



Commissie voor de  
**milieueffectrapportage**

## National Programme for Radioactive Waste

Advisory report on scoping guidelines for the contents of the EA-report  
(published in Dutch on Januari 30th, 2024)

March 14<sup>th</sup>, 2024 / projectnumber: 3750



# 1 Advisory report on the contents of the EA report

The European EURATOM directive (hereinafter: EURATOM)<sup>1</sup> obliges every Member State to establish and maintain a national programme for the safe management of radioactive waste and spent fuel at least once every ten years. The Netherlands has to deal with radioactive waste from a range of sources. These include energy generation facilities such as the Borssele nuclear power plant, nuclear research in Petten and elsewhere, and hospitals (following cancer treatment, for example), as well as the industrial and mining sectors. In line with this directive, the Netherlands established the National Programme for Radioactive Waste<sup>2</sup> in 2016. This programme is due to expire in 2025, so the government is now drafting a second programme that will extend through to 2035. In the context of a preliminary, exploratory stage, and in preparation for the forthcoming decisions in the 2<sup>nd</sup> National Programme for Radioactive Waste (hereinafter: NPRA in this advisory report, unless otherwise stated), an environmental assessment report (hereinafter: EA report) will first be drawn up. The Netherlands Commission for Environmental Assessment (hereinafter: the NCEA) appreciates this early initiative. In this context, the Minister of Infrastructure and Water Management has asked the NCEA for guidance on the required content of the forthcoming EA report, based on a research proposal that was commissioned by the Minister. This is referred to as the draft version Terms of Reference memorandum<sup>3</sup> (hereinafter: NRD).

## **First a delineation: what will fall within the scope of the NPRA and what does not?**

In the 1<sup>st</sup> National Programme for Radioactive Waste, central government focused on the above-ground management of radioactive waste for a period of at least 100 years, as a preliminary step to final disposal (geological disposal) in 2130. Based on the NRD, the NCEA is still unclear about the exact delineation of the NPRA and, accordingly, about the topics that shall/should be addressed in the EA report. On the one hand, there is a focus on overarching principles such as minimising radioactive waste and not unnecessarily passing on costs to future generations. On the other hand, there is a much more limited focus on radioactive waste management in the run-up to 2035, due to a multitude of policy uncertainties in the near future. Related to this, there is still some ambiguity regarding the way in which this NPRA and the upcoming environmental studies on which it will be based will fit into the overarching decision-making process concerning both the use of nuclear energy in the Netherlands<sup>4</sup> and Dutch waste policy<sup>5</sup>. This complicates the preparation of an advisory report on the question of what should or should not fall within the scope of the upcoming NPRA environmental study (delineation), and on which environmental studies will be conducted in connection with other decision-making procedures. If future assessments of the EA report's quality and completeness are to be effective, a more thorough understanding of these matters will be required.

The NCEA held discussions on delineation with representatives of the Minister of Infrastructure and Water Management and his advisors.<sup>6</sup> This conversation touched on the

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<sup>1</sup> [Council Directive 2011/70/Euratom of 19 July 2011 \(europa.eu\)](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D070).

<sup>2</sup> The NCEA also provided guidance on the first NPRA in 2013 and 2015, see [Advisory reports - Commissiemenr.nl](https://www.commissiemenr.nl)

<sup>3</sup> Mott MacDonald and The Binding Energy, 25 August 2023. Draft Terms of Reference memorandum on the National Programme for Radioactive Waste (NPRA).

<sup>4</sup> See also the [NCEA's advisory report on the Borssele nuclear power plant's life time extension](https://www.ncea.nl/ncea/adviesrapport-over-de-levensduur-uitbreiding-van-de-borssele-kerkraftcentrale).

<sup>5</sup> Consider, for example, the upcoming Circular Materials Plan 1 (CMP), which is expected to come into effect at the beginning of 2025, see [Letter to Parliament on the implementation status of the Circular Materials Plan | Parliamentary Paper | Rijksoverheid.nl](https://www.rijksoverheid.nl/onderwerpen/circular-materials-plan-1) (June 2022).

<sup>6</sup> At an initial discussion on 16 November 2023, representatives of the Minister of Infrastructure and Water Management and his advisors explained the situation to the NCEA.

importance of not only working towards final disposal, but also of **preparing to manage** additional volumes of radioactive waste in the upcoming years. This is exemplified by the potential for a different approach to handling very low-level waste and to managing the increasing volume of radioactive waste from hospitals. It has also been stated that, in addition to the NPRA<sup>7</sup>, new policies *and* new regulations might be desirable and necessary in the upcoming years. This could include enabling the government to **regulate the volume of radioactive waste** (an option that does not yet exist) and the potential for **reusing low-level waste** (which is presently prohibited)<sup>8</sup>. This also follows from various policy evaluations<sup>9</sup> that central government has carried out in recent years.

In Section 2 of this advisory report, the NCEA explores this matter in greater detail and recommends that the Minister of Infrastructure and Water Management provide a clear (or clearer) statement on the delineation of the NPRA. In particular, it advises the Minister to specifically address the connection with the overarching decision-making process on nuclear energy, including new nuclear power plants and Small Modular Reactors (hereinafter: SMRs)<sup>10</sup>, as well as with waste policy, like the Circular Materials Plan 1 (hereinafter: CMP)<sup>5</sup>, which is expected to come into effect in 2025.

In this advisory report, the NCEA assumes that the EA report for the NPRA will focus solely on preparations for the management of radioactive waste. This stems from the initial discussion<sup>6</sup> *and* the presumably relatively protracted time frames needed to develop new (nuclear) waste regulations and waste policy. It has provided a more detailed explanation in Section 2 of this advisory report.

