



Commissie voor de
milieueffectrapportage

Lifetime extension for the Borssele nuclear power plant

Interim advisory review on the environmental assessment report
(published in Dutch on October 25th, 2024)

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1 Advisory report on the EA – in short

The government of the Netherlands is seeking to prolong the operational life of the Borssele nuclear power plant for the purposes of electricity production. The plant is owned by Elektriciteit-Produktiemaatschappij Zuid-Nederland (hereinafter: EPZ).^{1,2} This will require amendments to the Nuclear Energy Act. The environmental consequences need to be investigated before the House of Representatives, the Senate, and the government can reach a decision on a legislative amendment.

To this end, the environmental assessment report (hereinafter: EA-report) has been divided into two parts. The first phase of the EA-report (Part 1) maps out the environmental consequences of the legislative amendment. If a favourable decision is reached, EPZ may proceed to apply for a permit. This is because the current act prohibits the processing of a permit application.³ At a later point in time, the second phase of the EA-report (Part 2) will map out the potential environmental consequences of a permit application. The Minister of Infrastructure and Water Management (hereafter: I&W) has asked the Netherlands Commission for Environmental Assessment (NCEA) for guidance on the accuracy and completeness of Part 1 of the EA-report (referred to as the EA-report in this advisory report, unless specified otherwise).



Figure 1, Borssele Nuclear Power Plant (source of photograph: NRD).

What insights does the EA-report provide regarding the Nuclear Energy Act amendment?

The EA-report starts by presenting a summary of the plans and decisions surrounding nuclear energy, which collectively shape the future of the Borssele Nuclear Power Plant (hereinafter: KCB). It specifies the necessary decisions, and indicates when and where environmental information will be further refined. The foremost issue concerns the necessity of nuclear energy: *‘on what environmental grounds should nuclear energy be included in the national energy mix?’*. The Minister for Climate Policy and Green Growth (hereinafter: KGG) plans to develop this further in 2024, using a separate procedure.⁴ The EA-report also notes

¹ This is because the Nuclear Energy Act currently stipulates that the KCB must close in 2033.

² The power plant’s technical design life expired in 2013. Its lifetime had already been conditionally extended to 2033, by mechanisms such as the [Borssele Covenant](#) (in Dutch)

³ Article 15a of the current Nuclear Energy Act states that a permit application to ‘release nuclear energy at the power plant beyond 2033’ shall not be considered.

⁴ See pages 12, 22, 23, and 26 of the EA-report.

that the Minister for KGG has committed to exploring the interrelation between all proposed (national) energy projects in Borssele and the associated distribution problems (given the region's limited environmental and physical capacity) later in 2024.⁵

The EA-report makes it clear that a lifetime extension depends not only on the legislative amendment but also on long-term technical studies. These studies will need to determine whether the nuclear power plant can continue operating safely, from a technical perspective, beyond 2033.² Since these studies are still ongoing, there is no guarantee at this stage that the KCB will indeed be able to remain operational for longer.

The EA-report presents the environmental consequences of the legislative amendment in the form of an 'exploratory study'. It provides a summary of the KCB's environmental consequences in the present situation, with a projection beyond 2033. Finally, the EA-report includes 'an agenda listing environmental focal points for Part 2 of the EA-report' (for a potential permit application). This agenda emphasises the importance of focusing on nature (protected areas and species) and water quality (cooling water).

What recommendations does the NCEA make?

The EA-report is clear, well-structured, very readable, and impressively presented. The NCEA welcomes the clear distinction between the environmental information that has already been detailed and that which is yet to be provided. The report also specifies where and by whom this will be done. The NCEA finds the summary of plans and decisions surrounding nuclear energy to be insightful and of significant value. A complex decision-making process, as in the case of the KCB, undertaken under tight time constraints and in a region where space is limited, requires what the NCEA describes as a timely sequence of considerations that is as logically structured as possible.

Recommendation 1

The NCEA, therefore, recommends that the findings of the wide-ranging environmental review on the need for nuclear energy and its place in the national energy mix be made available to the public without delay. This step is essential for ensuring a well-founded decision on the legislative amendment. This also applies to the findings of the study into the interrelation between all (national) energy projects in Borssele and the associated distribution problems. 'Without delay' means ensuring availability before any decisions are made on the legislative amendment by the House of Representatives, the Senate, and the government.

The NCEA points out that both of these study findings could also have implications for the EA-report. Naturally, as the results are not yet available, none have been incorporated, but it does emphasise the importance of addressing this issue.

The NCEA also highlights the fact **that important environmental information on other key points is still missing from the EA-report**. Environmental information that could potentially lead to different considerations in the context of the legislative amendment has not been explored in sufficient depth. This includes:

- **Water and nature**, the KCB's environmental impacts on these aspects in the present situation have not been fully explored in the EA-report. The EA-report has not yet addressed the issue of whether the KCB's impacts on water and nature beyond 2033 can be deemed acceptable (or made acceptable) under relevant policy objectives and

⁵ See page 30 of the EA-report.

legislative and regulatory provisions (such as the Water Framework Directive and Natura 2000).

- **Nuclear safety, plus emergencies and disaster scenarios**, is addressed using outdated information. Furthermore, the EA-report does not elaborate on emergencies and disaster scenarios and the associated impacts beyond 2033.
- **Nuclear waste**, the implications of an extended lifetime beyond 2033, in terms of the volume of nuclear waste, have not been adequately substantiated. This is particularly relevant to changes in the radioactive composition of decommissioning waste.

To properly weigh the interests of the living environment in decisions regarding the Nuclear Energy Act amendment, it is crucial to provide this additional information.

Recommendation 2

For this reason, the NCEA recommends incorporating the missing environmental information into a supplement to the EA-report before any decisions are made on the Nuclear Energy Act amendment. In this supplement, provide a concise summary for each environmental aspect, specifying the environmental study and reasoning used to determine how the projected environmental impacts beyond 2033 can be deemed acceptable (or made acceptable). This ensures that the information can still inform the decisions made by the House of Representatives, the Senate, and the government.

