Federal Council for Sustainable Development (FCSD)

(FRDO-CFDD)

Opinion on the draft waste plan of the Belgian Agency for Radioactive Waste and Enriched Fissile Materials (ONDRAF/NIRAS) and on its strategic environmental assessment report

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- Requested by Minister Magnette in a letter dated 15 June 2010
- Prepared by the workgroup on *energy and climate*
- Approved by the General Meeting of 24 September 2010
- The original language of this opinion is French.

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1. Context

[1] In a letter dated 15 June 2010, the FRDO-CFDD received a request for an opinion from Minister Magnette about the ONDRAF/NIRAS draft waste plan[1][2], and its strategic environmental assessment (SEA) report. Such consultation is provided by the Act of 13 February 2006 concerning the assessment of certain environmental plans and programmes and public participation in drawing up environmental plans and programmes.

[2] The draft plan was prepared by the ONDRAF/NIRAS in order to help the federal government take a decision of principle on the long-term management of B and C radioactive waste[3], which is currently stored in different buildings and surface facilities, and which will be produced in the future. The purpose of this management is to ensure as much as possible that such waste has no negative repercussions on health and the environment. Given the level and length of activity of such waste, the management must therefore be considered in accordance with periods that extend to several hundreds and even thousands of years.

2. Observations

[3] Such radioactive waste emits ionising radiation in the form of particles and waves. This radiation has harmful effects for health and the environment in addition to having very long lives. Several studies have been conducted so as to be able to assess and gauge these effects better.[4]

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1 Belgian Agency for Radioactive Waste and Enriched Fissile Materials

2 More precisely: *Waste plans for the long-term management of conditioned high-level and/or long-lived waste.*

3 Types of waste: Type A = low- or medium-level and short-lived waste; Type B = low- or medium-level and long-lived waste; Type C = high-level and short- + long-lived waste, as well as heat generation

4 Cf. in particularly the studies of the *International Commission on Radiological Protection (ICRP)*: http://www.icrp.org/), cf. also: "*The 2007 recommendations of the International Commission on Radiological Protection,*" ICRP Publication 103, 2007

[4] The FRDO-CFDD wishes to draw attention to the fact that extending the operational life of power stations would generate additional radioactive waste. The members of the FRDO-CFDD have spoken on extending the operational life of Belgian nuclear power stations in the Agency's divided opinion on the report of the Energy Commission 2030[5].

3. General principles, decision criteria

[5] The overall aim of radioactive waste management is to deal with such waste in such a way as to protect man and the environment, today and tomorrow, without handing unacceptable burdens down to future generations.

[6] Nuclear waste management must respect the right of future generations not to be subjected to the impact of our unsustainable modes of production and consumption.

[7] It is also necessary to manage nuclear waste with a degree of maximum safety, in particular as regards the workers in the sector.

[8] The nine management principles[6], as well as the ten fundamental safety principles[7] of the International Atomic Energy Agency (IAEA) must be applied accordingly.

4. ONDRAF/NIRAS proposals

[9] The ONDRAF/NIRAS recommends taking a decision rapidly to determine the type of solution to be developed for the long-term B and C radioactive waste management.

[10] The ONDRAF/NIRAS recommends definitive deep disposal in a not very hard clayey formation as a "long-term management technical solution." The current ONDRAF/NIRAS research programme is focused on the Boom clay in Mol-Dessel, whilst the clays in Ypres are being studied (to a lesser degree) as an alterative host formation.[8]

[11] The ONDRAF/NIRAS recommends that the proposed option be implemented gradually and that community support be maintained for this option.

