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# INSIGHT

into nuclear decommissioning

**NDA**  
Nuclear  
Decommissioning  
Authority

Delivering progress across the UK



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*Front cover: Wylfa staff switch off the UK's last operating Magnox reactor. Full story, see pages 14-15*

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## Welcome to Tony Fountain

The NDA has announced that Tony Fountain will become the new Chair of Sellafield Ltd as part of the new management arrangements for the site. He will replace the current Chair Tony Price.

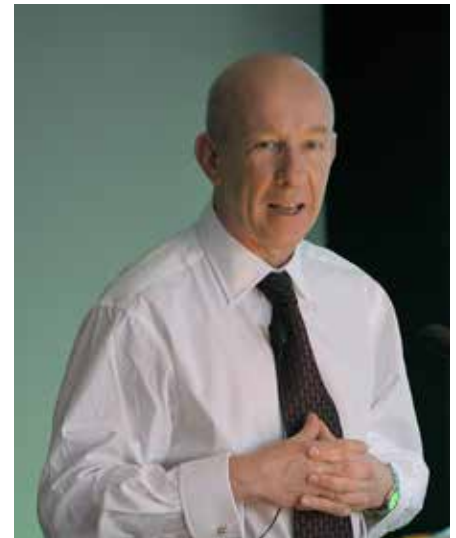
The new Chair brings 30 years of industrial experience, having held key roles at BP and, more recently, leading Reliance Industries' refining and marketing business in India. As the former Chief Executive of the NDA from 2009 to 2011, he also brings valuable knowledge of the nuclear industry.

Announcing the appointment, the NDA's Chair Stephen Henwood said: "The position of the Sellafield Ltd Chair is a hugely important one, requiring someone of considerable experience in industry and first-class leadership skills. Having scoured the international market we are delighted to have secured Tony's services. He will be a huge asset to Sellafield Ltd in overseeing its delivery of the NDA's decommissioning mission at Sellafield, the most challenging across our estate.

"I would like to thank Tony Price who, in his role as Managing Director and latterly as Chair of Sellafield Ltd, has brought a much improved focus on delivery at the site."

Tony Fountain added: "From previous experience I know of the tremendous expertise and passion within Sellafield Ltd to make real progress. I am also fully aware of the significant role the organisation fulfils in its communities. I am looking forward to playing my part in what will be a pivotal period for the organisation and the site."

Paul Foster, Managing Director of Sellafield Ltd said: "In Tony Fountain, the NDA has found someone with the right skills, experience and attributes to chair an organisation with a mission



*Tony brings valuable knowledge of the nuclear industry.*

as complex as ours. I am looking forward to working closely with Tony as we drive progress in evolving the business."

Under the new NDA owner/Sellafield Ltd subsidiary arrangements, the NDA is responsible for selecting the Chair of the Sellafield Ltd Board. The appointment will run for three years, renewable by mutual agreement. The Chair will lead the Board of Non-Executive and Executive Directors in driving safe, secure progress and value for money in the delivery of the mission at Sellafield.

Sellafield is one of the world's largest, most complex nuclear sites and home to some of the UK's most technically challenging projects. With an annual spend of around £2 billion and 10,000 employees, it accounts for around 60% of the NDA's annual budget and represents one of the largest programmes funded by the public sector.



*The new Sellafield arrangements will come into operation in April.*

## Creating the environment for success

On 1 April 2016, Sellafield Ltd will become a wholly owned subsidiary of the NDA, replacing the previous management model of ownership by the private sector.

The new arrangements will enable Sellafield Ltd to better drive accelerated, more efficient hazard and risk reduction as well as decommissioning at the Sellafield site.

The new model, developed in partnership by the NDA and Sellafield Ltd, replaces the Parent Body Organisation model and ownership of Sellafield Ltd by Nuclear Management Partners.

Instead of being owned by the private sector, the Site Licence Company, Sellafield Ltd, will lead all aspects of delivering the mission and acquire the support of partners from the market as required.

NDA Chief Executive John Clarke said: “1 April 2016 is the starting point for making the wider improvements that will bring about accelerated, more efficient high hazard and risk reduction and decommissioning at Sellafield.

“The good news is that the NDA and Sellafield Ltd are running towards that starting line together, free from the constraints of the complex commercial arrangements that existed previously. Our goals are no longer conflicted by shorter-term commercial incentives and instead the organisations will collaborate to tackle the enormous long-term challenges of Sellafield.

“While the parent body organisation model continues to be right for some of our other sites, the complexity and uncertainty of Sellafield makes it difficult to incentivise

the private sector at an enterprise level. This model instead will enable Sellafield Ltd to determine how it will engage the market and provide progress and value for money to the UK taxpayer.”

Pete Lutwyche, NDA Programme Director for Sellafield, said: “We are entering a pivotal period for the site and we must align our efforts to drive the success of the Sellafield mission. The NDA and Sellafield Ltd have developed the new owner-subsidary model with one objective in mind, to drive improved performance and value for money. An owner-subsidary structure will enable Sellafield Ltd to do this.

“I’d like to thank Nuclear Management Partners, whose co-operation through this process of moving towards the new arrangements has enabled us to progress early benefits of the new arrangements such as collaborative working between the NDA and Sellafield Ltd.”

Paul Foster, Sellafield Ltd MD, said: “The new ownership model paves the way for the wider changes needed at Sellafield and will be a catalyst for closer, more collaborative working between Sellafield Ltd and the NDA.

“We know that the purpose of Sellafield Ltd business will fundamentally change when reprocessing ends in 2018 (THORP) and 2020 (Magnox), which gives us a defined window of opportunity to evolve so that we are best placed to deliver our mission.”

# spotlight on Japan

*The upper lid is removed from Unit 4 at Fukushima Dai-ichi.*

## International support continues for Fukushima clean-up

It is now five years since the massive earthquake and tsunami struck Japan.

**John Mathieson**, the NDA's Head of International Relations, explains how the UK is providing ongoing support for clean-up operations at the Fukushima Dai-ichi nuclear plant.

The date was 11 March 2011, and, according to figures from the IAEA, some 15,000 people were killed, over 6,000 injured, while around 2,500 are still missing.

The tsunami destroyed much of the power plant's infrastructure and despite the best efforts of the TEPCO operators, the fuel in three reactors units melted and their containments were breached. The release of hydrogen gas led to explosions, radioactive material escaped into the atmosphere and the sea, and 80,000 people were evacuated.

The international response was overwhelming. Nuclear organisations and companies rushed to offer support in the immediate aftermath, with offers from 163 countries or regions, and 43 international organisations. None of the six

Fukushima Dai-ichi reactors will operate again even though two units were relatively undamaged.

This is built on a long-standing relationship between Japan and the UK which began with Japan's first commercial nuclear power plant (Magnox), operated in the 1960s, and was followed by the concept of the Thermal Oxide Reprocessing Plant (THORP), which developed in the 1970s. Also, a nuclear assignment at the British Embassy in Tokyo was established in the 1970s and INS Japan was set up in 1995.

Following the Fukushima accident, the Embassy was instrumental in arranging international and UK-specific seminars in Japan, which allowed the UK to share expertise in areas from strategic planning to the technical challenges of dealing with

some very difficult wastes.

