04.2020

BILFINGER now!

we create

EPR2: An optimized reactor

we can

ICEDA: New waste conditioning plant goes live

we care

NUCLEAR TECHNOLOGY

Innovative processes for safe power generation

BILFINGER

BUILDING A NEW NUCLEAR POWER PLANT

POWER FOR **SIX MILLION** HOUSEHOLDS

The two nuclear reactors under construction at Hinkley Point C in Somerset county in the southwest of England represent one of the biggest and most ambitious energy projects in Europe. Bilfinger is on board as a tier-one supplier.

The construction of Hinkley Point C has progressed rapidly since work began four years ago and the facility is increasingly taking shape with the outline of the two reactor buildings as well as more and more plants and components visible on the site near the town of Bridgwater. Another important milestone was reached in mid-September when the steel housing, known as the liner cup, was lifted into place on the second reactor building.

Bilfinger is involved in many of the construction-related services at Hinkley Point C. The company was selected by French energy group EDF and its UK subsidiary as a tier-one supplier on the construction project. That makes the industrial services provider not only one of a small number of suppliers strategically managing the project together with EDF but also a preferred partner for future projects.

Among the initial services provided by Bilfinger is the construction of the nuclear plant's three main piping systems. These include the pipework for the Balance of Plant (BOP), Balance of Nuclear Island (BNI) and Nuclear Steam Supply System (NSSS). Bilfinger will be responsible for the execution design, prefabrication and delivery as well as supplier management on the BOP, BNI and NSSS pipework.

Bilfinger UK, Bilfinger Engineering & Technologies from Germany and Bilfinger Peters Engineering in France will work as a team to provide these services. "We are combining several of our Group units' strengths and experience to perform the technologically demanding piping production and installation," says Tom Blades, CEO of Bilfinger. "That makes us a single source for all the necessary services."

Bilfinger Noell was additionally awarded a contract for services ranging from designing to commissioning a waste conditioning system for liquid and solid radioactive materials generated during operations at the Hinkley Point C nuclear power plant.

Our subsidiary is also designing and delivering components for the Core Melt Stabilization System (CMSS), which harnesses Bilfinger's unique expertise to ensure even greater plant safety.

"We are bringing to bear our 360-degree approach in the construction of Hinkley Point C," says Blades. "Our all-embracing, multifaceted skill sets allow us to provide end-to-end solutions from planning, design and calculation through manufacturing and assembly to commissioning. In recent years, this has secured us an outstanding market position in our cooperation with the nuclear technology industry in Germany and abroad."

BYOND Learn more

HINKLEY POINT C

Hinkley Point C is the first new nuclear power plant to be built in the UK in over 20 years. Commissioned by Électricité de France (EDF), works currently include construction of two third-generation pressurized water reactors (EPR™), each with a capacity of 1,600 megawatts. They will supply electricity to around six million households.

Big Carl, the world's biggest crane, lifts the 70-ton liner cup onto the reactor.

Balance of Plant (BOP)

Bilfinger is responsible for planning, designing, prefabricating und delivering the BOP package. This encompasses the essential pipework and auxiliary systems outside the water-steam cycle (or primary circuit), which are vital to supplying energy. In addition, Bilfinger will install the GRE piping and assist in supplier management.

Balance of Nuclear Island (BNI)

The nuclear island is the heart of the nuclear power plant. It includes the reactor, steam generators as well as primary safety and piping systems. Bilfinger is tasked with implementing the planning, design, procurement and prefabrication and is also providing parts of the supplier management.

Nuclear Steam Supply System (NSSS)

The nuclear steam supply system drives the turbine-generator unit that produces low-carbon electricity. Execution design, procurement as well as prefabrication and assembly of piping falls to Bilfinger, which is also overseeing supplier management.

Conditioning plant for waste

Bilfinger has been contracted to plan, design, manufacture, deliver, assemble and commission a conditioning plant for liquid and solid radioactive operational waste. To ensure that the waste produced during operations will be safely conditioned without consuming a lot of space, sorting, crushing and compacting processes have been applied. After this, the waste containers are encased in concrete and finally capped.

Core Melt Stabilization System (CMSS)

Bilfinger is designing, manufacturing and supplying the CMSS. In recent years, Bilfinger has developed and supplied the CMSS for other new nuclear power plants, including Flamanville 3 (France), Olkiluoto 3 (Finland) and Taishan 1 and 2 (China).

NUCLEAR FUSION

GETTING TO GRIPS WITH USING TRITIUM

Nine kilometers south of Oxford, England, near the small town of Culham, a facility is currently under construction that could make a significant contribution to tomorrow's energy supply – the world's first tritium research center.

