



# Comparison among different decommissioning funds methodologies for nuclear installations

**Final Report**

## Country Report The Netherlands

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Final Country Report (WP 1/WP 3)

The Netherlands

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Wuppertal, 31 October 2006

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## Summary

The Netherlands has a small nuclear programme: one NPP in operation, one NPP shut down in 1997, the High Flux Reactor of the JRC of the European Commission in Petten, the Low Flux Reactor at Petten, both managed by NRG, the HOR-RID research reactor at the Technical University of Delft, the storages of the Central Organisation for Radioactive Waste (COVRA), the URENCO enrichment facility at Almelo, and the decontamination facility Coeverden.

There are no restrictions for private operators of nuclear facilities in the Netherlands with regard to decommissioning financing. Therefore, only internal, unrestricted funds exist. Except a little amount of provisions for the JRC facility, no provisions for decommissioning of the research reactors have been made so far. The public company for radioactive waste management and final disposal, COVRA, sets up provisions from the fees that COVRA requires the operators to pay. COVRA has an internal, restricted decommissioning fund, with restrictions imposed by the Ministry of Finance.

Main risks involved in the current decommissioning financing system include

- Risks related to the internal, unrestricted financing systems, e. g. with regard to the lack of independency and possible conflicts of interests involved (cf. the main report of this project for further analyses of these risks).
- Risk of an early shutdown and unexpected cost increase, which are not accounted for.
- Risks related to the long timeframe set for operation of COVRA (100 to 150 years).

The decommissioning financing system has been under discussion recently. In 2006, a study by KPMG and NRG on the financial risks and possible risk reducing measures was carried out, and a legislative proposal for changes in the current system has been discussed. In October 2006, the Dutch government set conditions for any possible new nuclear installation, which might be built in the future, including the requirement to set up a restricted decommissioning fund, with decommissioning funds clearly earmarked. However, these new conditions do not affect the decommissioning financing system in place for the existing plants. Therefore, it is recommended to follow the recommendations by KPMG and NRG, and to improve the current system for all types of existing nuclear facilities respectively, i. e. to ensure financial security of future decommissioning mainly by either

- providing a bank guarantee;
- installing a dedicated fund approved by the government; or,
- other means approved by the government which ensure that decommissioning costs will be covered at the time needed.

## 1 Introduction and overview

The Netherlands has a **small nuclear programme**:

- There is one NPP in operation (Borssele PWR). In spring 2003, the Dutch government decided to postpone the closure of the reactor, now planned for 2033. The second NPP (Dodewaard BWR) has been shut-down in 1997, at the start of the liberalisation of the electricity market, after 28 years of operation. The Dodewaard plant had been built primarily as a means of gaining experience with nuclear energy and was never meant to operate economically. Since July 2005, it has been in safe enclosure status, which is foreseen to last for 40 years.
- At Petten, there is the High Flux Reactor of the JRC of the European Commission, operated by the Nuclear Research and Consulting Group (NRG) which is also operating another research facility (Low Flux Reactor) at Petten. A third research facility (HOR-RID) is located at the Technical University of Delft.
- Many of the radioactive waste management activities are carried out by the state-governed, state-owned Central Organisation for Radioactive Waste (COVRA). There is a storage facility called LOG for low and intermediate level waste, and two storage facilities called COG and VOG for special kinds of containers with radioactive waste. In September 2003, the facility for treatment and storage of high-level radioactive waste (HABOG) of COVRA was commissioned. HABOG has been designed to receive, condition and store, for a period of about 100 (to 150) years, different types of waste coming from COGEMA and BNFL reprocessing plants as the result of fuel elements reprocessing (coming from Borssele and Dodewaard NPP) or used fuel elements from Dutch research reactors or laboratories. A certain amount of historical radioactive waste and spent fuel is still stored at the research establishment at Petten, because at first radioactive waste was managed by ECN before this was done by COVRA. There is furthermore a fuel storage pond at the research reactor of the Technical University of Delft. Seadumping of radioactive waste was abandoned in 1982, when COVRA was founded.
- Finally, there is the URENCO enrichment facility at Almelo, and the decontamination facility Coeverden.

The following are the **main laws** to which nuclear installations are subject (VROM 2005):

- The Nuclear Energy Act of 1963 (as amended in 2004);
- The Environmental Protection Act of 1979 (as amended in 2002);
- General Administrative Law Act of 1992 (as amended in 2003).

