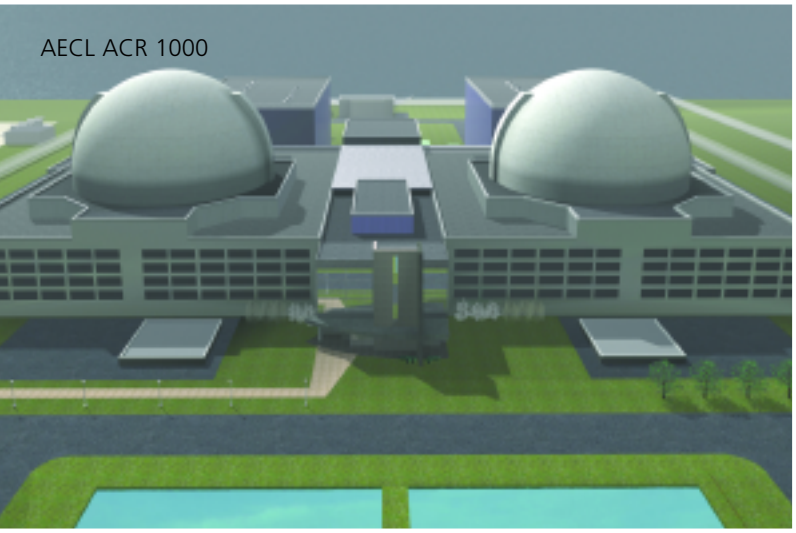
Nuclear Industry Association

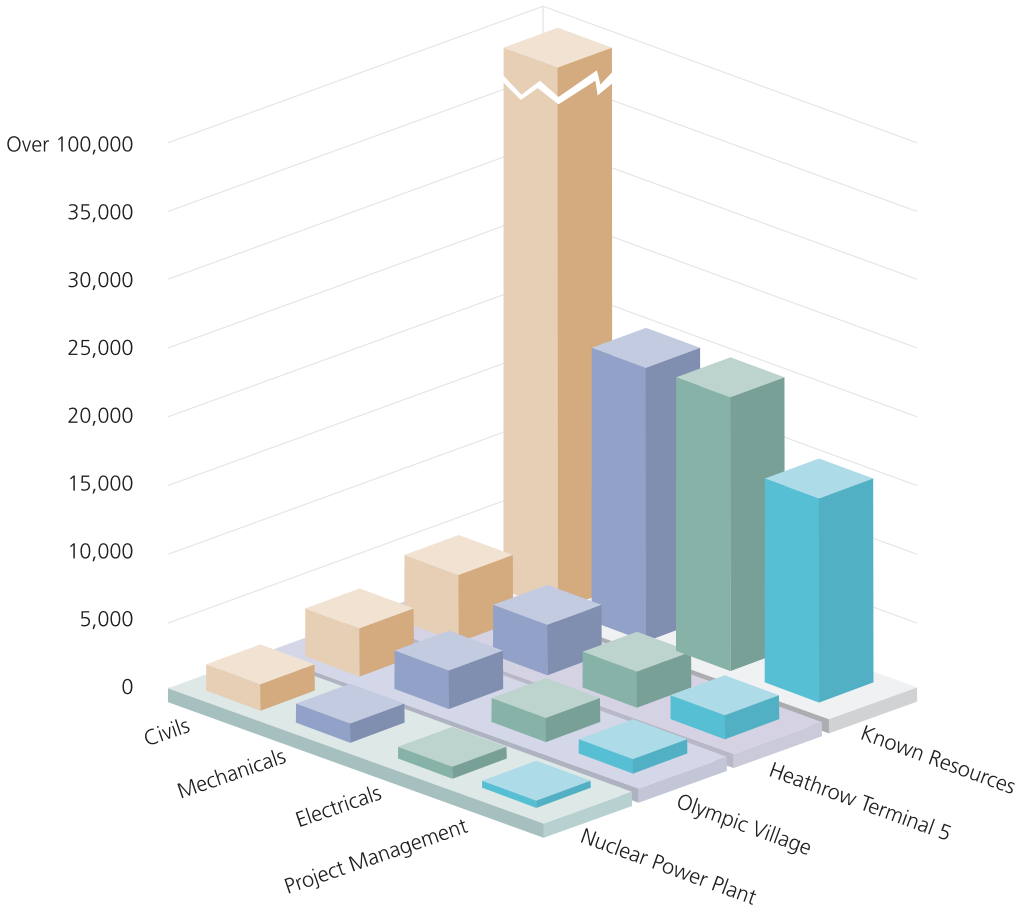
The UK capability to deliver a new nuclear build programme

