

Belgium



Belgium – General Discussions

- Countries of CG1 and other CPs present

CG1: Australia, Belgium, Bulgaria, Congo, Indonesia, Ireland, Mauritius, Netherlands, Poland, Saudi Arabia, Switzerland, Viet Nam

Others: China, EURATOM, France, Germany, Italy, Japan, Korea (Rep. of), Russian Federation, UAE, UK

- Summary of discussions

- Points of agreement and disagreement



Belgium – General Information

- 3 nuclear power plants in (extended) operation, 2 negotiating extension, 2 shut down
 - Two sites, Doel and Tihange: each has at least one reactor in each category
- 4 research reactors at Mol: 2 operating, 1 in decommissioning, 1 subcritical
 - Thetis reactor at Ghent university decommissioned
- Extensive legacies from nuclear research (Mol), radium processing activities (Olen)
- Spent fuel from power plants stored on-site pending decision on further management
 - Some past reprocessing in France, now discontinued (and residues returned)
- Spent fuel from research reactors – specific strategies
- Centralized ‘nuclear’ waste management by Belgoprocess at Dessel
 - Process being established for management of radium legacy
- Construction licence for surface disposal facility at Dessel for LILW-SL
 - Policy for higher activity and long lived = geological disposal, general policy approved but no site or concept selected
- Waste from Luxembourg managed in Belgium



Belgium – Summary of Discussions (1)

- Radium-bearing waste (from Olen site) will be treated in three groups: for least active, landfill disposal foreseen; middle group foreseen for intermediate depth disposal (~100 m); most active waste to be treated with Category B waste
- Different stages of licensing decision-making all involve public consultation: decisions at all stages can be appealed, but to different authorities for different stages
- All inspectors must follow common steps of training programme to be qualified, plus some additional training for different subjects needed. Training records need to be presented to Scientific Council. FANC inspectors have enforcement powers, Bel V inspectors cannot take enforcement actions.

Belgium – Summary of Discussions (2)

- Several new facilities coming into operation and being constructed. Site for each has to be considered in EIA and preliminary safety assessment, need to include relevant site characterization and assessment. No specific regulation for siting of facilities, but some criteria specifically for disposal facility are under discussion.
- Financing of FANC is challenged by shutdown of NPPs that provide fees when operating. Alternative funding will be needed to fulfil FANC's activities – legal measures taken to provide for this, discussions with government to reach agreement on future financing. IRRS mission made a recommendation to address the issue.
- Royal Decree of 2022 on the First Part of the Policy for Geological Disposal instructed to look at advanced technologies, e.g partitioning and transmutation, deep boreholes, to consider possible alternatives to geological disposal in line with the principle of reversibility of national policies. Also looking at possibilities of multinational solutions.
- Preliminary conclusions from prelicensing of MYRRHA project (construction of a proton accelerator for research in spent nuclear fuel, nuclear medicine and fundamental and applied physics) will be presented to Federal Public Services in coming months.



Belgium – Summary of Discussions (3)

- FANC/Bel V R&D programme on strategic research needs addresses precisely identified topics to answer key questions, which can then be used for action plans. Programme is described in more detail on FANC website.
- Transposition of the contractual agreements between Engie and the federal government into the legal framework changes the ‘nuclear landscape’ for the management of all SF and RAW from all NPPs.
- Surface disposal facility for Category A waste intended to be built in two groups of modules – one now and one later.
- Licence for Category A disposal facility prohibits ‘hot spots’ from any DSRS (because of human intrusion risk), so even low activity DSRS have to be excluded.
- Issue with recruiting and retaining younger staff, complicated by changes in nuclear landscape. It is a consideration in FANC’s HR programme, trying out measures that could help in appealing to younger people and keeping them interested. FANC and Bel V working with universities to establish connections.



Belgium – Summary of Discussions (4)

- General (binding) rules exist for establishing WAC, and ONDRAF/NIRAS puts WAC in place. Update to the general rules was due but delayed following LTO discussions. New proposed rules from ONDRAF/NIRAS based on binding advice from FANC are with the government for publication as a Royal Decree.
- FANC and ONDRAF/NIRAS are separate federal agencies with different roles and responsibilities, but have some interfaces, so agreement between them to discuss possibly overlapping issues. This does not affect FANC's independence as regulatory body.
- Specific law regarding remediation of soil contaminated by practices. Licensing process includes public consultation.
- Several medical isotope production facilities, including Fleurus, cyclotrons at hospitals and BR2 research reactor, plus transit of isotopes through Belgium. Some new isotopes will need changes to requirements for handling and management of waste, and this is already being addressed in licensing.