In conclusion, the NCEA observes that several broad assertions about nuclear energy in the EA-report either lack support or are open to debate.^{6,7} This could potentially mislead readers of the EA-report. The NCEA recommends that these assertions should be improved or made more nuanced in the supplement.

⁶ Examples include statements such as: *'...In most cases, nuclear energy is no more expensive than renewable sources such as wind and solar'* (page 24 of the EA-report) or *'A service lifetime extension for an existing nuclear power plant, ..., is one of the cheapest and fastest ways to generate CO₂-free electricity'* (page 24 of the EA-report).

⁷ Many public submissions underscore the need to draw attention to this aspect.

Background to the EA-report

An amendment to the Nuclear Energy Act is a primary and indispensable prerequisite if the plant's operator is to apply for a permit for a lifetime extension. In their Terms of Reference Memorandum (hereinafter: NRD),⁸ the ministers of I&W and KGG (previously Climate and Energy) indicated that the legislative amendment, therefore, serves as the initial stage of the EA procedure. They gave the following reasons for this:

- 1) *in compliance with the case law of the Court of Justice of the European Union, they argue that an EIA must be conducted to assess the environmental consequences before amending the Nuclear Energy Act.*⁹
- 2) *in compliance with the Court of Justice's case law, the environmental consequences must also, where possible, be thoroughly mapped out in the initial decision.*

The EA-report currently states that the ministers now have three additional reasons to launch an EIA:

- 3) *this could have been concluded from a 2021 communication from the European Commission on the application of the EIA Directive;*¹⁰
- 4) *a 2019 United Nations ruling by the Implementation Committee of the Aarhus Convention on the previous lifetime extension of the KCB² adds further justification for organising an EA-procedure with civic participation at this stage;*¹¹
- 5) *a 2023 United Nations ruling by the Espoo Convention Compliance Committee stated that Bulgaria should have conducted an EA-procedure for the relevant technical modifications (physical measures) associated with the lifetime extension of the Kozloduy nuclear power plant, as part of its ten-yearly safety evaluation (10EVA). There are clear parallels between this situation and the case of the KCB.*¹²

In the NRD, the Minister of I&W indicated that he anticipates the legislative amendment will not constitute a plan or programme as defined in the SMB Directive¹³. However, as a precautionary measure, Part 1 of the EA-report also complies with the substantive and procedural requirements applicable to a SEA.¹⁴ Within the framework of the Habitats Directive, a plan might also be involved.¹⁵ In such instances, a SEA may also be needed due to adverse impacts on Natura 2000 sites, which must be detailed in an Appropriate Assessment. For this reason, an EIA is being prepared that also satisfies the requirements of a SEA.

Procedure, phases, and decision-making

A phased EA-procedure is used for the KCB's lifetime extension. First, Part 1 of an EA-report for the Nuclear Energy Act amendment will be drawn up. If a favourable decision concerning the legislative amendment is reached, the Authority for Nuclear Safety and Radiation Protection (ANVS)¹⁶ will no longer need to withhold consideration of a permit for lifetime extension. This will enable the plant's operator to apply for such a permit. The operator will then investigate the environmental consequences of this

⁸ See [Draft Terms of Reference Memorandum on the Service Lifetime Extension of the Borssele Nuclear Power Plant \(commissiemer.nl\)](#) (in Dutch).

⁹ [European ruling on the Doel Nuclear Power Plant.](#)

¹⁰ [EUR-Lex – 52021XC1203\(01\) – EN – EUR-Lex \(europa.eu\).](#)

¹¹ <https://unece.org/DAM/env/pp/compliance/CC-63/ece.mp.pp.c.1.2019.3.en.pdf>.

¹² [ece_mp.eia_ic_2023_6_e.pdf \(unece.org\).](#)

¹³ [SMB Directive.](#)

¹⁴ Moreover, the NCEA does consider a 'law in the formal sense' to be a plan or programme under the SMB Directive, as such laws are adopted by a national authority and prescribed by the Constitution (see Article 81 and subsequent articles). In the Netherlands, the East Brabant District Court reached a similar conclusion, ruling that a law qualifies as a plan or programme (see East Brabant District Court, 16 June 2023, ECLI:NL:RBOBR:2023:2931).

¹⁵ The [Habitats Directive](#), this EU directive's definition for determining what qualifies as a plan may be more comprehensive than the SMB Directive.

¹⁶ [Authority for Nuclear Safety and Radiation Protection \(ANVS\).](#)

permit in Part 2 of the EA-report. The Authority for Nuclear Safety and Radiation Protection (ANVS) will decide on the permit application. Parts 1 and 2 jointly constitute the formal EIA for the KCB's lifetime extension, including all (other) associated permits. These could include a modified water permit and (possible) environmental permits.

Due to the nature of the project and its location, transboundary effects cannot be ruled out. The Espoo Convention¹⁷ mandates that both the public and the authorities in neighbouring countries must be involved in the EA-procedure in the same way and at the same time as those in the Netherlands.

Roles of the NCEA and stakeholders

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 (for Part 1 of the EA-report, that would be the Minister for KGG, and later, for Part 2, it is the plant's operator). The competent authorities – namely the Senate, House of Representatives, and government for Part 1 of the EA-report, followed, in any event, by the Authority for Nuclear Safety and Radiation Protection (ANVS) for Part 2 – are responsible for making decisions regarding the legislative amendment and the permit.

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 posted on the website. These can be accessed by entering 3723 into the search field at www.commissiemer.nl.

¹⁷ [Espoo Convention \(environmental assessment in a transboundary context\)](#).

2 Explanatory notes to the advisory report

This section presents the NCEA's opinion and offers guidance on the supplement to be drafted. This guidance is included in a text box. In the NCEA's opinion, following this guidance is key to ensuring that environmental interests are properly taken into account in decisions by the House of Representatives, the Senate, and the government on the proposed amendment to the Nuclear Energy Act.