### **Essential information for the EA report**

The NCEA deems the following points to be essential information in the EA report. In other words, if environmental interests are to be factored into the decision on the NPRA, the upcoming EA report must at least contain the following information:

- a delineation decision that includes an explanation of the reasons behind the choices made in that context, and give a clear summary and timeline for the essential decisions and details of the stakeholders. In this context, address connections with the overarching decision-making chain regarding nuclear energy (such as plans for new nuclear power plants and SMRs) *and* with waste policy;
- viable alternatives to the NPRA policy field that are also clearly distinct from an environmental point of view. Develop this by emphasising the numerous options for managing radioactive waste, including ‘road maps to final disposal’ and alternative approaches to handling radioactive waste in the period up to 2035 and beyond;
- a survey of the environmental consequences of these alternatives, with a particular focus on radiological safety, emergencies, and the impacts on neighbouring countries.

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<sup>7</sup> The NCEA notes that the NRD could indeed give rise to the suggestion that the NPRA and EA report are now (also) aimed at informing new waste policy and new waste regulations. Many public submissions have also called for – and responded to – the need for new policy in this area.

<sup>8</sup> For more information, see the [Decree on Basic Safety Standards for Radiation Protection | Authority for Nuclear Safety and Radiation Protection](#).

<sup>9</sup> See, for example, ‘[An evaluation of the Radioactive Waste Memorandum and the NPRA](#)’ (Berenschot, 2022) and ‘[Recommendations for the second NPRA](#)’ (RIVM, 2022).

<sup>10</sup> Small Modular Reactors (SMRs) are smaller than the nuclear reactors found in conventional nuclear power plants. These new small power plants are not currently operational anywhere (or available for purchase), but they are the focus of ongoing research. The timeline for the operational introduction of these power plants remains uncertain.

Decision-makers and participants primarily read the summary of the EA report. That is why this section merits special attention. The summary should be comprehensible as a standalone document, faithfully representing the content of the entire EA report.

In the forthcoming sections, the NCEA will elaborate on the specific details that must be included in the EA report. Its advisory report builds upon the contents of the NRD. It revisits points raised in the NRD only when this is required for a proper understanding of the advisory report, or when suggesting modifications to elements of the approach.

#### **Background to the EA report**

*The NRD points out that, in view of the upcoming Environment and Planning Act, it is realistic to anticipate a mandatory Strategic Environmental Assessment (SEA) for the NPRA. The stated reason is Article 16.36 of the Environment and Planning Act, which mandates a SEA for any legally or administratively required plan or programme that sets a framework for projects that are subject to a mandatory SEA. It also indicates that it is realistic to assume that the NPRA will contain such framework-setting or guiding statements.*

*This is reflected by the launch of potential follow-up decision-making (with associated environmental assessment reports) on new or revised storage sites for (low-level) radioactive waste.*

*For that reason, the Minister of Infrastructure and Water Management has decided to have an EA report drawn up.*

#### **The NCEA's role**

*The NCEA is an independent body, established by law, that is tasked with advising on the content and quality of EA reports. It appoints a working group of independent experts for each project. It does not prepare environmental assessment reports. That responsibility rests with the initiator: the Minister of Infrastructure and Water Management. The final decision about the NPRA rests with the competent authority who, here too, is the Minister of Infrastructure and Water Management.*

*Annex 1 of this advisory report contains details of the NCEA working group's composition and procedures, as well as additional project details. The project documents used when drafting the advisory report have been made available at the website. These can be accessed by entering the number [3750](#) into the search field at [www.commissiemer.nl](http://www.commissiemer.nl).*

## 2 Background, goal and decision-making

### 2.1 Background and goal

EURATOM obliges every Member State to establish and maintain a national programme for the safe management of radioactive waste and spent fuel at least once every ten years. This is why the government wishes to draw up the NPRA. In this connection, the NRD cites the following NPRA principles:

- minimising the creation of radioactive waste;
- the safe management of radioactive waste;
- no undue burdens should be placed on the shoulders of future generations;
- the expense of managing radioactive waste should be met by those who produce it.



Furthermore, the NCEA notes that the NRD's lack of detail in developing these goals has led to ambiguity about how these will be investigated in the EA report. It also seems that some of these goals may be beyond the scope of the EA study or this NPRA.

If it is to frame an effective impact assessment and underpin decision-making, the EA report must be clearer about the specific goals the NPRA is intended to achieve. Accordingly, in the EA report, the NCEA recommends that the NPRA's goals should first be precisely articulated and developed in line with a management-oriented approach.<sup>11</sup> In this context, address the following aspects:

- **working towards final disposal**, in the 1<sup>st</sup> NPRA, the Netherlands stated that it would defer decision-making on geological final disposal until around 2100.<sup>12</sup> As a result, the procedure involved was not formulated in detail.<sup>13</sup> The Secretary of State for Infrastructure and Water Management did unveil a 'final disposal road map' at the end of 2022, as part of the forthcoming NPRA<sup>14</sup>, which also includes further details of EURATOM steps (or intermediate steps), referred to as 'milestones'.<sup>15</sup> The significance of this is also highlighted by various public submissions, which view the stance of 'defer decision-making until 2100' as being fundamentally at odds with the above-mentioned third NPRA principle of 'not placing any undue burdens on the shoulders of future generations'. Both a practical road map and specific milestones are needed to showcase progress;
- **the international context**, collaborating with other EU Member States on final disposal (referred to in the NRD as the 'dual track' approach).<sup>16</sup> While the NRD does mention this track on page 9, it still provides no specifics concerning cooperation with other Member States. In this context, discuss the potential implications concerning frameworks for the management (or temporary management) of foreign waste in the Netherlands and vice versa;
- **(urgent) management changes up to 2035**, such as fleshing out the NPRA frameworks for any expansion of new management sites (or temporary sites) that may be needed and/or for the purpose of selecting locations for such sites. For instance, a potential extra volume of waste from nuclear power plants, with or without the reprocessing of spent fuel, NORM waste<sup>17</sup>, and – to a lesser extent – hospital waste. In this context, also examine ways of better tailoring management practices to the risk profile of the waste.

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<sup>11</sup> For example, the evaluation conducted by Berenschot shows that while all stakeholders broadly support the NPRA's goals/principles, they also see a potential for further refinement (differentiation in terms of risk profile, management, and regulation).

