

8th Review Meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

Greece National Presentation

by

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Country Group 8

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National presentation

- Capital and largest city: Athens
- Total area: 132,000 km²
- Total population: 10,4 million
- Currency: Euro
- GDP (PPP):
 - Total: \$436 billion (2024)
 - Per capita: \$42,000



Outline of the Presentation

- Summary of basic information on the national programme, including the Matrix;
- Changes in the national programme since the last Review Meeting;
- Action on Suggestions and Challenges from the 7th Review Meeting;
- Current Challenges;
- Significant events since the last Review Meeting;
- Potential Good Practices and Areas of Good Performance;
- Relevant overarching issues agreed at the 7th Review Meeting;
- Questions and comments received on the National Report;
- Planned measures to improve safety beyond the Convention itself.

Basic information on the National Programme - Greece

Spent fuel

No NPPs

One research reactor (GRR-1) in extended shutdown
- Spent LEU returned to the USA in 2019
- Remaining fresh LEU exported to Canada in 2023

One decommissioned sub-critical assembly
- Fresh natural Uranium exported to the USA in 2024

Basic information on the National Programme - Greece

Radioactive waste

Originate from:

- **Non nuclear** applications: Medical, Research, Industrial, Consumer products
- Past operation and decommissioning of the research reactor GRR-1

Vast majority: VSLW, VLLW, or LLW category

A very limited amount of ILW potentially arising from parts of the dismantled reactor core

VSLW from medicine and research activities are stored for **decay and subsequent clearance**

One interim storage facility (NRWIS) at National Centre for Scientific Research “Demokritos” (NCSR “D”)

Siting selection procedure for the disposal facility (ongoing)



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Basic information on the National Programme - Greece

Sealed Sources

All sealed sources in Greece are imported (upon take back agreement)

The licensee importing is responsible for the safe management

Orphan sources mostly stored in the NRWIS interim storage facility

Matrix

Type of Liability	Long-term Management Policy	Funding of Liabilities	Current Practice/Facilities	Planned Facilities
Spent Fuel	N/A	N/A	N/A	N/A
Nuclear Fuel Cycle Waste	N/A	N/A	N/A	N/A
Application Wastes	Disposal	Licensee, Government	On site storage, decay and release for short lived waste. Longer lived waste are stored until final management solution	Near surface disposal facility with engineered barriers (vault) is being investigated
Decommissioning Liabilities	Decommissioning waste stream included in the national program waste streams	Licensee, Government	Decommissioning plan is required in the national regulatory framework	GRR-1
Disused Sealed Sources	Return to the manufacturer Recycling Disposal	Licensee, Government	Return to the manufacturer. Exported to be recycled. Interim storage	None