Scope of legislative amendment clarified in the EA-report and Letter to Parliament¹⁸

Based on the NRD, the NCEA was previously unclear about exactly what is included in the legislative amendment and what is not. The EA-report indicates that under the legislative amendment, the KCB can continue operations beyond 31 December 2033 only if it applies for a permit and the Authority for Nuclear Safety and Radiation Protection (ANVS) grants it. This is confirmed by the clarification issued by the Minister for I&W¹⁸ (previously the Secretary of State) concerning the scope of the act, in response to the NCEA's previous advisory report.¹⁹ Accordingly, the NCEA is certain that the proposed legislative amendment will not directly result in a 'permit for an indefinite period'. It was against this backdrop that the NCEA assessed the EA-report.

The NCEA believes this indicates that a possible end date for keeping the KCB operational is not covered by the current legislative amendment and will instead be considered when applying for a permit. Part 2 of the EA-report must then supply the necessary environmental information for this purpose. This legislative amendment does provide an opportunity to consider the Nuclear Energy Act amendment (including its political ramifications), the associated distribution problems, and the inclusion of potential preconditions for issuing a permit to the KCB beyond 2033.

Public submissions on the EA-report reveal uncertainties and questions about the scope of the Nuclear Energy Act amendment.^{20,21} For example, some public submissions point out that the proposed legal text²² 'legally' creates scope for reinstating a permit for an indefinite

¹⁸ See the [Letter to Parliament on the NCEA's recommendations concerning the EA-report on the Borssele nuclear power plant | Parliamentary Paper | Rijksoverheid.nl](#) (in Dutch).

¹⁹ See pages 4 and 5 of [its advisory report on the NRD](#).

²⁰ Several public submissions express concern that the legislative amendment might permit an indefinite service lifetime.

²¹ One particular public submission also raises another issue. The draft Article 15a, paragraph 4, of the Nuclear Energy Act (see footnote 22) refers to the *granting* of a permit. If the permit is granted but later revoked by an administrative court, it may still be deemed to have been issued. When a permit is revoked, its legal effects are nullified retroactively, but it remains uncertain whether this also means the permit is deemed never to have been issued.

Moreover, for the sake of completeness and due diligence, the NCEA notes that issuing a permit, as such, has no legal consequences but is merely a factual act. Revoking a permit does not negate the fact that it had, indeed, once been issued.

²² Proposed legislative amendment: Article 15a of the Nuclear Energy Act will read as follows:

1. The permit holder of the Borssele nuclear power plant, which has been operational since 1973, must apply to the Authority for a variation to that facility's permit, referred to under Article 15(b), to continue releasing nuclear energy from the Borssele nuclear power plant after 31 December 2033.
2. The variation of the permit is intended to extend the plant's design lifetime and ensure the continued operation of the Borssele nuclear power plant beyond 31 December 2033, insofar as this relates to the release of nuclear energy. As part of this process, the permit application must at least provide an updated safety report along with details of studies into the consequences of continued operation for the environment.
3. The Authority will review the application for a variation on the permit in accordance with the interests referred to in Article 15b.
4. The permit holder is authorised to continue releasing nuclear energy at the facility beyond 31 December 2033, provided the Authority approves the aforementioned variation of the permit.

period. If so, the environmental consequences should have been addressed during Part 1 of the EA-report. The NCEA reiterates its recommendation that the Minister of I&W should make it clear that the legislative amendment is not intended to directly result in a 'permit for an indefinite period'. This clarification can be included in the legal text, the explanatory memorandum, in policy, or conveyed in some other way.²³

2.1 Exploratory study of environmental consequences too limited

The EA-report presents the findings of an exploratory study²⁴ that offers an in-depth perspective of the current environmental situation around the KCB (emissions from the KCB), although some areas are not fully covered. Put simply, the environmental study conducted during the exploratory study assessed the 'scale' of the KCB's environmental impact compared to a scenario in which the KCB does not exist.²⁵ An assessment (in broad terms) of this environmental impact for the period beyond 2033 is also presented here. This information offers sufficient detail for the government, the Senate, and the House of Representatives to reach a decision on the legislative amendment.

The NCEA finds that the environmental information lacks the level of detail needed for central government to entertain different considerations. As a result, this information cannot be effectively incorporated into the legislative amendment. This concerns clear statements about the consequences that the study outcomes could or should have for a healthy living environment, water, and nature. Take, for instance, responses to the following strategic questions:²⁶

- Is the projected increase (or decrease) in environmental impact deemed acceptable in the context of relevant policy objectives, legislation, and/or international standards?
- Could standards be exceeded or thresholds reached, as a result of which the cumulative (aggregated) impacts are no longer deemed acceptable? And on what timescale might that happen?

Answers to these questions are critical for ensuring that environmental interests are properly taken into account, and this information is already key to decision-making. They can, for instance, lead to different considerations in the context of the legislative amendment. The focus here is on outlining potentially greener measures or preconditions to ensure that, where necessary, any environmental stress beyond 2033 is made acceptable. Moreover, both aspects are directly pertinent to the agenda that must now be drawn up, highlighting environmental focal points for the forthcoming Part 2 of the EA-report.

The KCB's environmental impacts in the present situation must first be clearly established before any meaningful conclusions can be drawn regarding the implications of the study

²³ This could, for example, include a requirement that, when applying for a variation of the permit, a specific validity period for the permit must be requested and substantiated in Part 2 of the EA-report.

²⁴ The NCEA recommended a revised approach to the topics of 'alternatives and reference' in Part 1 of the EA-report, involving the preparation of an exploratory study; see also [its advisory report on the NRD](#) (page 9).

²⁵ Thus, the description of the KCB's effects in the present situation, as presented in this EA-report, forms the basis for the description in Part 2 of the report (where the impacts in both cases are evaluated vis-à-vis a scenario in which the KCB does not exist).