<sup>12</sup> See, for example, the Minister of Infrastructure and Water Management's [letter to parliament](#) concerning the 1<sup>st</sup> NPRA of June 2017: '*... At this stage, no irreversible decisions are being taken with regard to future management. This gives future generations the opportunity to make decisions about the details of final disposal, based on the insights available at that time. In addition, any new developments (including new techniques, multinational solutions and lessons learned in other countries) for the management of radioactive waste that may become available during the above-ground storage period will be taken into account during the definitive decision-making process (around 2100).*

<sup>13</sup> On page 36 of the 1<sup>st</sup> NPRA, the Minister of Infrastructure and Water Management stated that: '*... At the same time, it is essential not to lock in a specific route to geological disposal at this stage, by taking definitive decisions that would eliminate the requisite flexibility in selecting a long-term management strategy.*'

<sup>14</sup> For further details of this letter to parliament click [here](#).

<sup>15</sup> For details of the milestones, see Article 12 (1)(b) of EURATOM. For instance, in its 2022 evaluation, the National Institute for Public Health and the Environment (RIVM) noted that milestones are significant for both near-term (the next ten years) and long-term planning. These milestones need to be linked to specific timelines and goals.

<sup>16</sup> NPRA 2016: '*In this context, while a national pathway for final disposal is under development, the option of collaborating with other European Member States to achieve final disposal remains open. Should this opportunity present itself, we need to be prepared to act on it.*

<sup>17</sup> NORM stands for Naturally Occurring Radioactive Materials. Mining and industrial processes, for example, generate NORM waste. The NRD references studies into release routes for the very low-level waste (VLLW) segment in particular. This is the lowest radioactive category of NORM waste.

A key factor in the development of these goals is alignment with other decrees related to nuclear energy and waste, including any potential new regulations that may be developed. This stems from the fact that, based on the NRD, the NCEA is still unclear about what falls within the scope of the NPRA and what does not. This complicates the preparation of an advisory report on the requisite delineation of the environmental study for the EA report. The NCEA provides further details below.

## 2.2 Delineation: what falls within the scope of the NPRA and what does not?

### 2.2.1 Road map for final disposal (including geological disposal)

EURATOM requires each Member State to pursue the final disposal of radioactive waste, either independently or in cooperation with other Member States. As stated, in the 1<sup>st</sup> NPRA the Netherlands declared its intention to pursue geological disposal for all types of waste (low-level, intermediate-level, and high-level radioactive waste) and that it would defer decision-making on this issue until around 2100. This decision was, to some extent, prompted by the fact that the Netherlands only needed to store relatively limited volumes of waste<sup>18</sup>, but the anticipated expansion of the nuclear sector could alter this scenario. The Secretary of State for Infrastructure and Water Management unveiled a ‘final disposal road map’ at the end of 2022, as part of the upcoming NPRA. In and of itself, creating a transparent road map to final disposal has no environmental consequences. However, it does establish a timeline for pinpointing specific insights (environmental and otherwise) and for finalising certain decisions. Accordingly, it is mostly a matter of timing. In that sense, it is relevant information that merits further exploration in the EA report.

### 2.2.2 Waste policy, minimisation and reuse of radioactive waste

The NCEA notes that the NRD gives rise to the suggestion that the NPRA should now (also) **regulate the volume of radioactive waste** and the **reuse of low-level radioactive waste**.<sup>19</sup> Based on government policy, such as the draft CMP and the National Circular Economy Programme (hereinafter: NPCE<sup>20</sup>), when managing hazardous waste, the priorities should be: protecting those in the vicinity, eliminating this waste from the raw material cycle, and – first and foremost – prevention. If these principles also apply to radioactive waste, this could place greater emphasis on radioactive waste management by national governments. However, the NCEA is uncertain about the extent to which central government intends to align with the CMP and NPCE in terms of managing both high-level waste (nuclear power plants, etc.)<sup>21</sup> and

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<sup>18</sup> This decision was also influenced by the hope that additional disposal options might become available in the future, coupled with the assessment that the risk of attacks/emergencies was extremely low.

<sup>19</sup> The NRD contains the following examples:

- Section 2.1, which addresses the goals for minimisation and release routes for reuse;
- listing the permit holders’ (and future permit holders’?) obligations to minimise the generation and volume of radioactive waste, to meet the NPRA’s minimisation goal;
- three scenarios projecting the volumes of radioactive material that would be generated when new reactors/facilities are commissioned.

<sup>20</sup> [National Circular Economy Programme 2023 - 2030 | Policy memorandum | Rijksoverheid.nl](#).

<sup>21</sup> The NRD indicates that depleted uranium falls outside the scope of the EA study, except when it is classified as radioactive waste (page 11 of the NRD). The NCEA is uncertain about the specific expectations associated with this delineation. For instance, how much depleted uranium could still be processed into fuel? How much will become waste?

radioactive NORM waste (low-level waste). Any reuse of low-level NORM waste will probably mainly concern the very low-level waste segment (hereinafter: VLLW).<sup>22</sup>

Policy evaluations<sup>23</sup> have indeed revealed the necessity for – and the desirability of – new policy and new regulations for the minimisation and reuse of radioactive waste (as described in the NRD). For instance, this could include enabling the government to regulate the volume of radioactive waste (a capability that does not currently exist) and the potential for reusing low-level waste (which is presently prohibited).

In this context, the NCEA notes that the reuse of VLLW could be consistent with the goals for the circular economy (first waste prevention and then, preferably, reuse for recycling, incineration, or landfill). This is a waste stream that involves a special type of landfill.<sup>24</sup> Reasons should be given to explain why circular principles will not (or should not) apply to this waste stream. It is also important to address the question of whether circular principles can be applied to this waste stream (or parts of it) and, if so, under what conditions. In addition, the principle of ‘extended producer responsibility’ is an increasingly common feature of waste policies.<sup>25</sup> In this way, the producers themselves are accountable for effectively managing the waste generated by their products and services. This principle will increasingly apply to a wide range of products and waste streams. Thus it might be wise to prepare for that change in this NPRA.

