Integrating
ITER
Making a difference at the world’s largest fusion project

Customers
Operations Site Works contract adds to an impressive portfolio at Sellafield
Page 03

Performance
Planning under way for major refurbishment of Romanian reactor
Page 10

Technology
Small Modular Reactors – an energy concept of the future
Pages 14/15
New framework boosts Sellafield strength

OneAIM, a joint venture between Amec Foster Wheeler and Interserve, has won a key framework contract to support reprocessing plants and facilities at the Sellafield nuclear site in Cumbria.

Operations Site Works, which is worth up to £160 million over four years, covers engineering support services for asset care and maintenance. OneAIM’s participation in the full project lifecycle is designed to produce greater cost-efficiencies for Sellafield Limited, the company responsible for reprocessing, decommissioning and nuclear waste management.

Clive White, President of Amec Foster Wheeler Clean Energy, said: “Winning the Operations Site Works framework reflects our strategy to extend the range of services we provide to Sellafield Limited.

“We welcome the opportunity of taking a greater role in the full project lifecycle, focusing on delivering safe, efficient and predictable outcomes and supporting Sellafield Limited in its cost-efficiency objectives, while also having a positive social impact on communities, skills and growth in Cumbria.”

The combination of Amec Foster Wheeler and Interserve creates a highly capable vehicle that will work to bring international best practice and value-driven solutions to the Sellafield mission.”

The Operations Site Works framework replaces the Multi-discipline Site Works framework and the Site Wide Asset Care framework. People who worked for other contractors on these frameworks will be transferred to Amec Foster Wheeler, creating one of the largest contractor workforces on the site.

Amec Foster Wheeler’s other work at Sellafield includes:

- Lot 3 of the Decommissioning Delivery Partnership, a 10-year, £125 million framework to support accelerated clean-up of the site;
- Membership of the AXIOM joint venture, which supplies design, engineering, and safety case assessment services under the Design Services Alliance for projects and tasks supporting accelerated hazard reduction;
- Delivery, as part of a joint venture, of the Box Encapsulation Plant, a £600 million project to tackle one of the site’s most hazardous legacy facilities;

Interserve has worked with Sellafield for 17 years, supporting major projects such as the opening of the new Evaporator D facility – a significant expansion to the capacity for processing nuclear waste material on the 6km² site.

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Cover image: Courtesy of ITER Organisation
Technical expertise underpins LLWR wins

The company responsible for overseeing the management of the UK’s lower activity radioactive waste has appointed Amec Foster Wheeler to two of its key frameworks.

The awards, from LLW Repository Ltd (LLWR), are for environmental safety case (ESC) services and waste characterisation and assurance support (WCASS).

LLWR operates the UK’s Low Level Waste Repository in West Cumbria on behalf of the Nuclear Decommissioning Authority and also oversees the management of lower activity waste throughout the country on behalf of the Nuclear Decommissioning Authority (NDA). As part of the ESC framework, Amec Foster Wheeler has been appointed as the single supplier for hydrogeological and geological support, and as one of four suppliers for general technical support.

This work will be carried out by the waste management team in Harwell, Oxfordshire, and it is estimated that the contract will generate approximately £2m in revenue over the next four years. The WCASS framework, which is expected to be worth about £3m over four years, will see Amec Foster Wheeler providing analytical support services and environmental monitoring support from its full-service analytical laboratories in Birchwood, Cheshire.

Andy White, Vice President for Decommissioning at Amec Foster Wheeler’s Clean Energy business, said: “These awards reflect the high value placed on the technical expertise of our people and their proven ability to exceed the requirements of LLWR, which has been a valued customer since it was created in 2009.

“Our understanding of LLWR’s business enables us to play an integral part in the cost-effective management of UK waste streams.”