2008 Update

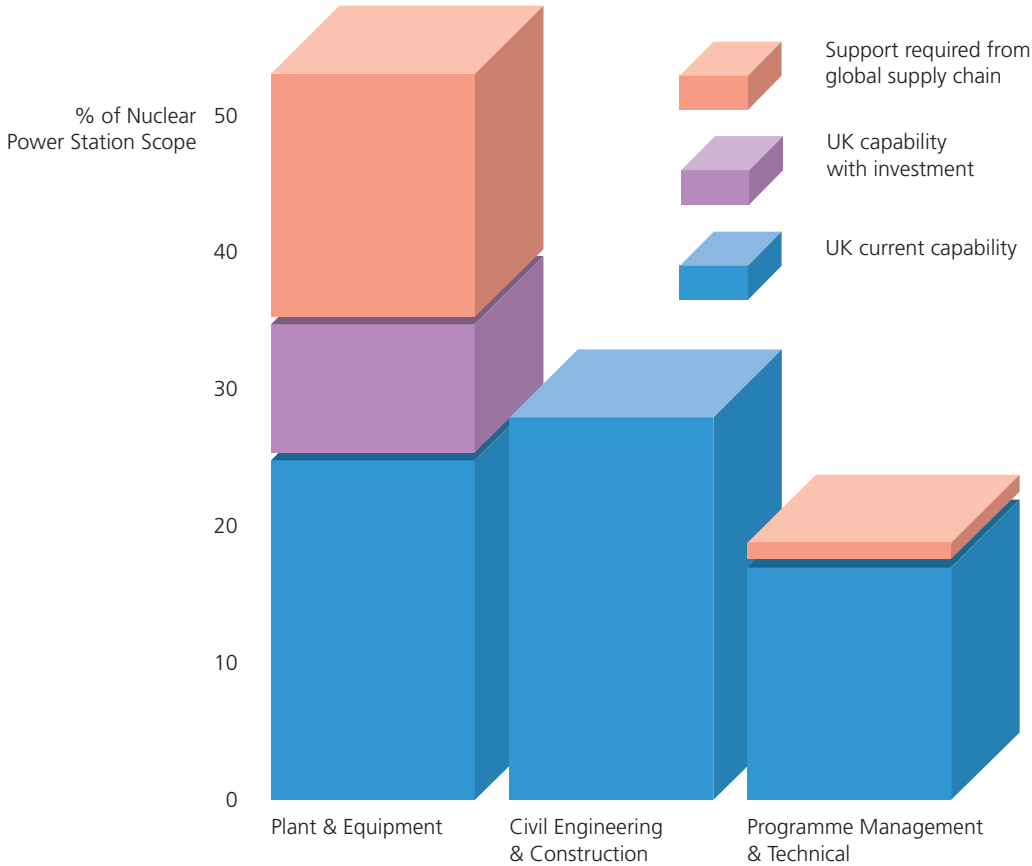


The UK - delivering a nuclear future

Trade Skills - Known resources compared to major project requirements



% of Nuclear Power Station Scope



UK Capability to Deliver a New Nuclear Build Programme

Summary and Conclusions

Following the Government's announcement in January 2008 that it was in the public interest for new nuclear power stations to play a role in the UK's future energy mix, along with other low carbon energy sources, the Nuclear Industry Association (NIA) reviewed its original 2005/06 study on "UK capability to deliver a new nuclear build programme"(Note 1). This included all four designs (Note 2) that had been submitted to the Nuclear Installations Inspectorate (NII) for Generic Design Assessment, and assessed the impact of other key developments since the March 2006 report.

