

Reactor Decommissioning Plan in Spotlight

By Isao ADACHI

Nuclear power reactors, as with any other man-made facility destined to be obsolete and torn down over time, will soon be decommissioned one after another in Japan. Unlike other facilities, however, decommissioned nuclear reactors leave behind the problem of disposing of radioactive waste. How much cost and time are required for waste disposal leads directly to the cost of power generation. So, ever since the advent of nuclear reactors, their decommissioning has always been high on the agenda of power companies. Chubu Electric Power Co. of Nagoya, Aichi Prefecture, which serves the central Japan region of Chubu, announced at the end of 2008 plans to decommission two reactors, Hamaoka No. 1 and No. 2, and construct a new reactor at its Hamaoka Nuclear Power Station in Omaezaki, Shizuoka Prefecture. The reactor decommissioning and construction projects, the first of the kind at a major commercial power plant in Japan, are considered a milestone in the country's nuclear power generation.

The Hamaoka plant is equipped with five light-water reactors, all of the boiling water reactor (BWR) type. The No. 1 reactor, capable of producing 540,000 kW, began operation in 1976 and the 840,000 kW No. 2 unit in 1978, both now more than 30 years old.

Chubu decided to decommission the two reactors in view of their long service as well as the subsequent need for seismic retrofitting which would entail huge new costs. Japan is a country generally prone to earthquakes. Especially Omaezaki, where the nuclear plant is located, sits right in the hypocentral region of a Tokai earthquake, a hypothetical magnitude 8 jolt seismologists consider may hit the Tokai coastal area in the future. The power company decided a plan in January 2005 to carry out seismic retrofitting with an eye to enhancing the entire plant's quakeproof capabilities to withstand a max 1,000-gal tremor.

Hamaoka's three relatively new reactors – Nos. 3, 4 and 5 – have been successfully retrofitted at a cost of ¥20 billion. However, it was learned that it would take 10 years and ¥300 billion to retrofit and put in service the first two reactors, designed before the quake hypothesis was made public in 1976. Chubu has opted for a more economical option of decommissioning the two old reactors and building a state-of-the-art new one, No. 6. Company documents say decommissioning requires spent fuel to be brought out of the plant, radioactive materials removed from inner tubing and reactor vessels, and, after five to 10 years of safekeeping necessary to lower the level of radioactivity, the reactors dismantled and removed.

Photo: Kyodo News



Chubu Electric Power decides to decommission Hamaoka Nuclear Reactors No. 1 & No. 2 (front left) and build a new No. 6 unit (dot-line area, upper right) in Omaezaki, Shizuoka Prefecture.

A detailed decommissioning plan is yet to be firmed up, but it is believed that costs will exceed ¥100 billion. Spent nuclear fuel will be reprocessed, but the dismantled facilities will become metal and concrete debris amounting to some 540,000 tons in all. About 3%, or 16,000 tons, will be low-level radioactive waste in need of processing and safekeeping.

The proposed No. 6, an advanced boiling water reactor (ABWR) with a 1.4 million kW capacity, is set for construction beginning in 2015 and is to start operation in a few years afterward. The new reactor is expected to cost ¥360 billion to build as was the case with the No. 5 unit that has a similar output capacity. All in all, the decommissioning and construction projects will cost in the neighborhood of ¥500 billion. Since nuclear facilities, either decommissioned or constructed, require local residents' understanding and support, their success depends on how Chubu can explain the projects to the local people.

Nuclear reactors with service periods well over 30 years abound in Japan, including the first five reactors at the No. 1 Fukushima Nuclear Power Plant run by Tokyo Electric Power Co., the first three reactors at the Mihama Nuclear Power Plant operated by Kansai Electric Power Co. of Osaka, and the first two reactors at Kansai's Takahama Nuclear Power Plant. If the Hamaoka projects go off without a hitch, they will be a model case to be followed at other old reactors as they are decommissioned in the future. As use of nuclear power is viewed in a new perspective in the wake of global warming, the decommissioning and construction of the Hamaoka reactors are beginning to take on a new aspect of environmental protection as well.

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Isao Adachi is editor, City News Desk, Jiji Press.