²⁶ See its advisory report on the NRD (page 10, and elsewhere) [Advisory report on scoping guidelines](#).

findings for a healthy living environment, water, and nature.²⁷ According to the EA-report, there are still areas where this does not apply, specifically for nature and water (see also §2.2 of this advisory report), 'Nuclear safety, plus emergencies and disaster scenarios' (see also §2.3 of this advisory report), and 'nuclear waste' (see also §2.4 of this advisory report).²⁸

In this context, the NCEA points out that the statement in the EA-report's summary (page 9) creates a misleading impression: '*...From the findings of Part 1 of the EA-report, it can be concluded that there are no immediate barriers to the envisaged legislative amendment.*'²⁹ This needs to be validated by the environmental study that has yet to be conducted. This study could unearth potential obstacles.

This also makes it possible to assess all environmental aspects, determining whether standards might be exceeded beyond 2033 and/or thresholds reached, as a result of which the cumulative (aggregated) impacts are no longer deemed acceptable. And the timescale within which this could occur.³⁰

For this reason, before any decisions are made on the Nuclear Energy Act amendment, the NCEA recommends that a supplement to the EA-report should thoroughly evaluate the KCB's environmental impacts in the present situation. The focus is on 'Water and nature', 'Nuclear safety and calamities and disaster scenarios', and 'nuclear waste'. In this supplement, provide a concise summary for each environmental aspect, detailing the environmental study and reasoning used to determine how the projected environmental stress beyond 2033 can be deemed acceptable. The NCEA explores this issue in greater detail below.

2.2 Water and nature

The KCB is situated close to environmentally sensitive nature reserves of national and international significance, including the Western Scheldt & Saeftinghe Natura 2000 site. The KCB was established in 1969, however, and its effects on nature have yet to be investigated systematically and in detail (even in this EA-report), for example in relation to decisions about an environmental permit.³¹ This EA-report offers unprecedented and valuable insights into how the KCB affects (or could affect)³² water and nature quality, highlighting the

²⁷ Earlier in the EA-report, the Minister of KGG expressed a preference for using existing information about the power plant, as well as environmental studies that are already available (historical). In this context, the NCEA had previously noted (in its [advisory report on the NRD](#)) that no environmental assessment report has been drawn up for the power plant for the period from 2013 to 2033. This implies that there is/was no clear and comprehensive summary of the existing power plant's environmental consequences for the period until 2033. This made it necessary to retrospectively determine some of the environmental impacts in this EA-report.

²⁸ Many public submissions highlight this as well.

²⁹ EA-report summary, page 9.

³⁰ In (§4.4 of) its [advisory report on the NRD](#), the NCEA highlighted the fact that – specifically with regard to Natura 2000 sites – the KCB does not currently hold an environmental permit. It is uncertain whether existing rights are applicable within the framework of nature conservation regulations. The EA-report underscores the importance of this question, but it will only be addressed in Part 2 of the report. The NCEA points out that, in the absence of existing rights, the baseline for the *natuurspoor* (the pathway for integrating nature conservation into decision-making) is that the KCB will not be operational beyond 2033.

³¹ The KCB does not have an environmental permit.

³² See, for example, page 82 of the EA-report: '*...It appears likely that populations of characteristic and sensitive (protected) species, populations, and biotic communities, which may be less resilient, are more susceptible to the stressors associated with the KCB.*'

resulting barriers to meeting water and nature targets. The report notes that ‘*in the main, the state of biotic communities is not good*’ and that there is ‘*a mix of negative and positive elements*’. Consequently, the state of most biotic communities has been evaluated as ‘*variable*’ both in the present situation and beyond 2033. For a summary, see Figure 2 below.

Tabel 6-11 Overzicht milieueffecten. Directe milieueffecten: Een direct effect op een levensgemeenschap. Zoals het potentieel doden, beschadigen of verstoren van soorten (bijvoorbeeld direct effect van inzuiging vis). Indirecte milieueffecten: Een indirect effect op een levensgemeenschap. Zoals een potentiële doorwerkende invloed via de voedselketen (bijvoorbeeld indirect effect op visetende predatoren door inzuiging vis)

Criterion	Potentieel beïnvloede levensgemeenschap	Directe / indirecte milieueffecten	Huidige toestand en extrapolatie toekomstige toestand (>2033)	Relevante onderdelen ecologisch kader
Onttrekken en lozen koelwater	Habitattypen kwaliteit	Direct	Wisselend	N2000
	Fytoplankton	Direct	Wisselend	KRW, (N2000 indirect)
	Zooplankton (waaronder macrofauna en vislarven)	Direct	Onduidelijk	N2000, FF, KRW (allen indirect)
	Trekvissen en overige vis	Direct en indirect	Wisselend	N2000, FF, KRW
	Broed- en niet-broedvogels	Indirect	Wisselend	N2000, FF, NNZ
	Zeezoogdieren	Indirect	Overwegend goed	N2000
Verstoring en aantasting	Broed- en niet-broedvogels	Direct	Wisselend	N2000, FF, NNZ
	Zeezoogdieren	Direct	Wisselend	N2000, FF
	Overige soortgroepen (vegetatie op land, vleermuizen, grondgebonden zoogdieren, amfibieën)	Direct	Niet behandeld	FF, NNZ
Vertroebeling en sedimentatie	Habitattypen kwaliteit	Direct	Wisselend	N2000
	Fytoplankton	Direct	Wisselend	KRW, (N2000 indirect)
	Water- en kustflora	Direct	Wisselend	KRW, N2000
	Macrofauna	Direct	Wisselend	KRW
	Trekvissen en overige vis	Direct en indirect	Wisselend	KRW, N2000, FF
	Broed- en niet-broedvogels (zicht-jagende vis- en macrofauna-etters)	Direct en indirect	Wisselend	N2000, FF, NNZ
	Zeezoogdieren	Indirect	Overwegend goed	N2000, FF
Verontreiniging	Habitattypen kwaliteit	Direct	Wisselend	N2000
	Fytoplankton	Direct	Wisselend	KRW, (N2000 indirect)
	Water- en kustflora	Direct	Wisselend	KRW, N2000
	Zooplankton (waaronder macrofauna en vislarven)	Direct	Wisselend	N2000, FF, KRW (allen indirect)
	Macrofauna	Direct	Wisselend	KRW
	Trekvissen en overige vis	Direct en indirect	Wisselend	KRW, N2000, FF
	Broed- en niet-broedvogels (in verbinding met aquatische milieu)	Direct en indirect	Wisselend	N2000, FF, NNZ
	Zeezoogdieren	Direct en indirect	Overwegend goed	N2000, FF
Stikstofdepositie	Stikstofgevoelige habitattypen (kwaliteit)	Direct	Wisselend	N2000
	Stikstofgevoelige beheertypen	Direct	Wisselend	NNZ

Figure 2, analysis of risks to potentially impacted biotic communities in Dutch (source: Table 6-11 of the EA-report).

