

Summary

The Nuclear Energy Act⁷ obligates the owners of nuclear installations to form a Decommissioning Fund and a Waste Disposal Fund. If the nuclear installations are decommissioned, these funds must contain sufficient financial resources to cover the cost of decommissioning and waste disposal that are incurred after this point in time.

To ensure this, a comprehensive estimate of the costs of decommissioning and waste disposal is required. Based on this estimate, one can measure the provisions the owners of the nuclear installations must enter in their accounts for decommissioning and nuclear waste disposal as well as the amounts they must pay into the Decommissioning Fund and the Waste Disposal Fund. This cost estimate must be conducted every five years as specified in the Ordinance⁸ on the Decommissioning and Waste Disposal Funds for Nuclear Installations. The owners must pay the costs of post-shutdown operations directly. Nonetheless, these costs are also re-estimated with each update of the studies on the costs of decommissioning and waste disposal.

The last estimate of the costs of post-shutdown operations, decommissioning, and waste disposal was conducted in 2011. It was reviewed by the Swiss Federal Nuclear Safety Inspectorate (ENSI) and other experts. The Administrative Commission for the Decommissioning and Waste Disposal Funds for Nuclear Installations, hereinafter called “Administrative Commission” for short, subsequently approved the Cost Study of 2011. This study served as the basis of assessment for provisions in the accounts and for fund contributions for the years 2012 through 2016.

In 2014, the owners of the Swiss nuclear installations commissioned swissnuclear to update the new cost study as prescribed by law and to complete the study by the end of 2016 in cooperation with the organizations responsible for decommissioning and waste disposal in Switzerland. In that process, the specifications set by the Administrative Commission for the preparation of the cost study were to be taken into account. This task has been carried out with the reports [1], [2] and [4]. The recommendations from the assessment of the Cost Study of 2011 were also supposed to be taken into account for the preparation of the Cost Study of 2016. The associated details can be found in the Annexes A.3, A.4 and A.5 of this Summary Report. The Swiss Federal Nuclear Safety Inspectorate (ENSI) and independent costs assessors will, in turn, audit the Cost Study of 2016 on behalf of the Administrative Commission.

As part of the specifications for the Cost Study of 2016, the Administrative Commission for the first time defined binding cost structures to present the estimated costs for decommissioning and waste disposal. This term refers to cost structures for end-to-end use in all phases of cost planning and cost determination. Binding cost structures are meant to lay the groundwork for planning costs transparently, comparing them meaningfully, and controlling them effectively as well as for enabling the fund resources to be drawn on effectively.

The specifications for the Cost Study of 2016 also contained instructions on how to deal with inaccuracies and risks. To this end, a classification of cost levels was specified and taken into account in the determination and presentation of costs.

The two terms “classification of cost levels” and “cost structure” must be distinguished from each other:

- The cost structure allocates the total costs to the individual activities and organizational units for post-shutdown operations, decommissioning, and waste disposal.

⁷ Art. 77 of the Nuclear Energy Act.[10].

⁸ Art. 4 of the Ordinance on the Decommissioning and Waste Disposal Funds [12].

- The classification of cost levels, for its part, considers the cost estimate from the standpoint of riskiness. It differentiates not only the calculated initial costs and the costs for risk-mitigating actions but also cost surcharges for inaccuracies of the forecast and threats as well as cost deductions for opportunities and if required, an additional safety surcharge.

Owing to the new procedure, the results of the Cost Study of 2016 are only conditionally comparable to the previous cost studies.

The cost estimates are based on the legal and regulatory framework as of 1 January 2015.

Cost studies are conducted at the monetary value in the year of the estimate (“overnight costs”). To enable a direct comparison, the costs estimated in the Cost Study of 2011 were adjusted from the price basis for 2011 to the price basis for 2016 as applied to the Cost Study of 2016. The applied inflation rate of 1.5 % per year is given in the Ordinance on the Decommissioning and Waste Disposal Funds.

The Table 4 below shows the results of the Cost Study of 2016 for the categories post-shutdown operations, decommissioning, and waste disposal compared with the Cost Study of 2011. After being adjusted for inflation, the total costs rise by approximately 7 %.

Table 4: Estimate of total costs for the Cost Study of 2016 CS16 and the Cost Study of 2011 CS11, price basis in 2016 (MCHF).