Note: NORM has not been declared as radioactive waste

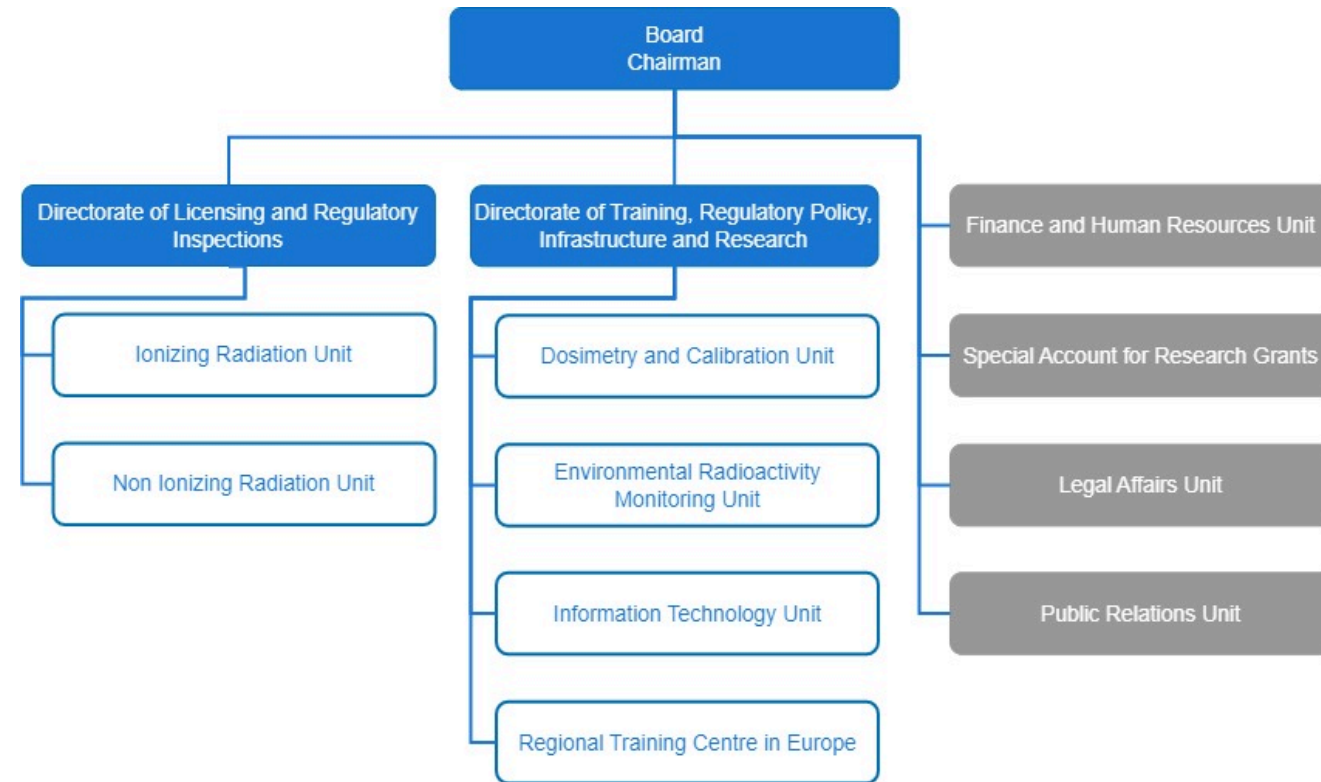


Changes in the National Programme since RM7

2022 New Presidential Degree for the organization of the regulatory body

The **new** organizational structure of EEAE

- ✓ ensures **inter-operability and flexibility** while maintaining its **independence** in regulatory decision-making.
- ✓ **no conflict** between EEAE's regulatory role and its provision of technical services.



Changes in the National Programme since RM7

2023

Revision of the national policy and strategy.

Ministerial Decision 35225/2023: supplementing and expanding the existing national **legislative, regulatory and organizational** framework to ensure the **responsible and safe management of SF&RW** and avoid any undue burden on future generations

MD 35225/2023 article

15

Provisions for **responsibilities** of the relevant parties (the Minister of Development, EEAE, NCSR “D”, EEDRA Committee, licensees).

16

Provisions for a new MD with **specific measures** for the siting, operation, closure and decommissioning of storage and disposal facilities.

25

The national programme (national strategy).

25

For the **first time** in Greece, a **multiannual budget for RWM** has been officially published in the Government Gazette, demonstrating the commitment of the government to the purposes of the RWM national programme.



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National policy

MD 35225/2023 article

5.1.f, 7.1

The SF & RW producer or license holder has the **prime responsibility** for the management of the SF & RW

13.1.a

Safety is the highest **priority**

4.1.h,i

Polluter pays principle and **graded approach** are applied

4.1.a,b

Storage of RW, disused radioactive sources and radioactive materials is not a **final** RW management solution



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Article 11 JC compliance: GENERAL REQUIREMENTS for the safety of radioactive waste management

MD 35225/2023 article

4.1e

RW generation shall be kept to the reasonably practicable minimum

4.1f

The interdependencies between all stages of production and management of RW are taken into consideration