Belgium – Summary of Discussions (5)

- Reprocessing of SF from NPPs has been suspended since 1993.
- Belgium invited the CG1 members to identify any proposed Good Practices and Areas of Good Performance



Belgium – Points of Agreement and Disagreement

- There were no points of disagreement.



Belgium – Overview Matrix

Type of Liability	Long Term Management Policy	Funding of Liabilities	Current Practice / Facilities	Planned Facilities
Spent Fuel	<ul style="list-style-type: none"> - On-site wet and dry storage of spent fuel (SF) from NPPs - Dry storage (at Belgoprocess) and reprocessing of SF from research reactors 	Long term management policy still to be defined: reprocessing or direct disposal	<p>NPP operators contribute to the fund managed by SYNATOM.</p> <p>For spent fuel of research reactors:</p> <ul style="list-style-type: none"> - Funds fed by the Belgian state for historical fuel, - provisioned by SCK CEN for fuel produced after 1988 	Geological disposal (host rock and site undecided)
Nuclear Fuel Cycle Waste	Centralised storage at Belgoprocess site of all LILW- SL, LILW-LL and HLW transferred to ONDRAF/NIRAS	<p>LILW-SL: Near surface disposal</p> <p>LILW-LL and HLW: geological disposal (in both galleries and deep boreholes and does not prejudice the host formation(s) nor the site(s))</p>	<p>Producer pays, contribution to the ONDRAF/NIRAS long-term fund</p> <p>Various funds for historical liabilities fed by the Belgian State</p>	<p>Surface Disposal for LILW- SL at Dessel, including the disposal facility and other facilities for waste packaging for disposal. (licence for construction obtained in 2023)</p> <p>Storage building for the ASR non-conform waste⁵ at Belgoprocess</p> <p>Geological disposal (host rock and site undecided)</p>
Application Wastes	<p>Centralised storage at Belgoprocess site of all LILW- SL, LILW-LL and HLW transferred to ONDRAF/NIRAS</p> <p>Radium waste storage at Umicore/Olen</p>	<p>LILW-SL: near surface disposal</p> <p>LILW-LL: geological disposal (in both galleries and deep boreholes and does not prejudice the host formation(s) nor the site(s)).</p> <p>Radium waste: policy still to be defined, shallow-depth disposal is investigated as LT management solution</p>	<p>Producer pays, contribution to ONDRAF/NIRAS long-term fund</p> <p>Insolvency fund</p> <p>Radium waste: Producer pays</p>	<p>Surface Disposal for LILW- SL at Dessel, including the disposal facility and other facilities for waste packaging for disposal. (licence for construction obtained in 2023)</p> <p>Geological disposal (host rock and site undecided) for LILW-LL</p>
Decommissioning	<p>Present projects : Doel 3 and Tihange 2 PWR reactors</p> <p>BR3 Research Reactor; Eurochemic reprocessing plant; SCK CEN waste department; University of Gent (accelerators)</p> <p>Radio-element production facility ex- “Best Medical Belgium”</p>	<p>Responsibility of operator; approval of decommissioning plan by ONDRAF/NIRAS</p> <p>LILW-SL: near surface disposal</p> <p>LILW-LL : geological disposal (in both galleries and deep boreholes and does not prejudice the host formation(s) nor the site(s))</p>	<p>Operators contributed to the provisions; various funds for historical liabilities fed by the Belgian State;</p> <p>Transfer of financial means to ONDRAF/NIRAS (waste funds managed by ONDRAF/NIRAS) when waste is transferred to ONDRAF/NIRAS</p>	Idem
Disused Sealed Sources	Return to supplier, decay storage or transfer to ONDRAF/NIRAS	Implementation of EU directive, recovery of orphan sources	If no return, holder has to set up financial guarantee	Idem

Belgium – Follow-up from the 7th Review Meeting

- Planned measures to improve safety
- Challenges
- Suggestions
- Overarching issues



Belgium – Follow-up from RM7 – Planned Measures (1)

- R&D programme on partitioning and transmutation (maintenance of knowledge and expertise in the nuclear field, as well as potential method for optimising geological disposal)
- According to the Royal Decree of 28 October 2022, ONDRAF NIRAS is asked to continue to monitor developments on deep disposal, including deep boreholes, and advanced nuclear technologies, i.e., Partitioning and Transmutation.
- The ARTEMIS peer review held in December 2023 recommended ONDRAF/NIRAS to focus its main resources on solutions that are technically feasible and internationally acknowledged for the long-term management of category B&C waste of the Belgian inventory.

