



TECHNICAL DOCUMENT

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Title: **GKN Dodewaard**
Decommissioning cost estimate 2021

Task: Deferred scenario
Starting date of decommissioning: 2045
Clearance levels: KEW

Client: **B.V. Gemeenschappelijke**
Kernenergiecentrale Nederland (GKN)

00	02.07.2021	ICK / P. Hippauf		
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Executive summary

The objective of the present study is to provide an updated cost estimate for the complete dismantling of the “Kernenergiecentrale Dodewaard” (KCD) after Safe Enclosure (SE) called “KCD new Decommissioning Cost Estimate”.

The new KCD decommissioning cost estimate is evaluated in the frame of a “**Deferred Decommissioning Scenario**”. Under this scenario, it is assumed that the actual KCD dismantling works start in **2045**. Licensing and preparation start about 4 years earlier.

The task is evaluated using best estimate assumptions, including clearance levels as defined in the Dutch “Kernenergielwet” [1] and “Besluit Basisveiligheidsnormen Stralingsbescherming” [2].

The new cost estimate is performed in a frame of a Preliminary Decommissioning Plan (PDP). The sections of the present study represent a table of content for this PDP as given in Appendix 1 of the Technical Requisition File (TRF) [3]. The level of detail provides a full understanding how the decommissioning costs are obtained and shows that they are in compliance with Dutch Laws and context specifications taking into account all KCD conditions.

The present study is prepared by Siempelkamp NIS Ingenieurgesellschaft mbH (NIS). For 40 years now NIS has been involved in nuclear decommissioning projects and has analyzed them from a technical and an economical point of view. These experiences have steadily been included in the NIS calculation application CORA & CALCOM to assure an up-to-date cost calculation with regard to modern techniques.

The main assumptions made in the present study are:

- Non-radioactive concrete rubble is to be reused or sent to landfill.
- Only decommissioning costs (incl. licensing and preparation) are estimated. Operational costs for Safe Enclosure (SE) are not included.
- Costs related to Authorities are included with 40.590 € per year. Additionally 466.099 € are considered for the license. This includes a fee for the license and for the technical support to the regulator.
- The staff wages are based on relevant wages of Dutch companies.
- The goal of the decontamination and dismantling activities is to reach “Green field”. The dismantling includes the removal of the buildings, of all the various underground structures, including among others the foundation piles, the cooling water inlet structures, and bringing the soil of the site at the same level as the surroundings.
- An updated status of KCD (using the most recent physical and radiological data inventories stored in Dodewaard Information System – DIS) has been taken into account.
- All materials in the controlled area are supposed as being radioactive, unless measurements indicate that the contamination is below the clearance levels.
- The radiation exposure is kept ALARA. In any case, the radiation exposure per person is limited to 20 mSv per year. This is the current Dutch dose limit for workers occupationally exposed to radiation.
- The COVRA waste management costs given in the Appendix 6 of the TRF [3] apply.
- Both absolute and net present value costs are estimated. The discount rate (the rate of return that could be earned on an investment in the financial markets with similar risk) is 4 % above inflation. This figure serves as a standard indexing number, as it was chosen in the past. It is used in the present study as well, in order to make a comparison between studies possible.

- The reference date for the price level of the cost estimate is taken as 01.01.2021. VAT is not included in the costs.

The results of the updated decommissioning cost estimate KCD are presented in the following two tables. The first one gives an overview of the produced amount of radioactive waste, the necessary packages, the waste storage volume as well as the costs for transport, interim storage at COVRA and final disposal.

Main results related to radioactive waste

Packed mass disposal [Mg]	Number of disposal containers [-]	Costs disposal containers [Million €]	Final storage volume [m ³]	COVRA storage volume* [m ³]	COVRA costs for transport, interim storage, disposal [Million €]
966,9	2.170	3,8	1.679,0	2.816,9	42,9

*incl. 50 years decay storage

Table 0-1: Overview main results related to radioactive waste

The second one shows as the results of the cost estimate the absolute value and the net present value taken into account an interest rate of 4% above inflation.

Main results related to costs

Total costs absolute [Million €]	Net present Value (4% above inflation) [Million €]
194,8	64,4

Table 0-2: Overview main results related to costs

The overall duration of the project (starting with planning and ending with "Green field" conditions) takes about 14 years.

More detailed results can be found in the following sections of the study.