**Decommissioning licenses** are granted jointly by the Minister of Housing, Spatial Planning and the Environment, who has a coordinating function, the Minister of Economic Affairs, and the Minister of Social Affairs and Employment (plus, where relevant, some other ministers whose departments may be involved). Decommissioning is

thereby regarded as a special form of modification of a plant, which invalidates the earlier description of it.

The **decommissioning financing system** has been **under discussion** recently (cf. Chapter 5 for more details). A study by KPMG and NRG (2006) on the financial risks and possible risk reducing measures was carried out, and a legislative proposal for changes in the current system has been discussed (cf. Chapter 5 for more details). In October 2006, the Dutch government set conditions for any possible new nuclear installation which might be built in the future, including the requirement to set up a restricted decommissioning fund, with decommissioning funds clearly earmarked (Platts News Flash, 29 September 2006; The Nuclear Communications Network [www.worldnuclear.org](http://www.worldnuclear.org), 11 October 2006; cf. also VROM 2006).

Table 1 Overview on nuclear installations in the Netherlands (Status: June 2006)

Nuclear facility	Short name	Country	Kind of facility <sup>*</sup>	Output (Power in MW <sub>el</sub> for NPP)	First criticality (in case of reactors)	Operational period	Operating company	Name of quoted companies holding shares in the nuclear facility, if any <sup>**</sup>	Percentage of shares held <sup>***</sup> [%]	De-comm. started in year	De-comm. stage <sup>****</sup>	Analysed in this report
Dodewaard		NL	NPP	58 MWe	21.06.1968	1969 - 1997	N.V. Samenwerkende Elektriciteits-Productiebedrijven			1997	1	x
Borssele		NL	NPP	452 MWe	20.06.1973	1973 -2033	N.V. Samenwerkende Elektriciteits-Productie maatschappij Zuid-Nederland					x
URENCO Almelo		NL	Enrichment facility			1985 - to-day	Urenco					x
Decontamination facility Coeverden		NL					Interstate Nuclear Service					
HOR-RID, TU Delft		NL	RR	2 MW		1963 - to-day	Reactor Institute Delft (RID), IRI, Technical University of Delft					x
Petten nuclear reactor (HFR) (JRC Site)		NL	RR	45 MW		1962 - to-day	JRC / NRG					x
LFR, Petten		NL	RR	30 kW		- today	Nuclear Research & consultancy Group (NRG), Petten and Arnhem					



COVRA, Vlissingen (harbour)		NL	Storage of radio- active waste			1982 – ca. 2130 (at least 100 years)						X
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\* Kind of facility: NPP = Nuclear Power Plant      RR = Research Reactor

\*\* Quoted: quoted on the stock exchange. Quoted companies directly or indirectly owning the nuclear installation or at least a part of it.

\*\*\* Percentage of direct or indirect shares held by companies quoted on the stock exchange.

\*\*\*\* Decomm. = Decommissioning. Decommissioning stages:

Operating: Still in operation; not shut down yet

1 Decommissioning to stage 1

3 Decommissioning to stage 3

-x Decommissioning in progress towards stage x

Complementary information:

a partly converted into a museum

c Equipment dismantled, building to be reused

e Chimney being partly dismantled

0 Decommissioning announced

2 Decommissioning to stage 2

3\* Decommissioning to stage 3 without civil engineering

b converted into a spent fuel facility

d Contains damaged fuel elements

f used as radioactive waste store

Source: European Commission 2004; VROM 2005; [www.nea.fr](http://www.nea.fr) (8 May 2006).

## **2 Decommissioning strategies and costs**

### **2.1 Current and past decommissioning activities**

#### **2.1.1 Dodewaard NPP**

The Dodewaard nuclear power plant (58 MWe) was shut down in 1997 after 28 years of operation. Decommissioning started in 2002. All spent fuel has been removed and since 2005, the plant is in a state of safe enclosure. The three main decommissioning strategies were considered in an Environmental Impact Assessment for the Dodewaard plant. Finally, the operator, who is responsible for taking that decision, opted in favour of the least expensive strategy, namely deferred dismantling. Calculations of the net present value showed the lowest cost for deferred dismantling. The calculations were done assuming an interest of 4%, corrected for inflation over a period of 40 years. The selected end-state is green field status and unrestricted use of the site.

Although the government had a slight preference for immediate dismantling, no legal means were available to object to the decision of the operator. The slight preference of the government was mainly based on

- concerns about the availability of dismantling, or in general nuclear, know-how in the Netherlands in the future;
- concerns about the developments in decommissioning costs;
- the availability of sufficient funding in the future; and
- a perceived societal preference for direct dismantling.