Belgium – Follow-up from RM7 – Planned Measures (2)

- Licensing, construction and operation of the near surface disposal facility
- Disposal facility
 - Civil construction & environmental license: May 2020
 - Nuclear construction & operation license: Royal Decree of 23 April 2023
 - Start construction : mid2025
 - Start operation: 2029/2030 →challenge!
- Ongoing assessment of waste streams for surface disposal:
 - Systematic conformity check of waste drums in storage with disposal WAC
- Waste packaging facilities
 - Caisson production facility and facility for production of disposal monoliths – in operation 2027

Belgium – Follow-up from RM7 – Challenges (1)

- Finalising construction and commissioning of new radioactive waste storage facilities at Belgoprocess
- Storage facility for non-conform waste; operational in Q3 2025
- Central storage building for non-conditioned waste
 - Storage and non-destructive radiological characterisation
 - Licensed on 23 April 2023, in operation in ~2028
- Construction of new storage buildings:
 - New storage building for bituminised intermediate-level waste In operation from ~2032, designed to account for flammability risk associated with the waste type
 - New storage building for the intermediate-level waste of category A and B, In operation from ~2030



Belgium – Follow-up from RM7 – Challenges (2)

- Decommissioning of NPPs and other facilities
- The evolutions in the DECOM-program are monitored by ONDRAF/NIRAS. If necessary, management steps and associated projects at the site of Belgoprocess are adapted accordingly
- Installations at the site of Belgoprocess are prepared to receive the waste
- Reception of category B-waste via extension of building 136X (2027-2031)
- Reception of category A-waste via extension of IPM (~2029)

Belgium – Follow-up from RM7 – Challenges (3)

- Establishing and implementing national policy on long-term management of HLW and long-lived wastes, including a stepwise, reversible and participative decision process
- 1st Part of National Policy on Long-term Management of Radioactive B&C-Waste laid down in the Royal Decree of 28 October 2022:
 - Deep geological disposal on Belgian territory, on one or more sites, is the reference long-term management option for B&C-waste. No host rock nor design defined yet.
 - Decision-Making Process needs to be participative, fair and transparent
 - Reversible process (re-evaluation of previous steps)
 - National policy contains several parts
- National societal debate (as input for 2nd part of the policy)
 - Started in 2023, ran until February 2024
 - Led by ONDRAF/NIRAS under the King Baudouin Foundation as a neutral institution.
 - Provided recommendations for a reversible, participative decision-making process
- Further inputs to process, complementary to consultation process for SEA
- Site selection foreseen ~2045



Belgium – Follow-up from RM7 – Challenges (4)

- Site remediation for radium-bearing waste at Umicore, Olen
- Policy proposal (part 1) by ONDRAF/NIRAS for the disposal of radioactive radium-bearing waste
 - Concept of intermediate depth disposal
 - Preference for a local disposal solution
 - SEA procedure & national consultation Dec 2024 –March2025
 - Final proposal to Federal Government mid2025
- After National Policy decision part 1
 - Design of disposal facility (open pit facility or facility with shaft/tunnel access)
 - Site selection process → site selection as part of National Policy (part 2)
 - Local participation

Belgium – Follow-up from RM7 – Challenges (5)

- IRRS and ARTEMIS missions in 2023
- IRRS
 - 1 good practices (not directly related to scope of JC)
 - 2 areas of good performance
 - The way the regulatory body takes into consideration research and development results when preparing regulations and guides for radioactive waste management, including deep geological disposal.
 - The interactive tool “Pathway Evaluation Process,” which facilitates structured interactions among interested parties on radioactive waste disposal matters.
 - Main challenge: To identify and ensure the necessary competences and adequate financial resources of the regulatory body due to the evolving nuclear energy policy in the country
- ARTEMIS
 - 10 recommendations, 3 suggestions
 - 2 good practices
 - Centralized waste management by Belgoprocess,
 - Preparation for remediation of Olen site
- Programme for long-term management of non-conform waste.
- Belgoprocess storage for non-conform waste; operational in Q3 2025



Belgium – Follow-up from RM7 – Suggestions

- No suggestions from RM7

Belgium – Follow-up from RM7 – Overarching Issues (1)

- Competence and staffing linked to timetable for spent fuel and radioactive waste management programmes
- Holders of a nuclear licence must make arrangements for education and training, as well as research activities, to acquire, maintain and further develop the necessary expertise and competences
- ONDRAF/NIRAS must define RD&D programmes that are necessary for the execution of its missions
 - These also contribute to capacity building
- Bilateral agreements with other radioactive waste management agencies and regulatory bodies
- FANC and Bel V
 - conduct independent R&D to develop and retain expertise
 - have programme on strategic research needs for geological disposal, regularly updated
- ONDRAF/NIRAS, FANC, SCK CEN and Bel V continuously invest in education and training of their own personnel and other actors involved in spent fuel and radioactive waste management
- Inclusive public engagement on radioactive waste management and on spent fuel management programmes
- National societal debate for deep geological disposal