5. FRDO-CFDD reactions supported by all its members

[12] The discussions in the FRDO-CFDD have not led to a unanimous opinion by all the members on the ONDRAF/NIRAS proposals. The proposals and remarks shared by all its members are

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5 In particular, §§ 53, 54 and 55 of the opinion of 28 February 2007 on the interim report of the Energy Commission 2030 (2007a02)

6 ***1*** *Radioactive waste shall be managed in such a way as to secure an acceptable level of protection for human health.*
2 *Radioactive waste shall be managed in such a way as to provide an acceptable level of protection for the environment.*
3 *Radioactive waste shall be managed in such a way as to assure that possible effects on human health and the environment beyond national borders will be taken into account.*
4 *Radioactive waste shall be managed in such a way that predicted impacts on the health of future generations will not be greater than relevant levels of impact that are acceptable today.*
5 *Radioactive waste shall be managed in such a way that will not impose undue burdens on future generations.*
6 *Radioactive waste shall be managed within an appropriate national legal framework including clear allocation of responsibilities and provision for independent regulatory functions.*
7 *Generation of radioactive waste shall be kept to the minimum practicable.*
8 *Interdependencies among all steps in radioactive waste generation and management shall be appropriately taken into account.*
9 *The safety of facilities for radioactive waste management shall be appropriately assured during their lifetime.*

7 Consultable at http://www-pub.iaea.org/MTCD/publications/PDF/P1273_F_web.pdf

8 Cf. Chapter 8 of the ONDRAF/NIRAS draft waste plan

contained in this chapter. The proposals that are not supported by all the members are contained in the next chapter.

[13] The FRDO-CFDD believes that taking a decision of principle should not stand in the way of considering other modes of management than the one selected. For it is not possible to predict at this time the theoretical and experimental advancements of science in this field.

[14] The FRDO-CFDD recognises the quality of the research conducted in Belgium on nuclear waste storage in underground clayey layers. It considers that such research must be continued and widened to other options applicable in Belgium in accordance with the progress in knowledge. Funding must be secured for such research, and be geared in particular to the possibilities of maintaining and transmitting knowledge from generation to generation.

[15] The FRDO-CFDD is wondering in particular about the procedures and responsibility for financing nuclear waste management.

[16] The FRDO-CFDD has insisted on the need to maintain knowledge over very long periods during which waste will continue to be dangerous and wondered how the costs to meet this need are / will be booked.

[17] While recognising that some efforts have been made on the information front, the FRD-CFDD demands that maximum transparency be ensured not only during the consultation procedure, but also during the different phases and choice of waste management. Such transparency should make it possible to exercise democratic supervision.

[18] The FRDO-CFDD regrets particularly that an initiative geared to adopting a certain number of recommendations made by people selected on the representative basis determined by a private institution, namely the King Baldwin Foundation, and called a "citizens' conference,"[9] was organised by the ONDRAF/NIRAS before the consultation procedure provided by the Act. This entails the risk of influencing the results of the legal procedure or of disavowing the procedure itself, which is democratic after all. The FRDO-CFDD is moreover wondering about how representative the "chosen" sample is and about the organisation of the conference.

[19] The FRDO-CFDD believes that contacts must be pursued to explore the potential for developing disposal solutions shared by several countries, while making sure that all guarantees are obtained in terms of transport safety, environmental and population protection and non-proliferation aspects.

6. Proposals not supported by all FRDO-CFDD members

[20] The ONDRAF/NIRAS proposals did not receive the support of all the members of the FRDO-CFDD. Two different nuclear waste management options emerged among the members. These options are not shared by all the members of the FRDO-CFDD. They are discussed below.

[9] Citizen's conference organised by the King Baldwin Foundation at the request of the ONDRAF/NIRAS: *How to decide about the long-term management of high-level and long-lived radioactive nuclear waste?' (cf. http://www.kbs-frb.be/otheractivity.aspx?id=251600&LangType=2060)*

OPTION A[10]

[21] Pursuant to the most recent recommendations of the International Commission on Radiological Protection (ICRP), any additional dose of irradiation, whoever minimal, entails risks of irradiation-related illnesses.[11] These members of the FRDO-CFDD therefore underscore that there is no safe or harmless dose of irradiation.