UK support to Japan is backed at the political level: Prime Minister David Cameron signed the UK-Japan Joint Declaration on Civil Nuclear Co-operation during his 2012 visit. This led to an ongoing exchange of information through meetings and other interactions involving the NDA, Site Licence Companies and the supply chain.

Since then, information exchange agreements have been signed between TEPCO and Sellafield Ltd, and between NDA and the Nuclear Damage Compensation and Decommissioning Facilitation Organisation of Japan (NDF). Signing agreements is one thing, but making these materialise into tangible outcomes is another, and so we have been working with colleagues

in INSJ and the Embassy to provide impartial support to companies in our supply chain who wish to access the Japanese market.

The NDA's Strategy Director Adrian Simper heads NDA support to Japan. He sits on the international advisory panels of TEPCO and, until recently, on the International Research Institute for Nuclear Decommissioning (IRID).

Adrian said: "The Fukushima Dai-ichi site is no longer a reactor site having a very bad day – it is a decommissioning site having a normal day! The decommissioning challenge is a long-term one. It is a completely different job that needs a different approach than was needed in electricity generation – different skills, different technologies, different infrastructure, different procedures and a different approach to permitting."

UK expertise to support this approach has been recognised by Japan which is evident from the companies which have benefited from NDA's and INS Japan's assistance. These include:

- **Amec Foster Wheeler:** strategic

waste management, geopolymers encapsulation and regional remediation issues.

- **Cavendish Nuclear:** a major study on fuel debris retrieval at Fukushima and have concluded a collaboration agreement with Hitachi on BWR decommissioning.
- **Createc and React Engineering:** winners of the NDA's 2016 Export Award, analysis and consultancy support on clean-up activities through the N-Visage™ Gamma Imaging System.
- **James Fisher Nuclear:** a debris sampling feasibility study.
- **Oxford Technologies Ltd:** remote handling expertise and sampling.



*NDA estate staff supporting decommissioning at Fukushima*

## Quotes:

"The NDA/INSJ-led initiative enabled us to meet the right partners in Japan to raise awareness of the skills and services we can deploy to assist the restoration of Fukushima prefecture." Dr Mayur Jagatia, Nuclear Business Director – Japan, Amec Foster Wheeler Asia KK

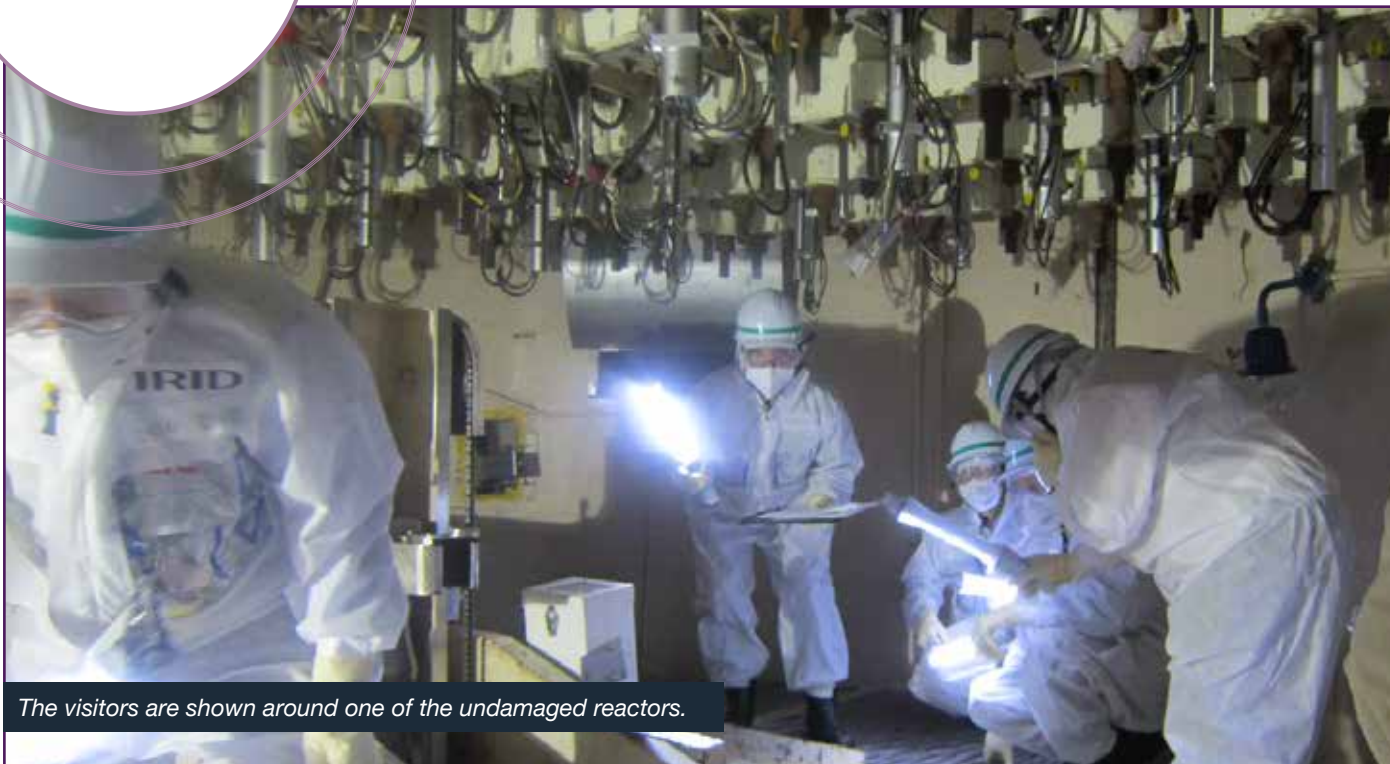
"Without INSJ's help, we would have found it almost impossible to understand the Japanese nuclear market as clearly as we do today." Matt Mellor, Createc

"Without NDA's help we would not have been able to navigate the Japanese nuclear industry. Real value-add, real win, win!" Pete Woolaghan, React Engineering

"The NDA has provided an impartial conduit into Japan for the transfer of lessons learned in UK decommissioning projects by UK companies. The ambassadorial work by UK NDA in Japan, and the ongoing promotional work by the UKTI in Japan, has aided our engagement and participation in Japanese decommissioning projects." Chris Carter, Cavendish Nuclear Limited.

"UKTI Japan, NDA and INS have all been incredibly helpful in gaining market intelligence and helping OTL to navigate the Japanese market." Mark Sharpe, Oxford Technologies

## Fukushima focus



The visitors are shown around one of the undamaged reactors.



"It was, a humbling experience to see the site and appreciate the scale of the challenges."

Melanie Brownridge, NDA Head of Technology

## Japan forges ahead with latest clean-up technologies

The Fukushima Dai-ichi site is abuzz with activity and a 'can do' attitude towards the huge clean-up task, according to the NDA's Head of Technology Melanie Brownridge, who has recently returned from a technology-focused visit.

Melanie has taken over from Adrian Simper as a member of the team of International Advisors supporting the International Research Institute for Nuclear Decommissioning (IRID). This team meets every six months to hear progress and provide advice in relation to R&D management and to discuss ongoing challenges and look at possible areas for collaboration.

"The proactive support from the INS office in Japan (INSJ) before, during and after the visit was essential in helping provide me with an understanding of the Japanese business context," said Melanie.

