

Preparing for Joint Programming – the Romanian Approach in Planning & Developing Geological Disposal

Ilie Turcu
RATEN ICN

Alice Mariana Dima
ANDR

Outlines

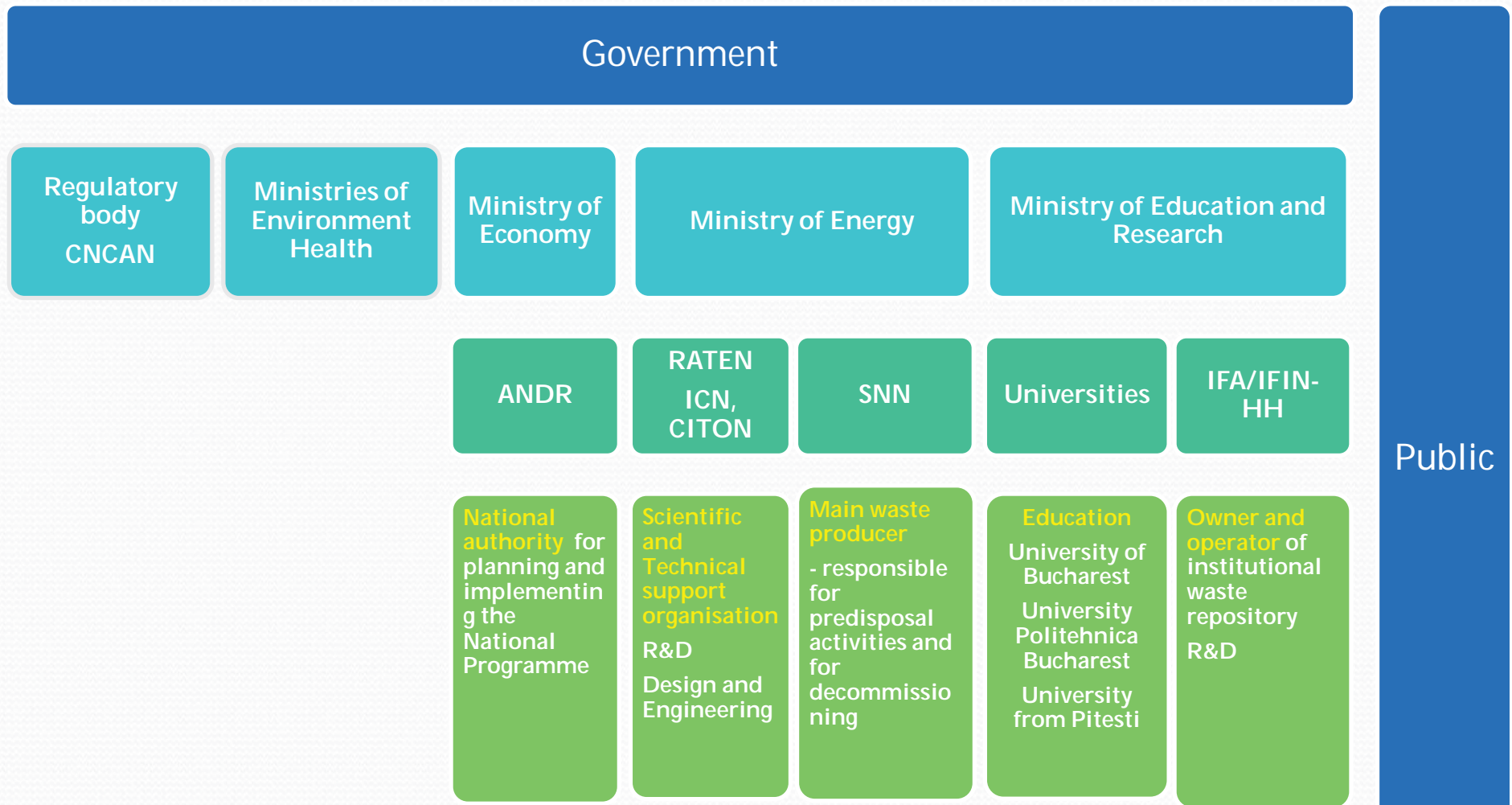
- National context framing Romanian participation in EJP in RWM
- Main actors for EJP
- Main reasons for participation in EJP
- National needs to be considered in EJP
- Expectations and benefits for national program
- Preparations for Romanian participation in EJP