[22] A solution to the problem of high-level and long-lived radioactive waste has not been found yet anywhere in the world, and no such storage facility is yet operational. The allegation that consensus has been reached on the deep disposal of high-level and long-lived radioactive waste at international level is not supported by independent, peer-assessed research.[12]

[23] The infinite life, as it were, of such waste calls for a technological solution of guaranteed efficiency over a period exceeding the history of human civilisation, which appeared on earth some 200,000 years ago. That is an illusion. How reliable are simulations that are supposed to exceed several hundreds of thousands of years?

[24] Research conducted in other countries on the deep disposal of B and C waste is valuable but far from completed. There are still many questions outstanding on crucial factors: the effects of heating on clay, the high acidity level, the production of hydrogen and the impact of chemical toxicity in the long term.

[25] The choice of the clay in Boom as a favourite host formation is moreover highly controversial due to: the rather non-homogeneous composition of Boom clay[13], the shallow depth and thickness of the Boom clay, the presence of water tables under the Boom clay formations, which are part of the main drinking water reserves of our country, the proximity to Roedalslenk, an active fault for millions of years.

[26] There is no emergency situation in 2010 that requires us to focus on deep disposal. Once unloaded from the nuclear power station, heat generating and high-level nuclear waste must still be stored in surface facilities for at least 50 years and be actively cooled.

[27] The notion of definitive deep disposal in the Boom clayey formation entails having nuclear waste irrecoverably buried underground. These members point out that, from an ethical point of view, it is less reprehensible to hand a known problem down to future generations in a controllable manner, than to pretend wrongly that it has been solved once and for all and that no one needs to worry about it.

[28] The area in Belgium where the Boom clayey formation reaches a depth of at least 200 metres and a thickness of 100 metres is limited to a territory of twenty municipalities in Campine. The statement by the ONDRAF/NIRAS to the effect that a decision of principle for deep disposal in no way presupposes the choice of a site is not completely correct.

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10 Members who support these positions: Mr Jan Turf, Mrs Anne Panneels – vice-presidents; Mr Roland de Schaetzen (Natagora), Mr Sabien Leemans (WWF), Mrs Jacqueline Miller (IEW) – representing environmental protection NGOs; Mr Jo Dalemans (Broederlijk Delen), Mrs Brigitte Gloire (Oxfam-Solidarité), Mr Gert Vandermosten (VODO) – representing development cooperation NGOs; Mrs Anne De Vlaminck (CSC), Mr Bert De Wel (CSC),), Mr Sébastien Storme (FGTB), Mr Daniel Van Daele (FGTB), Mrs Diana Van Oudenhoven (CGSLB) – representing trade unions; Mrs Lieve Helsen (KUL), Mr Dries Lesage (UG) – representing the scientific world.
Members who abstained from these positions: Mr Theo Rombouts – Chairman
The other members were against these positions.

11 "ICRP Publication 103", 2007

12 H. Wallace: «No time to waste: scientific review of existing models for long-term storage of radioactive waste ». September 2010

13 Sampling in 1991 under the direction of Prof. H. Hooyberghs, KUL

[29] The size of the underground storage site is widely underestimated and therefore unrealistic, because this estimate takes account only of the 55,000 m³ radioactive waste of the former "Union Minière" in Olen, which falls partly under B waste (up to 10,000 m³ of non-conditioned waste).

[30] These members of the FRDO-CFDD consequently recommend the following:

1. The discussion on high-level and/or long-life nuclear waste is inextricably linked to -- and may not be separated from – the discussion about the production of such waste:
    - The production of higher activity nuclear waste must be limited to a minimum. To this end, the nuclear power stations must be shut down in several phases, in accordance with the scenario provided by the Act of 2003 on the gradual withdrawal from nuclear energy.
    - Spent nuclear fuel may not be reprocessed and the irradiated elements of nuclear fuel must be immediately considered as C waste.

