




# NUCLEAR ENERGY PROJECTS: WE MAKE IT WORK

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FROM ENGINEERING AND TECHNOLOGY TO FABRICATION, CONSTRUCTION AND SERVICES







# NUCLEAR ENERGY PROJECTS: WE MAKE IT WORK

We design, manufacture and supply crucial equipment for nuclear power plants and other nuclear facilities. We also take care of the assembly, maintenance and upgrade of those components. From containment to the handling of nuclear fuel, from compacting to the decontamination of nuclear material and from design and prefabrication to installation of vessels and complex piping assemblies, we manage the technological challenges and meet the regulatory requirements of the nuclear industry.



## SAFETY AND VALUE IN CRUCIAL EQUIPMENT AND COMPLEX SERVICES

### COMPLEX PIPING SERVICES FOR THE NUCLEAR INDUSTRY

Based upon its long standing experience in the nuclear industry, Bilfinger provides complex piping services for the nuclear island, the turbine hall, for plants on the upstream part of the value chain (nuclear fuel preparation and upgrading) as well as on the downstream side of the value chain (for nuclear waste fuel treatment plants).

Within the scope of these services, Bilfinger creates superior value by handling the engineering part (from complete layout, flexibility and stress analysis to detailed design) as well as complete logistics from procurement to inspection and testing. We also provide prefabrication of key components in our own workshops and handle the installation, welding and testing on site.

Bilfinger manages these activities in accordance with the demanding industry codes and regulations such as ASME III, ANSI, RCCM, KTA and DIN EN and has extensive experience in managing all documentation and inspection requirements associated with these activities.

While Bilfinger provides piping systems fabricated in-house as work packages, most of this type of work is carried

out through fully-integrated teams with our customers or our partners in order to fully connect the various working processes and improve overall efficiency of the work. We help our customers reduce this complexity and improve the overall efficiency, thus creating added value.

### MANAGEMENT OF NUCLEAR ENCLOSURE CONTAINMENT

Bilfinger has extensive experience supplying the nuclear industry with containment solutions from nuclear island pool liners to airlocks and associated containment solutions. Bilfinger not only designs and supplies the required equipment but also finds the best individual solution for every project. This includes all engineering phases from the concept design using structural and mechanical analysis through to fabrication and installation design. It takes into account for instance all required seismic related computations and analysis as well as all the engineering coordination phases required by the plant owner and all regulatory validations. This work is done by Bilfinger engineers. Bilfinger manages all the manufacturing of the relevant equipment as well as all associated inspection and testing according the most stringent nuclear codes. Finally, Bilfinger provides the complete field supervision through a senior supervision team and, if required, manages the overall construction on site as well.



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- 1 Hot cells
- 2 Airlock
- 3 Narrow gap orbital welding
- 4 High pressure pipe induction bending
- 5 Super-compactor system
- 6 Phadec™

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Bilfinger is your partner of choice when it comes to optimizing “mission critical” containment concepts for the nuclear industry.

## HANDLING OF NUCLEAR FUEL

Bilfinger supplies the nuclear industry with proprietary equipment to manage nuclear fuel in contained areas. We provide all the necessary handling equipment to remove the rods and handle them with automated fuel handling machines. We also provide the intermediate storage pools and racks.

