legal Services	Other (Insure/Training /valves)	Waste Management/Recycling	Maintenance / Monitoring
Oil & gas Offshore	■	■		■		■		■	■	■	■	■	■	■	■	■			■					■	■	■	■	■
Green Ship breaking	▶	▶				▶		▶	■	▶		■	■	▶											▶	▶	■	
MOD/ Defence	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■			■	■	■	■	■
Mining	■	■		■				■		■			■	■		■	■					■		■	■	■	■	■
Fossil Fuel Power Gen.	■	■		■		■		■	■	■	■		■		■	■	■		■			■		■	■	■	■	■

The survey indicates that the UK has a relatively strong decommissioning supply industry, covering most non nuclear markets. It should be noted that suppliers may provide services to several markets. The results indicate relatively strong cross-sector supplier capability in:

- Project management
- Facilities management
- Safety case services
- Decontamination services
- Asbestos removal
- General construction
- Effluent treatment
- Mechanical handling
- Site remediation
- Consultancy services
- Legal services
- Waste management/recycling

6.2 Opportunities for Product/Market Diversification

6.2.1 Nuclear

Decommissioning nuclear facilities involves various dismantling techniques, e.g., mechanical or thermal cutting, sawing and decommissioning buildings. These techniques are available in the non-nuclear area and may be adapted to the decommissioning nuclear facilities in such a way that the protection of individuals from inhalation/ingestion of radionuclides and from direct radiation is effectively ensured. The required protection may be provided by applying for example remote techniques, working under water, providing shielding and installation of appropriate ventilation systems.

6.2.2 Non Nuclear

It should be noted the above rankings are only to provide an indication of opportunity potential. Companies should undertake a detailed assessment of the opportunities before making decisions on future market entry.

The wider UK non nuclear industry has capability strengths that fit with capability/capacity shortages in nuclear decommissioning, which provide potential product/market diversification opportunities for capability transfer into nuclear decommissioning. These include asbestos removal (e.g. fossil fuel power plant, offshore, industrial plant and MOD defence), effluent treatment (e.g. mining, oil & gas and MOD defence), mechanical handling (oil & gas, MOD defence, mining and fossil fuel power plant) and remote handling/control (offshore and defence).