

INNOVATION | FUSION

Joint venture scores a 'first' in ITER project

STORY | CHUCK GRIEVE

A NEW THREE-PARTNER British and Spanish joint venture is to develop and manufacture a prototype 'first wall' panel for the International Thermonuclear Experimental Reactor (ITER).

The deal was signed between Britain's AMEC and two Spanish companies, Iberdrola Ingeniería y Construcción and Mecánica Industrial Buelna (MIB).

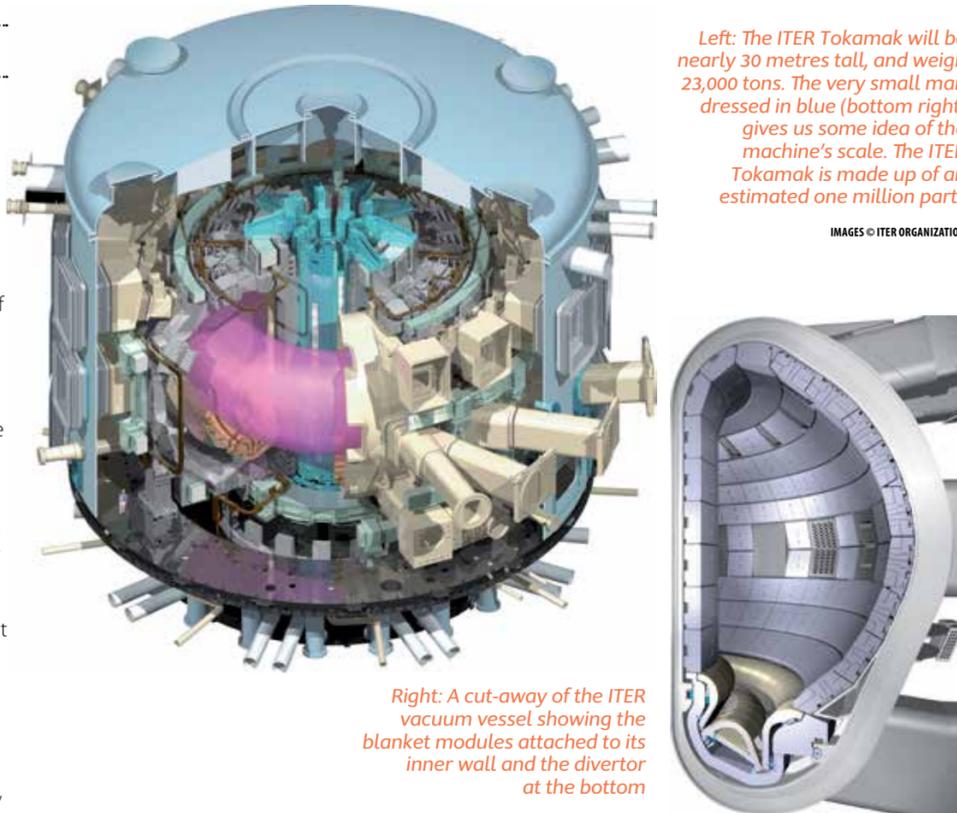
The first wall panels are crucial to the success of ITER, the multi-billion-euro project in Cadarache, southern France, that aims to demonstrate the technical feasibility of nuclear fusion as a future power source. The panels form part of a barrier that protects the vacuum vessel at the heart of the ITER machine from neutrons and other energetic particles produced in the fusion process.

The contract awarded by Fusion For Energy (F4E) follows on from the joint venture's success in developing a one-sixth-size semi-prototype under a contract awarded in 2013.

"The successful delivery of this contract is an important step along the road to the development of a fusion reactor," said Greg Willetts, director of AMEC's consultancy services business. "Our role will be to verify and provide technical design expertise in the fabrication, manufacturing and testing of a 'first wall' panel using our unrivalled knowledge of hot isostatic pressing of metals, which we have developed during the last decade."

Francesco Zacchia, blanket module responsible officer at F4E, said: "This contract represents an essential step towards our final goal to fabricate the 'first wall' panels for ITER. We are looking forward to AMEC, Iberdrola and MIB solving the challenging manufacturing issues and to delivering on time with the expected high quality."

Paris-based ESI, a specialist in simulation, has been selected by AREVA to work on the advanced assembly of the ITER vacuum vessel during manufacturing. ESI's electron beam welding study has been validated for the prediction of distortions in large welded assemblies such as the ITER vessel.