One topic on the agenda at the meeting was the application of a gated process for the development

of technologies. This was followed by a site visit to see the challenges the technologies will have to address.

"There is a lot of visible progress and it was extremely valuable to understand the technical approaches being adopted, and identify the areas where the UK might be able to contribute and also learn," added Melanie.

Comparisons between the R&D decommissioning strategies in Japan and the UK gave reassurance that both countries were effectively and successfully focusing the bulk of investment on support for site-level research, with a smaller budget for generic multi-site projects.

“I was also impressed by the Japanese willingness to put relatively new robotic technologies to the test which demonstrates a real commitment to move the mission forward. Deploying the technology also helps to reinforce to the public that some of the most difficult challenges are being dealt with.”

Melanie and her international colleagues toured the site and visited the undamaged reactors, fully suited up in protective clothing.

“The heat, even in December, was stifling and I appreciate how challenging it must be to work in those conditions during the summer months,” said Melanie.

Evidence of the accident remains a feature in the surrounding countryside, with radiation counters positioned alongside the region’s motorway network to monitor the atmosphere and visible progress of land clean-up in the areas surrounding the site. A recent community development is the establishment of a service centre in

nearby Okuma town which will deliver hot meals to the site, made from local ingredients and prepared using locally manufactured kitchen equipment, providing a boost for the economy.

The welcome for overseas representatives able to share decommissioning expertise and offer support is warm, Melanie added. UK technology companies are making a valuable contribution, including a number who have received funding from the NDA or its funding partners to develop innovative technologies.

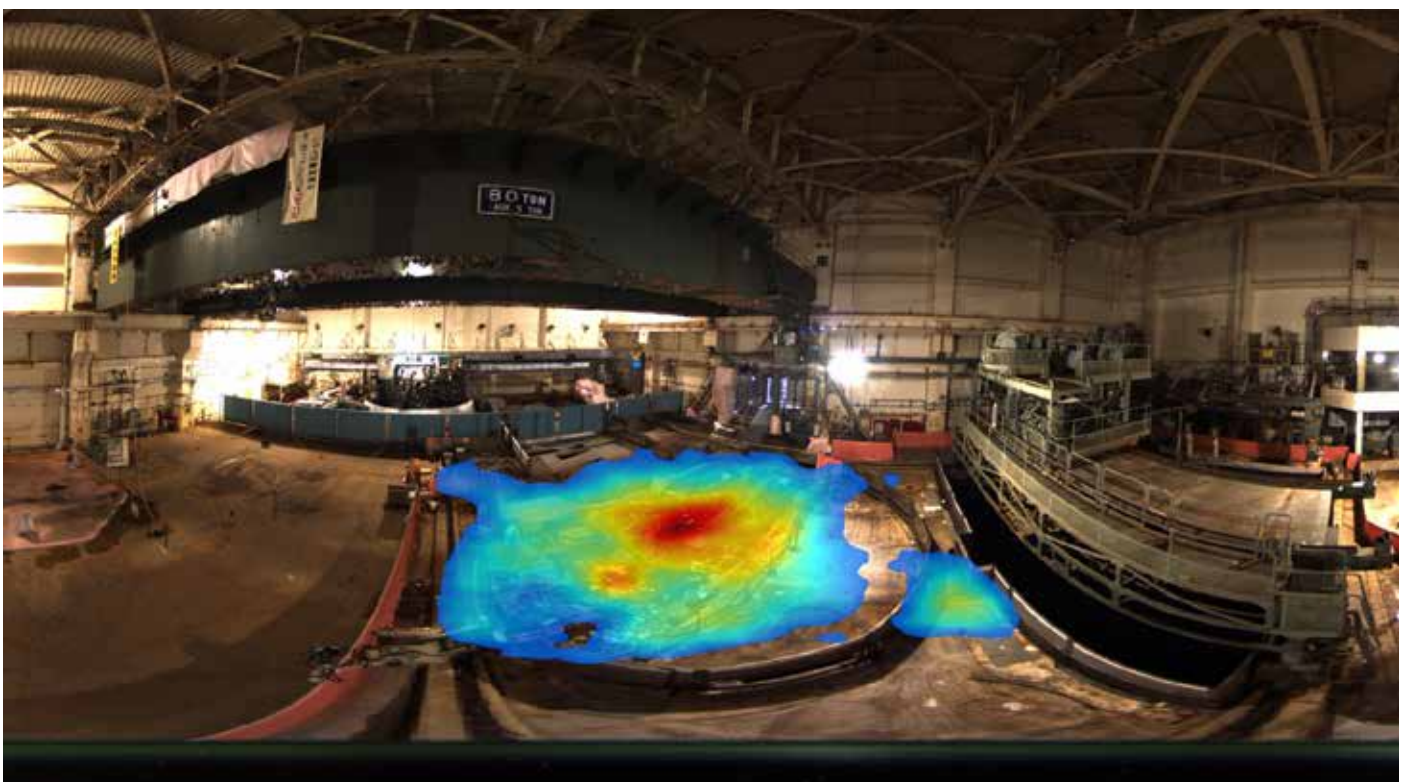
“I was really pleased to see that financial support from the NDA’s R&D budget is assisting businesses to develop their technologies not just for the UK market but also to deploy overseas.

“Their deployment in Japan provides valuable understanding to further develop the technology which brings benefits back to the UK as well,” Melanie added.

## Guidance for businesses is available at:

- **[www.exporttojapan.co.uk](http://www.exporttojapan.co.uk).** This gives an insight into cultural differences and potential misunderstandings.
- The UK government’s trade arm, UKTI, at **[www.exportingisgreat.gov.uk](http://www.exportingisgreat.gov.uk)**. Expert advice and practical support for UK-based companies who want to grow their business overseas.

Meanwhile, further information and advice is also available from Dr Keith Franklin, MBE, who is currently on secondment from the National Nuclear Laboratory to UKTI and is based at the British Embassy in Tokyo: **[keith.franklin@fco.gov.uk](mailto:keith.franklin@fco.gov.uk)**



Creatic's lightweight laser scanner combined with gamma imaging shows the distribution of radioactivity.

## Funding for novel ideas

# £500,000 nuclear boost for R&D fund

The NDA is contributing £500,000 to a £1.5 million initiative that encourages smaller businesses to find new ways of solving technical challenges in the energy industry.

The contribution means Innovate UK's Energy Game Changer initiative will now be able to distribute a total of £2 million, seeking to benefit from the novel approaches of innovative Small and Medium-sized Enterprises (SMEs) who currently operate outside the energy sector.

The fund is designed to encourage new entrants into all sectors of the industry, including oil, gas and nuclear, but the NDA is particularly interested in technologies that could be applied to decommissioning.

Innovate UK is the government's innovation-driving agency, working across all industrial sectors ([www.gov.uk/government/organisations/innovate-uk](http://www.gov.uk/government/organisations/innovate-uk)). The NDA has been collaborating with the agency over the last few years to stimulate and encourage innovative ideas that could be deployed on challenges at its sites.

Allocation of funding will take place through a competitive process led by Innovate UK, which starts on 28 March, with SMEs welcome to submit stand-alone project ideas or working collaboratively with partner organisations of any size.

