Freie Universität Berlin

ENTRIA

DISPOSAL OPTIONS FOR RADIOACTIVE RESIDUES:
INTERDISCIPLINARY ANALYSES AND
DEVELOPMENT OF EVALUATION PRINCIPLES

Technical, Political and Socio-Economic Challenges of Governing Nuclear Waste: A Comparative Perspective

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Agenda

- **ENTRIA**

  - Research Platform
  - FFU contribution

- **Nuclear Waste Governance**

  - Crisis in NWG
  - A comparative perspective
  - Questions
  - Lessons learnt

ENTRIA Partners

- 12 institutes from German universities and major research institutions and one partner from Switzerland
- Disciplines represented:
  - Natural sciences
  - Civil engineering
  - Repository research
  - Philosophy
  - Law
  - Social sciences
  - Political sciences
  - Technology assessment

Objectives and Areas of Work

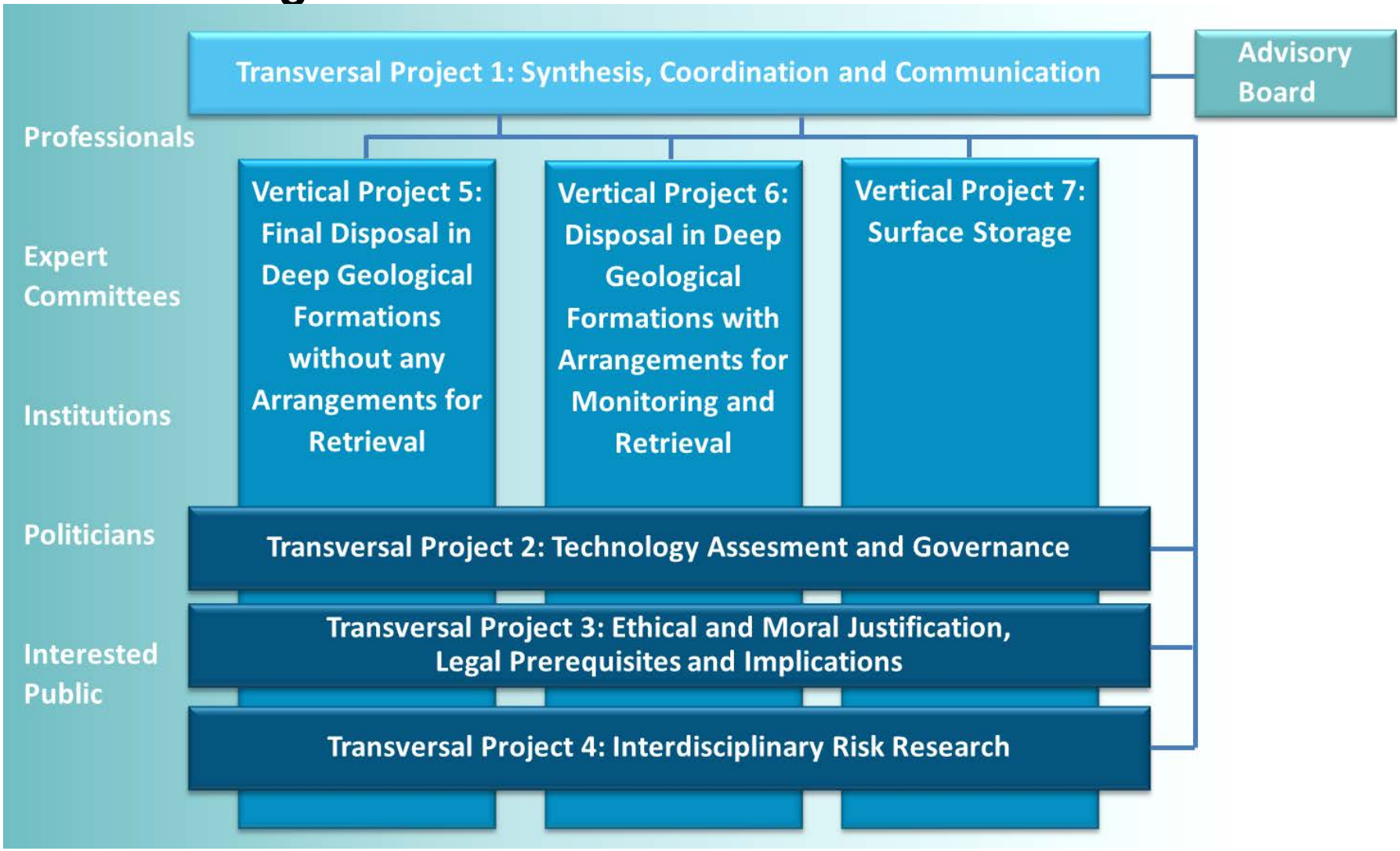
- **Disciplinary** and **cross-disciplinary** research regarding three waste management options
  - Final disposal in deep geological formations without arrangements for retrieval
  - Emplacement in deep geological formations with arrangements for monitoring and retrievability
  - Prolonged surface (or near-surface) storage