Total costs	Beznau NPP	Mühleber g NPP	Gösgen NPP	Leibstadt NPP	Zwilag	Confeder- ation	Total
CS16 PB16							
Disposal ¹	4'717	2'155	5'315	5'736	-	1'187	19'176
Disposal with opportunity of combined storage ¹	4'546	2'066	5'105	5'471	-	1'108	18'362
Post-shutdown operations	462	339	434	468	-	-	1'703
Decommissioning	900	564	806	1'015	121	-	3'406
Total	6'079	3'058	6'555	7'219	121	1'187	24'286
CS11 PB16							
Disposal	4'330	1'927	5'333	5'244	-	792	17'626
Post-shutdown operations	512	344	490	496	-	-	1'841
Decommissioning	872	524	714	991	102	-	3'204
Total	5'713	2'795	6'538	6'731	102	792	22'671
Diff. CS16 CS11							
Disposal	388	228	-18	492	-	395	1'551
Post-shutdown operations	-50	-4	-57	-28	-	-	-138
Decommissioning	28	39	92	24	19	-	202
Total	366	263	17	488	19	395	1'614
Diff. CS16 CS11 (%)							
Disposal	9.0%	11.8%	-0.3%	9.4%	0.0%	49.9%	8.8%
Post-shutdown operations	-9.7%	-1.3%	-11.6%	-5.6%	0.0%	0.0%	-7.5%
Decommissioning	3.2%	7.5%	12.9%	2.4%	18.9%	0.0%	6.3%
Total	6.4%	9.4%	0.3%	7.3%	18.9%	49.9%	7.1%

¹ The total of the costs of disposal for the Cost Study of 2016 contains an outstanding adjustment of accounts between the entities obliged to dispose of nuclear waste in the amount of approximately -11 million Swiss Francs. This amount also contains a contribution made by the former Gesellschaft für nukleare Entsorgung Wellenberg in the amount of 65 million Swiss Francs.

PB16 = Price Basis in 2016

The cost estimate for 2016 also incorporates new knowledge and experiences from the ongoing nuclear dismantling projects and from the development of planning for deep geological repositories. The major deviations of the Cost Study of 2016 from the results in 2011 can be summarized as follows:

After being adjusted for inflation, the waste disposal costs rise at an average of nearly 9 %. This rise can be traced in part to the introduction of the cost breakdown. The cost breakdown includes cost surcharges for inaccuracies and risks that were not fully taken into account in earlier cost studies. Another factor that increased costs was that the base project for the deep geological repositories was adjusted following the participatory process in stage 2 of the sectoral plan process. Since the deep geological repositories will go into operation later than still planned at the time of the Cost Study of 2011, costs will be higher for inter-mediate storage as well as for transports.

The estimated costs of post-shutdown operations have been adjusted for inflation compared with the Cost Study of 2011 and have decreased by an average of 7.5 %. The level of annual costs for post-shutdown operations was able to be largely confirmed. On the one hand, the planning of post-shutdown operations was rendered more precise, thereby reducing the duration of post-shutdown operations – from five to four years for the Beznau and Leibstadt nuclear power plants and to three years for the Gösgen nuclear power plant. The total costs for post-shutdown operations drop as a result. On the other hand, the introduction of the cost breakdown with its broader consideration of risks had a cost-increasing effect. The opportunities and threats take into account the cost consequences of the post-shutdown operations lasting either shorter or longer than in the planning assumptions.

Following adjustment for inflation, the estimated decommissioning costs in the base version, i.e. up to being removed from regulatory control under the Nuclear Energy Act, rise an average of 6 % compared with the Cost Study of 2011. One must take into account in this context that the Cost Study of 2011 contains the costs of conventional dismantling to a depth of -2 meters. The Cost Study of 2016, however, sets the decommissioning goal as being to complete the decommissioning work and to remove the sites from regulatory control under the Nuclear Energy Act. The Cost Study of 2016 lists the costs for decommissioning including conventional dismantling as a variation in the sub-study “Cost estimate of the decommissioning costs”. The new cost break-down also leads to higher costs for decommissioning in some cases. For instance, the observation and analysis of ongoing dismantling projects abroad resulted in the finding that the costs for dismantling and for measures being conducted alongside the projects have to be corrected upward compared with the assumptions in the Cost Study of 2011. Optimizations in the process and in the organization of the dismantling projects had a cost-reducing effect.

The next cost study is anticipated to be carried out in 2021.