Belgium – Follow-up from RM7 – Overarching Issues (2)

- Ageing management of packages and facilities for radioactive waste and spent fuel, considering extended storage periods
- Facilities
 - Ageing management systems are put into place for all nuclear facilities and installations on the Belgoprocess site
 - For all SSCs ageing drivers are identified for which a maintenance program is implemented; maintenance logs are analysed to identify trends and adjust existing programs if needed
- Packages
 - ONDRAF/NIRAS and BP developed an approach for systematic follow-up of the quality and conformity of the packages
 - Periodic review of witness packages
 - Global inspections of the storage facilities and packages
 - Design of packages adapted to conditions prevailing in the storage building and expected lifetime

Belgium – Follow-up from RM7 – Overarching Issues (3)

- Long term management of disused sealed sources, including sustainable options for regional as well as multinational solutions
- Return to supplier is legal obligation. If not possible:
 - Dismantling and cementation of source capsule in a shielded container, direct cementation in a shielded drum
 - Low-activity sealed sources are loaded in 200L drums and super-compacted if possible. The 200L drum is cemented in a 400L drum.
 - Disused sealed sources are excluded from the inventory to be disposed of at the surface, all disused sealed sources are considered for deep geological disposal



Belgium – Findings from the 8th Review Meeting

- Planned measures to improve safety
- Challenges
- Suggestions
- Areas of good performance
- Good practices



Belgium – Planned Measures to Improve Safety

- Preparation of dismantling of the ENGIE Electrabel PWR reactors which have been permanently shut down
- Surface disposal of category A waste
- Deep geological disposal of category B&C waste: Outcomes of the public consultation
- Long term management of radioactive radium bearing waste
- New buildings at Belgoprocess
- National programme, legal framework and ARTEMIS follow-up
- Implementation of the four Laws of 26 April 2024: new nuclear landscape
- Capacity building
- Implementation of the IRRS recommendations



Belgium – Challenges from the 8th Review Meeting

- *Definition (INFCIRC/603/Rev.10, Annex 2): A Challenge is a difficult issue for the Contracting Party. It may be a demanding undertaking (beyond day-to-day activities); or a weakness that needs to be remediated.*
- Preparation of dismantling of the PWR reactors that have been permanently shut down and management of the decommissioning waste streams
- Making surface disposal for category A waste operational
- Defining a national policy part 2 following outcomes of public consultation on deep geological disposal of category B&C waste
- Defining a national policy for long-term management of radioactive radium-bearing waste
- New buildings at Belgoprocess
- National programme, legal framework and ARTEMIS
- Defining roles and responsibilities of nuclear actors in the new ‘nuclear landscape’ following transposition of contractual agreements between Engie/Electrabel and the federal government into federal legislation
- Capacity building



Belgium – Suggestions from the 8th Review Meeting

- *Definition (INFCIRC/603/Rev.10, Annex 2): A Suggestion is an area for improvement. It is an action needed to improve the implementation of the obligations of the Convention.*
- The government should consider means to ensure future financing of FANC (after 2026), as funding from operating NPPs decreases when dismantling starts, to allow FANC to maintain their skills and competence to fulfil their responsibilities consistent with international requirements, including the Joint Convention



Belgium – Areas of Good Performance

- *Definition (INFCIRC/603/Rev.10, Annex 2): An Area of Good Performance is a new or enhanced practice, policy or programme for a Contracting Party that is recognized as an improvement of safety and is being implemented. An Area of Good Performance is a significant accomplishment for that Contracting Party, although it may have been undertaken by other Contracting Parties.*
- Broad stakeholder involvement and use of an independent mediator in the societal debate on recommendations for policy regarding geological disposal
- The proposed step-wise graded approach for remediation of the radium-contaminated site at Olen and long term management of three different categories of waste, taking account of both their activity levels and their suitability for different management options
- The centralized management of the radioactive waste by Belgoprocess prior to disposal contributes to the minimization of waste and helps to optimize the interdependencies of the different waste management steps



Belgium – Good Practices

- *Definition (INFCIRC/603/Rev.10, Annex 2): A Good Practice is a new or revised practice, policy or program that makes a significant contribution to the safety of radioactive waste and spent fuel management. A Good Practice is one that has been tried and proven by at least one Contracting Party but has not been widely implemented by other Contracting Parties; and is applicable to other Contracting Parties with similar programs.*
- None



Belgium – Conclusions

- Constructive discussion was had by CG1 members recognizing progress that Belgium has made on Challenges and Overarching Issues from the 7th RM, as well as other areas of its national programme.
- Several ongoing Challenges were identified
- One Suggestion was made
- Three Area of Good Performance were identified.

