Tying up loose ends: Spain's successful decommissioning project

By Laura Gil

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— Juan Luis Santiago Albarrán, Director of Operations, Enresa

Globally, only 17 of the 157 nuclear power reactors that have been permanently shut down have undergone full decommissioning — a resource-intensive process that often takes decades to complete. While the process is complex, a case in Guadalajara, western Spain, illustrates how careful planning, the right policy and regulatory environment, government commitment and stakeholder involvement can ease the way towards successful decommissioning.

On schedule since the start, the decommissioning of José Cabrera, Spain's first nuclear power plant with an electrical output of 150 MW, is almost 70% complete and in line with the original budget of approximately €150 million at 2016 prices. Spain's National Company for Radioactive Waste (Enresa), the state agency in charge of the project, aims to complete decommissioning by 2018.

Dismantling of José Cabrera is unlike other commercial decommissioning projects, which are typically the responsibility of — and are carried out by — plant operators. "The Spanish case is almost unique, first of all, because decommissioning is the responsibility of a specialized state agency," said Juan Luis Santiago Albarrán, Director of Operations at Enresa.

In Spain, once a plant is shut down and a decommissioning permit is granted, control is transferred from owners and operators to Enresa, which is responsible both for decommissioning and long term management of radioactive waste.

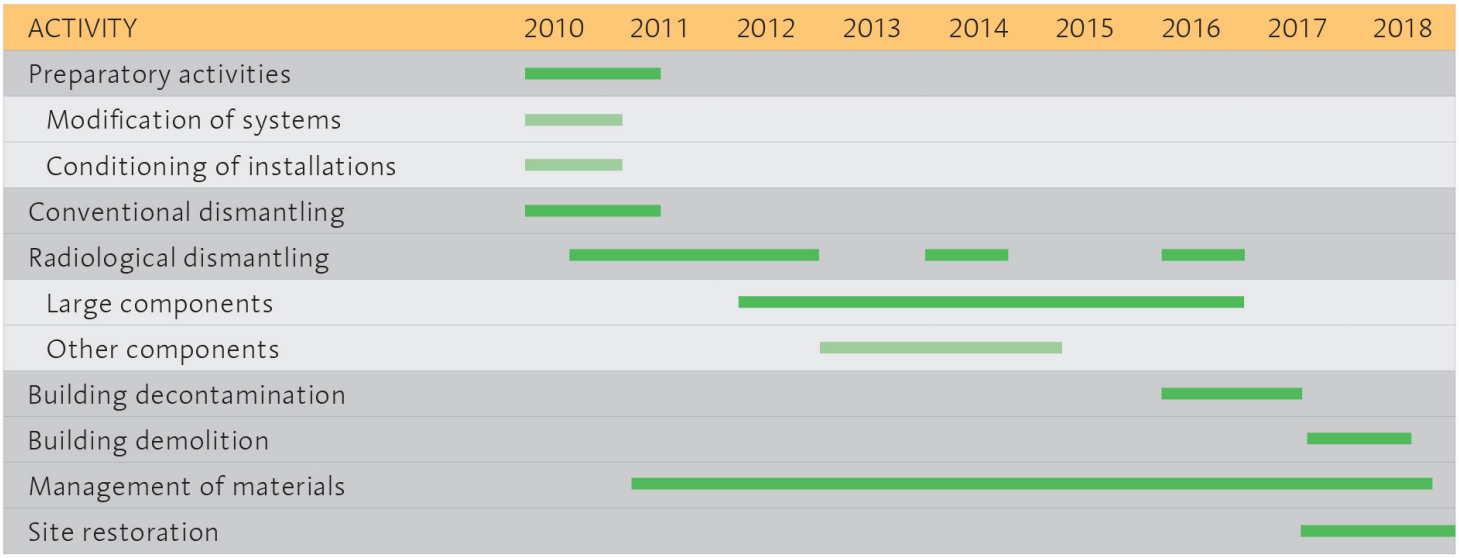
For over 20 years, Enresa has been the centre of decommissioning expertise in Spain, responsible for the decommissioning of all major installations that involve the use of radioactivity, including uranium factories in Jaén and Badajoz and a nuclear power plant in Tarragona. The decommissioning of José Cabrera is the first dismantling project in Spain to start immediately after shutdown.

Plan, plan again and innovate

The key to success in decommissioning is careful planning, including consideration of all aspects of the project from start to finish, Santiago Albarrán said. These include government licensing and approvals, dismantling and decontamination operations, waste management and, ultimately, return of the site to its owner.

Estimating a decommissioning timeline of seven years, Enresa began gathering the regulatory documentation and licences three years ahead of the plant's shutdown in 2006. By 2010, it had the necessary approval documents in place, had obtained full responsibility for the decommissioning process and was able to begin the project.

Schedule of the decommissioning of the José Cabrera nuclear power plant



(Source: Enresa)

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Decommissioning projects require a great deal of innovation to optimize the process, making the most of all available tools and mitigating potential hazards. Enresa repurposed the turbine hall — which has thick, protective walls — into a waste management facility, a place where they could treat, manage and store radioactive waste.

This possibility to explore, to make things better and to innovate adds a layer of creativity to the decommissioner's job, said Santiago Albarrán. "You should be prepared for the unexpected and a range of solutions should always be considered."

