OFFICE SUMMARIES

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Preparation of the Fifth National Plan for Radioactive Materials and Waste Management (PNGMDR)

Since the law of 30 December 1991 on radioactive waste management research, the Parliamentary Office for Scientific and Technological Assessment (OPECST) has been assigned the task of evaluating the plans regularly prepared by the Government for the management of radioactive nuclear waste. As of spring 2022, the fifth edition of the National Plan for Radioactive Materials and Waste Management (PNGMDR) from 2019 onwards has still not been submitted to Parliament; this is a serious failure of democracy.

The preparation of this fifth plan came at a time of renewed international interest in nuclear energy, generated by the Paris Climate Accords of December 2015, which confirmed the commitments of governments worldwide to reduce their carbon dioxide emissions. In view of the climate emergency, nuclear power has been presented by some lately as a source of power consistent with the green transition.

Nevertheless, the methods used for managing nuclear waste – high, medium, low or very low level (VLL), long or medium life – continue to generate controversy, even though some progress has recently been made with regard to VLL waste. The solutions that are chosen will shape the future in two ways: they will establish requirements for the safe processing of existing waste, and will also influence the prospects for the construction of a new generation of reactors. Faced with questions about the extension, shutdown and renewal of all or part of the nuclear infrastructure and the management of certain categories of waste, the OPECST report[1] reaffirms the need for rigorous democratic oversight.

Émilie CARIOU, member of the National Assembly

Bruno SIDO, senator

(1) National Assembly report no. 5144 (15th legislature) – Senate no. 560 (2021-2022).

A serious failure of democracy

The fifth National Plan for Radioactive Materials and Waste Management (PNGMDR) was intended to establish France's policy in this domain for the years 2019-2021. This document should have been presented to Parliament shortly before the start of this period. However, the plan has been subject to public debate and numerous consultations, and had still not been formally adopted when the parliamentary assemblies suspended their work due to the spring 2022 election deadline. The time for an in-depth examination by both chambers during the current legislature has therefore passed. It is clear that to operate in this manner strips the law of its content and parliamentary oversight of its meaning.

Nevertheless, good inter-institutional cooperation between Parliament and the Government is the foundation of ensuring the acceptability of solutions adopted in the nuclear domain. The credibility of the democratic oversight provided for by law is also at stake. It is therefore imperative to ensure that the next plan, which will cover the period 2026-2030, is sent to

Parliament before 30 June 2025. The OPECST must remain very vigilant of this deadline.

The latest advancements in waste classification and disposal

The radioactive waste produced in France is addressed in the "National Inventory of Radioactive Materials and Waste," which is regularly updated and made publicly available. Volume, type, location, future prospects: the inventory monitors and lists the entirety of the nation's radioactive waste. Each year, waste producers submit a declaration of their output. All the Inventory data may be viewed on its dedicated website, www.inventaire.andra.fr and is available as open data at data.gouv.fr.

The PNGMDR project is not intended as a replacement for the National Inventory, but does offer an overview of the various waste destinations. From this point of view, the current project generally confirms the choices already made in terms of radioactive waste management.

▪ The destination of the three main categories of waste

Deep geological disposal is the confirmed choice for **long-lived high or intermediate level waste.** Although it represents only 0.2% of the total volume, high-level waste accounts for 94.9% of total waste radioactivity. Intermediate Level Long Lived Waste (IL-LLW) represents 2.9% of the total volume, and accounts for 4.9% of the total radioactivity. Thus, the Cigéo project, planned for the Bure site, will accommodate 99.8% of the total radioactivity produced by all waste, while representing 3.1% of its total volume.

Bituminized waste packages pose a specific problem. They represent 25% of IL-LLW packages in Cigéo's baseline inventory. These packages have been fabricated by the French Alternative Energies and Atomic Energy Commission (CEA) and Orano for several decades. Upon request by the Ministry for Ecological Transition and the Nuclear Safety Authority (ASN), an international review was conducted on the management of this type of waste.

In addition to the proven fire risks, the rapporteurs expressed concern about the risks associated with the release of hydrogen. According to the members of the CNE2, this problem arises with all waste still containing any moisture or organic matter. In this case, the bituminous waste contains 60% organic matter. Therefore, these packages are the main emitters of hydrogen, via radiolysis. The subject should be clarified in the context of the next PNGMDR.

