



Building Nuclear Skills

A workforce for the future

November 2017

Balfour Beatty



About Balfour Beatty

With 15,000 employees across the UK, Balfour Beatty delivers and maintains the complex infrastructure that underpins our everyday lives, including works at Sellafield and Hinkley Point C nuclear facilities. At Hinkley Point C, Balfour Beatty is delivering a £460m electrical works package in joint venture with NG Bailey, delivering the critical infrastructure that will power the station and its operations; and a £200m tunneling and marine works package.

Balfour Beatty has over 60 years of experience in the nuclear industry working across the sector on new build, decommissioning, fuel cycle and defence projects. Our experience includes large-scale civil engineering and delivery of mechanical, electrical, control and instrumentation (MEC&I) engineering works on a continuous basis during this period, covering the initial and last phases of nuclear new build in the UK, operational nuclear power plant upgrades and decommissioning projects, as well as delivery of over 30 projects at Sellafield since 1979. We are currently delivering large scale M, E&I works for Urenco's fuel cycle activities at its Tails Management Facility near Chester. We worked on both the first nuclear power station to be built in the UK at Calder Hall and, the last, at Sizewell B.

Balfour Beatty invests in skills across the country. We are members of The 5% Club and are committed to the aim of ensuring that 5% of our UK workforce are apprentices, graduates or sponsored students on structured programmes by 2020.

Balfour Beatty is leading the design of Trailblazers in a range of construction apprenticeships at HNC and degree level, and has developed a training programme for Quality Managers, which it hopes will help fulfil the requirements for the current and future needs of our nuclear construction projects. We have also been involved in recruitment of resources (particularly ex-military) who have transferable skills which are relevant to the nuclear industry.

Balfour Beatty has a number of STEM Ambassadors who volunteer their time, enthusiasm and experience to encourage and inspire young people to achieve more, progress further and choose careers in Engineering tapping into the talents of a more diverse workforce.



Executive summary

The UK will be one of the most exciting places in the world to work in civil nuclear over the next two decades, as the country undertakes massive investment in a new generation of nuclear technology capable of meeting its energy needs while reducing greenhouse gas emissions. These will be some of the most complex, innovative construction projects for a generation – projects of national importance that offer significant opportunities for the construction and infrastructure industry.

To capitalize on this investment, we must have the highly-skilled workforce recruited, trained and ready to build, commission and maintain the nuclear power stations. However, Balfour Beatty, along with the rest of the sector, is seeing a disparity between the number of skilled workers needed and the number of young professionals entering the industry. Even taking innovative technologies and new construction methods into account, we are battling a skills gap which must be closed and we have a generation of young adults for whom our industry is not seen to be as attractive as it needs to be.

Delivering this vital new infrastructure to power our economy and the skilled workforce that goes alongside it requires the Government and industry to work hand in hand. We must take action now to accelerate the recruitment and training.

We must do more to attract more people into the sector. We must show that this is an immensely fulfilling field, where those working in it have the satisfaction of seeing their work realised and providing an enduring legacy for many years. We must demonstrate how a career in constructing civil nuclear provides exposure to the latest technologies while delivering some of the most important projects for a generation. This must happen via a higher-profile, more coordinated publicity campaign, which reaches young people and those influencing them, as well as those with transferable skills currently working in other industries. The importance and benefits of a career in the civil nuclear sector should be made clearer. School pupils should be given full and clear advice about all the career and study options available to them. And the areas around nuclear power stations should be made more attractive to those considering where to live and spend their careers: public services, public amenities and the local economies in these areas should be developed and enhanced.

Only by redoubling our efforts and working together will we close the gap between the skills we need in the civil nuclear industry, and the number of people entering it.

Key points

1. The measures in place to build skills in the civil nuclear industry, while welcome, are not making a difference quickly enough.
2. By strengthening the services, public amenities and the local economy in the remote areas nuclear power stations are located, communities can be made more attractive places to live for example, by creating 'Nuclear enterprise zones' and enabling greater retention of taxes.
3. Those with key specialist skills which are in short supply should be added to the Home Office Shortage Occupation List.
4. Balfour Beatty calls for an urgent solution to the issue of a shortage of skilled workers to regulate the sector following Brexit, to ensure that the planned new nuclear power stations are not delayed. A solution must be agreed before the UK leaves the EU.
5. The Government should provide more certainty over UK energy policy to give the industry the confidence to invest in the necessary skills and to ensure we are attracting enough talented people into the industry with enough time to develop the skills they required.
6. Developing existing national infrastructure plans to ensure they clearly map out the continuing need for trained people beyond the new nuclear programme would encourage employers to invest the five to ten years required in the development of their workforce.
7. Projects and funding should be identified to ensure the pipeline of investment is maintained at a steady level to ensure core skills being developed within the nuclear industry are preserved.
8. It is welcome that the Government is considering a parallel scheme to UCAS for vocational routes, and we urge them to find a way to make this a reality as soon as possible.
9. School pupils should have better access to career advice and information, beginning as early as possible at secondary level, enabling them and their parents to make informed choices after considering all of the various routes and options.
10. A coordinated, high-profile campaign such as the 2015 Royal Navy "If you can fix a bike, we can train you to fix anything" advert, would consolidate the existing piecemeal efforts to attract people into the sector and update its image more quickly.
11. The technical apprenticeships and graduate positions available should be both expanded upon and better publicized to ensure that the industry is getting the volume of applicants it needs, and that the most talented are made aware of the options and able to embark on careers in the industry.