The review found that the conclusions of the original study, that the UK is capable of building a programme of new nuclear power plants, are still valid and in fact there have been several changes for the better:-

- The vendors of the four designs submitted for assessment by the Nuclear Installation Inspectorate (NII) have clearly described the equipment they require and their global procurement policies, such that the UK supply chain has been able to take a more informed and pragmatic view of what it can deliver.
- The Energy and Planning Bills provide greater clarity on timescales for approvals and are thus giving industry greater confidence about when a new programme might begin, enabling more informed judgement about investments, resources and facilities.
- Positive actions by Government, the Training Boards, Universities and industry on skills requirements and programmes have been initiated to significantly increase the numbers of trades and professional engineering resources in the UK.
- Prospect and Unite trade unions support new nuclear and the re-skilling/training initiatives that have been implemented.

The original conclusions were confirmed:-

- Approximately 80% of nuclear new build is not nuclear, but is similar to other major construction projects.
- UK industry could supply 70% to 80% of a new build programme.
- Less than 5% of the current UK construction resources will be required across the board, with significantly less in some skill areas.
- With careful management such resources could be recruited and trained during the project development, planning and licensing period.

It is still recognised that some of the key components, e.g. very large forgings, reactor pressure vessels, turbo/generators, currently cannot be produced by UK companies and will come from the very few overseas companies with this capability. However, Sheffield Forgemasters is planning to extend its capability into very large forgings. This, along with increases in capacity by Japan Steel and Doosan Heavy Industries, will ease the scarcity of these components, but forecast demand will still outstrip supply for several years to come.

It is also recognised that procurement of equipment and services must be competitive and reliable and that procurers will have no obligation to use UK suppliers. However, the ongoing dialogue between the nuclear vendors and the UK suppliers is positive and encouraging.

Note 1: 'UK capability to deliver a new nuclear build programme' is accessible on the NIA website: http://www.niauk.org/position-papers.html.

Note 2: On 4th April 2008 AECL announced that in order to address major nuclear new build opportunities in Canada it would defer further participation in the UK's Generic Design Assessment until the joint regulators' second wave. We have, however, retained the ACR 1000 and AECL's contribution in this update.

Less than 5% of the current UK construction resources are needed to build a fleet of new nuclear power stations

Key Developments since March 2006

This 2008 update addressed only the developments that affect the supply chain. It did not address issues associated with the need or the benefits of new nuclear power stations.

- **Designs submitted to the NII for initial safety assessment,** known as the Generic Design Assessment (GDA)

  Four designs have successfully passed Stage 2 of the GDA:-

  - AECL ACR 1000 (1165 MW, CANDU) (see Note 2, page 2)
  - AREVA EPR (1650 MW, PWR)
  - GE-Hitachi ESBWR (1550 MW, BWR)
  - Westinghouse AP1000 (1100 MW, PWR)

  (For reference, Sizewell B is a 1200 MW, PWR)

  However, AECL has decided to defer further participation at this stage to concentrate on its home market. The other three will continue to the next stage of assessment.

  This update does not compare these four designs, but with the help of the vendors, NIA has reviewed the March 2006 study, which concentrated on PWR technology, and concludes that, although there are differences in the four designs, in broad terms, there is little difference between them in terms of manpower requirements for project services, construction and installation. Some differences will exist between them for factory manufacturing, dependent mainly on the amount of modularisation within each of the designs, and of course one design (ESBWR) does not have steam generators and another (ACR1000) does not have a reactor pressure vessel.

  The views of the vendors are that, overall, the March 2006 report is fair and, as a scoping exercise, estimates reasonably accurately the manpower requirements for all four designs.

- **UK Resource**

  It is intended that the design(s) selected for the UK will be internationally standardised and probably will have been built elsewhere before being built in the UK. Thus there will not be the need for large numbers of design engineers and scientists, as were required for Sizewell B. Also, many of the skills for construction of new plants will be similar to those used on other major construction projects, for example project management and project engineering, rather than specific nuclear skills.

  Specific nuclear skills will, however, be required during the Generic Design Assessment, commissioning and operation of the stations.