Left: The ITER Tokamak will be nearly 30 metres tall, and weigh 23,000 tons. The very small man dressed in blue (bottom right) gives us some idea of the machine's scale. The ITER Tokamak is made up of an estimated one million parts

IMAGES © ITER ORGANIZATION

Right: A cut-away of the ITER vacuum vessel showing the blanket modules attached to its inner wall and the divertor at the bottom

QUOTE OF THE DAY |
HENRY FORD
Coming together is a beginning; keeping together is progress; working together is success...

WIKIMEDIA COMMONS/TIME

INTERVIEW WITH | GÉRARD KOTTMANN

Gérard Kottmann, president of the Association of French Industrialists Exporting Nuclear Energy (AIFEN), was in bullish mood about both the challenges facing the industry and the innovations being displayed within the sector when Vincent Chappard caught up with him on the eve of the show

AN INDUSTRY ON THE MOVE

When AIFEN was founded a year ago, its first mission was to bring together global nuclear players. And what better way to do it, according to president Gérard Kottmann, than by staging the inaugural World Nuclear Event 2014 (WNE 2014) at Le Bourget?

"The exhibition aims mainly at bringing partners together, to enable large companies, SMEs and micro-businesses to meet clients and to promote their products, services and capabilities," said Kottmann. "We hope it will effectively showcase their expertise and know-how to international customers."

Unlike many exhibitions in this sector, the WNE covers all nuclear industry activities, from combustion, research and development, reactor technologies, maintenance and medical nuclear materials, to demolition and waste management.

"Above all I hope that our exhibitors are satisfied," said Kottmann. "If they are satisfied, it will be a clear indication that meetings were numerous and fruitful and that contacts

could lead to business." The president explained that the programme included only six round table events to enable visitors to make the most of the exhibition, exchange views, get more visibility and tap new markets within the common platform.

Kottmann recently stated his belief that the development of secure nuclear energy was the only way to meet the environmental challenges of the world's growing electricity demand. He was happy to elaborate for WNE Tribune.

"We now have seven billion people in the world; there were three billion when I was born and, according to estimates, the population will reach 11 billion by 2100," he said. "Our message is clear: we shall need all forms of energy. Rejecting nuclear energy is like banging your head against a wall."

"It's time to take the facts into account, to make policy decisions and to stop myopic reactions when tackling energy issues."

Turning to the nuclear energy sector's major innovations globally, Kottmann was enthusiastic:



Gérard Kottmann

"Improved designs of power reactors are constantly being developed internationally, bringing more efficiency and security," he said.

"There is incremental research and development to enhance our present capabilities and innovation with so-called Generation IV and Generation V power reactors – there are a number of projects, such as power plants for high-temperature hydrogen production.

"Among the most promising projects, embarked upon by France, China, India, Russia and Japan, is the 'fast breeder reactor'.

"The main criticism of the nuclear industry

CONTINUED | INSIDE >

EVENT ITINERARY

WNE | DAY ONE

- 9:00am > **OPENING CEREMONY:** Gérard Kottmann, WNE President
Henri Proglio (EDF CEO) presentation
Valéry Giscard d'Estaing, Former President of the French Republic
- 10:30am > **COFFEE BREAK**
Tractebel Engineering booth J63
- 11:00am > **AREVA - PANEL DISCUSSION:** Safe, Proven Technologies for Reactors and Fuel Cycle. Hosted by Luc Oursel, Chief Executive Officer, AREVA
- 2:00pm > **COFFEE BREAK.** Booth H07
- 2:00pm > **SPECIAL SESSION:** International nuclear development. Chaired by Gérard Mestrallet, Chairman and Chief Executive Officer of GDF SUEZ. **AUDITORIUM**
- 2:00pm > **SPECIAL SESSION:** International cooperation in Nuclear Fuel Cycle (tbc) - ROSATOM. **ROOM 2**
- 2:00pm > **HAIYAN:** Share the Spring Time of Nuclear Power, Come Together at China Nuclear Power City. **W1**
- 2:00pm > **HALE PRODUCT:** Diesel Driven Emergency Cooling Water Supply. **W2**
- 2:30pm > **CEA:** D&D technologies and processes: from R&D to implementation. **W1**
- 2:30pm > **EDF:** EDF nuclear rapid response force as a means of safety enhancement. **W2**
- 3:00pm > **AREVA:** EPR Project Delivery: The Value of Experience. **W1**
- 3:00pm > **ASSYSTEM:** The Importance of a PMC in Nuclear New Build Programs: an Engineering Consultancy Perspective. **W2**
- 3:30pm > **AREVA:** Supporting Utilities Demonstrate and Upgrade Safety of their Fleet. **W1**
- 3:30pm > **ASSYSTEM:** The Importance of a PMC in Nuclear New Build Programs: an Engineering Consultancy Perspective – **W2**
- 4:00pm > **BOCCARD:** The importance of traceability, reliable production tracking systems and clear processes to successfully deliver mechanical packages in a Nuclear environment. **W1**
- 4:00pm > **ANDRA:** Cigéo, Deep Geological Repository for High-Level Waste: gained knowledge from the initial research to the ongoing industrial project. **W2**
- 4:30pm > **ALTRAN:** Nuclear Reactor design: economical competitiveness with high safety standard. How to find the right compromise? **W1**
- 4:30pm > **DAHER:** A turnkey solution for evacuation of damaged fuel by DAHER. **W2**
- 5:00pm > **SCHNEIDER ELECTRIC:** Upgrading nuclear plants for improved safety and efficiency. **W1**
- 5:00pm > **ANDRA:** Over 20 years of improvements of disposal practices at the Aube Disposal Facilities for operational and decommissioning waste. **W2**