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EDF extends support deal for UK reactors

Under the Technical Support Alliance 3 (TSA3) agreement, the global engineering consultancy will continue its operational support for the UK reactor fleet, which began more than 40 years ago. The five-year agreement, with an option to extend for a further five years, follows Amec Foster Wheeler’s partnership with EDF Energy under two similar frameworks - TSA1 and TSA2. Amec Foster Wheeler expects the contract to generate annual revenues of between £25m and £30m. Brian Cowell, EDF Energy’s Managing Director Generation, said: “Amec Foster Wheeler has worked in partnership with EDF Energy for a number of years and shares our vision for zero harm, exceptional nuclear safety performance, and world record-breaking results. The support of all our strategic partners is an important factor as we continue to operate our nuclear stations to the highest standards, providing secure, low-carbon, affordable power for the UK.”

Dawn James, Vice President for New Nuclear and Generation Services, said: “Amec Foster Wheeler’s deep technical knowledge and strong track record in project delivery are crucial to our continued support for EDF Energy’s UK stations, which are producing more electricity than at any time since 2003.

“Amec Foster Wheeler’s relentless focus on safety and efficiency is designed to maximise the value of our customers’ assets, and we look forward to working in close partnership with EDF Energy to ensure the safe, efficient, return on investment from its UK nuclear stations.”

TSA3 will play a key role in major station upgrades and enhancements, compliance-related activities and fleet-critical projects. Amec Foster Wheeler will draw on the unique capabilities of its engineers, safety specialists and subject matter experts, and the largest commercial laboratory and test rig complex serving the UK nuclear industry.”

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Lead role in UK nuclear research

Amec Foster Wheeler has been appointed by the UK government to lead a key nuclear power research programme. Under a £2.9m contract from the Department for Business, Energy and Industrial Strategy (BEIS), Amec Foster Wheeler will set up and run a UK Digital Reactor Design partnership that will use virtual engineering and high-performance computing to enhance the techniques used to design reactors and optimise their performance.

Energy Minister at the Department for BEIS, Richard Harrington MP, said: “I am very pleased to have awarded virtual engineering, structural materials and nuclear design codes and standards contracts to Amec Foster Wheeler. Partnering with leading UK organisations in the nuclear industry will have a big part to play in helping deliver on our department’s big initiatives, including the Clean Growth Plan and the Industrial Strategy.”

Clive White, President of Amec Foster Wheeler Clean Energy, said: “This contract award reflects our strategy to win a growing share of UK Government nuclear research spending. We’re delighted to be working with BEIS and our partners to establish a virtual network that will enhance the techniques used in reactor design and allow how reactors will perform during their operating life and how this can be optimised.

“We will be bringing together valuable expertise from industry and academia and combining the latest digital techniques, such as virtual engineering, with advanced multi-physics modelling, and simulation expertise. The aim of the project is to enhance design capability and assist UK industry to play a crucial role in our future energy security.”

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Well-qualified alliance

Amec Foster Wheeler has formed an alliance with Element Materials Technology, Tecnotom and TÜV Rheinland to offer Equipment Qualification (EQ) and Materials Qualification (MQ) services for nuclear sites in the UK and Europe.

Together the four companies, which individually already support many power plants and other nuclear licensed sites around the world, have formed the EQ Services Alliance (EQSA) so that customers can benefit from their vast collective global experience, specialist testing facilities and qualification expertise.

Greg Willetts, Vice President for Consultancy and Defence at Amec Foster Wheeler’s Clean Energy business, said: “Our collective capability and expertise means that EQSA can meet all of our customers’ EQ and MQ needs on new build or modification projects.

“EQSA is dedicated to ensuring that the new build supply chain and existing operators can correctly qualify safety critical components right first time. “We are supporting customers on materials selection and preparation of qualification plans as well as analysis – all designed to establish, preserve and upgrade required equipment qualifications.”

Examples of services offered by EQSA include design support, materials selection, desktop/physical analysis, operating experience, ageing and thermodynamic accident conditions/design basis event testing (such as loss-of-coolant accident), seismic testing, CE marking test and certification, accelerated ageing tests on materials and equipment and testing for mechanical and corrosion resistance.