However, it remains to be seen whether policies for minimisation and reuse can be fully formulated within the upcoming year (the time frame within which the NPRA and the EA report need to be finalised). This will also impact other decisions about activities that generate radioactive waste (overarching decision-making process, see Section 2.2.4 of this advisory report).

### 2.2.3 Preparing for management strategies in the run-up to 2035

The NCEA sees EURATOM and the associated NPRAs as a mandate to the Member States to **prepare for the management** of radioactive waste streams in the period up to final disposal. Based on the information available to the NCEA and for the period up to 2035 (in addition to the NRD), the EA report would also have to incorporate **preparations for new management strategies** for the following:

- a potential increase in the volume of radioactive waste and a change in its characteristics, stemming from the life time extension of existing reactors coupled with the potential development of new nuclear facilities for the generation of electricity and the production of medical isotopes. In this context, consider expanding temporary management sites, such as COVRA;<sup>26</sup>

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<sup>22</sup> With NORM waste, a distinction is usually drawn between waste with ‘1 to 10 times the release limit’ and waste with ‘more than 10 times the release limit’. The first category, referred to as VLLW (very low-level waste), can be disposed of at designated depots. The second category currently has to go to COVRA. See also the Explanatory Memorandum to the ‘Decree of 26 November 2007, amending the Decree on landfills and dumping bans on waste (very low-level waste)’.

<sup>23</sup> See, for example, ‘[An evaluation of the Radioactive Waste Memorandum and the NPRA](#)’ (Berenschot, 2022) and ‘[Recommendations for the second NPRA](#)’ (RIVM, 2022).

<sup>24</sup> With the exception of VLLW, all radioactive waste should be stored at the COVRA facility in Borssele. Given its nature and the volume involved, VLLW is not suitable for storage at COVRA. Instead, VLLW is disposed of in provincial depots.

<sup>25</sup> See also [Extended producer responsibility – Waste Circular](#).

<sup>26</sup> Located in Vlissingen, COVRA is the Netherlands’ temporary storage facility for radioactive material, see [Home – COVRA N.V.](#)

- recovery of radioactive material from France, possibly involving different volumes and characteristics. The Borssele nuclear power plant regularly exports spent fuel to France, with the goal of ultimately reprocessing it into MOX fuel<sup>27,28</sup>. An agreement has been reached with the French state to take back radioactive waste.<sup>29</sup> New nuclear power plants may also use MOX fuel;
- the increasing volumes of VLLW waste in provincial depots (landfills designated for VLLW disposal) are causing capacity issues (some of which require urgent attention);
- the rapidly growing volume of ‘short-lived’<sup>30</sup> radioactive waste from hospitals. This is currently stored at COVRA, on a temporary basis. Should this kind of waste need to be stored at COVRA in the future, it would necessitate an increase in that facility’s central storage capacity. Alternatively, it could be stored at another (decentralised) facility or within the hospitals themselves;
- several additional radioactive waste streams that have been highlighted by public submissions<sup>31</sup> and that may also be significant for the forthcoming EA study. These include:
  - a. the request to include waste from the Caribbean parts of the Kingdom of the Netherlands within the scope of the NPRA;
  - b. a potentially accelerated decommissioning of Dodewaard.

#### 2.2.4 Other decisions on radioactive waste (overarching decision-making process)

The NRD features a limited exploration of the extent to which the NPRA and the associated EA procedure are consistent with other upcoming decisions on nuclear energy (such as decisions on the Main Energy Structure Programme,<sup>32</sup> potential new nuclear power plants, a life time extension for the Borssele Nuclear Power Plant, SMRs, etc.) and on conventional waste. This specifically concerns the role of nuclear energy in the future energy mix. In Section 2.5 of this advisory report, the NCEA explores other decisions regarding radioactive waste in greater detail.

The NCEA notes that the additional radioactive waste from potential future nuclear energy facilities (i.e. on which no decisions have yet been reached) have already been presented in Section 4 of the NRD as alternative scenarios for the NPRA. This could wrongly give rise to the suggestion that the NPRA influences these decisions or imposes preconditions upon them.

The question arises as to the precise ‘scope’ of the EA report for the NPRA, in relation to other forthcoming decisions (hereinafter: overarching decision-making chain). Put simply,

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<sup>27</sup> MOX fuel (Mixed OXides) is an alternative to the low enriched uranium used in most nuclear reactors. MOX offers a practical approach to the reuse of plutonium (a by-product of the core process in nuclear reactors) for energy generation. If it were not reused, this material would have to be stored as radioactive waste, with the associated risk that it might fall into the wrong hands. The Borssele nuclear power plant runs partly on MOX. Currently, spent MOX fuel is not reprocessed. This is because the main attraction of ‘plutonium multi-recycling’ is its use as a fuel cycle in fast reactors, which can generate energy from the recovered plutonium. As yet, there are no industrial scale reactors of this kind.

<sup>28</sup> In its public submission, the LAKA Foundation highlights the fact that if France were to stop reprocessing spent fuel (of certain types), this would have to be transported back to the Netherlands for storage, pending the development of a long-term management strategy.

<sup>29</sup> This would involve taking back all of the radioactive waste associated with fuel that has been reprocessed (or waste streams that are comparable in terms of radioactivity).

<sup>30</sup> Short-lived: Radioactive waste products that decay relatively quickly (within a few years) and subsequently no longer meet the regulatory criteria for radioactivity, thus excluding them from consideration for geological disposal. However, safe short-term storage is still important.

<sup>31</sup> This issue is addressed in various public submissions, notably by the LAKA Foundation and Greenpeace/WISE.

<sup>32</sup> The [Main Energy Structure Programme \(PEH\) \(rvo.nl\)](#).



what is to be decided, in what sequence, and in which decrees regarding radioactive waste, and how does the NPRA fit into this context? And to what extent is the NPRA dependent on decisions made elsewhere?