The Context



The UK's energy policy is at a crossroads. Significantly more energy is needed over the coming years to meet the rising demands for power. The use of electricity is predicted to increase by around a quarter over the next decade as the UK's transport networks and transportation are electrified, combined with a move towards electric heating¹, for example. At the same time, by the end of 2030, a further 35% of the UK's existing electricity generation capacity, including all but one of the current nuclear power stations, will close. However, new energy production is being guided by a number of principles. It must not come with unsustainably higher bills for domestic, commercial and industrial customers. Nor must it prevent the UK from meeting its international climate change commitments, including the requirement to reduce carbon emissions. And of course, the supply of energy must be secure and reliable.

Nuclear power is uniquely capable of meeting these challenges, offering a secure source of energy on a large scale, carbon-free at the point of generation. This is why the Government has committed to the biggest new nuclear programme outside China over the next decade, projecting that 38% of the country's power will come from nuclear by 2035².

In addition to nuclear new build, there is also a significant programme of decommissioning old power stations and managing nuclear waste, worth over £3.2 billion annually, and the UK is at the cutting-edge of next generation energy technologies, including Small Modular Reactors.

What all of this adds up to is that the new nuclear programme, teamed with decommissioning and new technology, presents the UK as a whole with a real opportunity to boost its capability, upskill its domestic workforce and reap significant economic benefits. With around 500 nuclear reactors in planning around the world, the aim is that building British expertise in new nuclear will give the UK a head-start in terms of the development of sought after technical knowledge, enabling the UK to become world-leaders in the field and export its skills and knowledge.

In decommissioning, the highly technical skills required will increasingly be in demand in countries around the world as other countries begin decommissioning their older reactors, providing a significant opportunity for the exporting of UK nuclear decommissioning expertise to safely retire these aging reactors.

Skills

There will be a huge number of exciting roles across the nuclear industry over the next decades, which will be spread right across the country. Building Hinkley Point C, Wylfa Newydd, and Moorside, will require 50,000 new workers during the construction phase, as well as 3,000 permanent roles³ once they are operational. For jobs, these facilities will provide long term stability for years into the future, both for those working directly onsite and for the thousands of manufacturers and engineers and those involved in the procurement and supply of specialist equipment, which will support them.

However, the industry is currently facing a skills shortage caused by a number of factors, from the cyclical nature of investment, a failure to develop nuclear specialist talent since the 1990s and an aging workforce which will see around 20% of the current nuclear workforce – many of whom are technical specialists - pass retirement age in the next decade⁴. The lack of certainty around nuclear new-build and timescales for construction as well as the remote geographic location of the proposed facilities compound these issues. However, the most significant point, perhaps, is that the UK workforce's expertise is primarily in decommissioning rather than in nuclear new build – it is over twenty five years since the last nuclear power station was built in the UK. This means that many of the country's qualifications, skills and standards in the required areas are either out of date, or simply do not exist. This is emphasized by the fact that the new nuclear programme involves a move away from the Magnox gas-cooled graphite moderated reactors and Advanced Cooler Reactors (AGRs) the UK workforce is familiar with, to light water reactors (LWRs). This change means that even the existing workforce will not be able to simply transfer across to new build – it will need significant retraining and upskilling first.

The highly skilled workforce the country needs to recruit and train to build and operate the new nuclear power stations is in addition to the 65,000 people currently employed across the UK's civil nuclear sector⁵ who will be needed to keep the existing stations operational, decommission the older ones and safely process nuclear waste. In addition to this is the UK's nuclear defence programme, which requires many of the same skills to complete the Successor Programme of works and associated infrastructure redevelopment and upgrades. Furthermore, new experts will need to be ready to enable the UK to be an intelligent customer and regulator throughout the new build programme. For those regulating the sector for example, a vital role in nuclear, an in-depth knowledge of standards, legislation and the principles for ensuring nuclear safety are required, skills and understanding which take time to develop.