Melanie Brownridge, the NDA's

Applications are particularly encouraged from businesses in, but not limited to:

- Inspection
- ICT
- Digital
- Sensors
- Virtual reality
- Gaming
- Robotics
- Autonomous systems
- Advanced materials
- Manufacturing

Technology transfer proposals from other sectors are also welcome, such as:

- Defence
- Aerospace
- Automotive
- Telecommunications
- Forensics
- Medical
- Space
- Creative industries

Head of Technology, said: "The UK is home to a number of world-leading companies in a wide range of cutting-edge fields such as robotics and computer gaming. We want to harness this dynamic and creative thinking in order to address some of the long-term challenges the nuclear decommissioning industry faces.

"Innovative solutions can mean that our decommissioning work is achieved more safely, sooner, and at a lower cost for the taxpayer. We want to stimulate the development and adoption of novel, emerging techniques as alternatives to established technologies as a means of improving the way we do things.

"We believe that game-changing technologies can solve a number of existing problems, either by the development of completely new ideas or through technology transfer from other sectors.

"Could we, for example, adopt virtual-reality techniques from the computer gaming industry to help us work remotely in hazardous environments?

"We would like to encourage those people who are currently working elsewhere, in industries such as

defence, aerospace, automotive and telecommunications, for example, to grasp this opportunity to consider how their techniques could be applied to our field of work."

## Details

- Projects must be led by an SME whose main business lies outside the energy sector.
- SMEs can work alone or collaboratively with partners of any size from any sector.
- Energy Game Changer projects are expected to last six-12 months and range from £25,000-£100,000 in costs.
- Competition opens: 28 March.
- Briefing event: 6 April.
- Registration deadline: 12pm, 4 May.
- Deadline for video submissions: 12noon, 11 May.
- Deadline for invited written proposals: 12noon, 7 July.
- Pitch sessions: 5-7 September.





*Investment support contributed to the development of radiation-mapping software mounted on a drone.*

## Problem-solving technologies on show

Meanwhile, robotic spiders, drones and other ground-breaking research projects will be the focus of an R&D event in Manchester next month, demonstrating the progress that has been achieved from earlier funding initiatives.

Since 2012, Innovate UK, the NDA, DECC and the Engineering and Physical Sciences Research Council have co-funded a wide range of innovative projects with the aim of boosting the UK's nuclear supply chain and accelerating their commercial application.

Many of the projects have benefitted from NDA and SLC input to ensure they are targeted at addressing real challenges, and have now progressed to testing on our sites.

Investment in the projects, which also include technologies adapted from other sectors such as Formula 1 and fisheries, was boosted by private sector contributions to reach a total figure of around £50 million.

The Nuclear Showcase - Collaboration Nation event takes place at the Bridgewater Hall on 16 March, 2016, showcasing 40 collaborative research projects and feasibility studies which received funding from 2012-2014. Most have now finished or are near completion.

The day will feature a number of short presentations from each project and an exhibition and networking area.

As well as invited speakers, the event is expected to attract Site Licence Companies, Tier 1 suppliers, investors, regulators, government funding agencies, academics and other potential customers for the technologies.

Organised by Innovate UK, in partnership with DECC, EPSRC and the NDA, the day will also be an opportunity to network with innovators and technology developers who could help support the resurgent UK nuclear sector going forward. Further details and more information from: <http://goo.gl/gv2YK2>.

Such collaborations provide the best leveraging of the NDA's R&D investments and the opportunity to encourage supply chain innovation. The NDA and its estate have already benefitted from these collaborations which will deliver future technological enhancements, reduced costs or improved safety.

# Building future skills



*Artist's impression of the Gloucestershire Science and Technology Park.*

## Support for colleges specialising in workplace skills

The NDA is working alongside a range of nuclear employers to support newly launched University Technical Colleges (UTCs) in different parts of the UK.

UTCs are among the government's pioneering educational initiatives, providing work-focused technical training and academic studies for students aged 14-19.

A key feature of the UTCs is sponsorship by local universities/FE Colleges/Educational Providers and, equally, partnership with business. The education providers offer expertise and a pathway for students through to further and higher education. Local employers, meanwhile offer work experience, provide funding for equipment and, crucially, help apply the education that students receive to the workplace.

Employers are fundamental to UTCs. They play a central role in identifying regional business needs and skills shortages. This shapes the UTC's technical specialisms and ensures it meets the needs of local employers. UTCs

offer high quality work experience, set real-life projects and, crucially, ensure the curriculum gives students the hard and soft skills they need in the workplace.

Around 30 UTCs are already open around the UK, backed by 500-plus employers, while more are set to open. In an environment that is intended to bridge the gap between college and work, students keep to a 'professional' dress code and attend during standard working hours.

In **Cumbria**, the Energy Coast UTC, at Lillyhall in Workington, started welcoming students in September 2014. With a strong emphasis on science, technology, engineering and maths (STEM subjects), its specialist technical training is offered alongside traditional GCSEs and A Levels. Sponsorship is provided by GEN2, Lakes College and the University of Cumbria.

Sellafield Ltd is among the businesses providing work experience, employment-related projects and mentoring. Other business partners include the National Nuclear Laboratory, Nuvia, the Royal Navy, Morgan Sindall, James Walker, Iggesund Holmen Group and Enerigus. The NDA's Becky Pleasant, Head of Skills and Talent, is one of the governors.

Andy Crowder, Chair of the Governors, said: "I am delighted to be involved with the Energy Coast UTC which is committed to providing local young people with the skills required for a successful future career in the construction and energy sectors.

"The UTC's facilities are exceptional and bring out the best in the students who attend; they are designed to ensure young people engage with local companies to develop the key life skills essential for success in the working environment."

In **Warrington**, where Sellafield Ltd employs around 2,000 off-site staff and supply chain businesses employ a further 3,000-plus, the UTC is now recruiting the first 220 of 620 students for its opening in September 2016.

Located in the town centre, the £10 million facility will specialise in energy and engineering, with a particular focus on nuclear. Manchester Metropolitan University is providing sponsorship, helping to design the curriculum and equipment requirements.

John Simpkin, NDA Lead Programme Manager (PPRG), has been working closely with the UTC Warrington development, along with Sellafield Ltd's Engineering and Development Manager Mark Duffy and Head of Risley Office Paul Adams. All were involved in the bid to secure UTC status and government funding.

John said: "I have been delighted to be involved and firmly believe that UTCs offer a fantastic opportunity for young people to gain practical experience in a work environment while continuing with their studies. UTCs can lead directly to university, to high-quality employment or apprenticeships - they are exactly what the UK needs to produce future generations of well qualified, skilled engineers and technical specialists who will be assets for their employers."

The UTC Warrington board of governors includes Sellafield Ltd's Head of Project Engineering Management, John Patterson, who said: "At our Birchwood offices we provide the engineering capability to support Sellafield Ltd's ambitions to safely decommission the UK's nuclear legacy. Warrington's UTC will provide young people with outstanding opportunities to prepare for challenging and rewarding careers in engineering."