- Development of **evaluation principles** and knowledge about “context structures” for these options (Ethics, Law, Risk, Governance …)

- Disciplinary and cross-disciplinary **education**

- **Communication** with scientific community and interested public

ENTRIA: Organizational Structure



FFU Contribution (2013-2017)

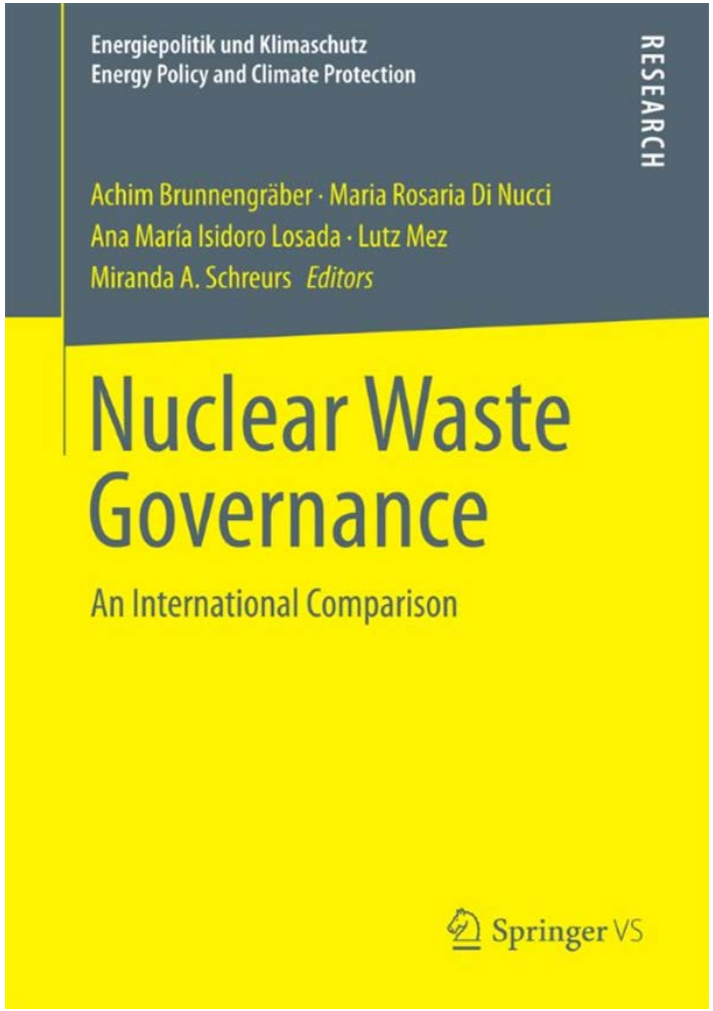
Multi Level Governance-Perspectives on Nuclear Waste Storage: A Comparative Analysis

- Actors screening and analysis of the actors in Germany
- Acceptance and conflict analysis
- Analysis of Multi Level Governance
- International comparison of nuclear waste disposal approaches and concepts
- Analysis of policy instruments and institutions

FFU ENTRIA Team

- Miranda **Schreurs**, Prof. Dr., Director of the Environmental Policy Research Centre until 2016
- Achim **Brunnengräber**, PD Dr., Political Scientist, Coordinator of the FFU-ENTRIA Project
- Maria Rosaria **Di Nucci**, Dr., Economist, Senior Researcher
- Daniel **Häfner**, MA in Culture and Technology, Researcher
- Karena **Kalmbach**, Dr., Historian, Postdoctoral Researcher
- Ana María **Isidoro Losada**, Researcher, Landscape and Environmental Planning (Diploma) and Sociology, Political Science and History (Magister)
- Lutz **Mez**, PD Dr., Political Scientist, Associate Professor at the Department of Political and Social Sciences, FU Berlin
- Dörte **Themann**, BA in Environmental Science, Student Researcher