## 2.3 Advice to the Minister: a clear delineation of NPRA is needed

Based on the above, the NCEA notes that the overarching decision-making process and the roles of the stakeholders remain unclear and lacking in transparency. Consequently, there is a risk that some issues may receive insufficient attention or may slip through the cracks. Examples: what environmental consequences need to be taken into account within the framework of the NPRA? Which environmental consequences will be addressed in other parts of the decision-making process? When and where will this happen?

Thus, as an initial step, the NCEA advises the Minister of Infrastructure and Water Management to now make a clear statement on the delineation of the NPRA, and to use clearer formulation and accountability in this regard.

In this context, address its consistency with the overarching decision-making chain regarding nuclear energy (such as plans for new nuclear power plants and SMRs) and with conventional waste policy (such as the CMP and the NPCE).

The delineation has significant implications for the required content and depth of the environmental study to be conducted, and is not optional. Should any environmental questions go/have gone unanswered elsewhere, these will need to be addressed in the EA report for the NPRA, or a clear indication must be given of when and where they will be answered in the future.

### 2.3.1 The delineation adopted by the NCEA for the purposes of this advisory report

As mentioned, the NCEA has acknowledged that the study suggested in the NRD (into the environmental consequences of *new regulations on minimising and reusing radioactive waste*) – while useful – cannot yet be incorporated into this EA report (or in the NPRA). On the one hand, this is because the incoming government’s plans for developing this further are still unclear (see also the above delineation ruling recommended by the NCEA). This makes it difficult to investigate the environmental consequences involved. On the other hand, as per the planned schedule, the Minister wants both the EA report and NPRA to be completed by the end of 2024, to ensure timely reporting to the EU in the context of EURATOM. Indeed, in the near future, the EA report and the NPRA may provide key reference points for the formulation of new policy and new regulations.

Based on the above and the initial discussion, in this advisory report the NCEA assumes that the EA report on the NPRA will focus solely on **preparations for management strategies of radioactive waste**.

A precondition for this advisory report is that the overarching decision-making chain is addressed elsewhere (see also Section 2.2.4 of this advisory report). The NCEA operates on the premise that the Minister will clarify this matter in good time, thus enabling its inclusion

in the EA report. This is because the NCEA requires a clear understanding of the structure of the overarching decision-making process to effectively evaluate the accuracy and completeness of the EA report at a later stage.

## 2.4 NPRA decision-making process

Include a clear summary in the EA report, together with a timeline for the NPRA and the directly related follow-up decisions. The starting point for this process is the advisory report mentioned above, concerning the 'delineation of the NPRA'. In the EA report for this timeline, specifically address:

- the aforementioned road map and milestones;
- time frames for the implementation and construction of potential new management sites (or temporary sites) and facilities that might be approved in the upcoming years;
- a summary of all the stakeholders, and of their responsibilities and liabilities.

## 2.5 Summary of other decisions on radioactive waste

Specify the other decisions (both strategic and operational) of the overarching decision-making chain and details of the relevant stakeholders. This provides clarity for participants and others regarding the nature of further decisions, the sequence involved, and the identity of the decision maker.

Next, indicate which of these decisions are the response to environmental questions in the context of the overarching decision-making process. In any event, the following points should be considered:

- on what (environmental) grounds is electricity production from nuclear energy deemed to be useful or essential? In this context, specifically address the associated increase in the volume of radioactive waste and how this relates to the NPRA principle of minimising radioactive waste volumes. In addition, address the role of nuclear energy in the energy mix and dependencies on foreign countries (for the supply of uranium, for example);
- does central government actually intend to formulate a policy to minimise the volume of radioactive waste, as indicated by the NRD? And if that is the case, how can central government regulate this, also how and where does it plan to do so?<sup>33</sup>;
- does central government actually intend to formulate a reuse policy for low-level (or very low-level) radioactive materials, as suggested by the NRD? And if that is the case, on what grounds (including environmental ones) and under what circumstances would such reuse be considered practical and viable?;
- under what conditions can and may spent fuel for future nuclear power plants be reprocessed? In the Netherlands, the policy stance on this issue is currently unclear. At the same time, reprocessing is linked to other types of radioactive waste, which – partly as a result of this – entails further environmental consequences;
- does the NRD's goal of implementing a dual track disposal strategy<sup>33</sup> also imply the future import (or potential import) of foreign radioactive waste<sup>34</sup> into the Netherlands, or the export of Dutch radioactive waste to other countries? And if that is the case, what

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<sup>33</sup> See page 9 of the NRD.

<sup>34</sup> As yet, there is no regulatory framework for this issue, in addition it is reasonable to expect that a dual track strategy can/must operate reciprocally.

kind of regulatory framework would be needed for importing and exporting radioactive waste, respectively? What conditions are attached to this? The NCEA notes that timely consideration and clarification (and, in due course, establishment) of the criteria could facilitate decision-making on a dual track approach.

## 3 Proposed activity and alternatives

### 3.1 General

The 'proposed activity' described in this advisory report is an NPRA that concerns preparations for radioactive waste management during the term of this programme (until 2035), while also working towards a final disposal road map. The latter spans a longer period, specifically until the decision-making process for final disposal is concluded (which is expected to be around 2100, according to the 1<sup>st</sup> NPRA).

Beyond developing the aforementioned road map, the EA report's key focus is laying the groundwork for adapting management practices in response to the potential *consequences* of other decisions *and* developments concerning nuclear energy and waste. Examples:

- a potentially substantial increase in the radioactive waste inventory earmarked for final disposal<sup>35</sup> and a change in its characteristics. This could impact the disposal initiatives undertaken by, and in cooperation with, other Member States: Given these circumstances, does a national strategy make more sense? And would this demand different preconditions for cooperation with neighbouring countries?;
- the recovery of radioactive material from France, possibly involving different volumes and characteristics, see also Section 2.2.3 of this advisory report;
- the likelihood that spent fuel – including MOX – will not be reprocessed (or that this will be discontinued), requiring the development of new disposal strategies for this material;
- the increasing volumes of VLLW waste in provincial depots are causing capacity issues (some of which require urgent attention);
- the rapidly growing volume of 'short-lived' radioactive waste from hospitals.