The 2006 law on the sustainable management of radioactive materials and waste provides for the shallow disposal of **long-lived low-level waste** (LLW-LL) of a highly diversified nature (graphite, radium, uranium). ANDRA has drawn up a plan for comprehensive management in this category by mid-2025. The plan examines *"the possibility of spreading out the construction of a repository on the Vendeuvre-Soulaines site in independent modules, with implementation in campaigns tailored to the different waste families."* This solution would permit comprehensive waste management tailored to the heterogeneous nature of this type of waste.

Very low-level waste (VLLW) is the only category for which the PNGMDR project provides a precise financial estimate: 2.2 million cubic meters, with an average processing cost of €1,200 per cubic meter, for a total value of €2,640 million. One new development is the possibility of recycling and recovering metals outside the nuclear sector; this has already begun to be practiced abroad, particularly in Germany.

In deciding their destination, it would seem appropriate to consider the corresponding degree of radioactivity, which is the approach generally taken elsewhere in the world. This is how exemption thresholds (sometimes referred to as “clearances”) have been defined for the various radionuclides.

The order and implementing decrees permitting this change were countersigned by the ministers for health and ecology and published on 15 February 2022. These legal texts underwent a prior public consultation process: http://www.consultations-publiques.developpement-durable.gouv.fr/projets-de-textes-relatifs-a-la-mise-en-oeuvre-d-a2279.html. This is a good example of the kind of consultation and democratic participation that can be implemented in the framework of a transparent and relatively untroubled management of the waste issue.

▪ The blind spot of parliamentary oversight: certain categories not covered by the PNGMDR

Civil industry is not the only user of uranium and plutonium. Our national defence is partly based on nuclear deterrence, and atomic energy is used to propel certain submarines in our fleet, giving them a very broad range of action and maximum autonomy. This activity also produces waste. However, the PNGMDR fails to make any mention of these sources of waste, although it is not specified that the plan should address only radioactive materials and waste of civil origin.

Military nuclear power is in fact not subject to transparency obligations. However, the National Inventory of Radioactive Materials and Waste does provide certain figures regarding the volumes concerned, representing approximately 230 cubic meters of high-level waste. The rapporteurs therefore recommend that future editions of the PNGMDR include information on this type of waste, so that the plan can provide a comprehensive and strategic view of the prospects for processing all waste present within the national territory, whether of military or civilian origin.

The National Inventory of Radioactive Materials and Waste is likewise the only source of figures on the volume of waste produced by the **medical sector**. It is quite frankly a modest volume, including no high-level waste, and includes only 2 known cubic meters of long-

lived intermediate-level waste (LLW-IL). The rapporteurs nevertheless recommend that the PNGMDR include a mention of this material as well.

The necessary involvement of public opinion

From laying the foundations for the power stations to the final processing of the last radioactive waste, the operation of nuclear infrastructure rests on a long chain of decisions, and therefore on a human chain, which, in light of the time involved, is also a chain of generations. Information and explanation efforts must therefore not stop with the public inquiry preceding the development of a nuclear facility. Throughout this process, it is essential to ensure that the population has the broadest possible access, not only to participate in the decision-making process, and in any case to information provided through public channels with simple and effective messages. This applies in particular to the youngest segments of the population, the "future generations" who will have to bear the consequences of our choices.

▪ The danger of technocratic drift

Until now, management plans were prepared in collaboration with a pluralist working group, bringing together waste producers and managers, regulatory authorities, in particular the Nuclear Safety Authority (ASN), industrial operators, experts (IRSN) and non-profits. The fifth edition of the PNGMDR saw two major changes: ASN withdrew from the project management process, which is now handled solely by the Ministry in charge of Energy, and the draft plan was prepared with the support of a "Guidance" committee, which is expected to transform into a "PNGMDR governance committee." This committee would be responsible for advising project management for the plan on its preparation and content and for monitoring its implementation. The Plan also provides for the direct participation of representatives of civil society in the future governance committee.

The rapporteurs welcome these developments. Nevertheless they also emphasize that the National Assessment Board for Radioactive Waste and Materials Management Research and Studies (CNE2) has unequalled expertise, thanks to the participation of French and foreign specialists in its work. A greater participation by civil society in the governance of the PNGMDR should not be to the detriment of CNE2 because it cannot offer the same guarantee of expertise.

The rapporteurs therefore recommend that the role of CNE2 in the new governance of the PNGMDR be specified, so as to ensure the maintenance of high-level scientific and technological expertise in regard to radioactive waste disposal oversight.

▪ Procedures for obtaining consensus

The rapporteurs reaffirm the established approach to designing participation in the PNGMDR. It is ultimately a matter of determining the allocation of responsibilities to stakeholders, scientists, citizens and elected officials. True democratic control can only be exercised validly if this allocation is defined among them clearly from the outset.