Nuclear power program in Romania

- ★ nuclear energy
- ★ research
- ★ education



Main actors and responsibilities



Framework of radwaste disposal program in Romania

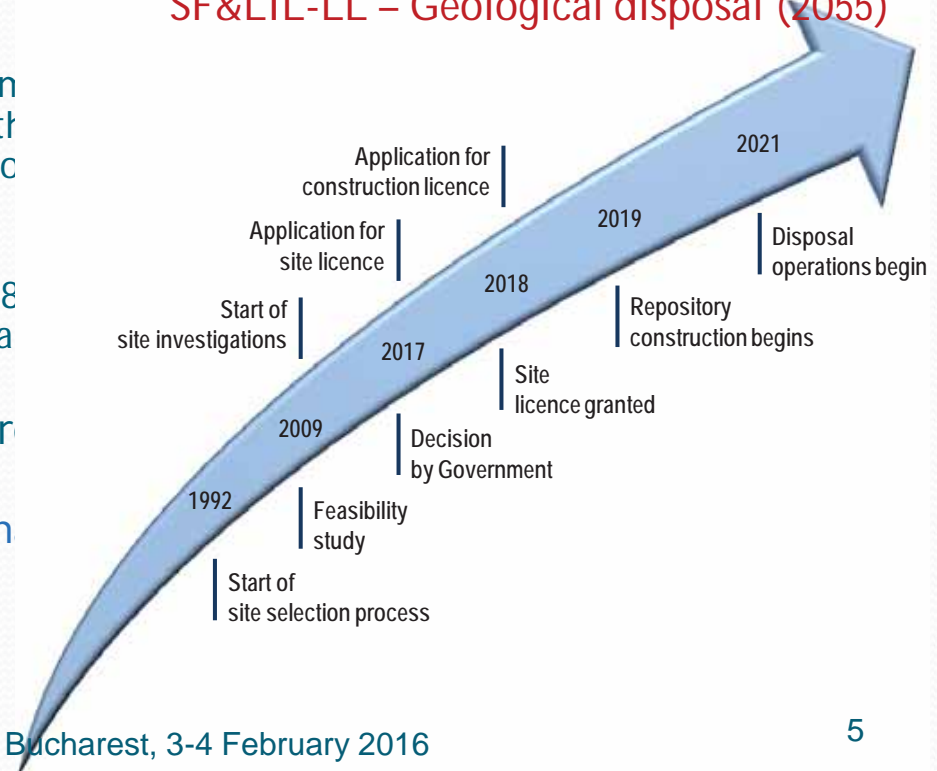
ANDR – Waste Management Organization – competent national authority responsible for planning and implementing the National Programme, including disposal of spent fuel and radioactive waste, and for coordinating the pre-disposal management of spent fuel and radioactive waste from operations and decommissioning

Legislation

- National Strategy on Medium and Long Term Management of Spent Nuclear Fuel and Radioactive Waste, including the Disposal and Decommissioning of Nuclear and Radiological Facilities (Order 844/2004) – ANDR - Includes the implementation program currently – under revision
- Government Ordinance 11/2003 (as amended by Law 378) establishes the national framework for the responsible management of radioactive waste and spent fuel
- Law 378/2013 for the transposition of Council Directive 2011/70/Euratom
- Notification to the Commission – update of the national program

First priority: LIL-SL disposal by 2021

LIL-SL - Near-surface disposal (2021)
SF&LIL-LL – Geological disposal (2055)