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First power at Kusile

The Amec Foster Wheeler Clean Energy Africa team successfully designed, procured, installed and commissioned the emergency diesel generators at the Kusile Coal Fired Power Station in South Africa.

The project commenced in 2010 when EPC contracts were secured for the emergency generators at both of Eskom’s new coal fired power stations – Medupi and Kusile. These will be among the largest coal fired power stations in the world when completed.

The Kusile Emergency Diesel Generator installation has three 3.0OMVA generator sets with MTU diesel engines. Stamford HV alternators and IMS exhaust systems. The generator sets and associated control panels were assembled and tested in Staffordshire by JCB Broadcrown, under close supervision from Amec Foster Wheeler Clean Energy’s Consultancy team.

The fuel supply piping with day tanks and dual redundant batteries with chargers were designed and sourced by the Amec Foster Wheeler Clean Energy Africa team from South African suppliers to support Eskom’s localisation programme.

Naud Duriez, Project Manager, said: “Our local team completed the planning, design and procurement phases and also performed the factory acceptance tests before the generator sets were shipped to South Africa.

“To accommodate the client’s project acceleration drive, the implementation and commissioning programme was reduced from the contracted eight months to less than four.”

“After much hard work by the site installation team and excellent client cooperation during the final plant integration, the 100% load tests were completed to plan in May 2016.”

“Although relatively small compared to station output, this means that during the load tests our diesel generators actually produced the first power out of the new power station.”

Amec Foster Wheeler Clean Energy Africa is a key supplier of engineering, procurement and construction services to Eskom’s Koeberg nuclear power plant near Cape Town.

£35m research contract to keep nuclear submarines at the cutting edge

Amec Foster Wheeler has been awarded a contract to supply the UK Ministry of Defence with research and technology (R&T) services.

The work, for the MOD’s Naval Nuclear Propulsion Programme (NNPP), is worth approximately £35m over five years. The contract will sustain about 70 jobs at Amec Foster Wheeler’s offices and laboratories in Warrington and Dorchester in the UK, where qualified and experienced technicians and subject matter experts carry out desk-based analysis and laboratory testing and also provide programme, project and technical management services.

Clive White, President of Amec Foster Wheeler Clean Energy, said: “We are valued for our technical expertise, comprehensive laboratory and analytical resources, strong relationships with academia, and best-in-class project and programme management. We are proud to serve this vital national programme, continuing the important work we have done for many years.”

The R&T contract covers critical areas of capability such as materials performance, materials science, modeling, code

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Decommissioning concept bids for cash prize in Sellafield innovation contest

A team led by Amec Foster Wheeler has been shortlisted in a competition to find new ways of cleaning up the Sellafield nuclear reprocessing site in the UK. A total of 15 proposals will be assessed to see which two are worthy to share a £3m prize. Amec Foster Wheeler and its partners have submitted plans for a modular integrated platform that will combine state-of-the-art technology with tried and tested decommissioning ‘know-how’.

Drawing on cutting-edge space, defence, medical and industrial technologies, the aim is to produce a step-change in performance that will make decommissioning cheaper, faster and safer.

The system will remove the need for manned entry and working at height, move the analysis work to the location of the waste, and introduce a repeatable and scalable process for waste handling and processing.

Amec Foster Wheeler has created the concept alongside Airbus Defence and Space Ltd, Clicks and Links Ltd, Damavan Imaging and SAS, Digital Concepts Engineering Ltd, IS-Instrumets Ltd, Lancaster and Salford Universities, and TWI. The contest is run by Nuclear Decommissioning Authority, Innovate UK, and Sellafield Ltd.

Accolade for nuclear safety culture training

A mec Foster Wheeler’s Nuclear Safety Culture Training programme has gained a key industry accolade. Following rigorous assessment, a panel of experts found that the course supports the knowledge requirements of the Nuclear Institute’s Nuclear Diploma, which defines the attributes necessary for nuclear professionals.