Discussions and negotiations on transfer of the Dodewaard plant in safe enclosure to the national radioactive waste management agency COVRA, failed up to now because of difference in opinions on the liabilities.

Liabilities, provisions and cost estimates of Dodewaard are still under negotiation with the ministry. Decommissioning funds of Dodewaard are reviewed by the regulator every five years as required by the license for operation of the safe enclosure. There is hardly any public information available on liabilities, provisions and cost estimates; the annual report is not public. In particular, showing details of the cost estimate of 175 million Euro for dismantling of Dodewaard NPP. It is just known that the calculation was done by NIS, and the result confirmed by the Technical University of Delft.

However, according to KPMG and NRG (2006, p. 34), the annual report for Dodewaard shows equality of provisions and (discounted) liabilities:

Provision for the closure of the power plant and the removal of spent fuel (x € 1,000):

Balance as of 1 January 2004	125,511
Addition charged to the profit and loss account	8,786
Withdrawals	19,895
Balance as of 31 December 2004	114,402

The additions are made on the basis of the financial results. The withdrawals concern:

- Contractual payments concerning the transport, storage and reprocessing of spent fuel as well as for buying out obligations in respect of COVRA concerning the storage and final disposal of the high level radioactive waste.
- Expenses with regard to decommissioning / preparations for safe enclosure.

The total value of the future obligations equals the sum of provisions at the end of the year 2004:

Social plan	16,493
Decommissioning and dismantling of the power plant	42,399
Removal of the spent fuel	55,510
Balance as at 31 December 2004	114,402

### 2.1.2 Urenco, Almelo

Urenco Netherlands BV started dismantling the first batch of centrifuges from the closed uranium enrichment plant SP 3. Information about decommissioning cost calculations for URENCO facilities are not accessible.

## 2.2 Future decommissioning strategies

### 2.2.1 Borssele NPP

Although the Netherlands, in principle, is committed to phasing out the use of nuclear power, nuclear power will continue to be used during the next decades. In 2005, it has been decided to expand the operational lifetime of the Borssele nuclear power plant to 60 years. This means that the facility will remain in operation until 2033, economy and safety permitting. On the other hand, it was negotiated between the operator and the government that Borssele has to switch to immediate dismantling. Therefore, discounted cost estimates and provisions will hardly change compared to the old situation, with operation until 2003 or 2013 but deferred dismantling. Total decommissioning costs

had been estimated at 700 million Euro (undiscounted), and 145 million Euro (discounted) respectively. Details on the old or new cost estimates for Borssele are not public, and thus could not be gained in the course of this study.

### **2.2.2 Urenco, Almelo**

Urenco, Almelo, will probably follow the immediate dismantling strategy. Details of Urenco's decommissioning strategy or cost estimates are not accessible.

### **2.2.3 HOR-RID, Technical University of Delft**

For the research facility HOR-RID at the Technical University of Delft there is no decommissioning strategy or plan finally decided yet. A cost estimate is under way, following the proposed standardised list of cost items by NEA/IAEA/EC (1999). For estimation of labour, the Technical University of Delft makes use of information from decommissioned or being decommissioned research reactors and available literature like EDF/Framatome-ANP (2001).

### **2.2.4 HFR, Petten**

Shutdown and dismantling of the Petten High Flux Reactor (HFR)(European Commission's JRC Site) is not envisaged before 2015, and will probably take place between 2015 and 2020 (European Commission 2004). An earlier shutdown cannot be ruled out, however, e. g., resulting from a stoppage of the research programme and/or withdrawal of the countries contributing financially.

In recent years, there have been different evaluations of expected total decommissioning costs of JRC facilities, partly based on studies by external companies. While the JRC's 1998 evaluation based on two studies by external German and French consultants, estimated total decommissioning costs at 65 million Euro and an evaluation in 2002 came to 72 million Euro, the latest evaluation made in 2003 by a consortium of four companies arrived already at 67 million Euro (69 million Euro including the "green field" option; not including JRC's staff costs)(all figures in Euro 2003). The latter cost estimate was initiated by the Court of Auditors.

Decommissioning activities between 1999 and 2003 concerned the processing of a consignment of spent fuel. Some nuclear materials (nuclear fuel) had to be sent to USA before 2006 since the USA are likely not to accept those materials beyond this date.