  Several initiatives that were recommended or were being conceived in, or since, 2005/06, have now come to fruition.

Contractors are gearing up for new power stations, whether fossil, renewable or nuclear

The **Engineering Contracting Industry Training Board (ECITB)** and the **Civil Industry Training Board (CITB)**

The ECITB has tripled its apprentice intake over the last two years to ~1,000 in 2008 and plans to continue increasing its intake to meet the demand forecasts for 2014 onwards, including nuclear new build. In 2008 it will also put 2,000 people through "Up-skilling" and "Re-skilling" programmes plus 4,000 people through technical supervisory programmes. Over the period 2008 to 2012, £18m pa will be invested to support 7,000 trainees per year. ECITB's output is not specifically for the nuclear industry, but many seek jobs in the power and nuclear sectors.

The CITB and the Construction Skills Network have similar recruitment, training and re-skilling programmes in hand. From 2008 to 2012, approximately 90,000 new recruits into the civil construction industry per annum are needed to meet the forecast workload.

Very significantly both Boards see an easing off in workload after 2012 which coincides with the earliest on site work for nuclear new build.

Contractors and Small and Medium Enterprises (SMEs) are reacting positively to the obvious need for new power plant in UK and worldwide, whether fossil, renewable or nuclear. Some of the larger contractors and SMEs have already increased their graduate and trade intake, and are planning for further increases. Also, some contractors new to the power station build sector are expressing interest and some are in fact taking positive steps to become involved.

The **National Skills Academy Nuclear (NSAN)** is up and running within the Cogent Sector Skills Council. NSAN works closely with industry, other education establishments and training boards to supply many nuclear training products and services, including for example programmes for secondary schools, accreditations for industry and particularly nuclear top up modules for trade apprenticeships. It currently concentrates on decommissioning and plant operation, but also covers new build. The first intake will be 250 apprentices in 2008 and the output is planned to increase to 665 pa by 2013.

The **National Nuclear Laboratory (NNL),** is due to evolve from the BNFL Nexia R&D centre to become UK's nuclear R&D centre for reactor physics, materials science, safety assessments and decommissioning etc. It is a strong source of engineers and scientists, which can support new build regulation, licensing, operation, decommissioning and waste management.

Universities and Colleges are introducing and expanding nuclear degrees courses and modules, plus postgraduate courses and research opportunities which will supply technical expertise to all segments of the industry. Compared to only one nuclear degree course available a few years ago, Birmingham University, there are now over one dozen universities and colleges offering around 40 nuclear courses e.g. the Dalton Institute (Manchester University); University College London; Imperial College London; Lancaster University.

Government, education and training establishments are responding very positively to the demand for engineering and technical staff

Vendor / Supply Chain Dialogues

The four nuclear vendors, and the NIA, have held successful supply chain events to become more acquainted with the UK supply chain. From these, the suppliers have gained a better understanding of the vendors' designs and requirements. These events are seen as the start of building a healthy localisation programme. Already some suppliers have won orders for supply of equipment to overseas nuclear new build programmes.

Meet the Vendors' Day
17 March 2008

Government Initiatives

As a result of the Government's initiatives, industry is feeling much more confident about new build, however, the momentum must be maintained. It is therefore necessary that:-

- **NII** continues urgently to increase its resources and use of external assistance to enable it to proceed with the GDA as quickly as possible. Salary scales have been improved and recruitment is underway, but more may be needed to be done to facilitate progress.
- The **Planning Bill** is effective in streamlining the process and proceeds through Parliament during this Parliamentary session.
- Clarity is provided to potential operators on the arrangements for funding **new build decommissioning and waste management costs** - the Energy Bill now before Parliament addresses this.
- Government's **Managing Radioactive Waste Safely (MRWS)** policies to identify a site for a deep radioactive waste repository move forward in a clear and publicly acceptable way without undue delay.

NII needs more resources urgently to carry out the Generic Design Assessment and to form the base for through life regulatory support to the industry

Delivering Projects to Time and Cost in the UK

Nuclear power stations are delivered to time and cost around the world though in some countries delays are experienced. To avoid delays in the UK, we must learn from world best practice.