A comparative perspective

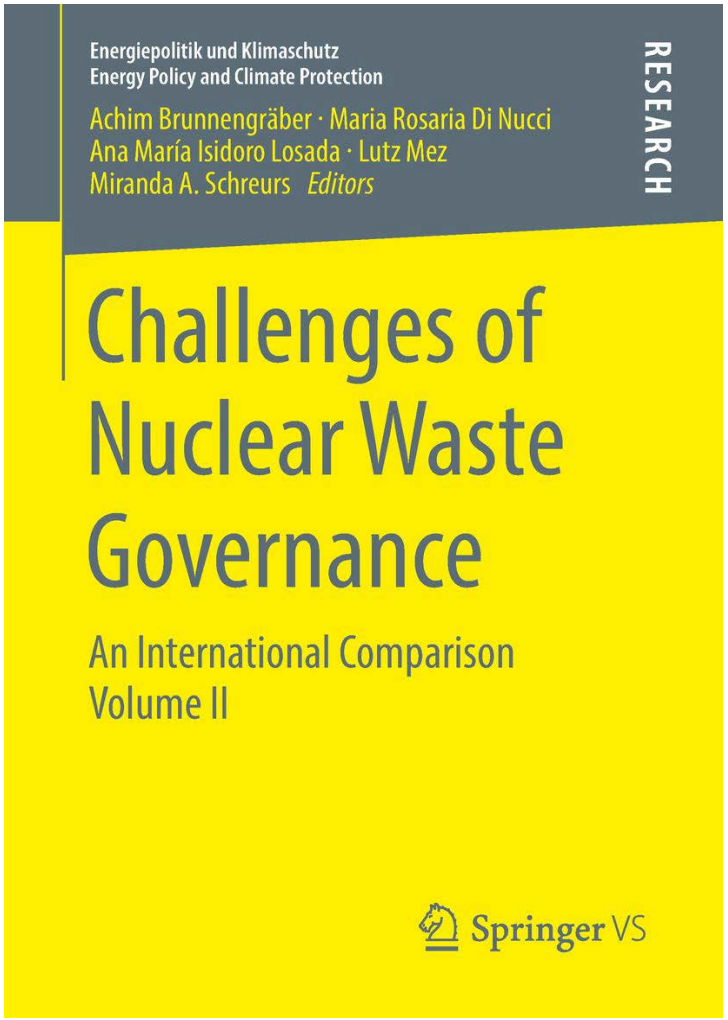


12 Case studies

- UK
- France
- Belgium
- Switzerland
- Germany
- Sweden
- Finland
- Czech Republic
- USA
- The Netherlands
- Italy
- Spain

Further 12 case studies in Volume II

A comparative perspective – Volume II

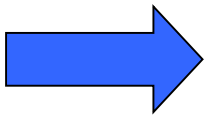


12 Case studies

- China
- Russia
- South Korea
- Japan
- Hungary
- Lithuania
- Slovakia
- Slovenia & Croatia
- Ukraine
- Canada
- Argentina & Brazil
- South Africa

Crisis in Nuclear Waste Governance

- Until today: **no Deep Geological Repository** for high level nuclear waste (HLW)
- governments **unable or unwilling** to take on the nuclear waste challenge
- companies' strategy: leaving the problem to future generations (***private goods – public bads***)
- financial calculations that **underestimate actual costs**



growing pressure to solve the problem?

A Comparative Perspective

- 24 country studies reveal the multifaceted „wicked problem“ of HLW
- HLW is a wicked problem – a highly complex issue, which is challenging to solve because of its many interrelated technical, material, social and political dimensions
- A further complicating factor is the time dimension involved with radioactive waste management and the impact on future generations
- Long term solutions must be found in currently 50 countries with spent nuclear fuel
- Nuclear waste governance (NWG) is used as lens to analyse how actors influence nuclear waste policies
- Special interest: how conflict is managed and whether and how public participation is encouraged
- NWG is influenced by local, national, and international factors and institutions

A Comparative Perspective 2

- The country studies reveal how siting decisions and processes are not only affected by geological, geographical and hydrological conditions
- They are also shaped by the nature of the political and legal system, formal and informal rules and procedures, culture, political constraints, technical skills, the stock of knowledge, public acceptance, and – a country‘s nuclear history
- An important role plays the way in which competing information and knowledge is processed and put to use by different actors in different political and cultural context
- NWG is confounded by regulatory challenges, the conflicting values and preferences of stakeholders and still unresolved socio-technical and political issues
- The comparative approach helps to identify common challenges facing governments in dealing with this wicked problem

Questions

- How are different political systems promoting debate and transparency in site selection?
- What steps have been taken to address HLW?
- How are scientific, political, and technical disagreements dealt with?
- Who is involved in decision making processes?
- How are conflicts being addressed?
- What lessons have been learned about NWG over time?