### **2.2.5 COVRA - Storage and disposal of radioactive waste**

The fees the operator pays to COVRA for dealing with radioactive waste discharge the operator from any waste management and disposal liability. This includes also dealing with waste products returning to the Netherlands after spent fuel has been reprocessed

and final disposal of these products (the NPPs have contracts with reprocessing plants; plutonium from reprocessing remains in France with AREVA for MOX production).

COVRA is expected to remain in operation for at least 100 years. The current plan foresees that all low, intermediate and high level waste will be in the storages until 2130, and then placed in a disposal facility, where the waste will be retrievable until the decision is taken for permanent closure. It is estimated that the construction and operation of the disposal facility for all Dutch radioactive waste generated over a period of at least 100 years will cost 1,270 Euro<sub>2002</sub>, of which about one third is allocated to low and intermediate level waste, and two thirds to high level waste.

Table 2 Expected total costs of future decommissioning of nuclear installations in the Netherlands (in prices of 2004)

Short name of nuclear facility	Kind of facility: NPP = nuclear power plant RR = Research reactors Others: please specify	Years decommissioning activities are expected to take place	Total decommissioning costs estimated [Mio. Euro]	Annuity of estimated decommissioning costs in relation to output over lifetime [ct/kWh for NPP; 4%]	Remarks
Dodewaard	NPP	1997 – ca. 2055	175	0.7	Dismantling, decontamination, demolition only. Calculation of costs by NIS, confirmed by a study by TU Delft. Calculation of annuities by Wuppertal Institute assuming a yearly usage of the plant of 7,000 hours per year.
Borssele	NPP	Immediate dismantling > 2033	700	0.3	Dismantling, decontamination, demolition only; not including removal of core and radioactive waste management. Calculation of annuities by Wuppertal Institute assuming a yearly usage of the plant of 7,500 hours per year.
URENCO Almelo	Enrichment facility	Information not accessible	Information not accessible		Not any information accessible.
Petten nuclear reactor (HFR) (JRC Site)	RR	Not decided yet, but not before 2015	69		Different studies have been carried out.
HOR-RID, TU Delft	RR	Not decided yet	Not known yet		Cost estimation under way. Due to possible changes in Dutch law in the near future this might become a requirement.
COVRA	Waste management & disposal	During next 100 – 150 years	1,270 (construction and operation of disposal facility only)		

Source: European Commission 2004; VROM 2006; KPMG/NRG 2006; Written information by Technical University of Delft and COVRA; Own calculation of annuities by Wuppertal Institute.

## **3 Funds and fund management**

### **3.1 Setting aside funds**

#### **3.1.1 Funds for decontamination, dismantling, demolition, etc.**

Although a strict legal requirement to ensure that adequate funding for decommissioning is available does not exist, there is a general understanding that the 'Polluter Pays Principle' applies. Consequently, and according to the accounting standards used in their balance sheets, the operators of NPPs and the URENCO plant have made financial provisions for decommissioning (internal unrestricted funds). For example, according to KMPG and NRG (2006), provisions for the Dodewaard NPP equal the estimated value of remaining liabilities. Provisions set up for the Borssele NPP equal estimated discounted costs. There has been some discussion and proposals about changing the current decommissioning financing system but there is no decision with regard to existing plants yet. However, for new nuclear facilities to be built new conditions have been already set (cf. chapter 3 for more details on the proposals and the new framework for new plants).

Since 1996, for the HFR of JRC, operated by NRG, provisions have been set up. They amounted to 5 million Euro at the end of 2003, and will be 7.4 million Euro at the end of 2006. The final amount of the provisions will depend on the date of final shutdown of the HFR. However, it will represent less than a third of the necessary decommissioning budget (69 million Euro), assuming shutdown taking place between 2015 and 2020 (European Commission 2004).

For the research facility at the Technical University of Delft, no provisions for decommissioning exist.

#### **3.1.2 Funds for waste management and final disposal**

For reprocessing of spent fuel, the NPP operators pay fees to the reprocessing plants according to their contracts. For dealing with waste products returning to the Netherlands after spent fuel has been reprocessed (except plutonium, which remains with AREVA in France), for further radioactive waste management, and for final disposal of all kind of radioactive waste, the operators pay fees to COVRA. Paying the fees discharge the operators from any waste management and disposal liability. This regulation is based on the assumption that COVRA will not be able to return to the original waste producer for payments after the period of interim storage, which will last at least for 100 years.