In response, the Government has published a Nuclear Skills Strategic Plan⁶ to aid the development of a pipeline of skills, an approach Balfour Beatty welcomes. We also support the greater emphasis on encouraging young people to consider studying 'STEM' subjects – Science, Technology, Engineering and Maths – to take up apprenticeships and to consider careers in engineering for example. Other measures, such as the National College for Nuclear which is being set up with £15m of government backing to train 7,000 people by 2020; and degree-level apprenticeships being offered for people training to work on the Hinkley C project, will also help develop the skills and capacity of the UK nuclear engineering industry.

However, the development of suitable qualified and experienced personnel for the nuclear industry takes on average a minimum of five years and, for many roles, such as those in plant operations, such as nuclear safety case engineers, and high-spec technical positions, for example, it can take up to a decade. The measures in place, while welcome, are not making a difference quickly enough: those retiring from the industry are not being replaced as fast as they are leaving, let alone bringing in those we need in addition in sufficient numbers.

¹ <http://www.bbc.co.uk/news/uk-scotland-scotland-business-41373466>

² BEIS 2016 Updated Energy & Emissions Projections

³ Nuclear Industry Association, 2017

⁴ <http://www.cogentskills.com/nssg/strategy/>

⁵ NIA, June 2017

⁶ <http://www.cogentskills.com/media/76258/national-nuclear-skills-strategic-plan.pdf>

Challenges and solutions in building the civil nuclear skills base

Efforts to recruit sufficient workers into the civil nuclear industry are facing challenges on a number of fronts. For example:

– Remote locations:

Nuclear new build is in competition with other large construction projects, including HS2, many of which will be underway at the same time. Studies from the construction of Sizewell B in Suffolk have been used to suggest that construction workers will not normally travel more than 90 minutes to work⁷. Given that nuclear power stations are in remote locations and often involve living in temporary, campus accommodation, over long periods, these other major infrastructure projects can seem more attractive.

Balfour Beatty believes that by strengthening the services, public amenities and the local economy in these communities they can be made more attractive places to live. Some ideas for how to do this include:

- ‘Nuclear enterprise zones’ could be created, with discounted business rates and other incentives to encourage businesses to start up in these areas.
- The Government has committed to ‘community benefits’ for areas hosting new nuclear power stations, potentially through greater business rate retention or direct Government grant. These funds should be used to build upon the opportunity that nuclear new build represents for the benefits of the wider economy. For example in Bridgewater there are a number of new initiatives which have been brought about by the proximity of the new nuclear power station, such as Huntspill Enterprise Park.
- Government support for towns hosting new nuclear developments, such as greater retention of taxes, Tax Incremental Financing for local infrastructure improvements and better use of Town and Country Planning Act Section 106 monies.
- The broader industry and the Government, working together, should rebrand the nuclear sector and invest in the local communities around nuclear power stations to make them more appealing. For example, the works at Sellafield and Wylfa are located very close to the Lake District and Snowdonia National Parks respectively. This natural beauty,

if combined with high quality facilities such as hospitals and schools, vibrant local communities and investment in world leading research and development facilities, would provide an attractive area for families to re-locate to.

– Not developing all the necessary skills:

UK companies have been promised two-thirds of building work on Hinkley Point C, which is welcome. Many UK contractors have entered into joint ventures French companies which have more recent nuclear experience. These partnerships will enable British workers to learn from their French counterparts, facilitating the upskilling of the domestic workforce.

However, for various reasons, key parts for Hinkley’s two European pressurised reactors will not be made in the UK, including the pressure vessel that houses the core, coolant pumps for the core and the steam turbines that generate electricity. This means that some areas of technical knowledge and highly skilled engineering jobs will not be developed domestically, leading, over the long-term, to a remaining domestic skills gap in key areas.

– Brexit:

There is likely to be a detrimental impact on efforts to boost the number of skilled people working in the industry if there is a significant fall in the number of migrant labour once the UK leaves the EU: between 8%-10% of the construction sector’s workforce today is made up of EU migrants. We welcome the Prime Minister’s proposal of a two-year post-Brexit transition period⁸ and look forward to the outcome of the negotiations and a firm outcome on this point. However, a two-year delay, while helpful, will still mean that measures to recruit and train people to work in the nuclear construction industry must be considerably accelerated. We therefore believe that those with key specialist skills should be added to the Home Office Shortage Occupation List. Balfour Beatty therefore welcomes the announcement that the Migration Advisory Committee will investigate skills need across the economy. If the UK does not find some way of maintaining access to some of these highly skilled individuals, the result will be an increase in costs where demand for labour outstrips supply, and the risk of delays to the completion of this programme of work.