2. As the current ideas, knowledge and technology provide too few guarantees for the hermetic isolation of nuclear waste from the biosphere for hundreds of thousands of years, during which it remains dangerous, we cannot concentrate on one management solution only. That is why it is not indicated to take a decision of principle this year on the definitive deep disposal in a clayey formation or any irreversible definitive option.

3. The study on deep disposal be continued and extended to research in other applicable options in our country for the long-term management of high-level and long-life nuclear waste, in particular their extended storage. It is necessary to continue investing in research and expertise on radiation protection, as well as on the transfer of knowledge to future generations.

4. All the management concepts and options that have been subjected to research must offer maximum reversibility guarantees over an unlimited period of time. This entails:
    - The possibility to inspect and supervise artificial barriers actively in order to detect any deterioration rapidly;
    - The recoverability of waste so as to be able to take action at all times when defects are detected or to enable future generations to apply new and improved processing techniques;

5. While waiting to develop a management concept accepted at international level, one that offers guarantees concerning the aforementioned criteria, B and C waste will continued to be stored in surface facilities for an unspecified period using a method that offers the best guarantees for the protection of workers, the population and the environment, and for protection against unauthorised entry.

6. The nuclear energy sector must make financial means available to the authorities to enable them to implement the aforementioned policy choice. This money must be managed by an independent body specialising in nuclear energy and may not be used for any other purposes. The financial and legal responsibility of the nuclear energy sector for radioactive waste remains applicable. This entails that the nuclear sector must not only provide the financing of the management concept selected, but also a fund to make it possible to take such actions in future as are needed to remedy situations due to unforeseen disasters and to enable future generations to develop better management solutions.

OPTION B[14]

[31] Other members pointed out that all human activities,[15] apart from medical applications, account for about 1% of the ionising radiation received by an individual in Belgium.[16] The rest of the radiation comes from natural radioactivity (cosmic radiation, radon, etc.) which is omnipresent and inevitable, as well as from medical applications.

[32] The impact of ionising radiation (emitted naturally or otherwise) on human health and the environment depends on the length of exposure, the intensity and nature of the radiation, but also on natural and artificial barriers installed (or not installed). The conclusions of the joint report[17] of the National Academy of Medicine (France) and the Academy of Sciences (France) on the impact of minimal doses of radiation on human health indicate that "*these results [from recent radiobiological data] show that* ***there is no justification*** *for using a linear relationship* ***without threshold*** *to estimate the carcinogenic risk of low doses from observations made (for doses ranging from 0.2 to 5 Sv).* "[18]

[33] These members consider **reprocessing irradiated fuel**[19] under the strictest safety conditions[20] to be the best solution, as it can help conserve the planet's resources and limit the quantity of ultimate waste.[21]

[34] During reprocessing, the most irradiating non-reusable waste is mixed closely with glass developed specially for its robustness and poured in stainless steel tanks. Once it solidifies, this matrix forms an inert and insoluble waste that represents about 99% of the radioactivity (and 3 to 4% of the mass) contained in the fuel before reprocessing. This **ultimate waste** from the reprocessing, i.e. the fraction that cannot be extracted from the irradiated fuel, should, as the ONDRAF/NIRAS proposes, be disposed of in a **definitive deep disposal facility** in a clayey formation, without waiting for one or more centuries in surface facilities.

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14 Members who support these positions: Mrs Isabelle Chaput (Essenscia), Mrs Anne Defourny (FEB-VBO), Mrs Ann Nachtergaele (FEVIA), Mrs Marie-Laurence Semaille (FWA), Mr Piet Vanden Abeele (Unizo) – representing the employers; Mrs Hilde De Buck (Electrabel), Mr Frank Schoonacker (SPE) – representing energy generators.

Members who abstained from these positions: Mr Theo Rombouts – Chairman
The other members were against these positions.