David Boath, Vice President for Project Delivery at Amec Foster Wheeler Clean Energy, said: “We are very pleased to receive this important endorsement. Nuclear safety is the overriding priority in all of our work and this training programme is about developing and reinforcing the culture and behaviours which underpin it.”

John Mackinnon, President of Amec Foster Wheeler’s nuclear business in North America, said: “We are proud to support this important aspect of the Life Extension Program, enabling Bruce Power to continue to provide safe, reliable nuclear power to Ontario families and businesses. Amec Foster Wheeler has been a primary supplier to Bruce Power for 14 years, providing key support in engineering and operational analysis including support for the Bruce Units 1 & 2 Refurbishment project.”

Alastair Laird, Chief Executive Officer of the Nuclear Institute, said: “We are delighted to formally endorse Amec Foster Wheeler’s Nuclear Safety Culture course, which includes training in human error prevention tools. We look forward to continuing our close working relationship with Amec Foster Wheeler to support and recognise the nuclear professionalism of their staff.”

The Nuclear Institute found that Amec Foster Wheeler staff completing the programme had successfully demonstrated their knowledge of nuclear safety culture, nuclear security, and personal behavioural standards. It also concluded that all staff are encouraged and supported to apply this knowledge in their day to day work, and that evidence of their nuclear professionalism was recorded using the company’s Competency Assurance System. The Nuclear Institute’s endorsement took effect on 1st November 2016 and will remain valid for three years. The recognition comes after Amec Foster Wheeler revised its training programme so that it complies with recent changes in the European Union Directive on Nuclear Safety which are due to come into effect in 2017. The directive places requirements on member states, nuclear operators, and regulators. Operators and regulators can also request an equally high degree of compliance from contractors and suppliers.

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New office opens to support life extension at Bruce Power

Amec Foster Wheeler is supporting the life extension programme for Bruce Power’s nuclear plant in Ontario, Canada. This contract, awarded under an existing Strategic Supplier Master Services Agreement, covers detailed design of feeder cabinets and feeder instrumentation for the Unit 6 Feeder Replacement Program. Feeder cabinets add coverage to the fuel channels and provide thermal insulation during operation. Our work also includes input to procurement packages, technical specifications, installation specifications and design change notices.

The Major Component Replacement Feeder Program, part of Bruce Power’s life extension programme, involves the replacement of 960 primary heat transport feeders. The overall aim is to ensure that Bruce Power continues to provide low-cost electricity for families and businesses to 2064. Bruce Power supplies 30% of Ontario’s electricity at 30% less than the average cost to generate residential power.

It will also create and sustain 22,000 jobs annually and contribute CAD$4 billion annually to Ontario’s economy through the direct and indirect spending on operational equipment, supplies, materials and labour income.

Kyle Cherrett, Senior Program Manager, Feeder Replacement Program for Bruce Power, said: “This contract win has been the result of significant efforts by the Feeder Replacement project team. The design work will support the life extension for the first of six units.

The continued operation of the CANDU reactors, which are among the safest in the world, will allow Bruce Power to supply Ontario with environmentally friendly and dependable power well into the future.”

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Refurb plan for Cernavoda

Planning is under way for a major refurbishment of Unit 1 at the Cernavoda nuclear power plant in Romania – with support from Amec Foster Wheeler.

The contract, from Societatea Nationala Nuclearelectrica (SNN), involves drawing up a work plan and timeline for the main activities including nuclear safety, budgeting, engineering and procurement, and advising on staffing and infrastructure requirements.

Clive White, President of Amec Foster Wheeler Clean Energy, said: “Amec Foster Wheeler has extensive, practical experience of carrying out refurbishments on reactors of this type and by drawing on the lessons learned, we are ideally placed to ensure that this vitaly important national asset is optimised for the future.