UTC Warrington currently has support from approximately 45 local employers, ranging from large engineering and



*Existing facilities at the Gloucestershire science park are being refurbished and upgraded.*

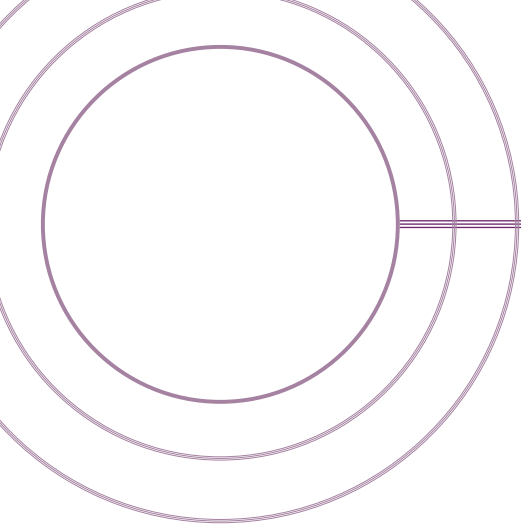
energy companies to Small and Medium-sized Enterprises (SMEs). Among the employers already involved are Tenet Consulting, Sellafield Ltd, Nuvia, AMEC Foster Wheeler, Atkins, Rolls Royce and Fujitsu.

Principal and Chief Executive Lee Barber's vision is for an academy based on energy and engineering, that would also encourage the development of skills in communications, leadership, resilience, organisational management and initiative: qualities that would enable them to flourish in their future careers.

Meanwhile, decommissioned land next to **Berkeley** site will house Berkeley Green UTC, a collaboration between South Gloucestershire and Stroud College and the University of Gloucestershire.

The land is being transformed into Gloucestershire Science and Technology Park and the UTC will take over some of the historic NDA-owned facilities that included the old nuclear labs which were once a key research complex for the UK's nuclear industry. Its specialisms will be advanced manufacturing and digital technologies, including cyber security.

*Continued on next page*



The UTC, which will open for the first intake of students in September 2017, is being built next to the old engineering rig hall, one of the buildings that will be refurbished and transformed into the GREEN (Gloucestershire Renewable Energy and Nuclear) Centre.

Some of the hall's existing internal equipment will be re-used, including the overhead crane, while its façade will see solar panels installed. Other facilities, including a suite of welding workshops, will also be given a facelift for re-use.

Funding support for college equipment has been provided from the NDA's socio-economic budget.

The campus will provide a wide-ranging curriculum up to post-doctoral level, including construction, mechanical, electrical and advanced engineering, with additional focus on sustainable skills and renewable technologies.

In 2006, following a comprehensive clean-up programme over many years, the Berkeley land became the first plot owned by the newly created NDA to secure de-licensing, followed by the lifting of all nuclear regulations by the government in 2010, enabling the site to be released for further use.

Its development as a science park will mark successful completion of the full decommissioning cycle. Other premises on the site are already occupied by a range of businesses.

*Artist's impression of the UTC Warrington, which will open in September 2016.*



# Site celebrates final ponds clean-out

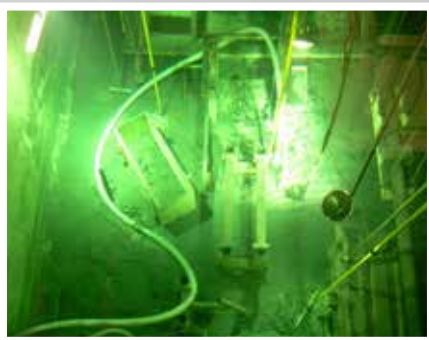
Both spent fuel ponds at Hinkley Point A site are now fully drained and decontaminated, completing a programme that started more than 10 years ago.

Work first started in the Reactor One pond in 2005 and, following a temporary two-year pause from 2010-2012, resumed in 2013. Since then, both ponds have had up to 10 cubic metres of highly active sludge removed, several tonnes of underwater pond furniture lifted out, 5,540 cubic metres of water drained and the surfaces stabilised. The final work on Reactor One pond was completed at the end of 2015,

marking a major operational milestone for the site's Ponds Programme.

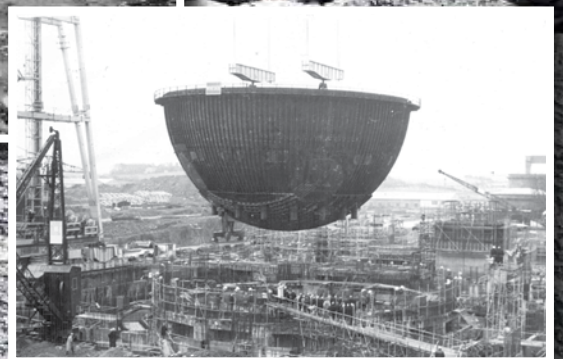
Ponds Campaign Manager Rob Taylor said: "We knew this was going to be one of the more challenging ponds in the fleet as the site suffered a couple of operational issues during its generation phase which led to higher volumes of sludge and higher levels of radiation in the pond."

"However, we've got a fantastic team at Hinkley, both in the project and support functions, which has worked hard to overcome the challenges. And, not only have the ponds been drained and stabilised, after final clean-out and shaving of the pond's contaminated surfaces, the general dose rates were reduced by two thirds – an excellent result."



*Radiological engineer on the pond floor without respiratory protection, a contrast to the conditions in both ponds before the clean-out*

# spotlight on Magnox



*Wylfa, above, which closed at the end of 2015, was constructed during the 1960s, right, and opened in 1971.*

# End of an era as UK's last Magnox power station closes

Wylfa Power Station has finally closed after generating electricity for almost 45 years - five years longer than originally planned.

The Anglesey power station was the last and largest in a fleet of 11 UK plants based on the ground-breaking Magnox design that gave the nation's scientists a global lead in the race to develop nuclear energy for homes and businesses.

Back in 1956, the nation celebrated the beginning of a new atomic age when the Queen opened the very first Magnox plant, Calder Hall in Cumbria. Its 190MW output was enough for 200,000 homes.

By 1971, the design had evolved and when Wylfa opened, its twin reactors generated 1,000MW, enough for 40% of Wales' total electricity needs and the most powerful nuclear power station in the world.

At the end of 2015, staff gathered to mark the Reactor One switch-off, which follows three years after Reactor Two closed. The five years of extended life were only possible thanks to an innovative method of transferring partly used fuel from one reactor to the other. The manufacture of Magnox fuel had ceased in 2008.

Site Director Stuart Law said: "Today marks a safe and dignified end to the generation of electricity at Wylfa, and indeed for Magnox, and I am proud to say that I was a part of it."

***"A safe and dignified end to the generation of electricity at Wylfa."***

Site Director Stuart Law

Wylfa was originally due to shut in 2010 but the pioneering Inter-Reactor Fuel Transfer, or IRX process, was endorsed by the regulators and enabled another five years of operations. The combined additional revenue from Wylfa's extra lease of life, as well as from Oldbury's four-year extension, amounted to approximately £1 billion which has been used for decommissioning.

The NDA's Chief Executive John Clarke said: "I am proud of the team's innovative work which made this extended operational life possible, but the time has come to finally switch her off and move into the decommissioning phase."

Fuel rods are already being removed from Reactor Two and dispatched to Sellafield for reprocessing. Defuelling of Reactor One will begin during early summer 2016, with a target for the site to be fuel free by late 2018. Full-scale decommissioning will last several decades.

## FACT FILE

In total, the UK's Magnox reactors generated approximately 1,100 TeraWatt hours of electricity – enough to supply all the nation's domestic users for about 15 years.