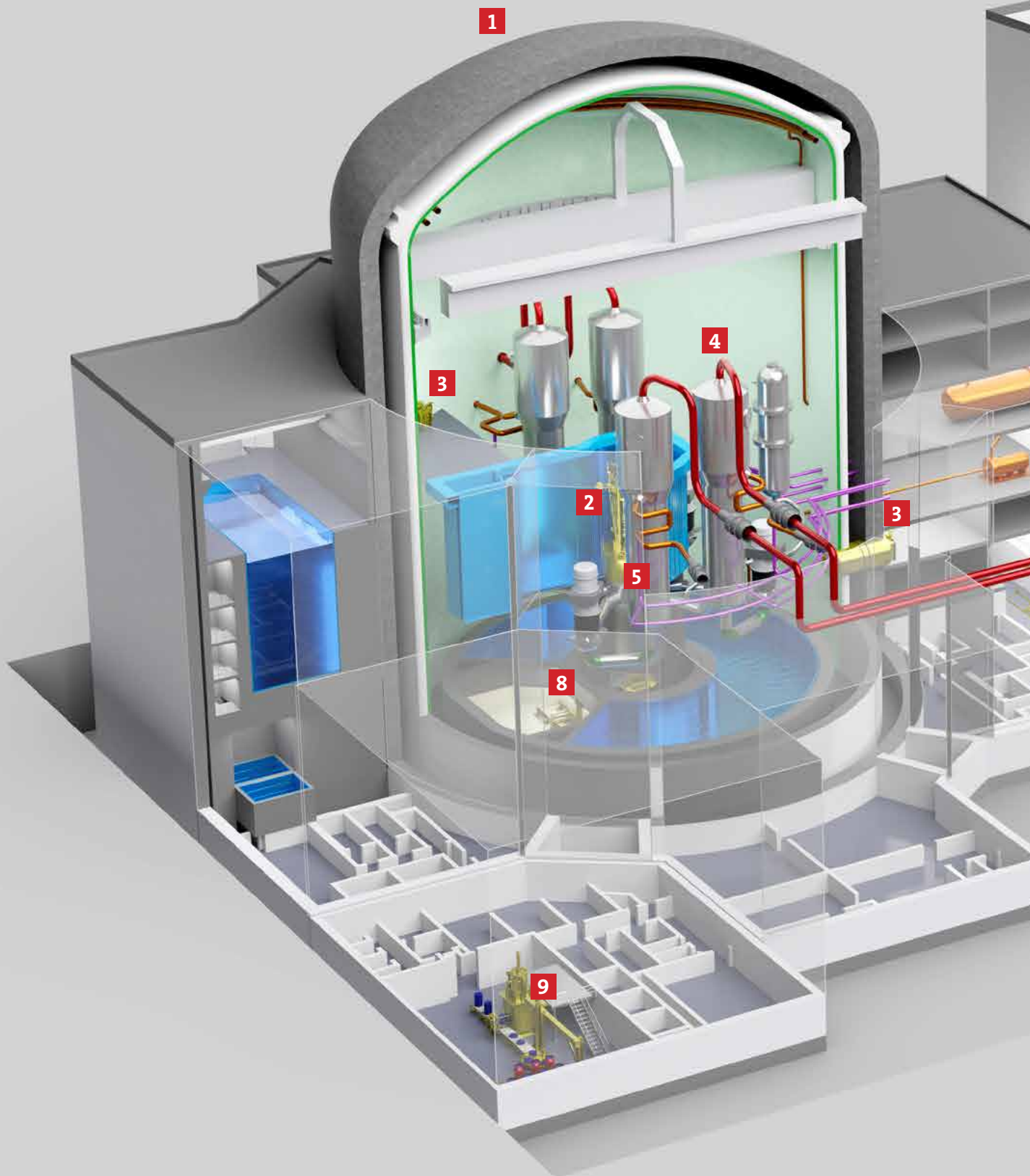
As for the containment, Bilfinger not only designs and supplies the required equipment, but can tailor design the optimum configuration and solution for “hot cells”, including all the engineering for the lining as well as all the engineering and planning for the handling equipment.