“We are pleased to have been awarded this work by SNN and we hope to be involved in supporting the refurbishment of Cernavoda Unit 1 for years to come.”

Cernavoda 1 is a CANDU 6 reactor which began operation in 1996 and generates about 8% of Romania’s electricity. Starting in 2023, it is expected to undergo a refurbishment programme in which the reactor fuel channels and other major components will be replaced in order to accomplish a second operating lifetime of at least 30 years.

The work will be shared between Amec Foster Wheeler’s Clean Energy and Nuclear Americas businesses. Nuclear Americas has been instrumental in CANDU refurbishment programmes in Canada for both Ontario Power Generation and Bruce Power.

John Mackinnon, President of Amec Foster Wheeler Nuclear Americas, said: “This is a great example of partnership — within both the CANDU community and Amec Foster Wheeler. We look forward to working with Clean Energy to support SNN on this important step in their refurbishment programme.”

Amec Foster Wheeler, the only global engineering consultancy with an active nuclear engineering office in Romania, has worked for SNN on a number of projects previously.

The 2018 conference organiser, Jeremy Busby of the US Department of Energy, said: “You have set the bar impressively high for next year’s meeting.”

Several presentations were made by Amec Foster Wheeler staff:
- “Testing of SA508-4N to alloy 82 weld interface in high temperature water” by Dr Mark Chatterton.
- “Microstructural effects on stress corrosion crack initiation in austenitic stainless steel in PWR environments” by Dr Venu Addepalli.
- “Summary and conclusions from the ICG-EAC international round robin on stress corrosion crack initiation in alloy 600” by John Stairmand.
- “Presentation of Amec Foster Wheeler’s results from the ICG-EAC international round robin” by Dr Stuart Medway.
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A cracking conference

Some of the world’s leading authorities on a key aspect of nuclear safety gathered in Chester in May.

The annual conference of the International Co-operative Group on Environmentally Assisted Cracking attracted a record attendance. Professor John Stairmand, Amec Foster Wheeler’s Technical and Operations Director for Materials Science and Structural Integrity, chaired the organising committee.

Afterwards, John received messages of thanks from many of the participants, including representatives of the Chinese Academy of Sciences, Mitsubishi Heavy Industries, GE Hitachi, Tsing-Hua University in Taiwan, VTT Technical Research Centre in Finland, and Canadian Nuclear Labs.

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Gen2, a training provider originally founded by Amec Foster Wheeler and four other Cumbrian employers including Sellafield, the UK nuclear reprocessing site, has moved into a new era after it was acquired by City & Guilds Group. West Cumbria-based Gen2 is regarded as a model example of an imaginative, novel and collaborative approach to boosting the skills and employment prospects for young people.

David Beath, Vice President for Project Delivery at Amec Foster Wheeler’s Clean Energy business, said: “We are proud of Gen2’s achievements in helping more than 3,500 young people to learn new skills and find secure, skilled employment. It has become one of the largest training providers to the UK civil nuclear industry.

“The Gen2 model is now self-sufficient and primed for further development under new ownership.

“Gen2 will continue to provide Amec Foster Wheeler with high quality training and education for our apprentices under existing commercial arrangements and we look forward to seeing it go from strength to strength.”

Amec Foster Wheeler led the recent sale to City & Guilds Group, which completed in May 2017, on behalf of all partners, including Sellafield Limited.

Chris Jones, Chief Executive of City & Guilds Group, said: “The engineering and nuclear industry is anticipated to grow exponentially in the future, particularly in Cumbria, but it cannot grow unless it has a skilled workforce. Gen2 will be at the heart of ensuring that the industry can thrive in the future.”
Integrating ITER

ITER is a big idea – recreating the power of the sun and stars on earth.

Just how big can be seen by looking at the numbers: Temperatures inside the tokamak will reach 150 million degrees centigrade; the ITER machine will weigh 23,000 tonnes; at its peak, the construction workforce will top 5,000; components are delivered along 104 kilometres of specially modified roads; and 100,000 kilometres of niobium-tin are needed to make ITER’s toroidal field magnets.