All waste producers have to pay fees on an equal basis. Waste generators pay per volume delivered to COVRA. For the discounting of costs to calculate the fees, COVRA uses a long time real interest average of 3%.

For low and intermediate level waste, the waste producer has to pay a fee that consists of the following items:

- Costs of delivering a standardised package in which the waste may be offered to COVRA;
- Costs of shipment of the package from producer to the COVRA facilities;
- Costs of treatment needed to create a package that can safely be stored for at least 100 years;
- Costs of storage for at least 100 years;
- Costs of final disposal based on the estimate of expected costs of 1,270 million Euro. The low and medium level waste must generate 1/3 of the money needed for the disposal facility.

According to information by COVRA of 28 August 2006, for the low and medium level waste, 529 Euro (2002 value) was charged per cubic metre of waste stored.

High level waste producers are the owners of the Borssele and Dodewaard NPPs, the HFR in Petten, the HOR in Delft and NRG in Petten. These five producers in total have to pay 100% of the high level waste costs. These are:

- The construction and active (15 years) as well as passive (at least 100 years) operation of the storage facility for high level waste (the HABOG facility); and,
- The costs of final disposal (2/3 of the 1,270 million Euro).

An agreement has been reached between these waste producers on each of their shares.

Table 3: Provisions for decommissioning activities at COVRA in 2005 [1,000 Euro]

Cost item	Provisions on 1 Jan 2005 (31 Dec 2004)	Interest on provisions 2005	Contributions to provisions 2005	Release of provisions 2005	Provisions on 31 Dec 2005
Solid radio- active waste	24,292	1,548	822		26,662
Other radio- active waste	490	31	34	-37	518
LOG	2,845	184	91	-34	3,086
COG	1,486	96	95	-14	1,663
VOG	2,007	129	1,123	-28	3,231
HABOG	54,223	2,204		-2,071	54,356
<b>Total</b>	<b>85,343</b>	<b>4,192</b>	<b>2,165</b>	<b>-2,184</b>	<b>89,516</b>

Source: COVRA N.V., Jaarverslag 2005, p. 43

At the end of 2005, total provisions accumulated by COVRA, summed up to nearly 90 million Euro. Next evaluation of the cost calculations behind the provisions is planned for 2008 (regular evaluation every five years).



### 3.2 Management of funds

Since the operators of NPPs and the URENCO plant have made financial provisions for decommissioning in internal unrestricted funds, fund management is up to them. The provisions are an important source of internal finance at zero cost for these operators. The balance sheet of URENCO shows that the sum of provisions for nuclear decommissioning is not covered by liquid assets.

Table 4: Balance sheet of URENCO Limited for 2005, UK, covering the URENCO plants in UK, Germany and The Netherlands (1,000 Euro)

<b>Assets</b>		<b>Liabilities / Equity</b>	
	[1,000 Euro]		[1,000 Euro]
<b>Non-current assets</b>		<b>Total equity</b>	656,756
Intangible assets	35,255	<b>Non-current liabilities</b>	
Property, plant, equipment	1,326,916	Loans and borrowings	610,300
Investments	8	Retirement benefit obligations	110,140
Deferred tax assets	22,330	Deferred tax liabilities	22,566
<b>Current assets</b>		<u>Provisions for tails disposal</u>	129,367
Inventories	257,803	<u>Provisions for decommissioning of plant and machinery</u>	156,710
Trade and other receivables	217,860	Other provisions	18,812
Cash and cash equivalents	22,631	Deferred income	10,094
Derivative financial instruments	24,892	Derivative financial instruments	33,626
		Trade payables	138
		<b>Current liabilities</b>	159,186
<b>Total</b>	<b>1,907,695</b>	<b>Total</b>	<b>1,907,695</b>

Source: Annual report / commercial balance sheet of Urenco Limited, UK, 2005.

Table 5: Balance sheet of the operator of Borssele NPP in 2004 (1,000 Euro)

<b>Assets</b>		<b>Liabilities / Equity</b>	
	[1,000 Euro]		[1,000 Euro]
<b>Fixed assets</b>		<b>Total equity</b>	40,447
Property, plant, equipment	88,484	<b>Provisions</b>	
Financial assets	47,434	<u>Provisions for nuclear decommissioning</u>	163,619
<b>Current assets</b>		Other provisions	210,753
Inventories	20,540	<b>Long-term liabilities</b>	10,348
Accounts receivable and other assets	13,203	<b>Short-term liabilities</b>	42,840
Cash and cash equivalents	298,346		
<b>Total</b>	<b>468,007</b>	<b>Total</b>	<b>468,007</b>

Source: Annual report / commercial balance sheet of N.V. Elektriciteits-Productiemaatschappij Zuid-Nederland EPZ, 2004

Provisions set up by COVRA are also internally managed. However, investments have to be approved by the Minister of Finance, i. e. restrictions exist. Until now, investments were mainly done in state bonds, with an average term of seven years. According to information by COVRA, average real interest received over the past five years has

been lower than the 3% discount rate used for calculation of the provisions (fees by the operators).