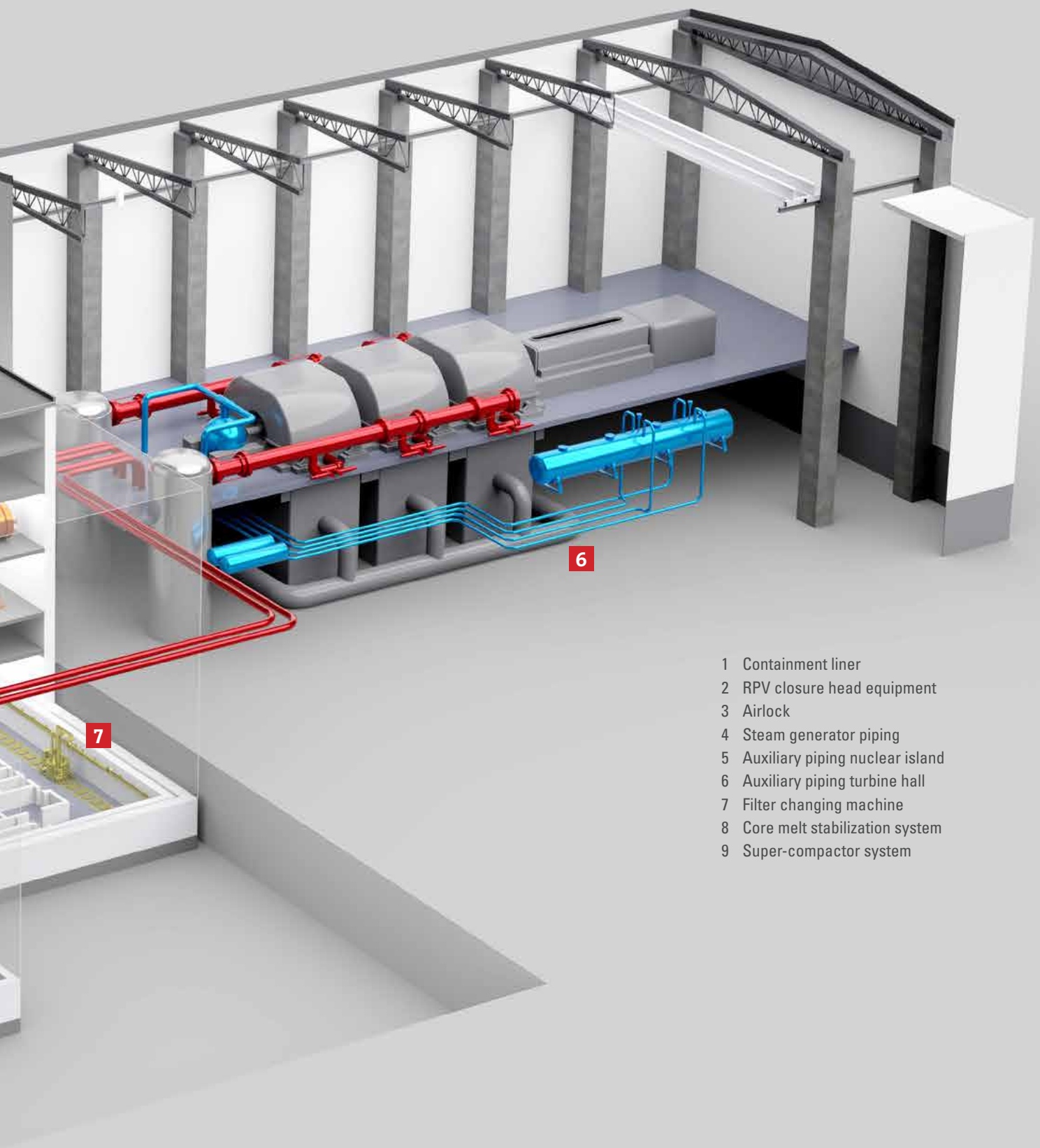
Bilfinger is uniquely positioned to design, supply and install under one umbrella the complete “hot cells” which is reducing a large number of interfaces for the plant owners and associated tier one contractors and bring a higher return on the invested capital.

## COMPACTING AND DECONTAMINATION OF NUCLEAR WASTE MATERIAL

Bilfinger has developed a service to help its customers in the nuclear industry better manage their radioactive waste. Bilfinger offers a modular system for the treatment of nuclear waste that includes sorting, decontamination, compaction and grouting. The major advantage is the flexibility that this system creates: It allows operators to temporarily install the equipment when they need it, saving space and money. As this service is charged based on unit rates, customers have better control of their spending and achieve greater value for their money.

# BILFINGER, PARTNER OF CHOICE FOR THE NUCLEAR INDUSTRY





- 1 Containment liner
- 2 RPV closure head equipment
- 3 Airlock
- 4 Steam generator piping
- 5 Auxiliary piping nuclear island
- 6 Auxiliary piping turbine hall
- 7 Filter changing machine
- 8 Core melt stabilization system
- 9 Super-compactor system



# BILFINGER'S LIFE CYCLE COMPETENCES

## 1. PROJECT CONSULTANCY

Bilfinger provides a full range of consultancy services to support the early project development phase in the nuclear industry. We provide feasibility studies and concept design for containment, nuclear fuel handling as well as nuclear waste management. Bilfinger also offers a wide range of project engineering and project management services in these fields as well as for equipment installation and piping work for nuclear islands, turbine halls and balance of plants. Bilfinger also provides project engineering and project management services for processes related the upgrading and retreatment of nuclear fuel.