But the big challenge really lies in all the little details that create scope for delays and overrun.

To make sure that ITER can be built on time and on budget, MOMENTUM was appointed last year as construction management-as-agent (CMA) contractor.

Project Director Angie Jones says the CMA role is all about integration, bringing the various parts of the ITER Organisation together and ensuring the constructability of the project.

She adds: “Quite rightly, ITER’s engineers regard their design as their baby and like all good parents they are very protective. One of my tasks is to persuade them that the Construction Management-as-Agent team is not here to take their baby away. We’re here to help them raise that baby so it can walk, talk and fulfil its potential and overun.”

“ITER’s engineers have been here for 10 years and they know this project inside out. In contrast, we are the newcomers. But we are bringing with us more than 100 years of experience on delivering large construction projects, much of it directly relevant to the task in hand here.”

Daniel Aznar, CMA Project Services Manager, adds: “Putting our skills and expertise together can only lead to a better result. The whole will be much greater than the sum of the parts.”

As ITER’s FIDIC engineer, MOMENTUM instructs contractors and assesses their work. Angie adds: “We’re also responsible for managing the interfaces between contractors, which are critical in understanding where one work scope stops and another starts.”

MOMENTUM had 50 people on-site in June 2017 but that number is expected to grow in line with construction activity. ITER has been complimentary about the JV’s contribution since it began work in August last year.

Angie explains: “We can take a broad view of what is happening and spot issues before they become problems. Sequencing is vitally important – making sure we do things in the right order – so that we avoid bottlenecks or quickly unjam them.”

Building on the team’s industrial experience, MOMENTUM has made a primary contribution in the area of constructability.

An example of this came when Angie’s team spotted that a pipe in the Tokamak complex had been designed too close to another pipe to allow the requisite amount of insulation to be installed around it.

“We’re challenging the design while it’s still achievable and the questions we ask won’t always be welcome or comfortable. We have to get people onside to understand that in the construction phase, a new perspective is needed.”

Achim Robok, CMA Construction Preparation Manager, says: “Our focus is on right-to-left planning, making sure that testing and commissioning requirements are maintained through the development of the engineering and construction documentation.”

“Examples of CMA’s technical construction input include assessment of welding procedures and materials, development of appropriate lifting arrangements, special tools and jigs for installation of unusual components in congested areas, introduction of testing facilities, validation of assembly sequences and access arrangements, and of course minimising risks to safety for the construction personnel.”

After graduating as an engineer, Angie was Project Director supporting Amec Foster Wheeler’s contribution to the construction of the Space Fence Radar System on Kwajalein Atoll, Marshall Islands in the Pacific Ocean. This is the largest ground-based radar of its type ever constructed and is designed to protect satellites by detecting and tracking more than 200,000 orbiting objects in space.

ANGIE JONES

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Angie says: “Our team is full of people who are used to building big things in the middle of nowhere. They know how to break up a project like this into construction work packages and how to manage all the interfaces between contractors. And it’s a nice change to be doing this in such a beautiful part of the world as the South of France.”

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Image: Courtesy of ITER Organisation
What’s next for Small Modular Reactors?

Why SMRs?
There has never been a greater need for safe, low carbon and affordable electricity than there is now, particularly with the electrification of public and private transport. Existing technologies based on fossil fuels will naturally be phased out in the coming years and new technologies such as renewables and storage will take their place. SMRs could provide a solid back-stop for these technologies, so if the wind is not blowing or it’s a cold, dark night we can be assured that we will still have power to heat our homes and charge our cars ready for the morning.