15 Including nuclear-generated electric power.

16 Website of SCK•CEN

17 Maurice Tubiana and André Aurengo, *La relation dose-effet et l'estimation des effets cancérogènes des faibles doses de rayonnements ionisants*, Académie Nationale de Médecine, France, 2005

18 Excerpted from the conclusions and summary of the report.

19 Chemical process that consists of separating reusable uranium and plutonium from the ultimate waste.

20 This means that the strictest precautions are taken in both the reprocessing plants and in MOX fuel production plants, and that discharges are under constant surveillance to ensure that discharges in the air and the sea are lower than the applicable standards, which incidentally are more and more strict.

21 In the past, the reprocessing of a quantity of irradiated fuel representing 5.5 years of electric power generation in nuclear power stations made it possible to generate the equivalent of one year of electricity in said station while consuming plutonium which without recycling would have been disposed of directly and therefore treated as ultimate waste.

[35] In spite of local heterogeneous features, the Boom clay layer has the indispensable qualities needed by an appropriate host rock and is generally **recognised** as an excellent trap for a set of chemical elements, whether radioactive or otherwise. In fact, the SAFIR 2 report on the burial of waste in Boom clay has been subjected to a peer-review[22] by the OECD NEA, which indicated that "the current scientific basis of the Belgian programme is considered to be sufficiently strong to enable the programme to move from the methodological phase towards siting."[23] The Boom clay layer actually meets the geo-scientific directives and criteria[24] of the IAEA and the European Commission for an appropriate disposal site.[25] Other countries such as France, Hungary, Japan, Switzerland, Germany and the United States, are also considering clay as a host rock. Such burial offers the maximum guarantees for the protection of current and future generations. This does not, however, prevent any recovery from being technically possible. It would be up to future generations to take the decision, with knowledge of the facts, if they want to recover such waste.

[36] On the basis of the current knowledge and research conducted for more than 35 years, these members believe that it is time for the Belgian state to **take a decision of principle** for the deep disposal of B and C waste and not to opt for long-term interim storage of such waste.[26] Such a decision will enable the ONDRAF/NIRAS to continue sound waste management in all its dimensions whilst implementing the different steps necessary for the final disposal of the ultimate waste, taking particular account of the cooling period needed to cool C waste on the surface for 50 years. Furthermore, the decision-making process itself on how to manage such waste, must remain flexible, to be able to redirect each new step of the deep disposal scenario.

[37] The option of leaving ultimate waste on the surface in the long term (or in storage so that it is easily recoverably) passes the burdens and constraints on to future generations in terms of inspections, **risks of exposure or intrusion.** Such an option means taking unnecessary risks relating to the uncertainty about the stability of our developed and democratic society, whilst there is incontestable scientific evidence about the stability of the clay layer over several dozen millions of years. Extended surface storage and its consequences then raise questions of an ethical and responsibility-related nature. It does not represent a solution.

[38] These members are aware that the more electricity power stations generate, the higher the quantity of irradiated fuel will be. Nevertheless, they pointed out that nuclear-generated electricity has many advantages in terms of security of supply, fuel compactness, continuity of electric power generation, non-emission of CO2 and other pollutants, including fine particles, production costs, etc. These members support **extending the operational life of nuclear power stations in Belgium.** This can only be envisaged, however, if the power stations are rendered safe by complying with the highest safety standards, if strict measures are taken against the risks of proliferation, and if an adequate solution is found for waste management (cf. points above). Companies and employment must also benefit from such a prolongation which must moreover have a direct impact on the electricity bill of businesses.

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22 OECD – NEA, SAFIR2: Belgian R&D Programme on the Deep Disposal of High-level and Long-lived Radioactive Waste, An International Peer Review, Paris, 2003

23 Excerpted from Chapter 2: Conclusions and Recommendations at an Executive Level

24 In terms of geology, geometry (thickness and depth), stability over the very long term, hydrogeology, **geo- and hydro-chemistry**, geomechanics, thermics, lack of usable natural resources and technical feasibility.

25 Source: Safir2 Report – Chapter 3

26 I.e. one or more centuries.