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AN EVENT OF



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THROUGH THE EYES OF WNE VISITORS

VIETNAM



› The Vietnam National Nuclear Safety Council delegation heard about WNE from its French partners AREVA and ATMEA, said Duong Hong Anh, Deputy Director of the National Council for Nuclear Safety Office of the Vietnam Agency for Radiation and Nuclear Safety.

He said the main goal of the delegation was to further its members' understanding of the French nuclear industry in particular, and the international nuclear community in general.

"We hope to have opportunities at the exhibition for plenty of direct communication with our partners," he said, "and we also hope to share knowledge and experiences with international experts."

CHINA



› China's CNIM Group learned of the World Nuclear Exhibition through the Partenariat France Chine Electricité (PFCE), an association whose members include major players in the field of electricity of France and China.

Group representative Xuejun Fu said he expected the exhibition would provide an opportunity to see many French companies active in the nuclear sector. He also hoped to meet potential clients and suppliers for the CNIM Group, a medium-sized company which designs and produces high-tech turnkey industrial solutions for the international market.

INTERVIEW WITH | GÉRARD KOTTMANN - CONTINUED FROM PAGE 1

concerns waste management; certainly a limited number of reactors are slow in losing their radioactivity. The advantage of 'fast breeder reactors' is their ability to re-use the fuel of the third generation reactors up to 50 times.

"With known reserves and stored fuel, we have energy for 3,500 years on a constant basis.

"ITER (originally known as the International Thermonuclear Experimental Reactor) is a wonderful international project. It must show its viability. The electricity which will be produced will generate temperatures which no material known today can resist. It will, in other words, recreate the energy of the sun, which remains the largest existing nuclear power plant."

Turning to France, Kottmann said: "The French nuclear industry is unique in the world as it encompasses the full range of needs of

such a specialised energy. Other countries don't possess an industry covering the whole spectrum - from A to Z - in this process.

Domestic market "The French nuclear industry has succeeded, despite the difficulties, in surviving and creating jobs, as well as innovating, as France has an important domestic market.

"The maintenance market is an essential pillar to sustain nuclear companies in the short-term. The other vital pillar is export. The French nuclear industry is diversified, has many assets and is renowned throughout the world."

Kottmann also pointed out that there were many global projects in which French companies could participate, like Hinkley Point, Sizewell, NuGen or Horizon.

WHAT THEY SAY | GÉRARD KOTTMANN

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"China and India also want to develop their nuclear sector and they have monumental electrical energy needs," he added. "The Chinese are willing to use other types of energy. Nuclear energy forms part of the energy mix that the country needs to reduce its dependence on coal."

NEWBUILD | UK



Groundworks are under way at Hinkley Point C - the UK's first newbuild nuclear plant in 20 years

EDF ENERGY

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specialist in:
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EDF boost as EU backs Hinkley Point scheme

Just days before WNE opened, EDF learnt that it had overcome the final regulatory hurdle to build the first new nuclear reactor in the UK for 20 years.

Last week, The European Commission (EC) gave the green light, by a majority decision, to approve the terms of agreements between EDF Group and the UK Government that will enable the multi-billion pound construction of Hinkley Point C in Somerset, south west England, to go ahead. Subject to a final investment decision, the power station is expected to complete commissioning of the first unit in 2023.

The basic deal allows the French-owned electricity generator to be guaranteed £92.50 per megawatt hour over the 35-year life of the plant.