Conventional nuclear reactors have been getting bigger. This produces greater thermal efficiency but also makes them more difficult to fabricate, construct, and finance. The concept of the small modular reactor (or SMR) is that shortfalls in thermal efficiency can be compensated for by smarter, simpler and more innovative design and manufacturing processes. Transportation is easier and assembly and construction times are much reduced. SMRs have a modular design which maximises factory build to offer greater programme certainty for the customer. SMRs require significantly smaller footprints – about a tenth of the size of a conventional nuclear power station and can typically generate between 200 and 450 megawatts of power, opening up a host of new siting opportunities.

They are also significantly cheaper to construct than larger reactors. And if they can be produced continuously, even at annual volumes in single figures, economies of scale would bring down the cost of each unit.

What's the potential market for SMRs?
Nobody has yet built a fully-developed SMR. Most concept designs are in the feasibility study/development stage. The UK market for SMRs is estimated to be 7GWe, which represents a sizeable opportunity. However, there is a growing consensus that by 2035 there will be a global market for them equivalent in generating capacity to 85 GWe, or about 50 Hinkley Point-style reactors. SMRs are particularly suitable for smaller sites, remote locations or applications such as desalination.

What is the UK government doing to encourage SMR development?
The nuclear industry, which sees the potential to create a new product with global potential, responded promptly and positively when the UK Government launched a competition for SMR designs in late 2015. But, as with any new product, SMRs will only succeed if they meet customers’ needs and come with a compelling business case.

The UK is likely to represent less than 10 per cent of the global demand for SMRs and a sizeable production run will be required to recover start-up and set-up costs. So third-party export sales will be vital.

What is Amec Foster Wheeler’s involvement in SMRs?
Amec Foster Wheeler is also part of the Rolls-Royce-led UK SMR consortium, which aims to deliver an all-British ‘homegrown’ solution, ensuring that the UK remains at the forefront of cutting-edge fabrication, assembly and test facilities if the UK is to gain a position in this market. Most importantly, UK Government support will be vital if SMRs are to create significant intellectual property and jobs for UK industry.

Over the next few years, we hope to be involved in many other aspects including the Generic Design Assessment (GDA) and the detailed analysis phases. We have unrivalled experience of the UK’s GDA process – the essential step of proving to the regulator’s satisfaction that nuclear technology is safe. We believe that the GDA process could be used to achieve a degree of international recognition for an SMR design. International licensing and standardisation would help create economies of scale.

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What advantages does the UK have in developing SMRs?
The UK has fantastic capability in nuclear products, services and technology. By drawing upon that capability, we know we can develop world-leading technology for use in the UK and overseas. The UK can add real value in the industrialisation of SMRs. As a highly complex product that would be in continuous production with annual volumes in single figures, they are in a manufacturing space where the UK has world-leading relevant experience.

What needs to happen if UK industry is to grasp this opportunity?
Up-front investment will be required in cutting-edge fabrication, assembly and test facilities if the UK is to gain a position in this market. Most importantly, UK Government support will be vital if SMRs are to create significant intellectual property and jobs for UK industry.

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A helping hand for UK Nuclear Plc

The Department for International Trade’s approach to boosting exports is starting to bear fruit

As it works to increase the UK’s estimated £600m per year of nuclear related exports, the Department for International Trade (DIT) has a challenge in promoting nuclear expertise. Although Britain has plenty of global companies operating in the nuclear sector, it lacks a high-profile technology champion like France’s EDF/Areva or Russia’s Rosatom.

Campbell Keir, the DIT’s Director of Energy, says: “It would be wrong of me to say that there is a clear understanding of the UK nuclear industry in every market, but I think it is getting better.

“The UK doesn’t have a reactor vendor but that should be seen as an advantage because it means we aren’t tied to a single supplier, so our companies have experience of lots of different technologies and can offer impartial advice.

“We have a world-class supply chain, which is already providing extensive support to the UK new build programme and which can play a strong role across the nuclear life cycle.

“This is borne out by the success that British companies have already achieved in Japan, the United Arab Emirates, China, Poland and Finland among others.

“Our expertise and experience in waste management and decommissioning programmes are recognised around the world.”