The EA-report does not yet indicate whether ‘a potential impact is acceptable’, ‘standards are exceeded’, or ‘whether thresholds might be reached beyond which cumulative (aggregated) effects are no longer deemed acceptable’.³³ However, the NCEA recommends that these

³³ EA-report, page 82: ‘In its response (Section 4.4), the NCEA states that it is important to conduct relatively detailed studies at this stage to find out how much scope (if any) protected nature can offer, in terms of a potential service lifetime extension for the KCB. The study that was conducted does not resolve this issue, but it does demonstrate that this scope is determined by a complex interplay of components, with certain biotic communities around the KCB experiencing stress.’

should be indicated in the supplement. Some of the impacted nature values will require a preliminary estimate of the nature and extent of the KCB's environmental impact in the present situation. In §2.2.1 to §2.2.5, the NCEA specifies this for cooling water, fish entrainment, 'discharges of radioactive substances and chemical pollution', nitrogen deposition, and the Zeeland Nature Network (hereinafter: ZNN) respectively.

2.2.1 Thermal discharges from cooling water and nature

The EA-report summarises the relevant requirements of the KCB's water permit and extrapolates the anticipated temperature increases in the Western Scheldt beyond 2033. The environmental status of nature and water has been assessed as 'variable' or 'unclear'. Regarding Part 2 of the EA-report, it is noted that '*...Furthermore, it is essential to model the heat plume and discharge plume to better understand the extent of the cooling water discharge effects.*'³⁴ In its advisory report on the NRD,³⁵ the NCEA specifically recommended that this modelling should now be incorporated into this EA-report. This is because – to the best of the NCEA's knowledge – no cooling water plume modelling has been carried out since 1969. For many decades this is the traditional approach to evaluating cooling water discharges and to understanding their environmental impact.

The EA-report also seems to indicate that, in the present situation, the ebb and flow of tides in the Western Scheldt, including during 'neap tide', likely facilitate the rapid dispersion of heat from the cooling water.³⁶ The NCEA can follow this line of reasoning, but the EA-report does not provide any supporting evidence.³⁷

Nor does the EA-report provide a complete summary of the cooling water components that determine the usable cooling water capacity in the Western Scheldt, both in the present situation and beyond 2033. This summary is key to understanding the consequences of climate change (including intermittent reductions in the cooling water supply for the KCB),^{38,39} and for other cooling water users. These cooling water components include:

- current cooling water discharges from other businesses along the Western Scheldt, in the Netherlands and Belgium;
- potential future discharges from new nuclear power plants in Borssele and Terneuzen.

³⁴ See page 144 of the EA-report.

³⁵ See page 13 of its [advisory report on the NRD](#).

³⁶ See page 134 of the EA-report.

³⁷ The NCEA points out that the situation could be different for protected habitats along the edges of the Western Scheldt. These values (habitat types with their associated typical species and foraging areas for breeding and/or migratory/overwintering bird species) could be affected if part of the KCB's cooling water plume temporarily 'lingers' here, resulting in prolonged, excessively high temperatures. It is unclear at this stage whether the consequences will be significant in relation to the conservation objectives (particularly when factoring in potential interactions with other cooling water discharges from the Sloe industrial area, which may temporarily constrain heat dissipation from the KCB) or to the water dynamics in the Western Scheldt.

³⁸ The European Water Framework Directive status assessment for surface water temperature (<25°C) specifies the need for 'the 98th percentile of the maximum daily values,' rather than the 'annual average value' referred to on page 136 of the EA-report. The EA-report (page 136) might give an unduly favourable impression in this instance. [Deltares](#), on behalf of the central government, estimated the '98th percentile' for 2024 to be 22.5°C, a figure that, with the 0.5–1.5°C per decade warming projected in the EA-report, is close to the 25°C European Water Framework Directive objective. This means that the cooling water bottleneck cited in the EA-report is probably more severe, as that report focuses solely on annual averages.

³⁹ [Protocol for Monitoring and Status Assessment of Surface Water Bodies under the European Water Framework Directive \(PDF, 3.4 MB\)](#), April 2020.

However, the EA-report does indicate that a cooling water bottleneck is likely to develop in the Western Scheldt beyond 2033: '*...Future power plants and the existing power plant will use the same water. It seems probable that any period of restrictions will force all power plants along the Western Scheldt to reduce output or halt production completely. The current power plant in Borssele, the Doel power plant in Belgium, and any future power plants will all be subject to these restrictions.*⁴⁰ No additional evidence is provided, but it could affect aquatic life and (directly or indirectly through the food chain) impact protected values under the European Water Framework Directive and/or conservation objectives for the Western Scheldt & Saeftinghe, as well as energy production.

For this reason, the NCEA believes it is necessary to provide a more detailed analysis of the environmental impact of thermal discharges. This information can, for instance, lead to different considerations in the legislative amendment.

Before any decisions are made on the Nuclear Energy Act amendment, the NCEA recommends that a supplement to the EA-report should:

- provide an indicative overview of the scale of the environmental impact caused by the KCB's thermal discharge in the present situation. This can be accomplished using adequate modelling of the thermal discharge;
- provide a concise justification of the thresholds at which cumulative thermal discharges will no longer be deemed acceptable in the future. In this context, discuss the KCB's remaining scope for thermal discharge in the light of other discharges in the area and potential future discharges (such as new nuclear power plants and other businesses) and the consequences of climate change³⁸;
- include a summary (in broad terms) of potential solution pathways. In this context, the NCEA is considering potential technical measures (such as relocating intake and outlet points, or modifying the cooling water plume), along with the adoption of alternative cooling techniques at the KCB or nearby businesses that currently require cooling or may do so in the future.