## 3. EQUIPMENT MANUFACTURING

Bilfinger, along with a network of qualified suppliers, has strong capabilities in the manufacturing of both specific equipment as well as pressure vessels and piping assembly works. We operate our own workshops that meet all necessary certificate requirements of the industry as well as local regulatory requirements. We also provide air lock manufacturing, handling systems for fuel rods as well as equipment for the compacting and decontamination of nuclear waste.

Project  
Consultancy

Engineering

Procurement/  
Fabrication

Construction/  
Commissioning/  
Startup

## 2. DESIGN ENGINEERING

Bilfinger has strong in-house expertise for the management of complex design engineering work. Our capabilities cover containment with the design of liners, windows and feedthroughs, airlocks and associated equipment as well as fuel and waste handling systems including all automated equipment to manipulate the fuel rods and for compacting nuclear waste. We also provide design engineering for complex piping systems that includes piping layout as well as all relevant fluid-flow computation and stress analysis.

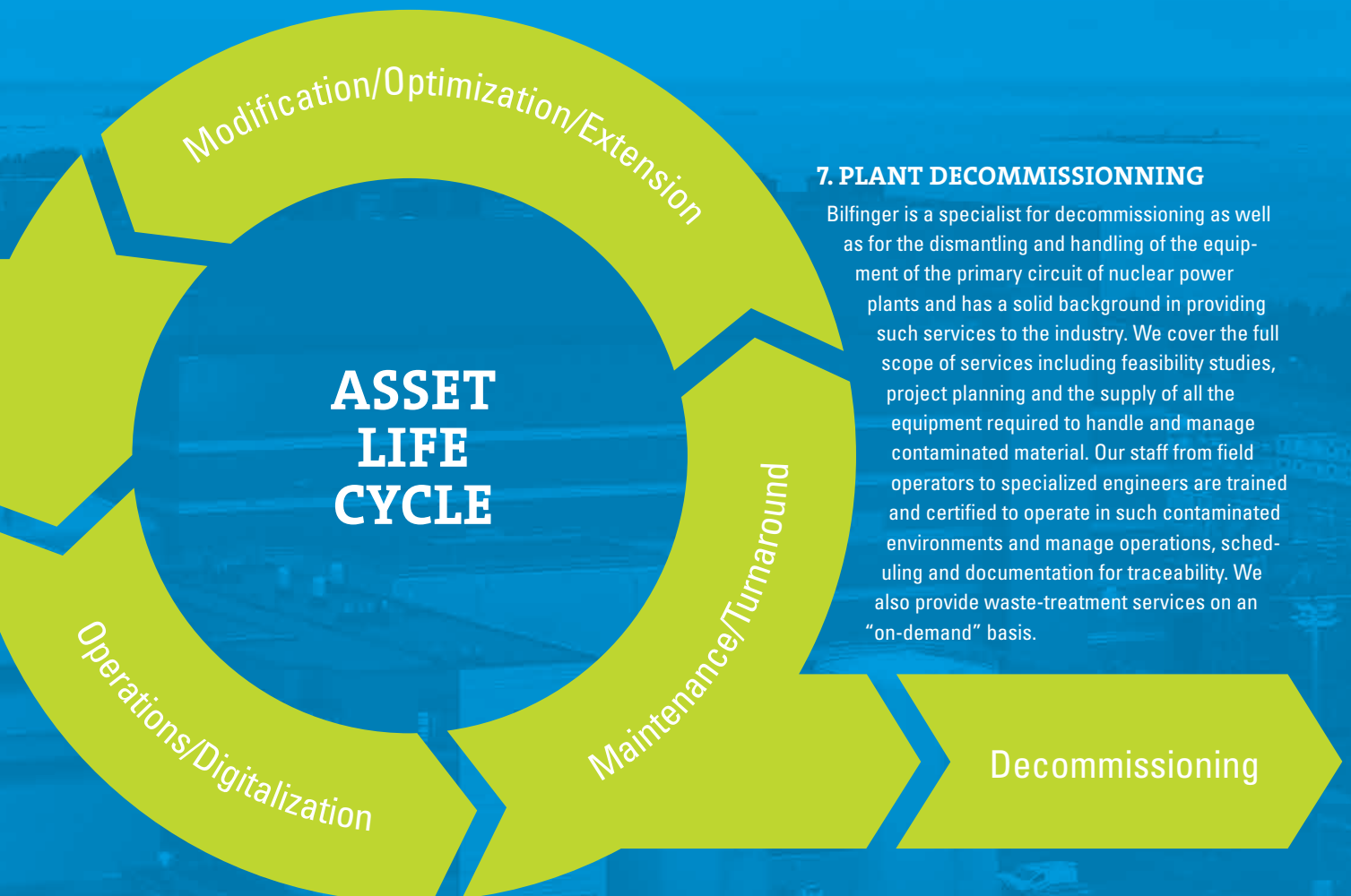
## 4. PLANT CONSTRUCTION

Bilfinger has qualified project and construction management teams that conduct installation work on site. As is the case with manufacturing activities, Bilfinger has a large range of certified staff in the relevant nuclear industry and local regulations to fully support our customers with the construction or enhancement of their plants. Our services cover supervision of the installation, start-up and commissioning of specific equipment as well as complex piping assembly including inspection and testing services.



## 6. NUCLEAR POWER PLANT MODIFICATION/OPTIMIZATION

Based on its project planning capabilities combined with its design, manufacturing and construction competences in the nuclear industry, Bilfinger can undertake and manage complete projects for the expansion, modification and optimization of nuclear power plants. Bilfinger has, for example, been deeply involved in the on-site installation of the standby diesel power generation systems at the nuclear power plants in France that have been requested by the ASN as a post Fukushima measure in order to improve operational safety.