Mr Keir sees the UK’s strong points as design, safety, reactor components (such as pumps, valves and actuators), robotics, decommissioning and waste management, instrumentation and control systems, and wider professional services.

And to give British products and skills a better chance to succeed in world markets, the DIT helps companies to take part in about 60 nuclear events every year. An example of these is the Great Nuclear Energy Summit in Bucharest, Romania, on October 3-5 this year, where companies will be able to get an insight into seven markets in Central and Eastern Europe and Finland, with conferences, sector roundtables, one-to-one meetings and networking opportunities. Also, Trade Minister Greg Hands has been active in promoting UK nuclear expertise in his meetings with key Ministers and decision makers around the world including China where he met with key state investors in the nuclear sector.

The DIT is focusing a lot of effort on major opportunities like decommissioning in Germany, where 17 reactors are either being decommissioned or are due to shut down; and Fukushima, where British companies are already working in areas such as remote handling and consultancy.

To boost awareness, the DIT’s trade officials based in embassies around the world undertake visits to UK’s nuclear sites and companies, including a recent visit to Amec Foster Wheeler’s laboratories and rigs complex in Birchwood near Warrington. These ‘Discovering Sector Knowledge’ missions equip trade officials to understand British suppliers’ offerings, which in turn helps them to identify opportunities in the countries where they are posted.

“We involve businesses far more in our activities,” said Mr Keir. “In Japan we have had quite a bit of success by forming a consortium, bringing together a number of companies interested in seeking opportunities connected with the decommissioning work at Fukushima.”

To find out more visit: the Department of Trade and Industry page on www.gov.uk

“The UK doesn’t have a reactor vendor but that should be seen as an advantage.”

CAMPBELL KIER, DIRECTOR OF ENERGY, DIT
Risk and Reward
How a fleet-critical control system was replaced

Nuclear power plants are fitted with equipment in current use at the time of design and construction. Inevitably, technology moves on and some of that equipment will in due course become obsolete.

Replacing obsolete systems is easier said than done, however, because this can have significant implications for the plant’s safety case and cause lengthy and expensive outages. The replacement of high-integrity control systems at two of EDF Energy’s UK power plants — Heysham 2 and Torness — provides an example of how such a fleet-critical project should be tackled.

Code migration and testing was a key element of the changeover because of the risk that any issues affecting availability and functionality could cause loss of output. This work was done by Amec Foster Wheeler and has taken 10 years. At the two stations, the fuel route plant, including the fuelling machines, were originally controlled by bespoke control and protection systems called Reypak.

Reypak, a programmable logic controller (PLC), was a distributed system with inputs and outputs in remote racks and the application in a main rack. Reypak, a distributed system, was vulnerable to failure due to the lack of redundant systems. The equipment delivery was specifically designed to aid installation, with each rack taking about three hours to replace.

A process was created around this to verify and validate the migrated code and the migrated application was then verified and validated against a dynamic plant model and test environment. The process supporting the testing of the migrated process included creating a logical plant model. The logical plant model was validated by testing against the Reypak environment and application before being used to verify the functionality in the migrated Siemens environment and application. This allowed full 100% off-site testing of the migrated application including interlock testing.

Having completed migration and off-site testing, it was possible to reduce the on-site installation and testing to a minimum and thereby to reduce plant outage significantly. In fact, installation and testing at the stations was reduced to a few days rather than the feared months or years. Now, the lessons learned on the project are being applied elsewhere. Dawn James, Vice President for New Nuclear and Generation Services at Amec Foster Wheeler, the project has developed a niche capability.

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For Amec Foster Wheeler, the project has developed a niche capability

DAWN JAMES, VICE PRESIDENT FOR NEW NUCLEAR AND GENERATION SERVICES

For Amec Foster Wheeler, the project has developed a niche capability that is being applied to similar projects for EDF Energy and others. It has also spawned further projects to enhance the fuel route systems at Torness and Heysham 2 and other EDF Energy sites.

To find out more:
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