2.2.2 Cooling water and fish entrainment

The EA-report touches only briefly on the entrainment of fish (and their larvae⁴¹) and plankton. It states that: '*...Entrainment poses a risk of injuring or killing individual organisms. There is also a risk that species may be affected at the population level and that interactions within the (local) ecosystem could be disrupted, particularly for those species that predominantly rely on macrofauna and/or fish as their primary food source.*⁴² The scale of this environmental impact remains an unresolved knowledge gap, one that is not addressed elsewhere in the EA-report.

The NCEA points out that substantial numbers of fish (and their larvae) are lost annually at other power plants, such as those in the Ems Delta. In recent decades, both in the Netherlands and internationally, a range of mitigation measures, including fish return systems, have been developed and implemented to reduce fish (and fish larvae) mortality from industrial cooling water intake. As far as the NCEA has been able to ascertain from Part

⁴⁰ See page 143 of the EA-report.

⁴¹ Fish larvae, unlike adult fish, are unable to escape, and are consequently at greater risk from cooling water intake.

⁴² EA-report, page 56.

1 of the EA-report, no such measures have yet been implemented at the KCB. Nor is the NCEA aware of any review of such measures in which the impact on fish (and their larvae), and plankton were factored into the analysis. The Environment and Planning Act (and earlier nature conservation regulations) is specifically designed to minimise avoidable animal mortality (specific duties of care).

For this reason, a more detailed evaluation is required of the environmental impacts of fish (and fish-larvae) entrainment. This information can, for instance, lead to different considerations in the legislative amendment.

Before any decisions are made on the Nuclear Energy Act amendment, the NCEA recommends that a supplement to the EA-report should:

- make an estimate of the scale of the environmental impact on fish (and their larvae) and plankton in the present situation;
- provide a concise justification of whether thresholds might be exceeded beyond 2033, as a result of which the cumulative (aggregated) impacts of fish entrainment are no longer deemed acceptable;
- include a summary (in broad terms) of potential solution pathways. In this context, the NCEA is considering the use of standard technical measures (such as reducing inflow rate, installing fish return systems, and the like).⁴³

2.2.3 Discharges of radioactive and chemical substances into the Western Scheldt

The volume of radioactive substances discharged into surface water each year is touched upon only briefly.⁴⁴ Its impact on the natural environment is not explored in detail. However, the EA-report does state that the presence of radioactive substances in the environment can continue in the food chain and the ecosystem.⁴⁵ The significance of this has not been explored in greater detail. This is an omission, especially in terms of understanding the accumulation of radioactive substances in aquatic sediments.⁴⁶

The EA-report offers a helpful summary of the annual discharge of chemical substances.⁴⁷ It indicates that this complies with the standards outlined in the water permit. The dredging operations also comply with the authorised yearly quantities. In this context, the EA-report highlights a key concern with dredging: disturbing aquatic sediments can potentially remobilise substances previously discharged by the KCB and other businesses, rendering them 'bioavailable' (again) in the Western Scheldt. It states that some of these are historically highly hazardous pollutants, including various types of PFAS and heavy metals. These are presently causing regulatory standards to be breached in the Western Scheldt.⁴⁸

⁴³ For further details see Arcadis (2022), for example. Monitoring plan for fish entrainment at cooling water intakes (fish entrainment at both the present High Flux Reactor (HFR) and the future PALLAS reactor).

⁴⁴ EA-report, page 100.

⁴⁵ EA-report, page 60.

⁴⁶ This could be accomplished, for instance, by adopting international standards set by the [International Commission on Radiological Protection \(ICRP\)](#) or the EU: [ERICA Tool – A flexible software system for assessing the radiological risk to biota](#), used to evaluate the impact of radioactive substances on nature (non-human biota).

⁴⁷ EA-report, page 137.

⁴⁸ The chemical water quality of surface water in the Western Scheldt is a cause for concern, see [Chemical Water Quality – European Water Framework Directive, 2021 | Environmental Data Compendium \(clo.nl\)](#) (in Dutch).

The EA-report does not address the question of whether, in the upcoming years, thresholds will be reached at which cumulative effects on nature are no longer acceptable (due to European Water Framework Directive requirements, for example).⁴⁸ Nor does it address the question of whether such discharges will still be deemed acceptable (or made acceptable) beyond 2033. Furthermore, the NCEA considers the poor water quality in the Western Scheldt a major concern.⁴⁸ For this reason, the NCEA believes it is necessary to provide a more detailed analysis of the environmental impact of discharges. This information can, for instance, lead to different considerations in the legislative amendment.

Before any decisions are made on the Nuclear Energy Act amendment, the NCEA recommends that a supplement to the EA-report should:

- estimate the scale of the impact on nature in the present situation, resulting from radioactive and chemical discharges, as well as dredging operations;
- provide a concise justification of whether, beyond 2033, thresholds (e.g., under the European Water Framework Directive or nature conservation regulations) may be reached or exceeded due to the cumulative (aggregated) effects of radioactive and chemical discharges into surface water and from dredging operations;
- include a summary (in broad terms) of more environmentally friendly techniques to combat discharges. In this context, the NCEA is considering options to maximise the treatment and/or off-site processing of discharged radioactive and chemical substances, along with measures to minimise emissions during dredging operations.

2.2.4 Nitrogen deposition

One study that features in the EA-report clearly shows that the power plant as a whole deposits up to 5.15 mol of nitrogen/hectare/year on sensitive habitat types in the Western Scheldt. At greater distances as well, deposition in Natura 2000 sites, though limited, is by no means negligible.⁴⁹ Most of this deposition originates from the power plant's diesel generators and from vehicles travelling to and from the plant.

