

## SWEDEN

### THE SWEDISH SYSTEM FOR FUNDING OF NUCLEAR WASTE MANAGEMENT

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#### Abstract

Nuclear activities in Sweden goes back to early 1950's when the first research reactor was commissioned in a rock cavern in central Stockholm. Small amounts of uranium were mined in Ranstad from the early 1960's until late in the 1970's. A treatment facility for low and intermediate level waste was built in the beginning of 1960's at Studsvik where are also two research reactors have been in operation. The Ågesta reactor, outside of Stockholm, was Sweden's first energy producing reactor, and it was in operation between 1964 and 1974. During the period 1972 to 1985 twelve nuclear power reactors were commissioned.

Research and development on spent fuel disposal in Sweden started in earnest with the report of the AKA-commission 1976, which outlined a complete system for the management of spent fuel and associated waste, including how to handle the costs. Components of the system, mentioned in the AKA-report, such as a sea transportation (MS Sigyn), a central spent fuel storage facility (CLAB) and a final repository for operational waste (SFR) have since been constructed and taken in operation. The research and planning for the additional facilities needed for a complete system is in an advanced stage. A nuclear waste fund has also been created, based on a special fee on nuclear power production.

During the 1970's the nuclear power utilities established their own internal funds for future waste management expenses. These funds were transferred to the government-run financing system established in 1981 when the Swedish parliament passed the Act on the Financing of Future Expenses for Spent Nuclear Fuel etc.

The fees to be paid into the Fund are to be based on the assumption that each reactor generates electricity for 25 years. These fees, plus the interest on the money already deposited in the Fund, must meet all expenses for handling spent fuel, dismantling facilities and for dealing with radioactive decommissioning waste. A guarantee shall compensate for the eventuality of a nuclear power plant being closed before the end of the 25-year earning period. The type of guarantee must be available until all nuclear waste has been placed in a repository and must cover contingencies for the waste programme. This guarantee will be used if expenses for future nuclear waste management become higher than expected, if these expenses have to be met earlier than expected, or if the actual amount in the Fund is lower than was estimated.

The process of yearly cost calculations, review and determination of fees and guarantees is well defined. SKB makes annual estimates for all nuclear power utilities that form the basis for the regulatory authorities' review as well as the basis for calculating the fee.

SKI is the regulatory authority that reviews the nuclear power utilities' cost estimates. Furthermore, SKI reviews the guarantee that the nuclear power utilities must make available. After its review, SKI submits a proposal for the size of the fees, and of the guarantees required, to the Government. Based on this proposal, the Government sets the fee and guarantees.

Furthermore, SKI decides on the reimbursements from the Nuclear Waste Fund. This means in practice that SKI approves SKB's annual budget and decides on reimbursements to SKB. It also means that SKI carries out annual audits of SKB's financial reports.

The estimated total future cost, from 2003 onwards, is SEK 50 billion, if all reactors are operated for 25 years. If they are used for 40 years, the costs will be SEK 48 billion (all estimates are January 2003 price level). The sum of the future expenses and of those already accrued on various nuclear waste projects, are approximately SEK 65 billion.

To date, the Nuclear Waste Fund has covered the expenses for:

- CLAB;
- the transport system, i.e., the ship Sigyn, containers, special trucks, etc;
- the Canister Laboratory and the Äspö Hard Rock Laboratory;
- SKB's research and development costs, including siting activities.

The Nuclear Waste Fund will eventually cover expenses for:

- the encapsulation of spent nuclear fuel;
- the repositories for spent nuclear fuel and long-lived low and intermediate level waste;
- the dismantling of nuclear power plants and the disposal of decommissioning waste;
- continuing research and development work;
- the expenses for regulatory control and supervision after closure of the reactors.

The repository for radioactive operational waste (SFR-1) has been paid for by the nuclear power utilities and not by the Fund. Costs for management of operational waste is paid for directly by the nuclear power utilities.

There is also a special Act for covering the costs for waste for past practices. As of 1989, a special fee has been levied on the nuclear power utilities according to the so-called Studsvik Act (1988:1597). This fee is intended to cover expenses for the management of nuclear waste from older experimental facilities, in particular the facilities at Studsvik, the Ägesta reactor and the uranium mine in Ranstad, and for dismantling these facilities. According to estimates, SEK 1.2 billion will be needed up to the year 2030 to meet these expenses. The special fee is the same for all four nuclear power

utilities, currently SEK 0.015 per kilowatt-hour, which is reassessed each year based on a proposal by SKI. These assets are administered together with the Nuclear Waste Fund.

The confidence in the system is basically very good from the parties who are involved in the process. There are some areas where there are discussions between SKB and SKI about how the financing act should be practised. Mainly it concerns the time scenario for the future decommissioning and dismantling of the nuclear power plants. The public in general and in the municipalities Forsmark and Oskarshamn seems to have a confidence in the system for funding and pleased with the fact that today the assets in the Fund is nearly 29 billion SEK (3,2 billion Euro).

From our experience it is has been vital to the Swedish disposal programme to have a solid financing scheme. The public's confidence is enhanced by the fact that substantial funds have been built up and that they are subject to regulatory supervision.