The EU examined the bid over concerns that the UK Government was giving excess help to the plan.

Formal state aid approval from the European Commission, on the condition of some minimal revisions to the scheme, came after a lively debate that led to four EU Commissioners voting against the decision.

The EC decision prompted criticism from

environmental organisation Greenpeace, which described it as a "world record sell-out" but it was welcomed by both the UK Government and by the British Nuclear Industry Association.

Britain and France already operate more than 50% of the EU's nuclear capacity and there have been generations of nuclear reactors built in the UK. Indeed, Britain has more than half a century of experience of safe and successful nuclear power station operation.

However, all but one of the country's 10 first-generation nuclear power stations are now closed. The seven second-generation power stations, which use advanced gas-cooled reactors, provide the backbone of the UK's current nuclear generation fleet but it is expected that, by 2025, more than 40% of the UK's older power stations could be closed.

EDF has a long history of exporting its expertise and its UK current nuclear fleet, including the pressurised water reactor at Sizewell B, now provides about 18% of the UK's electricity needs. In France, EDF has operated nuclear power stations since 1963 and today runs 58 nuclear reactors across the country.

SOLUTIONS TO ENHANCE SAFETY AND RELIABILITY

US COMPANY SPX has a long history in supporting the power generation industry. Its focus on nuclear technology includes programmes of continuous research and development to help provide the necessary reliability, integrity and availability of critical systems for safe operation.

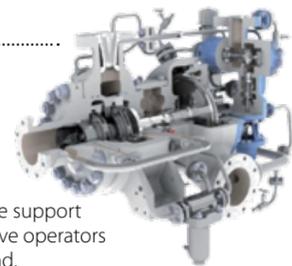
With leading brands, including ClydeUnion Pumps (CUP), Copes-Vulcan, Dollinger, Balcke-Dürr, Plenty and APV, SPX's wide nuclear portfolio has a comprehensive range of Class 1, 2 and 3 products such as pumps and valves as well as a broad range of conventional island technology.

Based on its operations in more than 35 countries and an even wider network of approved partners, its solutions are further backed by responsive,

comprehensive, lifetime support services designed to give operators complete peace of mind.

From SPX's CUP brand, the turbine water lubricated (TWL) is a single-stage safety pump that combines a centrifugal pump with a single wheel turbine to enhance the safety in both pressurised water reactors (PWRs) and boiling water reactors (BWRs). It provides continued operation under submerged conditions, as well as complete independence from the availability of other systems, addressing many of the safety concerns raised following the 2011 Fukushima incident.

Above: Turbine Water Lubricated (TWL) single-stage safety pump



UAE ON TARGET WITH FOUR NEW NUCLEAR REACTORS

THE UNITED ARAB Emirates (UAE) is on track to complete four new nuclear reactors, with the first coming on line in less than three years.

Four separate reactors are being built at Barakah in the western region of Abu Dhabi, approximately 53 kilometres from the city of Ruwais. Reactor unit one is scheduled to begin commercial operations in 2017, unit two in 2018, unit three in 2019, and finally unit four in 2020.

Unit one is already more than 57% complete and on schedule, and construction of unit two is well under way.

Following an 18-month review by the UAE Federal Authority for Nuclear Regulation (FANR), and a

team of international nuclear energy experts, the regulator granted ENEC approval last month to commence construction of units three and four.

Consequently, in a ceremony attended by senior officials in late September, 1,954 cubic yards of safety concrete was poured for one of the containment buildings at unit three.

Preparation work has been carried out over a 12-month period, including excavation works, laying lean-concrete to provide a base, waterproofing and the installation of reinforcing steel.

Work will now continue with more concrete being added until the reactor containment building wall is installed.

Once the four reactors are complete, the UAE's nuclear programme will provide approximately 25% of the country's electricity needs, saving up to 12 million tonnes of greenhouse gas emissions each year. The Emirates Nuclear Energy Corporation (ENEC) says its commercial operations will bring clean, reliable and efficient nuclear energy to the region.

Mohamed Al Hammadi, CEO of ENEC, said: "The concrete pouring is yet another key accomplishment for ENEC and the UAE's peaceful nuclear energy programme."

"ENEC is working hard to reach its construction targets on schedule and deliver safe, efficient and reliable nuclear energy to the UAE, starting by 2017."

NEWS | IN BRIEF

PROVEN ANSWER TO FUEL DEBRIS

> A versatile concept for fuel debris retrieval used at the Fukushima-Daiichi reactors will be on display at WNE for the first time.