Magnox reactors were exported to Japan and Italy, while similar designs were built in France and North Korea.

The fuel is encased in a can made of an alloy of magnesium, giving rise to the name Magnox.

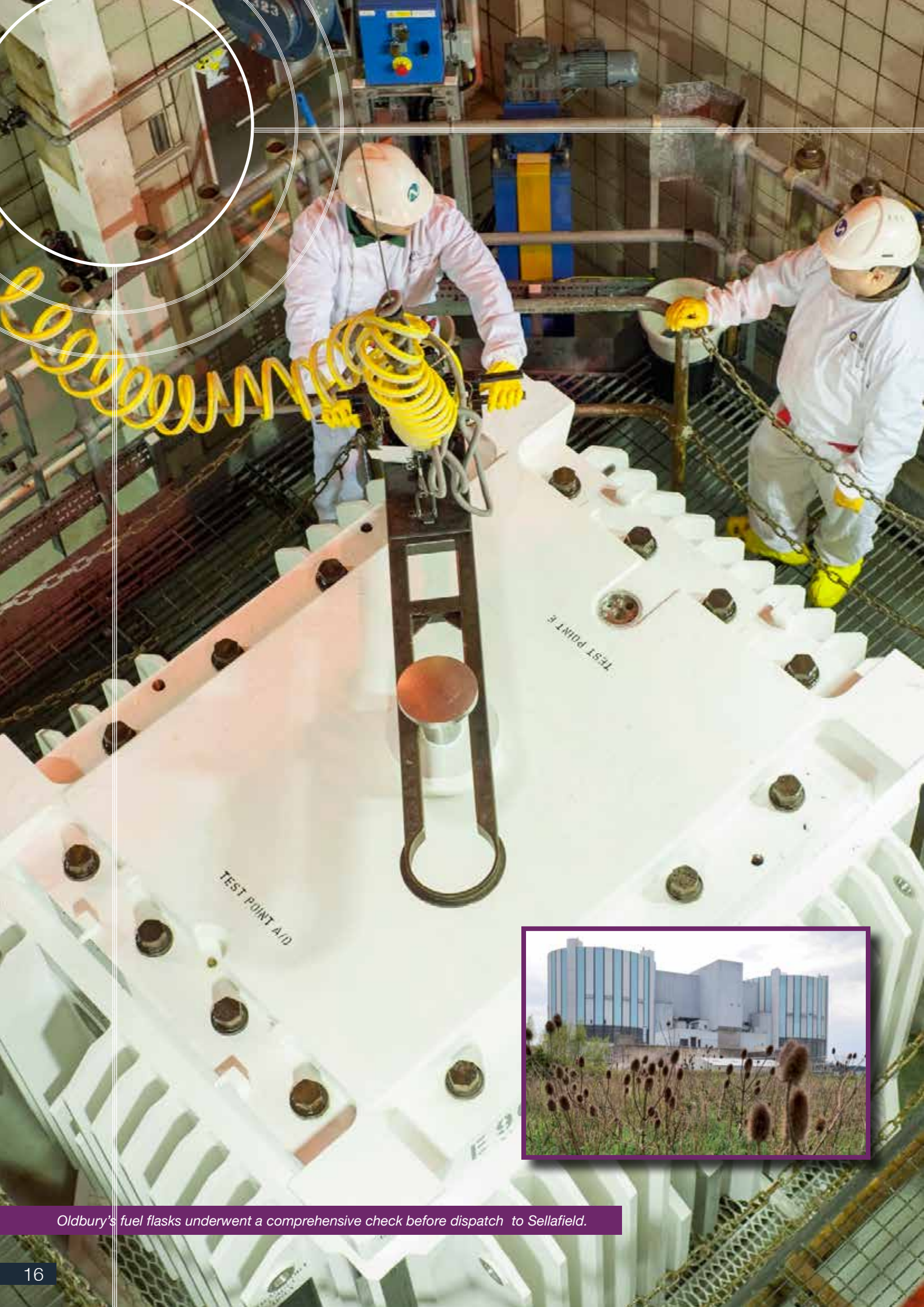
The reactors at Calder Hall and Chapelcross were optimised to produce materials for the weapons programme with electricity production as an additional benefit.

Wylfa was originally scheduled to close in December 2010. On 25 April 2012, Reactor Two was shut down and its fuel was used to enable Reactor One to continue generating.

While the fuel is being removed over approximately three years, non-essential equipment like the turbines and redundant office and lab facilities will be decommissioned.

In addition, any wastes will be retrieved and prepared for storage.

It will remain in a safe and secure condition for a number of decades, with final site clearance scheduled to be completed between 2096 and 2105.



*Oldbury's fuel flasks underwent a comprehensive check before dispatch to Sellafield.*





Staff, both past and present, gathered to wave off the fuel flask at the gates.

## All gone: 52,000 fuel elements

The last container of spent fuel has now left Oldbury, completing a defuelling programme that started when the power station closed in 2012.

Carefully packaged into the heavily shielded steel flasks, the site's 52,000 fuel elements, each measuring more than one metre long, have been dispatched to Sellafield where they will be reprocessed.

Removal of the fuel reduces 99% of Oldbury's radioactive hazard, marking a major milestone and enabling the site to move into its decommissioning phase. The aim is to reach the passive Care and Maintenance state by the late 2020s, when the closed reactor buildings will be left in situ, subject to a maintenance regime, until the whole site is finally cleared some 60 years later.

Oldbury Site Director Mike Heaton said: "I am extremely proud of the whole team for working together to reach this important milestone in record time. It has not been an easy task and the work at Oldbury

is far from complete, but today is a significant landmark in the site's journey towards Care and Maintenance.

David Batters, the NDA's Chief Finance Officer, added: "The dispatch of the final fuel flask is a significant hazard reduction milestone and marks the completion of a major programme of work. My congratulations to the Magnox team at Oldbury for an excellent job achieved ahead of schedule."

Oldbury will now go through a workforce transition to enable it to refocus on decommissioning. Near-term priorities include a mix of conventional and radiological projects to further reduce hazards on site.

### FACT FILE

Placed end to end, the 52,000 fuel elements would stretch for 17.5 miles.

The containers, or flasks, measure around 2.5 square metres square and are made from steel that is over 35 cms thick, which acts as shielding for the fuel.

Each flask carries around 200 fuel elements.

Out of a total 50,000 tonnes originally manufactured, supplied and used in 10 Magnox power stations, just over 1,000 tonnes of used fuel remains to be shipped from Wylfa, the only Magnox Ltd site with fuel, which ended electricity generation at the end of 2015.

Construction of Oldbury started in 1965.

During its operational life, Oldbury generated enough power for one million homes over 20 years - around 137.5 TWh of electricity.

## Student experiment gains top results

The internal condition of Winfrith's Dragon reactor core has been surveyed by camera for the first time in almost 50 years, thanks to a student's summer project.

With a budget of just a few hundred pounds, Lancaster University physics student Thomas Brind came up with techniques that enabled a standard CCTV camera with pan-tilt-zoom functionality to be controlled remotely and lowered into the core suspended from the polar crane.

A strip of LED lights wrapped around a short section of drainpipe provided illumination.