To this end, the EA report should include a diagrammatic representation of the existing management chains for the aforementioned radioactive waste streams. In short: from the producer, via an interim storage facility (or facilities), to COVRA and/or a provincial depot. Focus on the types of transport and safety measures, *as well as* on waste streams that are temporarily stored at foreign sites, in countries such as France.<sup>36</sup>

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<sup>35</sup> A calculation example: the addition of two new nuclear power plants would significantly alter the situation. It would trigger a sharp rise in the volume of highly radioactive waste. The [National-Radioactive-Waste-Inventory.pdf \(covra.nl\)](#) provides (page 17) an estimate of the volumes of high-level radioactive waste (HRA) associated with a range of potential scenarios. In the baseline scenario (where Borssele remains operational until 2034, and no new nuclear power plants are constructed) the volume of waste is projected to reach 173 m<sup>3</sup> by 2130. This volume is almost 20 times less than the maximum scenario depicted in Figure 7 (3,747 m<sup>3</sup>). The volume originating from nuclear power stations (nearly 3,000 m<sup>3</sup>) corresponds to the addition of two new nuclear power plants and Borssele's potential life time extension. This does not include any potential SMRs. In the short/medium term, this would necessitate a substantial expansion of temporary storage. The pace of this development, as well as the capacity and design of the storage facilities themselves, would partly depend on whether or not the fuel rods are to be reprocessed. It remains to be seen whether COVRA can accommodate such an expansion within the confines of its current plot.

<sup>36</sup> In their public submission, Greenpeace/WISE call for this issue to be closely examined.

Summarise the current radioactive waste inventory<sup>37</sup> (and COVRA's projected storage capacity). Provide a well-founded argument to show how comprehensively this takes account of the complete decommissioning of existing facilities in the Netherlands for electricity generation and medical isotope production under the Nuclear Energy Act, factoring in any uncertainties involved.<sup>38</sup>

### 3.2 The role of alternatives in the EA report

Even after reviewing the NRD, the intended role of the alternatives presented in the EA report is still unclear to the NCEA. According to the NCEA's interpretation of the NRD, the Minister is seeking to clarify the environmental consequences of continuing the old policy in the context of scenarios A, B, and C<sup>39</sup>. In other words, are the NPRA's goals (minimisation, management, and an equitable distribution of burdens and costs) attainable in these scenarios, and is this consistent with the effective management of any potential environmental consequences? If this is not the case, or if there is any doubt about this, are there other options in the NPRA that are feasible or necessary?

The answers to these questions should result in the EA alternatives which are presented later in the EA report. Put simply, are there alternative policy options that more effectively safeguard the principles and/or minimise the environmental consequences? However, the NRD does not specify any such EA alternatives. As mentioned, none of the three scenarios described in the NRD addresses the substance of these questions. Nonetheless, a broad outline of the three scenarios<sup>39</sup> would be a useful first step for the EA report. The NRD has already announced this outline.

According to the NCEA, this outline still needs to allow for the aspects specified in Sections 2.2 and 3.1 of this advisory report, which are: delineation, the consequences of other decisions, developments regarding nuclear energy and waste, *and* building on COVRA's waste inventory.<sup>35,37,38</sup>

Viable EA alternatives to the NPRA policy field – that are also clearly distinct from an environmental point of view – can then be highlighted by prioritising management strategies for radioactive waste in a second step. The NCEA recommends formulating these management strategies within the EA report and using them to implement the 'EA alternatives'.

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<sup>37</sup> [Waste-inventory-definitive.indd \(covra.nl\)](#).

<sup>38</sup> According to the COVRA inventory, the SHINE company's new sites would generate more low-level and intermediate-level waste (LLW/ILW) than two new nuclear power plants. In this connection, see the responses to [Parliamentary questions posed in the Dutch Senate](#). As of January 2024, the Authority for Nuclear Safety and Radiation Protection (ANVS) had yet to reach a decision concerning a permit for SHINE. One public submission points out the necessity for the rapid dismantling of the Dodewaard nuclear power plant, in compliance with the Nuclear Energy Act. This could also impact the required inventory and storage capacity that needs to be readily available for this purpose.

<sup>39</sup> The alternatives described in the NRD relate to three scenarios. Each scenario presents a different projection of the volume of new radioactive waste that could be generated by the potential expansion of the Netherlands' nuclear sector (for example, whether or not two new nuclear power plants are constructed). For a detailed description and analysis of these scenarios, see Chapter 4 of the NRD.

## 3.3 Developing alternatives

### 3.3.1 Alternative final disposal road maps (period up to 2130)

The final disposal road maps (for the period up to 2130) need to highlight prioritising 'expediting decisions' versus 'delaying decisions (as much as possible)', *and* national versus international disposal. In the EA report, develop these into alternatives and draw up an outline road map for each alternative, highlighting:

- the requisite storage capacity, corresponding to the maximum and minimum volumes specified in the NRD scenarios;
- differentiation according to radioactivity and disposal option. Put simply, taking a different approach when handling waste that requires a shorter period of containment and isolation. For example, consider classifying disposal concepts into categories, based on a phased approach: *Surface disposal for low-level and intermediate-level waste, intermediate depths for long-lived low-level and long-lived intermediate-level waste, and deep disposal for high-level radioactive waste*. Given the capacity and volumes involved (which may increase still further in future), the NCEA is unsure whether disposing of high-level radioactive waste in 'geologically deep' repositories is still the best (and most economical) option from an environmental and safety standpoint<sup>40</sup>;
- the decision point for spatial reservations for geological disposal. In this context, consider decision points that lead to the introduction of spatial reservation and definitive storage before 2100, with potentially important environmental benefits and differences (such as fewer safety risks);
- relevant intermediate steps in a road map and what environmental information must be available at that point.