4.5

The Radiation Protection Principles as described in the relevant provisions of the Radiation Protection Regulations, based on IAEA safety standards and the 2013/59/Euratom directive are applied

14.1

The radioactive disposal facility shall be sited, designed and operate with a view to isolating waste from humans and the biosphere for a prolonged period of time

7.3

The license holder proves the safety of the installation, including operation and decommissioning



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Action on Suggestions & Challenges from RM7

No suggestions to Greece have been made during the RM7

Action on Suggestions & Challenges from RM7

Challenge 1 To make a success of the national project “Recovery and Resilience Facility (RRF)”

Response RRF Two basic WP

WP I

Export of DSRS for recycling

- ~ 80% of the total activity of the disused sources in Greece have been included in the project to be exported abroad for reuse or recycle

Sources exported (May – Sept. 2024)

4 sources Am-241

3 sources Co-60

18 sources Sr-90

15 sources Cs-137

1 source Ra-226

3 old teletherapy sources of Co-60

Remaining Sources

cat 1 = 0 sources

cat 2 = 3 sources

cat 3 = 9 sources

WP II

NCSR “D” historical RW

Characterization & Re-packaging

- Started in September 2024 and expected to be completed by mid-2025

Tender for:

- Purchase of new drums
- Characterization of 153 old drums

After preliminary housekeeping ended up to **~350 drums**

**Up to now ~ 200 old drums have been characterized
and re-packaged in ~ 140 new drums**



Action on Suggestions & Challenges from RM7



Action on Suggestions & Challenges from RM7



Action on Suggestions & Challenges from RM7



Action on Suggestions & Challenges from RM7

Challenge 2 To **decide** whether a **disposal facility** is going to be **at new site or at NCSR “D” site**.

- Response**
- ✓ A **preliminary siting study** has been conducted, considering physical, geological and hydrological issues, radiation protection, and environmental impact.
 - ✓ Based on the NCSR “D” inventory (radioisotopes, activity), including estimation from future GRR-1 decommissioning, two types of disposal facility were considered: a **vault (near surface facility ~ 9 m depth)** for the majority of the RW and a **borehole (~ 65 m depth)** for radioisotopes of high specific activity (e.g. control rods of GRR-1).
 - ✓ The results indicate that **the site of NCSR “D” may satisfy safety criteria**.
 - ✓ The **conclusive radiological assessment** can only be finalized after **further hydrogeological and geochemical analyses**.



The work appeared in a scientific publication



Preliminary safety assessment for planning near surface disposal of low-level radioactive waste in Greece



Current challenges & Areas of improvement

Challenges

To finalize the procedures for the siting of the disposal facility: partially addressed since RM7.

To establish a waste management organization (WMO) in a timeframe suitable to carry out the necessary activities foreseen in the national programme.

Improvement

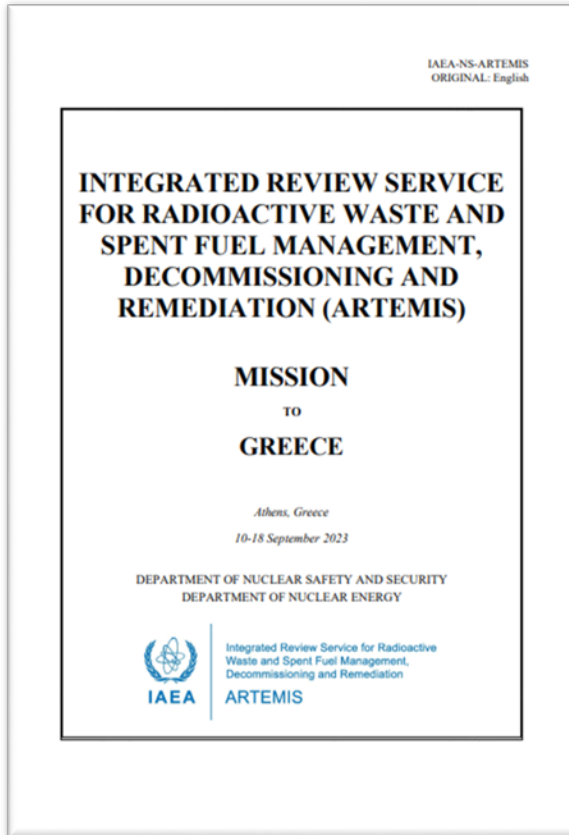
To update the national policy and strategy to address ARTEMIS findings.