Rob Shaw, Reactor Decommissioning Project Engineer, said: "Thomas's project demonstrates that expensive, specialised remote-viewing equipment is not automatically required for work of this nature.

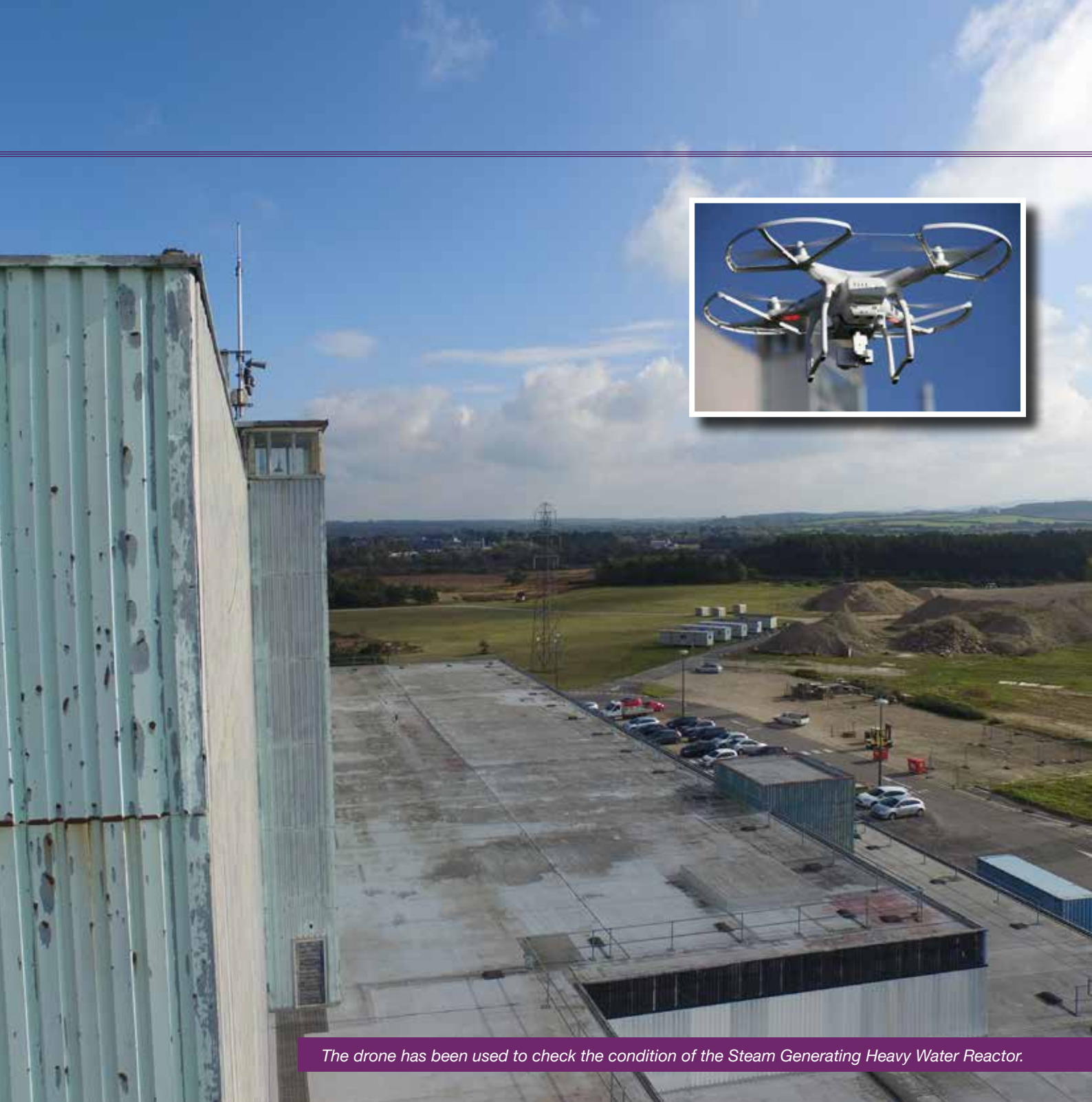
"If his set-up had proved unsuitable, it would have informed, at minimal expense, the requirement for a more specialised solution, both for this task and future activities in the project."

The survey revealed previously unknown information about the core's construction and condition, and will help to shape the developing reactor decommissioning design.



*The camera shows a close-up of the control rod guide tubes. Below, fuel being installed during the 1960s.*





*The drone has been used to check the condition of the Steam Generating Heavy Water Reactor.*

## A flying success

Meanwhile, with further efficiencies in mind, Winfrith are deploying a commercially available drone to check the external condition of the Steam Generating Heavy Water Reactor and reduce the risks of working at height.

The aim is to complete a visual inspection without the need for significant scaffolding, abseiling and manpower.

Further investigations will be carried out if the drone inspection shows significant issues.

To date, the camera-carrying drone has been tested around the outside of the turbine hall in windy conditions,

some 30 metres above ground level. Consideration is also being given to the value of checking some of the high radiation areas within the complex.

Other projects across the wider Magnox estate are exploring whether the drone approach could be of benefit to them. Strangely there has been no shortage of volunteers to pilot the drone.



*Nigel Lowe, the NDA's Programme Director (left), DSRL Managing Director Phil Craig (centre) and Project Director (Waste) Bruce Covert congratulate the WRACS team.*

## Dounreay celebrates crushing victory over backlogs

More than 5,000 drums of solid Low Level Waste (LLW) have now been crushed at Dounreay following the replacement of a vital compacting machine.

The supercompactor has been dealing with a backlog at the Waste Receipt Assay Characterisation and Supercompaction facility (WRACS) since it was re-started in July 2015.

WRACS had been out of action since July 2011 when one of the main support columns in the supercompactor suffered a stress fracture, requiring a replacement unit.

Procuring and installing a replacement supercompactor was challenging, especially as this was carried out while the rest of the WRACS facility continued to accept,

characterise and assay the site's LLW waste drum arisings.

By the time supercompaction resumed, there was a backlog of more than 16,000 stored drums.

Once WRACS resumed supercompacting, the team quickly achieved and passed their target of 3,500 crushed drums.

The WRACS facility receives 200-litre drums of solid LLW, assays and characterises the contents, then crushes them into 'pucks' approximately one fifth of their previous size.

The pucks are placed in half-height ISO containers which are grouted in the encapsulation plant and disposed of in the newly constructed low level waste vault.

Project Director Bruce Covert said team work and safe working practices were among the reasons for the team's success in reducing the backlog.

# Fast reactor clocks up 13 years of safe working



The Dounreay Fast Reactor, housed in its iconic steel sphere, closed in 1977.

The team responsible for decommissioning the Dounreay Fast Reactor (DFR) has achieved a 13-year flawless safety record.

The DFR team is extremely proud of its record which equates to 4,748 days without a lost-time accident.

Some major project work has been successfully completed over the years, as decommissioning progresses, and an open reporting culture is among the factors that have contributed to the safety record.

DFR team members have become adept at identifying and learning from issues before they become significant, while campaigns or roadshows are used to highlight common issues.

Management act quickly to correct any weaknesses identified while staff at all levels are directly involved in planning work, to ensure methods are safe and efficient. This enables all DFR team members to thoroughly understand procedures and share their knowledge, identifying safety concerns as they arise in the pre-planning phase.