### 3.3.2 Alternative management strategies (period up to 2035)

For the period up to 2035, the priorities differ more substantially and are determined by the type of waste stream involved. Put simply, the EA report requires the development of alternative management strategies vis-à-vis the current options (storage at COVRA, provincial depots and storage outside the country). This means for:

- the increasing volumes of VLLW waste in provincial depots: formulate an alternative approach to tackle capacity issues (some of which require urgent attention), for example by expanding existing depots or opening new ones;
- the rapidly growing volume of 'short-lived' radioactive waste from hospitals: develop an alternative involving a different type of storage, such as:
  - the expansion of COVRA storage facilities in which short-lived radioactive waste can be held until it has decayed;
  - the construction of a separate facility for hospital waste;
  - long-term storage within individual hospitals themselves;
- extra storage capacity at COVRA: an alternative that allows for the storage of:
  - additional future decommissioning waste;
  - the return (term) of radioactive waste from France (La Hague);
  - the anticipated expansion of the nuclear sector. Put simply, prepare for the maximum use of nuclear energy, new power plants, and SMRs in the upcoming decades.

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<sup>40</sup> In its public submission, the Rathenau Institute also suggests that changes in nuclear energy policies, influenced by the rising volume of waste, could make other (above-ground) storage and disposal methods more relevant.



In the EA report, formulate these alternatives for the next 10 years, providing as much detail as possible and focusing on the:

- options for technical management and site selection;
- requisite procedures and decisions;
- lead times for decision-making and implementation.

In this context, the NCEA notes that if there is a substantial shift in the Netherlands' nuclear energy policy or waste policy in the near future, an 'update or revision' to the NPRA might be required or advisable before a decade has passed (2034).

### 3.4 Reference point and comparison of alternatives

The NRD does not specifically address the question of a description of the (legally required) reference situation in the EA report. Typically, an EA report begins by detailing the present environmental status in the study area. It goes on to outline the environmental status that would be expected to result from autonomous development, as a reference point for the expected environmental impacts. 'Autonomous development' refers to the future environmental status if neither the NPRA nor any of the alternatives were to be implemented.

Given these circumstances, the NCEA recommends the following approach. In essence, this involves drawing up a survey that:

- begins by effectively and clearly outlining the current environmental status (i.e. based on the current 1<sup>st</sup> NPRA). This involves insights into the current management of radioactive waste, including the volumes stored, the level of environmental protection, and any undesirable impacts (e.g. radiological and on soil, water, and the natural environment). Apply this approach to both COVRA and the provincial depots that have historically been used for the disposal or storage of radioactive waste. Also describe the current temporary storage facilities at the 'site where the waste was generated' (operational and old power plants). Focus on any existing shipments that are necessary for effective management;
- creates an extrapolation based on the continuation of current policy and generates projections for every alternative for the 2025-2035 time frame and for the subsequent period, as needed. Do this for the various scenarios outlined in the NRD;
- specifically addresses the environmental consequences and focal points of the various alternatives, the differences between them, and options for mitigating any impacts.

The NCEA believes that a survey of this kind would enable the EA report to provide a more coherent and pertinent understanding of the environmental consequences *and* an agenda listing environmental focal points per alternative.

In the next section, the NCEA explains what it expects from this.

## 4 Survey of environmental consequences

### 4.1 Introduction

The NCEA recommends that the survey should start by establishing a lucid and comprehensive picture of the existing environmental situation. Next, use this to answer the following survey questions in the EA report:

- does extrapolation of the current situation for the 2025-2035 time frame lead to an increase (or decrease) in environmental stress and is that acceptable? Focus on central storage at COVRA, provincial depots and temporary storage abroad *and* on the transport routes and times;
- does extrapolation produce scenarios in which standards might be exceeded or thresholds reached, as a result of which the impacts (or cumulative impacts) are no longer deemed acceptable? Clarify the timescale within which this could occur;
- how do the alternative final disposal road maps differ, in terms of their environmental consequences? Classify the differences in terms of environmental consequences by disposal concept, with a particular focus on radiological safety, 'emergency and disaster situations', and the duration of storage;
- in what ways do alternative management strategies for the upcoming years differ, in terms of their environmental consequences? In this context, focus the studies of environmental consequences on alternative management strategies and on safe transport.

In this context, the NCEA also notes that the NRD does not specify 'how' and 'to what depth' thematic research into environmental consequences will be conducted and documented in the EA report. These are precisely the topics the NRD is designed to address. Consequently, the NCEA is unable to comment on/review these aspects in its advisory report. This has complicated the advisory procedure, potentially compromising the quality and completeness of the forthcoming EA report.<sup>41</sup>

Below, the NCEA provides a more detailed analysis of how these survey questions are addressed.

### 4.2 Environmental consequences of final disposal road maps

Summarise the environmental consequences of the alternatives for road maps to final disposal. Clarify the details of the management period until disposal, as well as the key considerations for the disposal process itself. Existing and ongoing European research trajectories, such as the OPERA research programme and its follow-up projects<sup>42</sup> are

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<sup>41</sup> In the NRD, the environmental aspects to be studied are referred to as 'SEA objectives'. Even after meeting with officials from the Ministry of Infrastructure and Water Management and their consultants (see footnote 6), the NCEA is still unclear about what exactly this is intended to achieve. It questions the added value and purpose of comparing such a wide range of aspects.

In Table 3.1, the NRD also lists environment-related challenges and opportunities. The rationale and relevance of the environmental study mandated for the NPRA are also unclear to the NCEA. The NCEA notes that environment-related challenges and opportunities are really very different from EA studies into environmental consequences and their subsequent evaluation. In addition, the NCEA considers the table to be 'broad/irrelevant', to the extent that it does not reflect environmental impacts and ways in which these can be managed/mitigated.

In summary: Table 3.1 and Annex D.2 in the NRD are too general and lack the focus and depth required for the EA report for the NPRA.