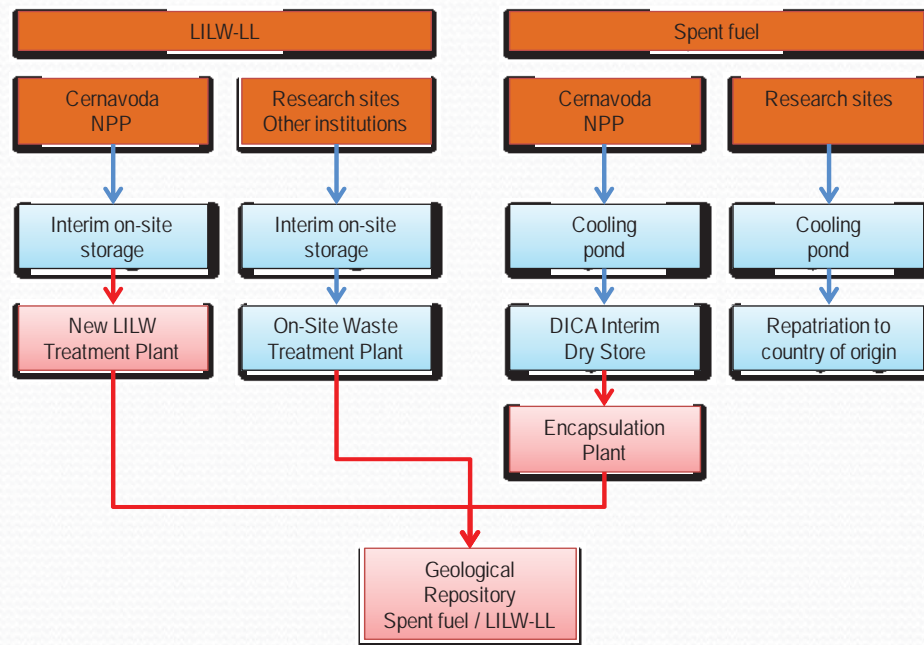


Geological disposal programme

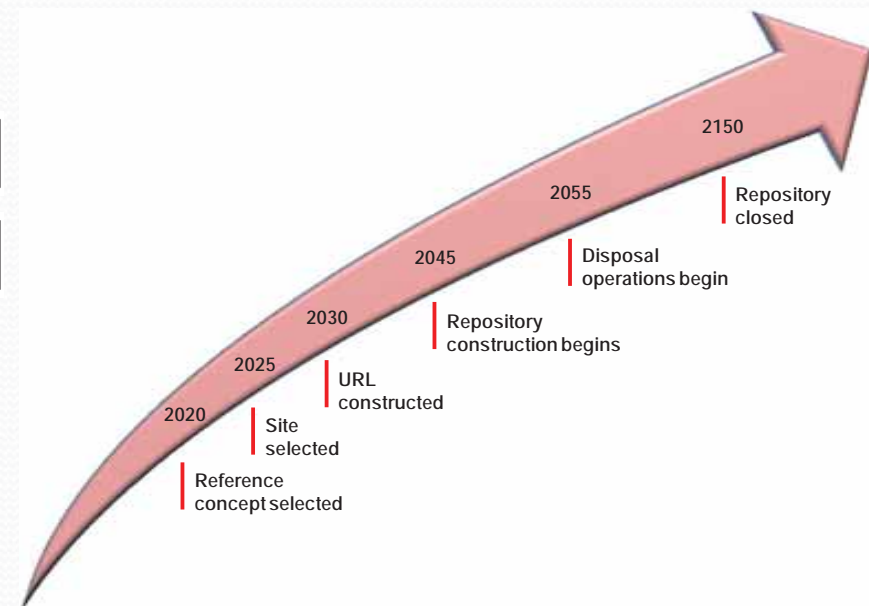
- Developed based on international experience
 - Ex.: IAEA technical cooperation project - Developing a geological disposal concept for spent nuclear fuel in Romania (TC ROM 3/005, 2007-2008).



Major outcome:
Geological disposal roadmap
(to be updated)



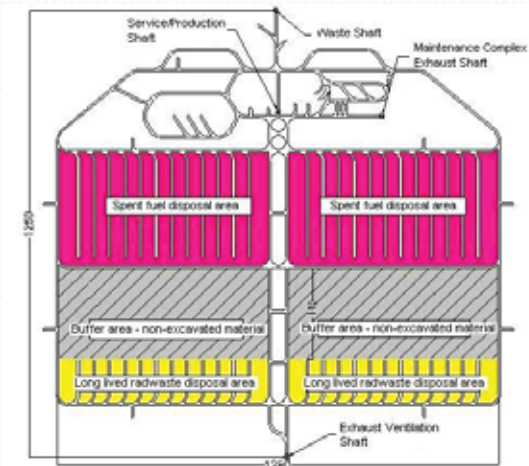
Management strategy for SF and LILW-LL
(blue- existing, red – future facilities)



repository implementation programming

Current Status of GD programme implementation

- Assessment of the national inventory
 - classification: LILW-SL, LILW-LL, HLW (SF)
 - waste streams and amounts (existing and forecasted)
- Defining a generic concept for geological repository
 - non-retrievable facility located at 500-1000m depth;
 - based on Canadian Concept for a Deep Geological Repository for CANDU spent fuel;
- Cost estimation
- Identification of 6 potential host rocks (desk research of existing geological data)- no decision on a preferred host rock
 - granite, green schists, basalt, clay, salt and volcanic tuffs.
- Development of a public involvement methodology
 - Methodology for public engagement (under IPPA project)
 - Romanian Stakeholders Group -representatives from industry, government, national agencies (including CNCAN and ANDR) for future debate of ANDR siting vision



- Horizontal galleries
- SF encapsulation in copper/steel double-shell containers
- Co-disposal of LILW-LL and SF in two separate areas,

ANDR approach for national program implementation

- establishing a detailed implementation plan for the geological disposal programme, identifying the necessary supporting infrastructure and skills base, plus a robust cost estimate;
- comparison of alternative disposal concepts, and adoption of a preferred design for further development and programme planning;
- site selection methodologies, including establishing the decision-making process and the involvement of stakeholders in it, and the specification of site requirements; and
- surface-based site characterization plans and technical requirements.