Nuclear Projects – Nuclear projects are similar to other major construction projects in terms of their project management, planning, and technical implementation tasks. However, they do differ in that planning approval tends to be more rigorous and the quality/regulatory documentation trail tends to be more complex. The latter has a direct knock on effect to the supply chain.

Hence the main lessons to be learned are:-

- Ensure planning and regulatory approval procedures are streamlined and deliver fast-track resolution of any issues arising during the project and avoid interference once decisions are made.
- Ensure documentation requirements and their approval routes are well understood by all.
- Involve main contractors early and through collaboration with architect engineers, regulators and nuclear vendors ensure that all parties understand what they have to deliver and under what terms and conditions.
- Ensure that the supply chain is suitably qualified and experienced. Although the NIA studies have demonstrated that the UK can supply 70% to 80%, it is essential that companies are experienced and get themselves formally qualified for the scope that they are seeking and that they have the resources necessary to deliver on time.

So far as construction is concerned, nuclear power stations are very similar to other major infrastructure projects, therefore lessons can be learned from other industries and "headline" projects.

Wembley Stadium/Arsenal Emirates Stadium
Wembley Stadium, £760m, poor experiences provided lessons about the need for a clear client brief and the benefits of collaborative working, involving major contractors at an early stage. The value of these lessons was demonstrated on the Arsenal Emirates Stadium, £240m, which was successfully completed to time and budget around the same period.

Terminal 5 at Heathrow
A £4.3 billion 5-year project, opened on time in March 2008, albeit with some operational teething problems. It was a very complex project involving multiple rail lines, rivers and roads as well as the terminal buildings. The contract philosophy of creating an integrated team at an early stage from the many companies involved proved its worth during implementation.

Channel Tunnel Rail Link
A £ 5.2 billion project, completed in 11 years, within its budgeted cost and timescale. The project was delivered by a consortium of Arup, Bechtel, Halcrow and Systra and had to overcome many complexities of siting, public concerns, civil engineering and supply chain management. The success was due to creation of an environment of openness and honesty within an incentive driven contract with everyone having the same clear objectives.

Other Lessons to be learned from these successes are :-

- Engage early with external and local stakeholders - be straightforward and up-front with people.
- Learn from what was done well in other projects.
- Avoid optimism fallacy – "Our project won't encounter such difficulties".
- Hold collaborative workshops after award of contract, but before any manufacturing/site work starts, to review the design, to ensure understanding of the contract and to start teambuilding.
- Establish strong controls and monitoring of programme and costs.
- Ensure high level leadership needs to be visible.
- Success is carried forward by people.

Vendors' Views on UK Supply

- **Atomic Energy Canada Ltd (AECL)**
  "AECL is targeting 70 to 80% UK content in a future UK new build program. This is assisted by our ACR-1000 reactor's modular design, which features over 500 small fuel channels in place of a single pressure vessel and by our history of using a network of small suppliers, including several in the UK, instead of manufacturing components ourselves."

