How much will it really cost to decommission the aging French nuclear fleet?

Author: *Paul Dorfman*

NM839.4624 A recently published French governmental report has blown a significant hole in the French nuclear decommissioning strategy. The report, on the technical and financial feasibility of dismantling nuclear facilities, was produced by the National Assembly's Commission for Sustainable Development and Regional Development.[1]

In late January, the Committee took evidence from the EDF head of decommissioning and me. Given the Commission had been working on this for months, and had listened to mounds of complex data, I decided to cut to the chase and make as clear an argument as I could. What follows is that evidence.

How much have France, Germany and UK set aside for decommissioning?

Whereas Germany has set aside €38 billion to decommission 17 nuclear reactors, and the UK Nuclear Decommissioning Authority estimates that clean-up of UK's 17 nuclear sites will cost between €109–250 billion over the next 120 years, France has set aside only €23 billion to decommissioning its 58 reactors. To put this in context, according to the European Commission, France estimates it will cost €300 million per gigawatt (GW) of generating capacity to decommission a nuclear reactor – far below Germany's assumption of €1.4 billion per GW and the UK estimate of €2.7 billion per GW.

How can EDF decommission at such low cost?

EDF maintain that because of standardization of some of the reactors and because there are multiple reactors located on single sites, they can decommission at a low cost. Does this claim stack up? Well, probably not. Reactors are complex pieces of kit, and each has a differing operational and safety history. In other words, nuclear reactor decommissioning is essentially a 'bespoke' process.

Who will pay?

Germany has made multiple provision, enrolling the reactor owners involved – EnBW, EOn, RWE and Vattenfall – to pay into a state-owned fund to decommission the plants and manage radioactive waste. The UK Government will pay most of the costs for nuclear decommissioning and existing waste. In France, EDF must pay for it all. For the French, the big question is: Has EDF set aside enough money to cover the huge cost of dismantling and cleaning up its existing nuclear power stations?

EDF says it wants to set aside a €23 billion fund to cover decommissioning and waste storage for an estimated €54 billion final bill – and the difference between these two figures will be closed through the appreciating value of its equities, bonds and investments – in other words, 'discounting'. Discounting involves hoping that the value of these equities, bonds and investments will increase over time. Unfortunately, recent experience has taught us that markets can go up and down over time – especially the very long-time periods involved in radioactive waste management.

Why has EDF underestimated the costs of decommissioning and waste storage?

Even EDFs €23 billion limited provision for decommissioning and waste storage is a large sum of money for a company that has huge borrowings and enormous debt, which is currently running at €37 billion. Already, Standard and Poor and Moodys (the two biggest international credit rating agencies) have downgraded EDFs credit-worthiness over the corporation's potentially ill-advised decision to go ahead with attempting to construct two more of the failing Areva reactor design (the EPR) at Hinkley Point, UK. And any significant change in the cost of decommissioning would have an immediate and disastrous impact on EDFs credit rating – something that the debt-ridden corporation can simply not afford.

EDF's other financial woes

EDF is already in financial trouble. Along with bailing out the collapsing French nuclear engineering design company (Areva), not only must EDF bear the huge financial burden of their failing reactor new-build at Flamanville, but also pay for extending the life of France's existing nuclear power stations (to 2025), at a cost of €55 billion.

Meanwhile, the estimated cost of radioactive waste management is steadily rising. There are three elements to the waste costs: decommissioning; spent fuel and waste storage (and conditioning) prior to disposal; and spent fuel and waste disposal.

The French nuclear regulator (ASN) says that storing and disposal are much bigger and costlier problems than just dismantling the reactors. This is because nuclear waste (high and medium level waste, including spent fuel) must be dismantled and moved to a new facility, which has not even begun to be built yet. And the French authority tasked with disposal of all the countries vast and increasing waste burden (Andra) has recently ramped the estimated cost for the planned national nuclear waste repository at Cigéo, to €25 billion – and EDF must pay for most of Cigéo's construction. Although €5 billion more than EDF anticipated, it still seems a gross underestimation, and the costs are likely to rise considerably.

Spent nuclear fuel build-up

Then there's EDF's existential problems at France's high-level waste storage and reprocessing facility at La

Hague, where spent nuclear fuel stores are reaching current cooling capacity limits. This means La Hague may now have to turn away spent fuel shipments from France's reactor fleet. In any case, since ASN has identified safety problems with some spent fuel transport flasks, spent fuel transport to La Hague has substantially slowed. All this means the build-up of spent fuel at nuclear sites across France, with the associated problem of cooling the spent fuel at those sites during dry summer periods, with all that means for further escalation of rad-waste costs.

French National Assembly Commission findings

Happily, and perhaps unexpectedly, when the National Assembly's Commission for Sustainable Development and Regional Development published its final key findings last month, they came down on the side of those who voiced concerns about EDF's provisioning for reactor decommissioning and waste management, noting that there is "obvious under-provisioning" regarding "certain heavy expenses" such as taxes and insurance, remediation of contaminated soil, the reprocessing of spent fuel and the social impact of decommissioning.

The Commission found that the clean-up of French reactors will take longer, be more challenging and cost much more than EDF anticipates.

The Commission reported that EDF showed "excessive optimism" in the decommissioning of its nuclear power plants. "Other countries have embarked on the dismantling of their power plants, and the feedback we have generally contradicts EDF's optimism about both the financial and technical aspects of decommissioning," the report states. The cost of decommissioning "is likely to be greater than the provisions", the technical feasibility is "not fully assured" and the dismantling work will take "presumably more time than expected".

Critically, the Commission's report says that EDF arrived at its cost estimate by extrapolating to all sites the estimated cost of decommissioning a generic plant comprising four 900 MWe reactors, such as Dampierre, noting that: "The initial assumption according to which the dismantling of the whole fleet will be homogeneous is questioned by some specialists who argue that each reactor has a particular history with different incidents that have occurred during its history".

So what now?

Soon EDF will have to start the biggest, most complex and costliest nuclear decommissioning and radioactive waste management programme on earth. It seems very likely that – for various reasons associated with its current bank balance – EDF may have seriously underestimated the real challenges and costs, with serious consequences for its already unhealthy balance sheet. This will have profound consequences for the French State, which underwrites EDF.

The National Assembly's report (in French) is posted at www2.assemblee-nationale.fr/documents/notice/14/rap-info/i4428/%28index%29/depots

Dr Paul Dorfman is Honorary Senior Research Associate, Energy Institute, University College London (UCL); and founder of the Nuclear Consulting Group (www.nuclearconsult.com).