In order to support this approach, ANDR will:

- develop a detailed RD&D programme to support geological disposal, taking into account the available expertise,
- promote international co-operation
- periodically review the new RD&D results
- Nominated RATEN – as scientific and technical support organization

RATEN: mission and structure

- to provide **scientific and technical support** for the national nuclear power program;
- to maintain and develop the **technical competence** including safety related expertise during the life-time of the nuclear installations;
- to participate in the **strategy development** and in the achievement with priority of the scientific and technical objectives of the National Programs approved by the Government.

- Institute for Nuclear Research Pitesti,
RATEN ICN

www.nuclear.ro

- Centre of Technology and Engineering for
Nuclear Projects, Bucharest-Magurele
RATEN CITON

www.citon.ro



Role of RATEN in nuclear research

Main player in the research on RWM in Romania

Manager of the R&D nuclear power program – funded by the State, guaranteed by Law 144/1998

- ❑ Technologies development for the **safe operation of nuclear facilities**;
- ❑ Technologies development for the **new type of GEN IV reactors**;
- ❑ **Technologies development for spent fuel and radioactive waste management**
 - ❑ addressing the country needs (treatment and conditioning technologies, site characterization and safety assessment for LIL-SL disposal, preliminary studies for GD)
- ❑ **Radioisotope production** for medicine and industry;
- ❑ Research, design and nuclear **engineering activities**,
- ❑ Training in the nuclear field; Competences development in nuclear
- ❑ Public Information Program;
- ❑ **Activities sustaining the international cooperation area**
 - ❑ Participation in Euratom programme
 - ❑ active and direct communication between specialists
 - ❑ exchange of information from partners with more advanced experience

As a result, two important assets for future participation in EJP:

- competence
- experimental infrastructure

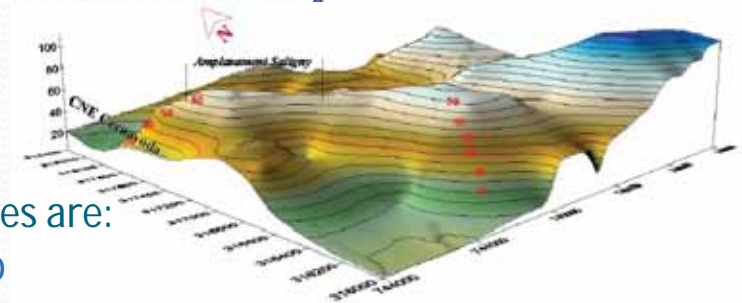
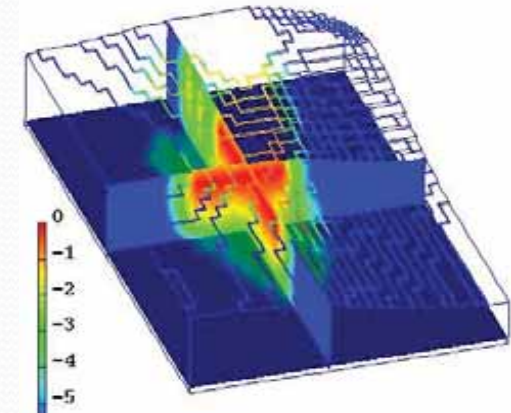
ICN Research potential for EJP

- Infrastructure
 - Radioactive waste treatment and conditioning plant
 - Radiochemical laboratories equipped for :
 - waste characterization
 - testing treatment & conditioning technologies
 - testing conditioning matrices
 - experiments for radionuclide behaviour in natural and engineering barriers



ICN competence and involvement in RWM

- Achieved as result of scientific research, design and technological development in LIL-SL waste management
 - inventory
 - treatment and conditioning technologies
 - site selection and characterisation
 - performance and safety assessment
 - uncertainty analysis
 - public involvement
- For Geological Disposal program, RATEN objectives are:
 - maintain and involve the existing competence in GD
 - improve it and build new competence
 - transfer it to the new scientists generation



To achieve these - participation in the European research must continue!