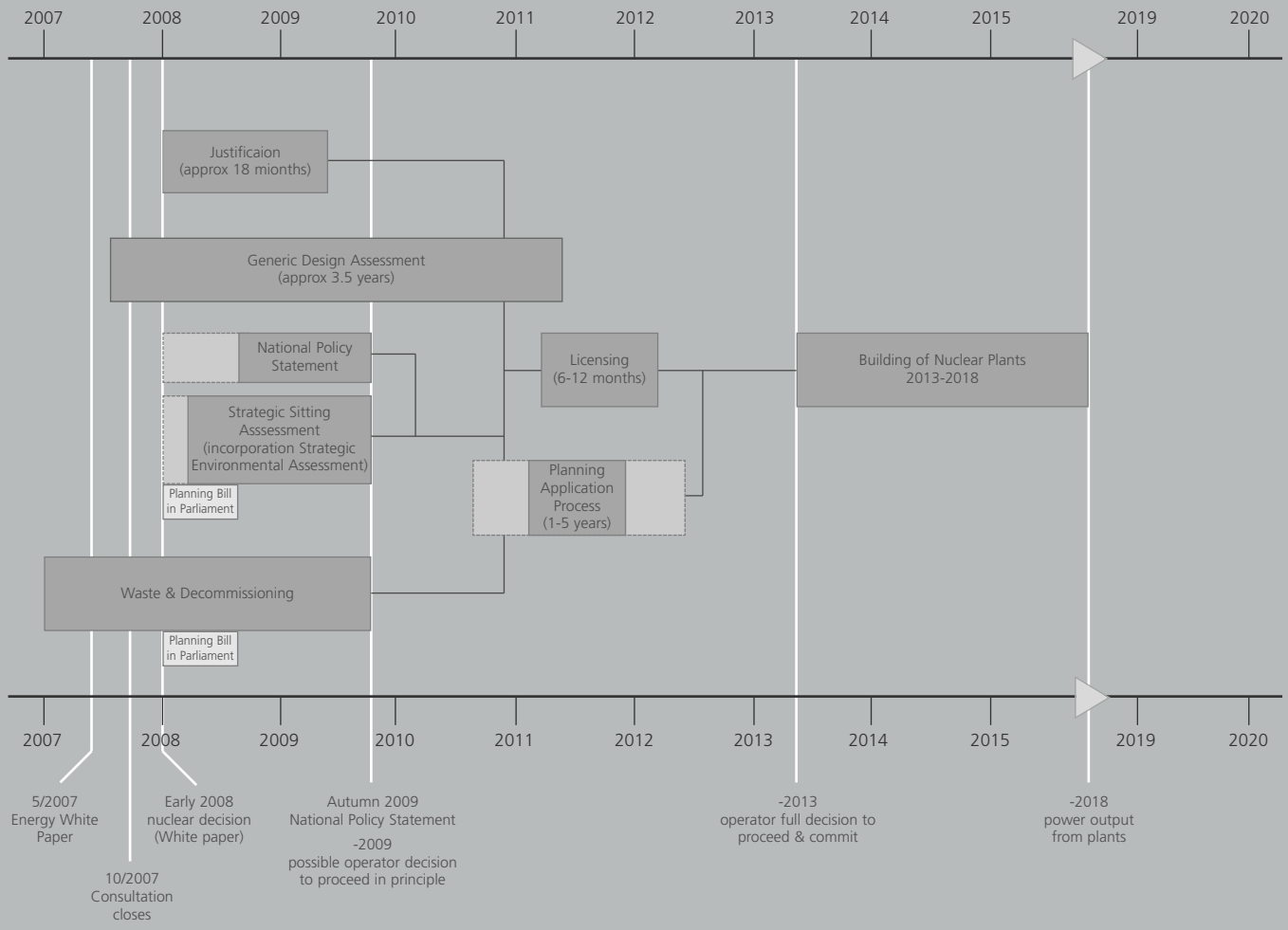
- **AREVA NP**
  "AREVA maximises the use of both its global integrated manufacturing capability and local resources in all its new build projects, AREVA looks forward to working closely with the UK supply chain to develop the appropriate strategy for UK."

- **GE-Hitachi Nuclear Energy**
  "GEH's assessment of the UK Nuclear Industry is well underway and, so far, GEH is pleased with the investment, commitment and capability of the existing supply chain. The construction of a fleet of ESBWR's in the UK could provide a substantial opportunity for the supply chain. Throughout this process, GEH plans to integrate local industry capability with its proven global supply chain to deliver projects on time and on budget."

- **Westinghouse Electric Company**
  "Our approach of "We Buy Where We Build" is based on a strong track record of localisation in countries like Korea, and we fully expect to repeat the approach in the UK. We have been most encouraged by the enthusiasm of UK suppliers to engage with us, and we are sure that the reactor coolant pump casings currently being made in the UK for the Chinese AP1000 plants will be the first of very many contributions to the AP1000 fleet to be produced here."

A phased programme of nuclear power station construction is well within UK capability

Indicative pathway to possible new nuclear power stations.
'Meeting the Energy Challenge: A White Paper on Nuclear Power', BERR, January 2008 p.36



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