

# Decommissioning of nuclear facilities: Germany's experience

By Boris Brendebach



Boris Brendebach is a research associate and the chief decommissioning expert with the Installation and Reactor Safety Company (GRS) that supports the German government in its decommissioning and remediation activities.

Germany has gained considerable experience in the decommissioning of nuclear facilities since the 1970s. Currently 16 nuclear power plants, both power and prototype reactors, are at different stages of decommissioning. Three decommissioning projects have been completed (see map).

Following the Fukushima Daiichi nuclear power plant (NPP) accident in March 2011, the German Government decided to end the use of nuclear energy for the commercial generation of electricity by gradually phasing it out. This decision resulted in an amendment of the German Atomic Energy Act (AtG) on 31 July 2011, withdrawing the authorization to operate an installation for the fission of nuclear fuel for the commercial production of electricity for the seven oldest NPPs and NPP Krümmel on 6 August 2011, and setting end dates for the authorization for the remaining nine NPPs in a phased approach ending in 2022.

Since then, all eight NPPs, which were shut down in 2011, applied for a decommissioning licence. Additionally, NPP Grafenrheinfeld was shut down on 27 June 2015, half a year before its originally scheduled end date. An application for decommissioning was submitted well in advance, and the same was done for NPP Gundremmingen B, which is still in operation and which is scheduled to be shut down at the end of 2017.

The map on next page provides an overview of the nuclear power plants under decommissioning in Germany, as well as those already either dismantled, permanently shut down but awaiting granting of the decommissioning licence, or in operation with end dates in place. In addition to the power and prototype reactors, more than 30 research reactors of various size and more than ten nuclear fuel cycle facilities have been shut down and have been or will be decommissioned.

## In many shapes and forms

There may be many decommissioning projects proceeding concurrently, but each project is unique. The course of the project, its financing, the choice of decommissioning strategy and many other conditions depend on the type of facility and its owner:

- Power reactors and plants for uranium enrichment and fuel fabrication belong to the power utilities and the companies operating in this sector.
- Research reactors, prototype reactors for electricity production and prototype nuclear fuel cycle facilities are, on the other hand, established at research centres or universities. They are financed publicly.
- The decommissioning of the Greifswald and Rheinsberg NPPs of the former East Germany is financed from the federal budget, as are the decommissioning and remediation of the uranium mining and processing facilities of East Germany.

The legal framework for the decommissioning of nuclear facilities results from the AtG. It stipulates that decommissioning is subject to licensing by the competent authority. According to the AtG, there are two different strategies allowed: immediate dismantling or dismantling after safe enclosure. The decision as to which decommissioning strategy to implement is taken by the operator. Most operators have opted for dismantling immediately.

For the licence application, specified documents and information have to be submitted to the competent authority of the state in which the nuclear facility is located. These have to describe, among other things, the procedure applied for, the planned dismantling measures and associated techniques to be used, the environmental impact and the provisions for radiation protection. Further details are regulated by the