TO THE VIDEO

HYDROGEN-3 ADVANCED TECHNOLOGY

Tritium – also known as hydrogen-3 – holds great promise. It could be one of the fuels used in the next generation of fusion power plants. This is why the UK Atomic Energy Authority (UKAEA) has commissioned the construction of a tritium research facility at the Culham Centre for Fusion Energy. Dubbed H3AT (Hydrogen-3 Advanced Technology), the facility will be dedicated to researching tritium processing, storage and recycling as well as developing technologies for its use.

H3AT will be the first facility to offer a closed-loop research system. All the technology needed for studying tritium will be located at a single site. As a result, for instance, a wide range of experimental work, component testing, waste management, computer-aided simulations and model validation will be possible. This makes H3AT a precursor to the multinational ITER fusion project, which is currently being built in southern France.

The UKAEA has tasked a consortium comprising DBD Ltd. and Bilfinger UK with developing, supplying and installing the mechanical and electrical components for the new research center. Bilfinger UK is in charge of developing and supplying a standardized control system for H3AT, including third-party systems for concept planning, manufacturing, factory testing, installation and commissioning the integrated control systems. The technology provided by Bilfinger UK is based on a distributed control system developed by experts at Bilfinger UK's Chesterfield office.

Once completed, H3AT will not only provide academic and industry representatives with extensive tritium testing systems and training facilities but will also help grow the UK industry by advancing technology, expertise and skills.

BYOND Learn more

> This is a prestigious contract for Bilfinger UK Ltd and a high point in the close, nearly one-year long collaboration with UKAEA/DBD. It's a testimony to our automation expertise and the role that Bilfinger is playing in the future of clean energy."
>
> STEVE LANG, DIRECTOR FOR AUTOMATION & DIGITAL SOLUTIONS AT BILFINGER UK

ENGINEERING

EPR2: AN **OPTIMIZED** REACTOR

A large proportion of France's energy is generated using nuclear power. But many of the reactors are reaching the end of their lifespans and need to be replaced by a new type of reactor.

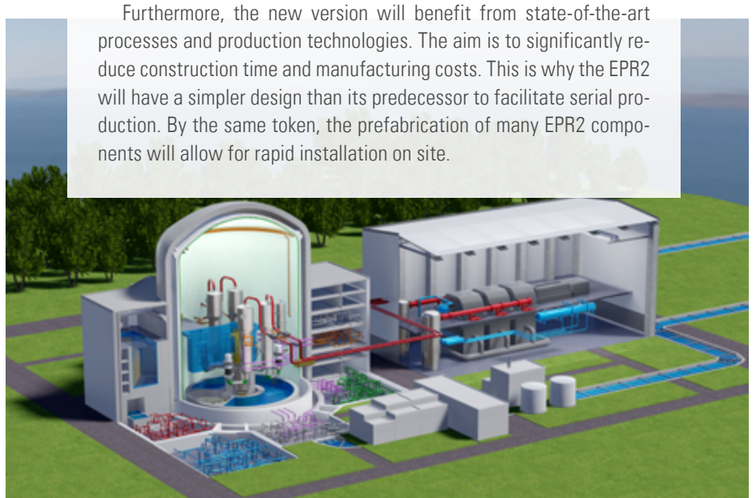
Commissioned by EDF (Électricité de France), a team of experts from several companies has since 2011 been cooperating with the French electric utility company on the development of a new EPR. The team includes ten Bilfinger engineers, headed up by Gilles Maes, Managing Director of Bilfinger Peters Engineering.

"When the project was launched, the initial goal was just to make various improvements to the EPR," Maes recalls. "We were aiming for a simpler, cheaper EPR that would above all be even safer than before. But as more and more ideas emerged during the discussion process, it became clear that this wasn't merely going to be an upgrade to the EPR, but a new generation – the EPR2."

The new reactor will be an optimized version of the current EPR. All the tried-and-trusted elements as well as the basic design will nevertheless remain the same. But it will take past experience into account, especially with regard to safety and environmental protection in addition to complying with future nuclear reactor requirements through a modified design.

These new requirements also include the energy mix, which has changed significantly in recent years due to the increasing importance of renewable energy. In order to respond to this constellation of new factors, special emphasis is being placed on the reactor's high operational flexibility.

Furthermore, the new version will benefit from state-of-the-art processes and production technologies. The aim is to significantly reduce construction time and manufacturing costs. This is why the EPR2 will have a simpler design than its predecessor to facilitate serial production. By the same token, the prefabrication of many EPR2 components will allow for rapid installation on site.



3 questions for ...
Gilles Maes

How does EPR2 differ from its predecessor version?
By factoring in past experience, including events in Fukushima, we are ensuring that the EPR2 will be even safer. At the same time, we are increasing its operational flexibility and reducing construction costs. By refining the design, we are streamlining the construction process, allowing many components to be prefabricated and harnessing the potential in standardization. Plus, we are, of course, making use of the latest digital technologies.