### **3.3 Special cases: Fall-back option and transfer of ownership**

In the Netherlands, an early shutdown of nuclear facilities is not accounted for in the decommissioning financing schemes, which is an important financial risk to be considered. The different types of financial risks of the current decommissioning financing system have been analysed in detail by KPMG and NRG (2006) (cf. Chapter 5 for a discussion of the conclusions and recommendations based on this risk analysis; also van Gelder and de Rijk (2005) address financial risks of the current decommissioning financing system).

Transfer of ownership should not have any influence on the financing system in principle.

Table 6 Base for decommissioning funds required in the Netherlands

Short name of nuclear facility	Kind of facility: NPP = nuclear power plant RR = Research reactors Others: please specify	Please check if decommissioning funds are based on overnight / undiscounted decommissioning costs	Please check if decommissioning funds are based on net present value / discounted decommissioning costs	Real discount rate used for discounting, if any	Reference date used for discounting	Remarks
Dodewaard	NPP		X	4%	?	Dismantling, decontamination, demolition only.
Borssele	NPP		X	4%	2044	Dismantling, decontamination, demolition only; not including removal of core and radioactive waste management.
URENCO Almelo	Enrichment facility		X	Discount rate according to IAS 37	2034 for dismantling, 2104 for tails disposal, 2011 for other provisions	
Petten nuclear reactor (HFR) (JRC Site)	RR	X				
HOR-RID, TU Delft	RR	<i>Not calculated yet</i>				
COVRA	Waste management & disposal		X	3%	Depending on the cost item	

Source: European Commission 2004; COVRA Jaarverslag 2005; URENCO Limited Annual Report 2005; N.V. Elektriciteits-Productiemaatschappij Zuid-Nederland EPZ; Jaarrekening 2004; KPMG/NRG 2006; Written information by Technical University of Delft and COVRA.

Table 7 Decommissioning funds accumulated in relation to expected total costs of future decommissioning of nuclear installations in the Netherlands

Short name of nuclear facility	Kind of facility: NPP = nuclear power plant RR = Re-search reactors Others: please specify	Total decommissioning costs estimated [Mio. Euro]	Provisions accumulated by 31-12-2004 [Mio. Euro]	Provisions accumulated in relation to expected costs [%]	Years of operation until 31-12-2004 in relation to total expected lifetime [%]	Remarks
Dodewaard	NPP	175* (undiscounted) 75* (discounted)	114 (for all remaining decommissioning liabilities)	100% (compared to remaining liabilities)	100.0%	*Dismantling, decontamination, demolition only. Decommissioning fund under review.
Borssele	NPP	700* (undiscounted) 145* (discounted)	163.6	23.4% (undiscounted) 100.0%* (discounted)	51.7%	*Dismantling, decontamination, demolition only; not including removal of core and radioactive waste management.
URENCO Almelo	Enrichment facility	No site-specific data accessible. Only data for the URENCO group as a whole: By the end of 2005, URENCO's provisions in the company's balance sheet for all the URENCO sites in total amount to 129 Mio. Euro for tails disposal, 157 Mio. Euro for dismantling of plant and machinery and 19 Mio. Euro for other, also non-nuclear purposes.				
Petten nuclear reactor (HFR) (JRC Site)	RR	69	5 (2003)	7.2%	Not decided yet, maybe 83%	The final amount of provisions will depend on the date of final shutdown of the HFR. However, it will represent less than a third of estimated total decommissioning costs.
HOR-RID, TU Delft	RR	Not calculated yet	0	0.0%	Not decided yet	
COVRA	Waste management & disposal	1,270 (disposal only)	85.3	6.7%	ca. 10% – 20%	Fees collected from the operators.

Source: European Commission 2004; COVRA Jaarverslag 2005; URENCO Limited Annual Report 2005; N.V. Elektriciteits-Productiemaatschappij Zuid-Nederland EPZ; Jaarrekening 2004; KPMG/NRG 2006; Written information by Technical University of Delft and COVRA.