The EA-report does not assess the consequences of this for habitat types and ecological zones that have already exceeded (or are approaching) critical stress thresholds. Nor does it specify how such deposition could be reduced to zero – if necessary – or which (source-limiting) measures could be used to achieve this. However, it does state that *'a reduction in autonomous nitrogen deposition reduces the likelihood of habitats exceeding critical stress thresholds and may even prevent it altogether. Gradually reducing this stressor can enhance the robustness and resilience of nature values, enabling them to better withstand environmental impacts, including those created by the KCB.*

In this context, the NCEA points out that, at present, a positive outcome of this kind cannot be guaranteed. The EA-report has yet to explain how this might prevent unacceptable cumulative effects on nature caused by nitrogen deposition. It hinges on the vulnerable habitat types and/or ecological zones that are already receiving excessive nitrogen loads, or that have already exceeded (or are approaching) critical stress thresholds.

⁴⁹ For example, 0.04 mol nitrogen/hectare/year on habitat types in the De Manteling dune area that have exceeded critical stress thresholds.

For this reason, the NCEA recommends adding a supplement to the EA-report before any decisions are made on the Nuclear Energy Act amendment. This supplement should:

- provide a concise justification of whether thresholds for cumulative (aggregated) impacts on nature due to nitrogen might be reached or exceeded beyond 2033;
- include a summary (in broad terms) of more environmentally friendly techniques to adequately combat nitrogen deposition.

2.2.5 Zeeland Nature Network (ZNN)

The KCB is surrounded by various ZNN areas. As far as the NCEA has been able to ascertain from the EA-report, no ecological mapping has been carried out recently. The impact on these areas from disruption or airborne and waterborne emissions has not yet been identified (particularly regarding the so-called management approaches and associated target species).⁵⁰ Consequently, the impact on the ZNN constitutes a knowledge gap. Nor have any options for preventing or limiting these impacts been explored. For this reason, the NCEA believes that the environmental impacts on the ZNN require more in-depth analysis.

For this reason, the NCEA recommends adding a supplement to the EA-report before any decisions are made on the Nuclear Energy Act amendment. This supplement should:

- initiate all (or part) of the ecological mapping process (fieldwork) at the earliest opportunity. To, nevertheless, facilitate a prompt understanding of the consequences for the ZNN in the present situation;
- provide a concise justification of the extent to which these effects are deemed acceptable (or can be made acceptable);
- outline strategies for avoiding, mitigating, or, where required, offsetting the impacts on the ZNN.

2.3 Nuclear safety, plus emergencies and disaster scenarios

The description of nuclear safety in the EA-report relies heavily on historical analyses and regulatory reports originating from the 1960s. It is further noted that the ten-yearly safety evaluation for 2003–2012 (10EVA13) and the stress test confirm that the casualty figures remain under the 1969 'BKSE standard'⁵¹, providing a sufficiently representative basis for this EA-report. No further explanation is provided. It is unclear for the NCEA why more recent and updated international guidelines or standards are left out of the EA-report.⁵²

Indeed, in its advisory report on the NRD, the NCEA recommended that the emergencies and disaster scenarios formulated for the KCB should be concisely summarised. Next, based on this, the effects should be estimated – and an explanation given – of the possible implications of a potential post-2033 lifetime extension on emergencies and disaster scenarios at home and abroad.⁵³ Neither recommendation has been implemented. The NCEA cannot assess what

⁵⁰ Management approaches and the associated species (target species) can be considered core attributes and values of the ZNN.

⁵¹ BKSE stands for the Nuclear Facilities, Fissionable Materials and Ores Decree.

⁵² For instance, the [WENRA Safety Reference Levels for Existing Reactors Revision 2020 | WENRA](#).

⁵³ See also page 12 of its [advisory report on the NRD](#).

has been included, due to the scant details provided. Outdated information was used for this purpose.⁵⁴ The EA-report notes simply: *...the 2015 Safety Report is the proper place to describe the presumed initial events, along with associated principles and preconditions, the facility's response (that is, the progression of the accident), and the proof that safety is guaranteed.'*

The NCEA further observes that the passages on ageing management^{55,56} in the EA-report are, in fact, detailed and exceptionally useful. They provide a meaningful perspective on the modernisation efforts, both organisational and physical, already undertaken at the KCB to mitigate ageing-related problems, incorporating lessons from international experiences and feedback from domestic and international inspections. This concerns structural alterations and technical modifications carried out at the power plant since its establishment in 1969.⁵⁷ The EA-report goes on to clearly outline how, as a result, the KCB's current design is already equipped to withstand climate change⁵⁸ and specify the remaining topics on the research agenda for Part 2 of the EA-report. The (provisional) results of the KCB's ten-yearly safety evaluation for 2013–2022 (10EVA23), finalised last year, are not summarised in the EA-report. These could offer further focal points in this regard (that are not yet covered in the EA-report).⁵⁹

The NCEA has established that outdated information has been used in the EA-report. No link has been made between the present situation (2024) at the KCB and how the living environment around it might change in the near future (beyond 2033). The impact on nuclear safety of the altered living environment in and around Borssele (new/different businesses and homes since 2015 and before) remains uncertain. No accident scenarios are identified or discussed.⁶⁰ No mention is made of the (provisional) results of the KCB's ten-yearly safety evaluation that was finalised last year. The NCEA concludes that the passages on nuclear safety and emergencies and disaster scenarios in the EA-report are incomplete and too generic. The EA-report falls short in this regard.

The NCEA recommends adding a supplement to the EA-report, before any decisions are made on the Nuclear Energy Act amendment, in which nuclear safety, emergencies, and disaster scenarios should be fully developed in line with its earlier advisory report on the NRD⁵³, providing clarity on nuclear safety, and the emergencies and disaster scenarios in the present situation, the potential increase (or decrease) in environmental stress beyond 2033, and the extent to which this can be deemed acceptable (or made acceptable). In this context, use recent (international) standards and up-to-date details about businesses, homes, and nature in and around the KCB.

⁵⁴ For instance, page 115 presents Figure 8–3 from 2015, simply stating that this is evidence that safety is guaranteed under the statutory criteria of the BKSE standard, specified as far back as 1969.