When will the new reactors be operational?
The first new reactors are scheduled for completion in 2030. They are set to replace six older reactors at three sites in France. Whether this plan goes ahead depends on the French government, whose decision on the matter is expected by next year or 2022 at the latest.

What is Bilfinger's role in developing the EPR2?
Bilfinger has supported the project since its inception and was initially involved with the conceptual design. We have subsequently moved on to the basic design. Together with other experts, we are currently working on the Balance of Nuclear Island – the heart of a nuclear power plant – and on the Balance of Plants, which encompasses the supporting components. We will start work on the detailed design in the course of 2021.

Gilles Maes is Managing Director at Bilfinger Peters Engineering SARL.

WASTE TREATMENT

GREEN LIGHT FOR ICEDA

The EDF Group is about to hot commission its new ICEDA conditioning plant for radioactive waste in Bugey, France. From the initial planning through to on-site implementation, the project required a great deal of forethought and high-level engineering skills.

A peek inside the ICEDA dismantling cell.

Located on the French nuclear power plant's premises in Bugey, near Lyon, ICEDA will soon be operational. In the future, the plant will condition and then temporarily store medium- and high-level radioactive waste generated at French nuclear power plants.

A consortium of five companies, including Bilfinger Noell, was responsible for developing and building the facility. The Bilfinger subsidiary was contracted to deliver the extremely challenging part of the plant – the hot cells area. It is here that the waste is conditioned and transferred to concrete containers suitable for temporary storage.

Bilfinger Noell was charged with planning, designing, calculating, manufacturing, assembling and commissioning the hot cells and their essential components. Special emphasis was placed on the machine technology required for processes such as dismantling, gripping and transporting as well as components for the remote handling of concrete containers. Furthermore, the scope of supply also included shielding components, e.g. stainless steel linings, radiation protection windows, air lock systems and shielding gates.

"It is exceptionally difficult and costly to replace components or fix processes once the system is up and running," says Jan Spiegelsberger, Senior Project Manager at Bilfinger Noell. "Therefore, one of the biggest challenges was designing the hot cells to ensure their reliable operation. Because after all, operating staff cannot work inside the hot cells and must do everything remotely from outside the area. This entails analyzing every process step in advance and checking all necessary functions."

While operations at ICEDA are on the verge of officially getting underway, it will still be a while before the first transporter containers with activated waste arrive. The hot cells and their functions have been extensively tested and approved. So now nothing stands in the way of the hot commissioning.

BYOND Learn more

we can

IN BRIEF

BILFINGER: OUTLOOK FOR 2020 AFFIRMED

Although revenues decreased chiefly in April and May 2020 due to the COVID-19 pandemic, Bilfinger's order backlog recovered significantly in the second half of the year. As anticipated, revenues and earnings surged. At the close of the first nine months of the year, our Group generated **€870 million** in revenue and an adjusted EBITA of **€23 million**.

Thanks to the satisfactory business performance in the third quarter, Bilfinger is able to affirm its full-year guidance provided in May: The Group expects revenue to fall by **20 percent** in 2020 compared with the prior year and adjusted EBITA to be positive.

BYOND Learn more

RADIATION PROTECTION WINDOWS AND LOCKS FOR ENCAPSULATION PLANT

Bilfinger Noell has been commissioned to design, manufacture and install radiation protection windows and small part locks at Finland's Olkiluoto encapsulation plant Posiva in 2022. In September 2020, the first components – embedded frames – were delivered.

BYOND Learn more

POOL GATES SUPPLIED FOR CAREM-25 PRESSURIZED WATER REACTOR

Argentina's National Atomic Energy Commission (CNEA) awarded Bilfinger Noell the contract to design and manufacture three pool gates and the corresponding embedded frames for the CAREM-25 pressurized water reactor. Delivery was made a few weeks ago.

BYOND Learn more

SEEN IN ...

Marghera (Venice), Italy: A 320-ton steel housing will be installed in the ITER fusion reactor. This is the first of 18 toroidal field model coils that will be put to use in the international research project at Cadarache Nuclear Research Center. Bilfinger is one of around 40 companies from 35 countries working on the depicted component.

IMPRINT PUBLISHER (responsible for content) Bilfinger SE, Peter Stopfer (Head of Corporate Communications & Public Affairs), Oskar-Meixner-Straße 1, 68163 Mannheim, Germany, now@bilfinger.com **CONCEPT AND REALIZATION** COMMPARK GmbH **LAYOUT** ServiceDesign GmbH

GET IN TOUCH WITH US NOW!

Caroline Sagne
Head of Sales
Nuclear Business Line

Bilfinger Technologies
Europaallee 1
46047 Oberhausen
Germany

Phone +49 208 4575-4455
caroline.sagne@bilfinger.com
www.bilfinger.com