Table 8 Management of decommissioning funds in the Netherlands

Short name of nuclear facility	Kind of facility: NPP = nuclear power plant RR = Research reactors Others: please specify	Provisions accumulated by 31-12-2004 [Mio. Euro]	... of which has been accumulated within the own assets of the operator of the facility or its mother company [Mio. Euro]	... of which has been accumulated by the operator of the facility or its mother company within a separated account / segregated fund [Mio. Euro]	... of which has been accumulated in an external fund under public control [Mio. Euro]	... of which has been accumulated in an external fund under mixed private-public control [Mio. Euro]	Share of funds the operator of the facility can access for other activities until the funds are needed for their original decommissioning purpose [%]	Remarks
Dodewaard	NPP	114	114					Decommissioning fund under review.
Borssele	NPP	164	164					Dismantling, decontamination, demolition only; not including removal of core and radioactive waste management.
URENCO Almelo	Enrichment facility	No site-specific data accessible. Only data for the URENCO group as a whole: By the end of 2005, URENCO's provisions in the company's balance sheet for all the URENCO sites in total amount to 129 Mio. Euro for tails disposal, 157 Mio. Euro for dismantling of plant and machinery and 19 Mio. Euro for other, also non-nuclear purposes.						
Petten nuclear reactor (HFR) (JRC Site)	RR	5 (2003)						No information gained in the course of this study
HOR-RID, TU Delft	RR	0						
COVRA	Waste management & disposal	85	85					

Source: European Commission 2004; COVRA Jaarverslag 2005; URENCO Limited Annual Report 2005; N.V. Elektriciteits-Productiemaatschappij Zuid-Nederland EPZ; Jaarrekening 2004; KPMG/NRG 2006; Written information by Technical University of Delft and COVRA.

Table 9 Investment of decommissioning funds in the Netherlands until they are used for their original purpose

Short name of nuclear facility	Kind of facility: NPP = nuclear power plant RR = Research reactors Others: please specify	Provisions accumulated by 31-12-2004 [Mio. Euro]	... of which have been invested in secure state bonds [Mio. Euro]	... of which have been invested in other assets with fixed interest rates [Mio. Euro]	... of which have been lent to associated or joined companies or to third parties [Mio. Euro]	... of which have been invested in other means (shares, mergers & acquisitions, etc.) [Mio. Euro]	Interest on invested financial means from decommissioning funds in 2004 [%]	Interest on invested financial means from decommissioning funds in period 2000-2004 [%]	Remarks
Dodewaard	NPP	114	Internal unrestricted funds, with no investment requirements and no information						Decommissioning funds under review
Borssele	NPP	164	Internal unrestricted funds, with no investment requirements and no information						Dismantling, decontamination, demolition only; not including removal of core and radioactive waste management.
URENCO Almelo	Enrichment facility	No site-specific data accessible. Only data for the URENCO group as a whole: By the end of 2005, URENCO's provisions in the company's balance sheet for all the URENCO sites in total amount to 129 Mio. Euro for tails disposal, 157 Mio. Euro for dismantling of plant and machinery and 19 Mio. Euro for other, also non-nuclear purposes.							
Petten nuclear reactor (HFR) (JRC Site)	RR	5 (2003)							No information gained in the course of this study
HOR-RID, TU Delft	RR	0							
COVRA	Waste management & disposal	85	62	11		12			

Source: European Commission 2004; COVRA Jaarverslag 2005; URENCO Limited Annual Report 2005; N.V. Elektriciteits-Productiemaatschappij Zuid-Nederland EPZ; Jaarrekening 2004; KPMG/NRG 2006; Written information by Technical University of Delft and COVRA.

## 4 Transparency of the funding schemes to the public

There is **not any requirement for the operators to disclose information to the public** on their reasons for choosing a specific decommissioning strategy, or on decommissioning costs or financing. Information can only be received from public sources, from the public company COVRA, and from the annual reports of the operator of Borssele NPP and of URENCO. The annual report of the operator of Dodewaard NPP was not accessible, but part of it is documented in KPMG and NRG (2006). Information beyond this is seen as **company or business secret**.

The Environmental Protection Act requires that prior to the dismantling of a nuclear facility an **Environmental Impact Assessment (EIA)** is performed, describing alternative decommissioning options. Within this process, **public participation**, advising and hearing is required. The public participation period is at least four weeks.