## 7. PLANT DECOMMISSIONING

Bilfinger is a specialist for decommissioning as well as for the dismantling and handling of the equipment of the primary circuit of nuclear power plants and has a solid background in providing such services to the industry. We cover the full scope of services including feasibility studies, project planning and the supply of all the equipment required to handle and manage contaminated material. Our staff from field operators to specialized engineers are trained and certified to operate in such contaminated environments and manage operations, scheduling and documentation for traceability. We also provide waste-treatment services on an "on-demand" basis.

## 5. OPERATIONS: NUCLEAR FUEL HANDLING

Bilfinger offers a broad spectrum of operation services for the nuclear industry including the operation of polar cranes and nuclear fuel handling machines and associated manipulators. Based on its broad experience in designing and supplying hot cells and the relevant equipment to reload and transport nuclear fuel rods, Bilfinger has been selected for several plants across Europe by renowned plant owners to provide such operational services.

# WE ARE BILFINGER

We offer international engineering and local maintenance. Our portfolio covers the entire value chain from consulting, engineering, manufacturing, assembly to maintenance, plant expansion as well as turnarounds. It also includes environmental technologies and digital applications. We increase the efficiency of assets, ensure a high level of availability and reduce maintenance costs.

## BILFINGER AT A GLANCE

Our organization along two complementary business segments enables us to accompany our customers along the entire life cycle of their assets: the capex side is covered by our Engineering & Technologies (E&T) segment, while our Maintenance, Modifications & Operations (MMO) segment addresses the opex side. Within E&T, we develop, construct and expand industrial plants. Within MMO, we assume responsibility for industrial maintenance. And while the MMO segment offers its services locally in four core regions, E&T is a project and technology business with an international setup.





Oil & Gas



Chemicals &  
Petrochemicals



Energy &  
Utilities



Pharmaceuticals  
& Biopharma



Metallurgy



Cement

We have a particular focus on six industries:

Oil & Gas, Chemicals & Petrochemicals, Energy & Utilities,  
Pharmaceuticals & Biopharma, Metallurgy and Cement.  
Our 36,000 employees ensure that our customers can  
focus on what they can do best:  
their core business.

**Bilfinger SE**

Engineering & Technologies

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**WE  
MAKE  
IDEAS  
WORK**