Improvement of EEAE's communication strategy to include all stakeholders in decision making.



Significant events since RM7

The ARTEMIS mission was successfully completed in September 2023, as scheduled



Recommendations & Suggestions

13 Recommendations

2 Suggestions

3 R National policy

1 S Inventory

3 R National strategy

1 S Capacity building

4 R Safety case

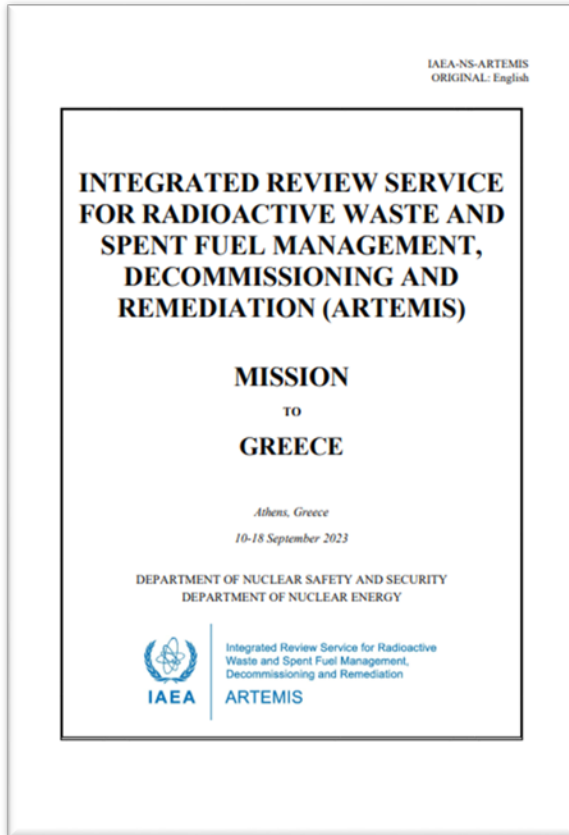
1 R Cost estimates

2 R Capacity building

8 R & 1 S to the Government, 3 R to the Implementer, 2 R & 1 S to the Regulatory Body

Significant events since RM7

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Recommendations & Suggestions

Further development of the national programme

- ✓ all waste streams: **decommissioning of all facilities, Norm waste**

Elaboration of the national inventory

- ✓ **future arisings from decommissioning of all facilities**

Cost estimation & financing

- ✓ **post closure of all facilities ...**

Capacity to implement all the actions within the programme

Relevant overarching issues agreed at RM7

Competence and staffing linked to timetable for SF and RW management programme

- **EEAE** has a 69-member staff. The EEAE unit responsible for ionizing radiation practices consists of 12 staff members. While most of them are mostly engaged with medical and industrial facilities (since these consist the majority of the facilities in Greece), which also generate radioactive waste, there are no staff members exclusively dedicated to radioactive waste management.
- The personnel of the **interested parties** is encouraged to actively participate in international conferences, workshops, and collaborations to exchange knowledge with global experts.
- The current **interim radioactive storage** staff comprises 2 scientists at permanent positions. The interim storage also occasionally employs other workers of the NCSR "D" (e.g. technicians, forklift driver).
Average age 46 y (Range 36 – 62 y)
- The current **GRR-1 staff** comprises 1 scientist (head of the lab) and 8 technicians (3 reactor operators, 1 mechanical engineering, 1 electrical engineering, 1 electronic engineering, 2 radiation protection technicians).
Average age 59 y (Range 53 – 65 y)