## 5 Stakeholder analysis

### Main stakeholders are

- the Dutch ministries, particularly the Ministry for Housing, Spatial Planning and the Environment (VROM), the Ministry of Economic Affairs (EZ) and the Ministry of Social Affairs and Employment,
- the Local Governments where the sites are located,
- the Parliament,
- the Nuclear Safety Service (KFD), being responsible for supervision of nuclear security and safeguards,
- the Chemicals, Waste and Radiation Protection Directorate (SAS), assessing whether the radiological safety objectives have been met,
- the Commission on Radioactive Waste (CORA),
- ILONA, the advisory body to the government, consisting of representatives from EZ, VROM, NRG and GKN,
- the Central Organisation for Radioactive Waste (COVRA),
- URENCO Nederland B.V. and its shareholders in the Netherlands, Germany and the UK,
- the operator of the Dodewaard plant, the Joint Nuclear Power Plant Netherlands Ltd (NV GKN),
- the operator of the Borssele plant, the Electricity Generating Company for the Southern Netherlands (NV EPZ),
- the Nuclear Research and Consulting Group (NRG), established through the merger of the Energy Research Foundation's (ECN) and Dutch electric power research institute's (KEMA) nuclear activities,
- the Technical University of Delft,
- the European Commission's JRC,
- environmental NGOs, and
- consumer organisations.

The decommissioning financing system has been under **discussion** recently:

- An **amendment of the Nuclear Energy Act** has been prepared, but not yet implemented, which applies only to licenseholders of reactors, but not to the URENCO plant. Paragraph 3 of the proposed new Article 15g of this amended Dutch Nuclear Energy Act would require the liable organisations to ensure financial security of future dismantling by either
  - providing a bank guarantee
  - installing a fund approved by the government or



- or other means approved by the government which ensure that dismantling costs will be covered when it comes to dismantling of a nuclear facility.

According to this proposal, the way financing is secured would have to be clearly defined, including determination of size of funds, dates when funds are expected to be needed, etc. An important basis for this proposal is a study by KPMG and NRG (2006) on behalf of the Dutch Ministry for Environment (VROM).

- **KPMG and NRG (2006)** have analysed the financial consequences and possible supplements or alternatives to the current decommissioning financing system in the Netherlands in detail. They suggest three alternatives to increase financial security:
  - Bank guarantees.
  - Dedicated fund (different types analysed: individual internal / central external / central individual): “Een fonds dat juridisch is afgescheiden van de overige activa en passiva van de vergunninghouder is de vorm die de meeste zekerheid bidet.”
  - Other measures which ensure that decommissioning costs will be covered.

Furthermore, with regard to investment of funding means, KPMG and NRG suggest different investment policies/rules for the first years of operation of a nuclear facility, for the years immediately before the final shutdown and for the years after the final shutdown, so that duration of investment in assets meets duration of liabilities.

- In October 2006, the Dutch government set **conditions for any possible new nuclear installation** which might be built in the future, including the requirement to set up a restricted decommissioning fund, with decommissioning funds clearly earmarked (Platts News Flash, 29 September 2006; The Nuclear Communications Network [www.worldnuclear.org](http://www.worldnuclear.org), 11 October 2006; cf. also VROM 2006). This might be one consequence of the study by KPMG and NRG (2006) and the legislative initiative described above.

How far further changes might be implemented, which also address existing nuclear facilities, remains unclear at the moment.

## 6 Conclusions and recommendations

There are no restrictions for private operators of nuclear facilities in the Netherlands with regard to decommissioning financing. Therefore, only internal, unrestricted funds exist. Except a little amount of provisions for the JRC facility, no provisions for decommissioning of the research reactors have been made so far. The public radioactive waste management and final disposal company COVRA sets up provisions from the fees that COVRA requires the operators to pay. COVRA has an internal, restricted decommissioning fund.

Main risks involved in the current decommissioning financing system include

- Risks related to the internal, unrestricted financing systems, e. g. with regard to the lack of independency and possible conflicts of interests involved (cf. the main report of this project for further analyses of these risks).
- Risk of an early shutdown and unexpected cost increase, which are not accounted for.
- Risks related to the long timeframe set for operation of COVRA (100 to 150 years).

The conditions set for any possible new nuclear facility with regard to decommissioning financing are a step into the right direction. However, this does not affect the decommissioning financing system in place for the existing plants. Therefore, it is recommended to follow the recommendations by KPMG and NRG (2006), and to improve the current system for all types of existing nuclear facilities respectively.

## 7 References

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