The 2019 consultation, conducted under the supervision of the National Commission for Public Debate, demonstrated the appropriateness of involving the general public in deliberations on the PNGMDR. It was a "first." Beyond the simple exchange of information, it also allowed the hearing of divergent voices. It is very important for their expression to be possible and to be duly recorded.

This allows for full transparency in matters of waste processing. This is the only way we can hope to reach the consensus conditions that must prevail in this domain.

▪ Further public information efforts

By nature, the participatory structures provided under the regulatory framework attract a civil society audience that is not entirely lay: on the contrary, it is often made up of personnel from nuclear facilities or environmental activists. While this is understandable, it is all the more important to remain open to broader relations with the general public. Information and communication efforts targeting the public should certainly be intensified. Informed participation by the public at large must enjoy its own channels of information.

And however modern they may be, it appears that the official channels have generally neglected the use of graphic novels, which appears to be the medium by which most people are introduced, if they are at all, to the issues involved in the burial of radioactive waste. If only superficially, graphic novels have recently popularized the theme, in such works as *Cent mille ans* [One Hundred Thousand Years] by Gaspard d'Allens and Pierre Bonneau, published in October 2020, and *Le Droit du sol* [Land Rights] by Étienne Davodeau, in October 2021. Despite the reservations that may be expressed about these works, they do in any case highlight the relevance of the "ninth art" (graphic novels) in reinvigorating communication with the general public.

It is therefore necessary to transcend the traditional divide between solid official information corseted in the framework of a rigid presentation, and visual aids that are more attractive and often more accessible, but whose informative content sometimes leaves something to be desired.

Conclusion

Because the fifth edition of the National Plan for Radioactive Materials and Waste Management has not yet been submitted to Parliament, the rapporteurs were only able to provide a progress report. In this context, they point out that like respect for transparency, good interinstitutional cooperation on nuclear issues is a guarantee that the solutions found to the problem of waste disposal will be democratically acceptable.

The Office is pleased that in evaluating the technical solutions adopted it can continue to rely on the work of the CNE2 and hopes that this will remain the case in the future. Since the law of 1991, the French legislative framework for the management of nuclear waste has required the heavy involvement of Parliament in the oversight process. Efforts to increase participation by civil society in new bodies such as the future governance commission of the PNGMDR are carrying on this tendency toward complete transparency in the choices made. The rapporteurs welcome this deepening participation, while also emphasizing the importance of an expertise centred on representative political legitimacy.

The Office's report is intended as a contribution to a broader debate on a subject that many essays, books and graphic works continue to promote in the public sphere. The rapporteurs reaffirm the importance of the work of the Office, which not only serves to inform Parliament on a highly technical subject but is also intended to help popularize science, thus placing itself directly at the service of the citizenry.

Recommendations

- Engage in upstream dialogue with the Government on the next (sixth) edition of the PNGMDR, so as to ensure its submission to Parliament no later than 30 June 2025.
- Specify the impact of the abandonment of the Astrid project on the volume of spent fuel to be managed and on the Cigéo project.
- Provide an appendix to the next PNGMDR which will provide an inventory of outgoing and incoming waste, specifying its final destination and the foreseeable duration of its presence within the national territory or in foreign countries.
- Supplement the next edition of the PNGMDR with a financial section, to include a compilation of the sums budgeted by operators for waste elimination, presenting various possible scenarios.
- Specify the role of CNE2 in the new governance of the PNGMDR, so as to ensure the maintenance of high-level scientific and technological expertise in regard to radioactive waste disposal oversight.
- Reflect on the legal position of the Environmental Authority and the impact of its opinions.
- Include items addressing the management of military nuclear waste in the next edition of the PNGMDR.
- Use the radioactive waste inventory to develop a long-term, comprehensive disposal strategy for radioactive medical waste.
- Provide a comprehensive update, following on from the international review carried out in 2019, on the issue of bituminous waste and the risk of hydrogen releases from long-lived intermediate level waste containers.

To consult the report:
www.assemblee-nationale.fr/commissions/opecst-index.asp
www.senat.fr/opecst

Assemblée nationale - 126 rue de l'Université - 75355 Paris 07 SP – Tel: 01 40 63 26 81 – Email: secretariat-opecst@assemblee-nationale.fr
Sénat - 15 rue de Vaugirard - 75291 Paris Cedex 06 – Tel: 01 42 34 25 58 – Email: opecst-secretariat@senat.fr