Ken Heider, Reactors Project Director, said: “Decommissioning DFR is one of the most significant challenges in the UK today. Our safety record is a huge achievement and reflects the commitment of the team. It requires a continuous focus by both DSRL and its contractors. Safety is in the forefront of everything we do.

“Decommissioning hazardous plants over half a century old brings with it many challenges and maintaining a safe working platform to do this is essential.”

## FACT FILE

Housed inside a steel sphere, the DFR was built between 1955 and 1958 to test the concept of fast breeder reactors, and closed in 1977.

Fast breeders offered the prospect of power stations that could produce material for new fuel as well as generating electricity.

In 1962, DFR became the first fast reactor in the world to provide electricity to a national grid.

Its 14MW output was enough to power a small town like Thurso (population of approx 9,000).

The UK’s fast breeder programme was halted in the 1980s.

# spotlight on Apprentices



*Philip was invited to No. 10 to meet the Prime Minister.*

## Sites lead in training young people

Sellafeld apprentice Philip Marwood was over the moon to meet the Prime Minister in Downing Street.

The 22-year-old mechanical design apprentice was selected to represent Sellafeld Ltd in the Apprentice Celebration meeting with David Cameron, where he was able to discuss how the Government, apprentices and businesses can do more to promote apprenticeships.

Philip, who is based at Sellafeld's Risley operation, was selected as one of the site's outstanding trainees to attend an apprentice celebration event in London.

He said: "It was such an honour to be invited to No 10 to talk to David Cameron about my experiences and how young people can be inspired to see apprenticeships as a great route to their future career.

"I've walked past Downing Street

many times and would never have expected anything like this to happen to me!"

Philip took an unconventional career path, starting out in various jobs including an accountant traineeship before finding his calling on the mechanical design apprenticeship in 2014.

Philip said: "My apprenticeship has been the best start on the career ladder I could have wished for. I have gained skills, knowledge and confidence that I would never have got at university and that's why I am so passionate about promoting apprenticeships."

Sellafeld Ltd, meanwhile, has long been at the forefront of apprenticeship training in the

nuclear industry and was recently recognised at the National Apprenticeship Awards 2015 for its outstanding contribution in the North West.

The company stood out from more than 1,200 entrants to be named as one of the top three 'Macro Apprentice Employers' alongside Lloyds Banking Group and the overall category winner, BAE Systems.

The company's commitment to investing in the skills and development of the next generation was formally recognised, taking home the 'highly commended' title and placing on the prestigious 'Top 100 Apprenticeship Employers list' which is compiled annually by the National Apprenticeship Service.

## Apprentices across the estate

Philip is one of hundreds of apprentices currently in training across the NDA's 17 sites as part of a strategy to develop and maintain the vital skills needed for a complex clean-up mission that will continue for at least another 100 years.

Even though NDA sites are heading for eventual closure, the UK's ageing nuclear workforce will lead to a shortfall in the medium term as well as a demand for skills to deal with future closures in the current global nuclear fleet, and to meet the needs of new build and regional economies.

The sites have a long tradition of training young people, in some cases dating back 60 years, particularly at Sellafield, which, with a 10,000-strong workforce, is the largest and most challenging nuclear complex in Europe. A key part of the NDA's People Strategy is support for apprenticeships both in its SLCs and in supply chain businesses.

The government is committed to supporting 3 million new apprenticeship starts in England between 2015 and 2020, and promoting high standards.

Among the achievements in the NDA estate are:

- More than 1,300 apprentices trained across the estate since 2005.
- NDA apprentices have been recruited in all parts of the UK, from northern Scotland to Wales and the south coast of England.
- In 2005, five types of apprentice training courses were available. Now, there are 17 different options for young people.
- Disciplines range from traditional engineering crafts such as fabrication, welding, electrical and instrumentation, mechanical and design to newer areas such as project management, which has recently been introduced at Sellafield.
- In line with the government's 2015 commitments, Sellafield is offering some of the country's first-ever apprenticeships at degree level: 18 recruits started last year.
- Sellafield will achieve a record 550 apprentices in training when it welcomes a further 165 new recruits in September 2016.
- Sellafield Ltd and nuclear partner companies established a Nuclear Trailblazer programme in 2014 which is developing new employer-led standards.
- Sellafield became the 100th member of the 5% club, a commitment to ensure that 5% of its workforce are undergoing formalised training at some level, from apprenticeships to graduates.
- Harwell, one of the NDA's smaller sites, has recruited two electrical apprentices for the first time in many years.
- Dounreay recently celebrated 60 years of training apprentices. In 2015, 23 young people were recruited onto a range of courses.
- Magnox sites took on 25 advanced-level apprentices between 2012 and 2015.

## Potential recruits check out LLWR

A commitment to apprenticeships has already paid dividends for LLWR Repository Ltd.

There are currently nine successful trainees and no shortage of potential new recruits keen to take their first career steps at LLWR.

Teenagers and parents flocked to LLWR's exhibition stand at a Careers Fair in Whitehaven - a joint effort with Framework partner GRAHAM Construction - to learn about the low level waste industry.

LLWR's early moves into the area have also proved fruitful with its first four apprentices - Daniel Paton, Rebecca Wood, Ellie Pearson and Beth McKee - progressing to full-time roles within the organisation. A second batch of five apprentices are all still in training.

Gen2 manage the scheme with LLWR providing the daily work environment.

The Careers Fair attracted dozens of people, said LLWR Ltd's Mark Edgar: "We had a constant stream for three hours, from start to finish."

National Apprenticeship Week, which runs from 14-18 March, is designed to celebrate the long-established route to the workplace.

Mel Scudamore, LLWR's Senior Training Officer, said: "After such promising beginnings, I believe LLWR will continue to place its faith in apprenticeships as a route to work for young people."

# Supply Chain



NDA  
Nuclear  
Decommissioning  
Authority

Around 1,500 visitors attended last year's event.

## Date for your business diaries

The date of the next annual networking event for NDA suppliers has now been confirmed as:

**3rd November 2016.**

For 2016, the NDA Estate Supply Chain Event again returns to EventCity in Manchester, providing opportunities for businesses of all sizes to exhibit in the main hall and to meet leading figures in nuclear decommissioning.

Last year's event, organised jointly by the NDA and its SLCs, attracted a record 1,500 visitors and scored an overwhelming 97% success rating, according to a follow-up survey. It is now believed to be the largest of its kind in Europe.

The one-day event is free of charge for visitors and exhibitors (optional extras are subject to a small fee). Launched in 2011, its aim is to continue improving the visibility of opportunities for suppliers, particularly those in the Small and Medium-sized Enterprise (SME) community.

A major highlight of the morning sessions is the prestigious Supply

Chain Awards, which acknowledge the vital role played by the estate's wide diversity of contractors. Details of the 2016 categories will be available in the near future.

The survey sought to understand which features had worked well and which might need adapting to ensure the 2016 event continues to meet business aspirations.

The survey also showed that:

- The majority of those attending had been to previous events.
- Around 20% were new to the decommissioning market.

Ron Gorham, the NDA's Head of Supply Chain Optimisation and SME Champion, said: "We are keen to listen to views about what could be better and will build additional refinements into the next event."