⁵⁵ With companies ever more frequently aiming to prolong the lifetime of nuclear power plants beyond their original technical design life, effective [ageing management](#) has become paramount.

⁵⁶ EA-report, page 116 and subsequent pages.

⁵⁷ For a summary, see page 117 of the EA-report.

⁵⁸ EA-report, pages 122 and 123.

⁵⁹ Various public submissions also highlight the absence of outcomes from 10EVA23, and/or call for a greater focus on effective ageing management.

⁶⁰ In this context, the NCEA is specifically considering the environmental impacts of 'design-basis accident' scenarios, such as primary pipeline rupture and fissionable-material handling accidents. In the case of 'beyond-design-for-accidents', it is considering scenarios that comprehensively address events involving a fuel transport accident, an aircraft accident, and sabotage situations.

2.4 Nuclear waste

The EA-report⁶¹ gives a short summary of the amounts of radioactive waste that would be generated by extending the KCB's operations by 10 years. These quantities are neither substantiated nor put into context.⁶² Consequently, it is difficult to get a clear understanding of this environmental aspect and its implications. There is also uncertainty about how extending the lifetime impacts the radioactive composition of decommissioning waste.⁶³ According to the EA-report, decisions regarding the decommissioning of the power plant and the storage and final disposal of radioactive waste are beyond the scope of the environmental study.⁶⁴

The NCEA concludes that the EA-report does not adequately substantiate the environmental impact of the amount of nuclear waste associated with an extended lifetime. It points out that the environmental assessment report for the Second National Programme for Radioactive Waste (NPRA) – which is currently in preparation (October 2024) – contains potentially relevant information that could be used (or repurposed) to this end.⁶⁵ Many of the public submissions reflect concerns about the storage and final disposal of radioactive waste.

The NCEA recommends adding a supplement to the EA-report before any decisions are made on the Nuclear Energy Act amendment. This supplement should briefly substantiate and put into context the consequences of an extended lifetime in terms of the amount of nuclear waste involved, in particular the radioactive composition of decommissioning waste. This can then be factored into the legislative amendment and in potential research assignments for Part 2 of the EA-report.

⁶¹ EA-report, page 99.

⁶² For example, vis-à-vis the amount of waste already generated by the KCB's operations prior to 2033.

⁶³ Long-lived 'activation products' build up, making sections of the power plant more radioactive.

⁶⁴ The EA-report provides limited detail concerning the origin of the KCB's fuels. The NCEA considers it reasonable to account for the chain effects of fuel extraction, pre-processing, and reprocessing in the forthcoming procedure on the need for nuclear energy and its place in the national energy mix.

⁶⁵ The NCEA also provided guidance on the environmental assessment report to be drawn up for the 2nd NPRA, see [here](#).

ANNEX 1: Project data for interim review of Part 1 of the EA-report

This advisory report is previously published in Dutch on the 25th October 2024

Review by the NCEA

The NCEA consists of a working group of experts. This working group reviews the EA-report to ensure it includes the required environmental information and to verify its accuracy. The NCEA will determine whether any missing or inaccurate information qualifies as essential. This applies when, in its judgement, additional information might result in different considerations. In such cases, the NCEA recommends ensuring that the missing or corrected information is made available before the decision is finalised. The working group visited the area that is susceptible to potential environmental consequences, to gain a better understanding of the situation. Further details about the [NCEA](#) and its [procedures](#) can be found at our website.

Composition of the working group

This project's working group consists of:

Dr Roelf Blaauboer

Prof. Johan Camps

Dr Pepijn van Denderen

Mr. Sjoerd Harkema (secretary)

Dr Danny Lathouwers

Prof. Hans Mommaas (chair)

Dr Marcel Soppe

Mr Rob Vogel

Mr. Gerrit de Zoeten

Act (or acts) for which this environmental assessment report was drawn up

Legislative amendment to the Nuclear Energy Act.

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

In the Netherlands, EA-reports may be required for activities that could have major environmental consequences. The central government has indicated that this is the case here. A phased procedure is used when drawing up the EA-report for the KCB's lifetime extension.

First, Part 1 of an EA-report for the legislative amendment is drawn up. As a precautionary measure, Part 1 of the EA-report will also comply with the substantive and procedural requirements applicable to a SEA.

Within the framework of the Habitats Directive, a plan or programme might also be involved. In such instances, an SEA may also be needed due to adverse impacts on Natura 2000 sites, which must be specified in an Appropriate Assessment.

For this reason, a combined EA-report (SEA and EIA) will be drawn up.

In the event of a favourable decision regarding the legislative amendment, the next step could be the completion of Part 2 of an EA-report. In fact, the Authority for Nuclear Safety and Radiation Protection (ANVS) will now no longer need to withhold consideration of a Nuclear Energy Act permit for the lifetime extension. Therefore, EPZ will be able to apply for this extension. Whether or not EPZ will do so is still unclear. EPZ will draw up Part 2 of an EA-report.

Parts 1 and 2 jointly constitute the formal EIA for the Borssele Nuclear Power Plant's lifetime extension, including all (other) associated permits. These could include a modified water permit and (possible) environmental permits.

Competent authorities for the decision on the Nuclear Energy Act

The Senate, the House of Representatives, and the government.

Initiator for the decision on the Nuclear Energy Act

The Minister for Climate Policy and Green Growth.

Competent authority for the EA-procedure

The Minister of Infrastructure and Water Management.

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

Under the Environment and Planning Act, the NCEA can incorporate public submissions (from members of the public and organisations) and advisory reports (from public bodies) in its recommendations. This is because including these perspectives improves the overall quality of the NCEA's recommendations. Unfortunately, the deadline set by the Minister of Infrastructure and Water Management made it impossible to incorporate all public submissions and advisory reports. Consequently, the NCEA could only include in this advisory report the public submissions and advisory reports received *and* registered with the Ministry of Infrastructure and Water Management by 2 October 2024.

Where can I find the documents assessed by the NCEA?

The project documents used in the advisory report can be accessed by entering project number [3723](#) in the search field at www.commissiemer.nl (in Dutch).

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