An additional impact of Brexit is the regulation of the sector, as the UK’s Office for Nuclear Regulation (ONR) prepares to take on the responsibilities currently held centrally for the EU under the European Atomic Energy Community (Euratom), which provides the basis for the regulation of civilian nuclear activity. The ONR, which is already facing a shortage of skilled staff due to the retirement of many of its existing workforce, is struggling to find the number of skilled staff it needs to oversee plans to build new nuclear power stations, while also decommissioning the existing fleet of reactors. Having to take on the significant additional responsibilities currently undertaken elsewhere, recruiting from a shrinking pool of skilled workers, is likely to prove a significant – possibly insurmountable – challenge, especially given the limited time available. Balfour Beatty calls for an urgent solution to this issue, to ensure that the planned new nuclear power stations are not delayed. We do not favour a particular solution from existing proposals such as bilateral arrangements, an “associate membership” of Euratom, or the delay or revoking of Article 106a – the notice of withdrawal of Euratom - but a solution must be agreed before the UK leaves the EU. An agreement on the two-year transition period would be helpful as early as possible.

– Remaining uncertainty around nuclear new build:

Hinkley Point C saw significant delays before it was approved, while the financing for Wylfa and Moorside is yet to be secured. Investing in the number of skilled workers which will be required if all the planned schemes proceed, is a significant commitment, both for the industry and for those considering careers to pursue. Government should provide greater certainty over UK energy policy to give the industry the confidence to invest in the necessary skills and to ensure we are attracting enough talented people into the industry with enough time to develop the skills they required.

Developing existing national infrastructure plans to ensure they clearly map out the continuing need for trained people beyond the new nuclear programme would encourage employers to invest the five to ten years required in the development of their workforce. This approach would create certainty of need, underpinned forward plans, and a reduced need for international resources. Balfour Beatty therefore believes that projects and funding should be identified to ensure the pipeline

of investment is maintained at a steady level to ensure core skills being developed within the nuclear industry are preserved.

– Attracting young people into the industry:

The civil nuclear industry faces the same challenges as the rest of the construction industry in that there are not enough young people considering careers into the industry. This is for a variety of reasons. For example, it is currently too easy for school pupils to close down their subject options or make choices without all the available facts. Young people need guidance to ensure that they are informed of all the options available, so they can make the decision that best suits their end goals. A key example is equipping young people with the tools they need to navigate the available options in terms of apprenticeships and other vocational routes: whereas UCAS is an established, accessible method for applying to university courses, there is no equivalent for apprenticeships, or technical and vocational education, leaving young people wishing to pursue this pathway at a disadvantage. It is welcome that the Government is considering a parallel scheme for vocational routes, and we urge them to find a way to make this a reality as soon as possible.

Linked to this, school pupils should have better access to career advice and information, beginning as early as possible at secondary level, enabling them and their parents to make informed choices after considering all of the various routes and options. At the moment, only 48% of school leavers say they got any information about apprenticeships⁹. Parents, who in many cases will have the most significant influence over the route their children will decide to pursue, are even less likely to advocate vocational routes, with only 6% knowing about ‘vocational further education courses’; and only 9% fully aware of apprenticeships or higher apprenticeship programmes¹⁰. Similarly, many people are unaware of the range of exiting roles the construction industry offers. We believe all students would benefit from much more systematic exposure to the range of possible careers at school. Furthermore, there are schemes underway specifically to update the image of the industry however, we believe that a coordinated, higher-profile campaign such as the 2015 Royal Navy “If you can fix a bike, we can train you to fix anything” advert, would consolidate the existing piecemeal efforts and really begin to have an impact.

⁷ EDF Energy, Draft Workforce Profile Report, February 2011

⁸ Set out in the Prime Minister’s speech in Florence, 22 September 2017

⁹ E&Y, An Age of Uncertainty. Young people’s views on the challenges of getting into work in 21st century Britain. September 2016

¹⁰ E&Y, Parents fill in ‘guidance gap’ over career advice for school-leavers, 12 August 2015

Conclusion

– **The ability to train the brightest and the best:**

The nuclear sector offers a range of technical apprenticeships – there are 1,800 places across the civil nuclear industry - and graduate positions, which should be both expanded upon and better publicized to ensure that the industry is getting the volume of applicants it needs, and that the most talented are made aware of the options and able to embark on careers in the industry.

We must invest in the skills of today to secure the infrastructure of tomorrow. This means that we must take swift action to ensure that we both have the skilled, trained staff in place to build new nuclear facilities, and that we can carve out a position for the UK as being world-leading experts in the delivery of nuclear projects and services.

Although some work has been done, more is needed – and it has to happen more quickly. The industry, Government and educators need to work together to develop the UK's nuclear capabilities to ensure the country is capitalize on the development of similar power stations across Europe and more widely.





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