The pneumatic transfer system was developed by Oakridge Sciences and Service. It works by loading an empty capsule in the pneumatic tube. The force of gravity allows it to fall into the fuel debris loading station which is located inside the reactor pressure vessel (RPV). The capsule opens automatically, allowing a robotic arm to fill it with fuel debris.

After it is filled, the capsule closes before being aspirated from the RPV to the containment space, where the debris is transferred to a cask.

FIRST SHOWING OF SPECTROMETERS

> New spectrometers from Baltic Scientific Instruments are on display for the first time at WNE.

The company's gamma spectrometers, based on HPGe detectors, are equipped with nuclear electronics and analytical software packages to perform qualitative and quantitative analysis of radionuclides.

On show will be a laboratory HPGe spectrometer with a lead shield to be used for non-destructive radionuclides analysis, an HPGe hand-held spectrometer NitroSPEC, and a mobile variant for field work used for the radiological control of environmental objects and processing radioactive wastes from nuclear energy plants.

NUCLEAR INDUSTRY INSPIRED BY AEROSPACE

INTERVIEW WITH | LUC OURSEL

The French nuclear industry doesn't do enough to promote itself – and the industry knows it.

That, said the head of the world's biggest nuclear company, was the impetus behind the creation of a 'Bourget du nucléaire'.

"In export markets, we haven't always projected the image of a well-organized industry," said Luc Oursel, chief executive of AREVA (stand E54, F53). He expects WNE to help correct that impression.

Inspired by the example of the aerospace industry and the work of Gifas, the French aerospace industry association, French nuclear industry exporters set up their own association – AIFEN.

It was intended to provide members with a forum to discuss issues of common interest, such as

exports, training, communication, technology etc.

Said Oursel: "The crowning success of Gifas is the International Paris Air Show at Le Bourget. To strengthen the cohesion of the nuclear industry, we have founded the World Nuclear Exhibition (WNE), at Le Bourget!"

He said a prime objective of the exhibition is to highlight the know-how of companies working closely with industry leaders such as AREVA and EDF. This "cohort of SMEs" benefits greatly, as industrial partners, from the order backlog of a company such as AREVA, which sits at €45 billion – some five years of revenue.

"Looking beyond our industrial partners, the WNE is an opportunity to bring together all those interested in our industry and who may be considering entering the sector," he said. "We will

WHAT THEY SAY | LUC OURSEL



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welcome to Le Bourget students from engineering schools, universities and technical colleges so that they can meet with the companies."

FRENCH BUILDER LAUNCHES NEW NUCLEAR DIVISION

FRENCH CONSTRUCTION FIRM Léon Grosse is using WNE to unveil its latest business division – Léon Grosse Nuclear (LGN).

It underlines the group's ambition to pursue a new industrial strategy and builds on its wealth of experience in this field.

"The experience we have gained over the years will be consolidated in a dedicated nuclear division that will be the single entry point for all stakeholders in the sector," said the company.

"The research and development (R&D) department works with the best-performing laboratories to innovate in the field of materials, recycling and traceability of components."

The new division will take advantage of the group's network of offices to provide a flexible and reliable service through local contacts.

Léon Grosse has worked in the nuclear industry since the 1960s when it produced materials used

in the oldest testing facilities at Mururoa Atoll in the Pacific Ocean. It has worked on the CEA/DAM incinerator at the Valduc Research Centre, a storage building at the Chinon Nuclear Power Plant, and the waste treatment plant at Marcoule.

Major projects the group has worked on include the tower of the European Parliament, the TGV station at Lyon, the Jean Bouin football stadium in Angers and the S4 terminal at Roissy Charles de Gaulle airport.

"LGN shares the ambition to expand its operations and help to dismantle barriers within related trades in nuclear engineering," said the company, which will have around 1,000 employees when it is officially launched.

Founded in 1881, the Léon Grosse Group has a turnover of more than €700 million and employs around 2,300 people in 40 branches and subsidiaries throughout France.



INNOVATION | FUEL HANDLING

FUKUSHIMA FEEDBACK AIDS RACK DESIGN

A NEW FREE-STANDING, high density storage rack for nuclear fuel which owes its design to feedback from the Fukushima incident is being introduced at WNE by Onet Technologies of France.

The new rack can be adapted to all fuel types and is fully compliant with current safety regulations and standards. Its enhanced safety functions take into account earthquake conditions and thermo-hydraulics, among other factors.

The rack not only satisfies technical requirements; Onet has positioned it as a competitive solution on the international market.

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