Lessons learnt

- Size matters
- Government – civil society relations
- Responsibilities for nuclear waste management
- DGD – deep geologic disposal as a favoured path
- Long-term interim storage facilities
- Procedural and distributional justice, voluntarism, and compensation
- The nuclear-industrial complex
- Sophisticated new forms of (robust) governance
- Risks and uncertainties

Size matters

- Size matters when is comes to NWG. The smaller and more densely populated a country, the higher the likelihood that there will be opposition to DGD sites
- Obvious reason: they are more likely to be near to population centers
- The transport of HLW to nuclear waste management sites is also more likely to travel near or through population centers
- Canada, China and Russia have vast territories, large sections which are only sparsely populated. This does reduce the potential for NIMBY style protest
- Relatively small countries like Lithuania, Slovenia, or Slovakia may have particularly challenging times finding DGD sites domestically

Government – civil society relations

- The experience of the Nordic countries reveals that a key element for successful siting procedures is public trust in governmental institutions and a willingness to delegate the negotiation of agreements to them
- Other countries like China and Russia are nuclear weapon states with on-going conventional nuclear energy programs
- Both countries have limited experience with public participation in NWG and there are various constraints on non-governmental organisations
- The limited experience with civil society participation in NWG is similar in central and eastern European countries
- Even in countries with longer democratic traditions, public participation in NWG is not always high (e.g. Japan and South Korea)
- Fukushima has forced major changes in Japan‘s approach to NWG
- In CEE countries with young or non-existent democratic traditions, there is still limited transparency and procedural opening

Responsibilities for NWG

- There are some common patterns concerning the subdivision of responsibilities between waste producers and waste management organisations
- In many national governance structures the functional separation between „operators“ and „regulators“ in charge of overseeing safety requirements and standards exist
- An issue can be the independence of regulators as in case of Japan. After Fukushima regulatory institutions were restructured and responsibilities altered
- There are prominent differences of the ownership structures of the implementing organisations (state agencies or private organisations)

DGD – deep geologic disposal as a favoured path

- DGD represents the preferred path of disposing HLW, independent of whether the host rock is crystalline, clay or salt
- DGD is considered by the great majority of scientific and technical experts as the best available option that does not place enduring burdens on future generations
- This paradigm is nor without some critique, however
- In some countries there is a debate concerning whether there should be permanent closure of the final repository or options for retrievability
- In smaller countries with small volumes of waste there are concerns about own DGD facilities

Long-term interim storage facilities

- All countries store their HLW currently in interim facilities which are used for initial cooling of radioactive material and because of the lack of alternative disposal options
- Until today none of the countries examined have constructed a DGD repository, but differ in the extent to which steps have been taken in this direction
- Several states have opted for interim storage options to be used for the next decades or even centuries, putting decisions about DGD sites on ice
- Radioactive waste is stored above ground in specially constructed facilities
- Major criticism of this approach concern the security risk in the case of terrorist attacks or war and other yet unknown problems

Procedural and distributional justice, voluntarism, and compensation

- In most countries there is still considerable public mistrust regarding NWM
- Governments have made too many false promises or shifted too often the waste question into the future
- Siting is a broad societal project that needs coming to terms with the past and a broad societal dialogue
- Voluntary search processes have been the preferred path in countries in an advanced stage of planning a repository or already constructing one
- The consent of the affected population is an essential advantage of voluntary siting approaches, often associated with compensatory measures
- In many countries, latent and open conflicts that have grown over decades have contributed to the „clumsy solutions“
- Waste siting decisions leave future generations to deal with problems they have not generated

The nuclear-industrial complex

- At the global level, the nuclear industrial complex is declining along with the decline in operational NPPs and their generation of electricity since 2006
- However, in several countries NPPs continue to be used and constructed and plans have been set for further expansion (e.g. China and Russia)
- In Japan‘s case the future of nuclear power in the country remains contested
- Argentina, Brazil, Canada and South Africa also aim to maintain or expand their nuclear energy systems
- Many of the eastern European countries still have operating NPPs and the added challenge of high nuclear electricity dependency, despite aging facilities

Sophisticated new forms of (robust) governance

- The development of geological repositories for radioactive waste will take place over many decades
- Societal developments of such a long time are not predictable and should be open to progress in science and technology, to evolving societal demands and to fixing potential implementation errors
- NWM debates in most countries examined in Vol. I were no longer confined to scientific and techno-political actors, but also include many other relevant stakeholders, including civil society and social movements
- This was less the case in many of the countries examined in Vol. II
- To some extent it can be found in Canada, in Japan and in South Korea
- In countries with limited open debate the question is whether the conditions exist for reflexive governance
- New and more democratic approaches to NWG will become necessary, even if the process is often slow and cumbersome

Risks and uncertainties

- Decisions concerning waste management require allocating risks and benefits to different regions, different generations, and social groups
- Many of these decisions are linked to the national debate over the role of nuclear energy and the future of nuclear weapons
- In other countries the deployment of nuclear energy is linked to the narrative of a “clean energy source” and as a way to combat GHG emissions
- The long term reliance on nuclear energy is questioned not only for safety reasons but also because of the problem of HLW management
- Problems are “socially and ideologically produced” and their (possible) solution depends on how the problem is framed
- The definition of problems also depends on the potential solution being considered or taken

Thank you for your attention!

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