National needs to be considered in EJP (1)

- Implementation of the RWM strategy has to rely on:
 - Existing knowledge accumulated at European level
 - National support and potential to capture and apply this knowledge
- Urgent needs in management:
 - revision of the National Strategy for spent fuel and radioactive waste management
 - establishing a detailed implementation plan for the geological disposal programme, identifying the necessary supporting infrastructure and skills base, plus a robust cost estimate;
 - comparison of alternative disposal concepts, and adoption of a preferred design for further development and programme planning;
 - site selection methodologies, including establishing the decision-making process and the involvement of stakeholders in it, and the specification of site requirements;
 - surface-based site characterisation plans and technical requirements.

National needs to be considered in EJP (2)

R&D support in early phase

- Develop a R&D programme in support of siting strategy
- Develop Generic Safety Cases
 - inventory database;
 - site descriptive models; generic models for near-field, far-field and biosphere modeling
 - assessment of the disposal system options
 - evaluate the compatibility of the waste types – concepts – geological options with respect to safety and cost
 - computer codes for Safety Assessment
- Building and maintaining national competence
 - Materials behavior; new materials for repository components
- Development of adequate methodology for communication with stakeholders and their involvement for the early stage based on the country specificities.

Summarizing,
needs for short
term:

- Transfer existing European knowledge in R&D and management to be implemented in the generic Safety Cases using the national expertise
- Developing R&D – as part of European Joint Research

Reasons for participation in EJP

Previous ICN participation in Euratom programme made possible to:

- deepen the R&D activity and improve knowledge in geological disposal
- increase confidence in research results
- accelerate the progress in improving GD inventory
- understand different processes specific for geological disposal.

These benefits were possible due to **collaborative projects**

- **active and direct communication**
- **exchange of information** from partners with more advanced experience,

- To maintain and improve the national potential and its technical support to the RWM programme, participation in the European Joint Programming is essential !

Expectations and benefits

As most of the NMS are in the early stage in geological disposal, framed by similar constraints: small nuclear programmes, similar schedule, cost affordability, etc.

it should be easy to identify and agree common interest for similar studies which could be developed under a Joint Programming research.

- Main expectations:
 - a SRA reflecting the most urgent national needs on R&D and management
 - an implementing scheme affordable for the MLAP participation
 - Participation in EJP contributes to:
 - Efficient use of the national and regional resources
 - joint research
 - improving the existing competences,
 - building new skills in specific aspects related to the geological disposal (R&D and management)
 - recognition of the research results, with a positive impact on public acceptance
- 
- training
 - access to the existing research results
 - access to large experimental infrastructure
 - guidance and exchange of knowledge

How EJP could help?

- **RWM Management: first need**
 - **Provide guidance** - in planning in details the national programme with a particular interest on the siting approach.
- **Research:**
 - **Facilitate the access to up-to-date knowledge**
 - **Facilitate building competence (training)**
 - to prepare contribution to Safety Case development
 - defining generic disposal concepts
 - FEPs analysis
 - disposal options evaluation
 - **Facilitate participation in future R&D projects**
 - priority R&D topics of the SRA

Preparing for EJP

- European Joint programming should combine:
 - strategic framework in this field,
 - bottom-up approach and
 - high-level commitment from Member States.
- RATEN ICN: understood the need and started to pave the way for an institutional participation.
- Prerequisites for participation in EJP:
 - country priorities have to be reflected in the SRA
 - appropriate national resources should be made available.
- member of SNETP, NUGENIA, EERA, IGD-TP
- already involved in setting up SRAs in:
 - severe accidents (ASAMPSA+)
 - new reactor systems (ESNII+)
 - advanced materials (EERA NMJP)
 - waste management – JOPRAD - contributed in the elaboration of Research Entities SRA and in priorities set up, promoting this way national needs.
- The RD&D strategy 2016-2020 of RATEN on RWM and its associated program, clearly oriented to comply with the national programme needs, can provide the resources in terms of competence and infrastructure for the future participation in JP.

Conclusions

- RATEN is the most important player in the national research in geological disposal, as manager of a State funded R&D program.
- Participation in EURATOM programme linked the national needs to European research and contributed in creation of scientific and technical competence in support of national RWM program.
- To maintain and improve the national potential and its technical support to the national RWM programme, participation in the European research must continue through the EJP.
- Joining efforts and competence, sharing infrastructure as part of collaborative projects, open access to the existing knowledge, and sharing existing experience would be the first useful aids at this stage for Romania.
- Competence building in research and management in parallel with the education of the new generation of scientists and implementers can also benefit from collaboration with the most experienced lecturers on topics adapted to the actual urgent needs, according to the implementation programme under the EJP framework.
- There is an interest of RATEN to participate in the EJP involving components of its R&D Program on waste management in terms of resources, competence and infrastructure

Thank you for your attention