Protect your people

A priority in decommissioning is to minimize workers' exposure to radiation. To this end, Enresa explored ways to protect its staff and found that if they removed the major plant components as large rather than small pieces and transferred them in large containers, they could shorten the time workers handled the materials, thereby lowering exposure.

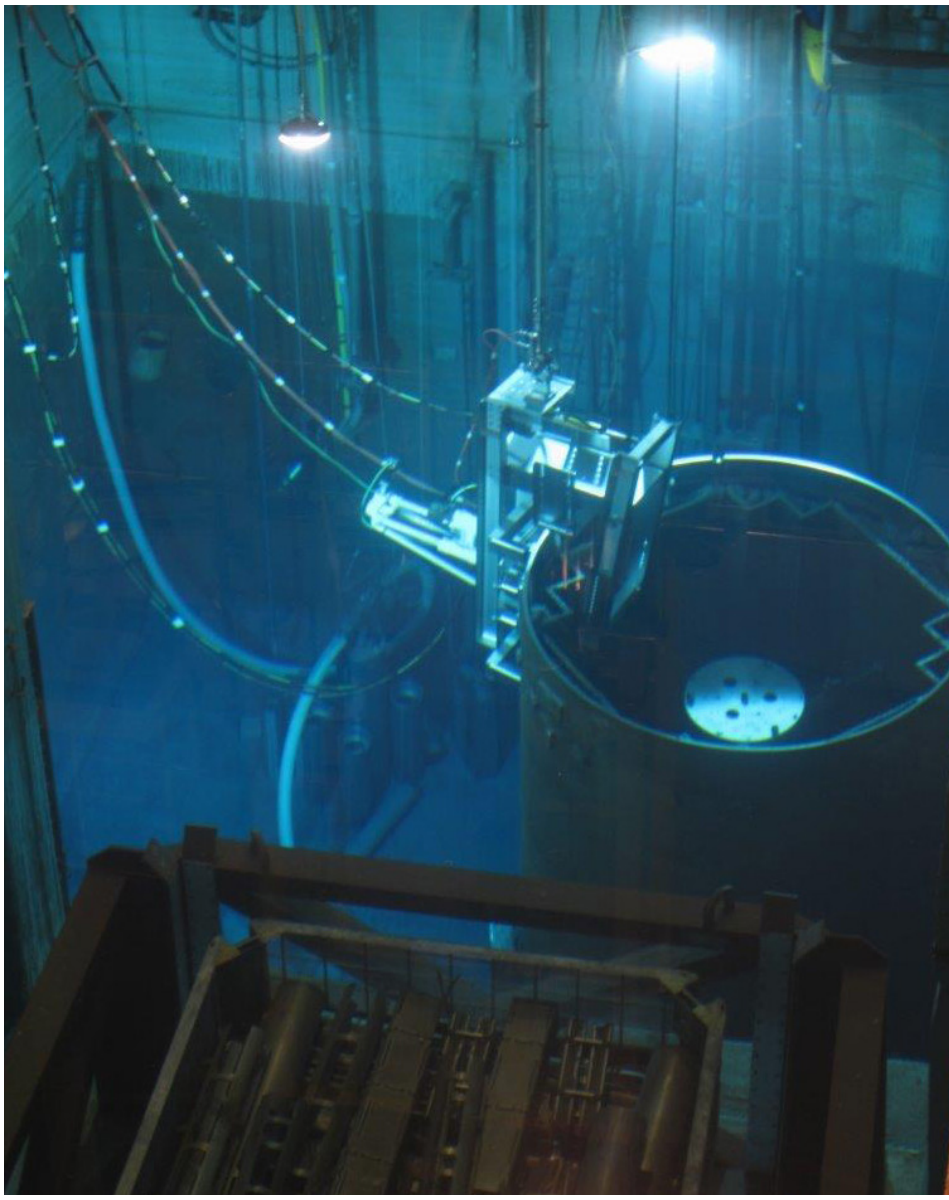
"The segmentation and packaging of waste into big containers were a challenge because we required new tools," Santiago Albarrán said. "But it was worth it. We reduced costs and radiation doses to workers."

Similarly, underwater segmentation of the reactor vessel and its components offered another avenue for protection. Water serves as an efficient natural barrier against different types of radiation. By using it as a buffer, specialists could stand alongside the top of the spent fuel pool and use remotely operated mechanical tools to segment all internal parts of the reactor underwater. "The metallic chips that originate from the cuts stay in the water, which acts as a shield," he explained. "Cutting big contaminated components underwater made the whole process safer for our workers and for the environment."

See it through to the end

After they dismantle all the components, Enresa will demolish the buildings, decontaminate the site and make sure that all waste has been removed. Then, in the final step of decommissioning, it will restore the site. "Once we've restored the site, the regulator will have to verify that no significant contamination remains, before we hand it back to the owners, who may then reuse the site for other purposes," Santiago Albarrán said.

The decommissioning process is completed once the regulator certifies that the site no longer presents a risk to the safety of the public or the environment and that the nuclear licence may therefore be revoked. "It's a question of leaving the site clean for future generations," said Patrick O'Sullivan, a decommissioning specialist at the IAEA. "A question of returning it to society for new uses."



Underwater segmentation of a reactor vessel at the José Carbera nuclear power plant.
(Photo: Enresa)