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Relevant overarching issues agreed at RM7

Competence and staffing linked to timetable for SF and RW management programme

- EEAE has established a **scholarship program** for postgraduate or doctoral studies abroad, in fields related to nuclear technology and radiological or nuclear safety.
- Greece through EEAE recognizes the importance of developing a **pool of skilled professionals** who can contribute to the critical area of nuclear technology (including the topic of radioactive waste management).
- The number of talents required for specialized fields such as RW might be limited. However, ensuring a strong foundation of expertise is essential for the effective implementation of the national programme.

Relevant overarching issues agreed at RM7

Inclusive public engagement on SF & RW management.

- Regulatory provisions **are in place** to ensure public information and 'meaningful participation' in site-selection decision making. EEAE also maintains communication mechanisms, including public information (e.g. by its website) and a public consultation process.
- The public **engagement strategy is currently being developed**. As a first step, **public needs** and **concerns** are being analyzed, and stakeholders are segmented based on their interests and influence on the radioactive waste management project. Key groups include the general public, local communities, NGOs, activists, and residents of surrounding areas.
- Given the documented lack of public awareness on radioactive waste in Greece, **priority has been given to providing accurate information**.
- To this end, a **social media campaign** has been developed and is about to be launched to inform and educate the public, including local communities.



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Relevant overarching issues agreed at RM7

Ageing management of packages and facilities for RW and SF, considering extended storage periods.

- Repackaging and recharacterization of legacy RW will be concluded by mid-2025.



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Good Practices & Areas of Good Performance

Practices

Recycling/reuse of all remaining fresh LEU (from GRR-1 to McMaster Univ. RR in Canada).

Recycling/reuse of all remaining fresh natural Uranium (from the School of Mechanical Engineering of the National Technical University of Athens to a DoE National Lab. in the USA).

Massive re-packaging and recharacterization of the legacy waste inventory (enhances NRWIS interim storage safety related to ageing, greatly facilitates final disposal).

Performance

First time publication of a multiannual budget for RWM in the Government Gazette.

EEAE scholarships for postgraduate studies abroad to obtain a master's or doctoral degree in subjects in the areas of nuclear technology and nuclear safety.

Questions and comments received on the National Report

Name of CPs	Country Group	No of Cs/Qs	No of Qs answered
Botswana	8	2	2
Brazil	8	3	3
Czech Republic	8	3	3
Germany	2	5	5
Iceland	8	3	3
Russian Federation	2	2	2
Ukraine	8	1	1
USA	6	2	2
Total		21	21

Topics of Cs / Qs

7	Details of the site selection process for the planned disposal facility & Public Engagement
3	Challenges in returning DSRS and alternative long-term management strategy if returning them is not possible
3	Reviewing and updating the national waste management strategy, partly in connection with the results of the recent ARTEMIS mission results
2	GRR-1 decommissioning plan and RWM
2	Staffing of RWM and WMO
1	Waste classification
1	No of licensed installations
1	SF/RW import prohibition
1	Operational license of the RW storage facility

(From Coordinator's report)

Planned measures to improve safety beyond the Convention itself

Emergency Preparedness & Response

- Strengthening cross-border cooperation and participation in **international emergency exercises**.
- Implementation of advanced **radiation monitoring systems**.

Capacity Building & Research

- Investment in **training programs** and human resource development for regulatory staff and key stakeholders.
- Promotion of **research and innovation** in radioactive waste management and radiation protection.

Public Engagement & Transparency

- Improved **stakeholder communication** and public awareness initiatives.
- Increased transparency through **accessible reporting and open data**.

Conclusions



The National Report demonstrates Greece's dedication to **safety** and **sustainable waste management**.



Ongoing efforts will further enhance **compliance** and **preparedness** in the field.



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