<sup>42</sup> [Definition of the OPERA safety case for radioactive waste disposal in the Netherlands](#) (2013) and [OPERA safety case](#) (2017).

probably already yielding a wealth of basic information on the environmental consequences of various disposal strategies. Briefly contrast this with the current environmental situation. In particular, address radiological safety and effects on neighbouring countries.

Some studies into environmental consequences may not be immediately available, nor may this be necessary in every case. The degree of urgency involved and the right timing will vary from one alternative to another. In the EA report, for relevant intermediate steps in a road map, be sure to specify which type of environmental information must be available and when. This will enable these focal points to be taken into account.

*Safe management and emergency and disaster situations in the period leading up to the decision on final disposal*

The NCEA recommends that the EA report begin by detailing various 'worst case' scenarios for emergency and disaster situations in the period leading up to the decision on disposal *as well as* measures that will (or can) be taken to mitigate their impact. Of course, there is only a slight risk that such situations will actually arise. However, if they do occur, the environmental consequences could be serious (or extremely serious). In this context, aside from internal factors such as 'human error' and 'sabotage', the NCEA is also taking external effects on storage sites into account, such as earthquakes, floods, aircraft crashes, attacks, and wartime hostilities.

Briefly discuss the relevant emergency and disaster situations for each alternative. Present a well-founded argument to identify the factors behind the safety disparities between the alternatives. Describe strategies for minimising such risks and analyse the potential for mitigating radiological impacts as much as possible.

For each alternative, explain how – and under what conditions (focal points) – safe radiological management is ensured.

## 4.3 The environmental consequences of management strategies

### 4.3.1 The environmental consequences of alternative management strategies

Summarise and compare the anticipated environmental consequences of alternative management strategies. The existing environmental studies for permits from COVRA and provincial depots have probably generated large amounts of basic information, which can be used to create this summary.

It is vital that the EA report should now focus primarily on the environmental consequences upon which well-founded choices between different management strategies can be based. After all, these choices will probably have to be made within the next few years. In-depth studies of environmental consequences will follow at a later stage, in the context of spatial planning and permit procedures. To implement management strategies, briefly indicate which type of environmental information needs to be studied (or available) at a later stage, and which environmental focal points are involved (locally or otherwise).

Also, examine the various options for mitigating impacts. The environmental consequences of alternative management strategies are likely to hinge mainly on a management strategy's choice of site and technology (or on its design). Radioactive emissions (into the atmosphere) and discharges (into groundwater and surface water) are a major determinant of the general

impact on human health (via direct exposure, inhalation, or consumption via water or food) and on biodiversity. Explain how risks can be minimised, and outline the expected outcomes regarding the management of radiological risks. In addition, illustrating ways of minimising impacts on other environmental themes is important for:

- landscape, integration and technical design of a management site;
- climate, the need for climate-proof construction (due to factors such as rising river levels and sea levels);
- emissions to surface water, groundwater, soil, and air (air quality, nitrogen and CO<sub>2</sub> emissions).

#### **4.3.2 Safe transport**

Estimate the expected increase or decrease in transport activities associated with the various alternative management strategies. When doing so, bear in mind that the degree of intensification involved is site-specific. For various standard scenarios, outline the potential for accidents and radioactive exposure during transport, as well as the measures that can be used to mitigate such risks.

The transport of radioactive material has consequences for the environment. A transport accident could also result in the release of radioactive materials, potentially exposing individuals and the natural environment to radiation. The environmental impacts and transport risks vary according to the type and volume of radioactive material involved, as these factors dictate the specific transport requirements. This could involve differences in the frequency and type of transport used for high-level radioactive waste, hospital waste, and NORM waste, for example. Explain how environmental impacts and transport risks can be minimised. Provide a well-founded argument with the aid of an analysis of historical transport data and known accident situations.

In doing so, be sure to also consider transport to and from France and through Belgium.

Explore the impact of alternative management strategies on the current transportation infrastructure (roads, railways, and waterways) and on anticipated transport frequencies – specifying any potential adjustments that might be needed to accommodate these changes.

## ANNEX 1: Project data

### **The NCEA's advisory report on the forthcoming EA report**

The NCEA consists of a working group of experts. This working group specifies the topics it believes should be addressed in the EA report, and the level of detail required. To ensure that it had a clear understanding of the situation, the NCEA held an initial discussion on 16 November 2023. At this gathering, representatives of the Minister of Infrastructure and Water Management and his advisors briefed the NCEA on the situation. Further details regarding the [NCEA](#) and its [operational procedures](#) are available on our website.

### **Composition of the working group**

This project's working group consists of:

ir. Geert Bergsma

drs. Sjoerd Harkema (technical secretary)

Prof. Hans Mommaas (chair)

Dr Ronald Smetsers

Ms Eef Weetjens

drs. Gerrit de Zoeten

### **Decision for which this environmental assessment report is being drawn up**

2<sup>nd</sup> National Programme for Radioactive Waste.

### **Why is an environmental assessment report being drawn up for this purpose?**

In the Netherlands, an environmental assessment report (EA report) may be mandatory for projects that could have major environmental consequences. [Annex V of the Environmental Decree](#), a component of the Environment and Planning Act, specifies which projects are involved. In any case, this procedure concerns C5 and C6. For this reason, an SEA will be drawn up.

### **The competent authority associated with the decision**

The Minister of Infrastructure and Water Management.

### **The initiator of the decision**

The Minister of Infrastructure and Water Management.

### **The competent authority associated with the EA procedure**

The Secretary of State for Infrastructure and Water Management.

### **Has the NCEA included public submissions and advisory reports in its own advisory report?**

The NCEA has reviewed all public submissions and advisory reports sent by the competent authorities up to and including 18 December 2023. Where pertinent to the EA report, these have been integrated into the NCEA's own advisory report.

### **Where can I find the documents used by the NCEA?**

The project documents used in the advisory report can be accessed by entering project number [3750](#) in the search field at [www.commissiemer.nl](http://www.commissiemer.nl).



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