

Site selection in Germany - A Restart – 14103

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Following the Fukushima event, Germany had decided a phase out strategy concerning the use of nuclear power for electricity production. In 2013 the federal government announced that they also had achieved an agreement with the Federal States in Germany on a law to restart the site selection for a repository for spent fuel and high active heat producing waste from scratch. The consequence of this law is a delay of at least two decades to start operation of a final disposal site and additional costs of at least EUR 2 billion.

The new law was passed in July. At first a 33-member commission will be installed to develop basic principles for site selection, including safety requirements and selection criteria for rock formations. The commission includes representatives from the parliament, academia, civil society organizations, industry, the environmental organizations and trade unions and should forward its recommendations end of 2015. The present law will then be reviewed. The site selection then should start beginning of 2016 potentially based on a new site selection law. A new site should then be determined till 2031 and for this site the more detailed site investigation will take place followed by a detailed safety analysis, before the erection of the repository can start.

INTRODUCTION

The concept for disposal in Germany up to now was based on a resolution for the disposal of the nuclear power stations set up by the federal government and the heads of the governments of the Federal States of Germany on September 28th 1979[1]. In the resolution the Heads of the Governments appreciated that Lower Saxony was willing to build a repository in Gorleben inside their Federal State, once the reconnaissance and investigation of the mine deliver the results necessary to make sure that the Gorleben salt dome is suitable for this purpose.

According this resolution, the site investigation should be performed “quickly”, hence “the

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knowledge needed for the decisions to be made is available in the second half of the 1980s". The suitability of the Gorleben salt dome was not questioned until 1998, when the federal government changed.

The new government saw a necessity to refine the requirements for the applicability criteria to revise the conceptual design for the disposal of radioactive wastes. It is stated in the declaration of the federal government about the exploration of the salt dome in Gorleben that further exploration will not clarify the questions raised. Thus, the exploration should be suspended for a minimum of 3 but 10 years in maximum, until questions about the concept and safety issues were solved. But it was also stated that there are no indications up to now that the Gorleben salt dome might not be suitable for disposing of high active and heat generating wastes. At that time according to the schedule of the Government a final repository was supposed to be available in 2030.

The moratorium on the exploration of the salt dome in Gorleben as a potential repository for heat generating radioactive wastes was suspended in October 2010[2]. The revision of the exploratory works should finally clarify, whether the salt dome is suitable as a final repository. An open and unbiased approach should comprehensively justify the suitability or otherwise if any findings disqualified the salt dome from being suitable, new ways had to be found.

After the Fukushima incident and the following repeal of the extension of operating times and the stipulated time limitation of power operations of all power stations, a discussion among the different parties in the German parliament about finding a consensus regarding the disposal of heat generating radioactive wastes took place. The result of the discussion was the "law about the search and the selection of a disposal-site for heat generating radioactive wastes and for the amendment of other acts". An assessment of the goals of this law and an evaluation whether the goals are accomplishable will be discussed in the following.

GOALS AND DETERMINATIONS FOR THE PROSPECTING OF A REPOSITORY

The law for the prospecting of a repository includes regulations for the prospecting and selection of sites for the disposal of heat generating radioactive wastes. The essential statements of the act are [4]:

- Finding a solution for an appropriate disposal site in a national consensus

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- Solving the task within one generation
- Disposal of the wastes produced in Germany according to the principle of national responsibility
- Selection of the site should be safety-oriented and based on scientific approaches
- All citizens should participate in a transparent procedure in every stage in order to achieve acceptance
- Essential decisions will be taken by the German Parliament and the Federal Assembly

The search is divided into nine procedural steps:

1. A first stage to evaluate the legal regulations and to determine general criteria
2. Investigation of potential siting regions
3. Exploration from above ground
4. Exploration under ground
5. Comparison of sites
6. Recommendation of one site
7. Determination of a site by federal law
8. Licensing procedure for the proof of safety at the defined site
9. Construction of the facility after legal verification of the approval decision, if applicable

Parties to the proceedings are:

- Federal and State Commission (33 members)
- Project developer (Federal Office for Radiation Protection (BfS))
- Regulating authority (Federal Office for Nuclear Disposal (BkE))
- Societal advisory committee

The law includes several approaches which all have to be considered positive. One is the planned consensus-oriented participation procedure, which represents an important socio-political goal after decades of controversy. Another important approach is to consider positive experiences acquired in other countries like Switzerland, Sweden and Finland. Another fundamental element is the open and unbiased siting procedure without prior determination of one site.

The implementation of these goals may result in consequences or issues affecting these goals themselves. There is some linguistic misunderstanding concerning the explanations of the new

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siting procedure. The Federal Minister for the Environment Gabriel said in a press release: “We don’t need some site, but the most qualified” [5]. Trittin, the predecessor of Gabriel as Federal Minister for the Environment states out an “open und unbiased search for the safest site for the most dangerous waste of mankind”[6]. In comparison, the law claims a “comparing siting procedure..., which is focused on the investigation of the best possible site in Germany in terms of safety” [3]. This diversity of goals may result in problems regarding specific criteria to compare the sites. Essentials elements of the law that have to be reviewed are the following:

- a. Role of the Federal and States Commission
- b. Apolitical procedure - Legal regulations
- c. Scientific approach
- d. Organizational definitions
- e. Comparability of the suitability of possible sites
- f. Time required for the search for a final repository
- g. Consequences regarding interim storage
- h. Voluntary principle
- i. Costs

REVIEW OF THE GOALS OF THE DRAFT LAW/ LAW FOR THE SEARCH FOR A FINAL REPOSITORY

a. Role of the Federal and States Commission

According to the siting law the Federal and States Commission is responsible for the following issues:

- a. Review of the siting law
- b. Analyzing the approach in other countries
- c. Suggestions to the following:
 - i. Review of alternatives to direct disposal
 - ii. Exclusion criteria (general safety requirements, geoscientific and water management, exclusion criteria or land use regulations)
 - iii. Minimal requirements
 - iv. Host-rock-specific exclusion and selection criteria for salt, clay, crystalline rocks

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- v. Host-rock-specific assessment criteria
- vi. Methods for the safety analyses
- vii. Retrievability, recoverability, re-entry)
- viii. Organization and procedure of the selection process
- ix. Requirements for public participation

The commission will then publish a report with recommendations for the Federal Government, parliament and the Federal States. The report represents the basis for the evaluation of the law and for passing further laws (law stipulating exclusion criteria, minimal requirements and assessment criteria)

For this purpose, it must be mentioned:

- The mandate for the Federal and States Commission basically corresponds to the approaches developed by the AkEnd [7]. It is essential for the entire process, that it is feasible to compare the safety of different host rocks and sites and corresponding criteria for comparing can be developed.
- The first procedural step of this law stipulates to evaluate the law itself.
- There might be alternatives to direct disposal like long-term interim storage, Partitioning and Transmutation or Partitioning and Conditioning.
- The questions to be clarified by the Federal and States Commission are of scientific nature.

The Federal and States Commission must develop profound criteria before the siting-process will start. Because of missing criteria for site comparison, it is not possible to determine the suitability of one site, yet. These criteria for comparison are crucial for the siting process, even more than minimal requirements or exclusion criteria. If there are no scientific criteria to compare sites of the same host rocks or overall, socioscientific criteria have to be used for siting, like it is the case in Switzerland.

Despite the fact that there are up to now no tools to compare different host rocks or sites, it is never the less possible to develop criteria to evaluate the suitability of sites or siting regions. Estimating the suitability of a particular site will be possible after surface exploration at the earliest.

The acceptance of the siting process and of the result is a vital element of the siting law. Public

acceptance will play a relevant role when the Federal Office for Nuclear Disposal reaches a decision.

The law does not stipulate how this acceptance will have influence on the decision. Therefore, the Federal and States Committee must specify how and to what extent acceptance should affect the decision-finding.

b. Apolitical procedure – legal regulations

It is intended that the process is purely scientific based and should not be influenced by political decisions. But the following legal regulations are provided:

- Evaluation of the siting act
- Law stipulating exclusion criteria, minimal requirements and assessment criteria
- Criteria (decision and assessment principles)
- Decision on sites to be explored on the surface
- Decision on sites to be explored from sub surface
- Binding decision on one site

Recommendations developed in the former AkEnd process only suggest a parliamentary decision, if Federal States are not willing to participate or to accept decisions. The chosen procedure is characterized by integrating the Federal Parliament as well as the Federal States. Thus, it meets the requirements of political legitimacy, but doesn't comply with the goal of an apolitical process.

This issue is intensified by regulations concerning mining and water law, which are the responsibility of the Federal States. This can be a potential cause for the exploitation of these regulations by state governments to prevent their state being chosen for a final repository.

c. Scientific approach

The Federal and States Commission consist of 33 members, but only 8 having scientific background. The commission can and should make use of the scientific expertise provided by different organizations.

It must be doubted, that this structure can fulfil the requirements of an apolitical, unbiased and scientific approach to the procedure because the academic/scientific field does not have a

majority. The procedure is politically dominated in two respects. On one hand, 50% of the votes in the Commission are provided by political organizations and on the other hand, the Federal and States Commission will simply give recommendations that will lay the groundwork for a political legislative procedure.

d. Organizational Definitions

Both the Federal Office for Radiation Protection BfS (being the applicant or project developer) and the Federal Office for Nuclear Disposal (BkE) are part of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BM).

Until now, it was the responsibility of the particular federal state authority to grant authorization concerning licensing of nuclear sites. The BMU was therefore authorized to issue directives (including those relevant for the search for disposal sites) to the appropriate authorities in the States. This fact was partly criticized by politicians.

Preliminary drafts recommended to separate these functions by transferring the responsibility for the applicant and operator of the repository to a private organization. This setup also represents the situation in Switzerland, Sweden and Finland.

The predefinition of the law will possibly not comply with the Council Directive 2011/70/EURATOM of 19 July 2011, “establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste” [8]. With regard to the regulatory authority the directive states in Article 6:

“Member States shall ensure that the competent regulatory authority is functionally separate from any other body or organisation concerned with (...) the management of spent fuel and radioactive waste, in order to ensure effective independence from undue influence on its regulatory function.”

Separating the regulatory body and the project developer (like the directive demands) is not implemented in this law. Therefore, the form of organization differs from the approaches in Switzerland, Sweden and Finland, which comply with the EU-directive.

e. Comparison of the suitability of possible disposal sites

Within the siting law, one of the biggest challenges is to compare regions or sites in terms of safety. This is underlined by the fact, that far reaching decisions are made at a time, when the

knowledge about different sites or regions is at the very minimum. Only those regions are evaluated that are explored in terms of geology, hydro-geology, tectonics, etc. Missing knowledge about other potential siting regions will lead to an exclusion of the particular sites even before they are explored adequately.

Evaluation of one particular site is not possible without having concepts or advanced ideas of the quantity and type of the wastes, waste containers or disposal concepts. Final disposal concepts can be optimized. Thus, a relatively higher release of radioactive material in the post operational phase must not lead to the conclusion that the particular site is less suitable. Instead, it might be the entire disposal concept that was not suitable.

Switzerland drew the conclusion to use a threshold for the effective dose in the biosphere as criterion for the safety of a specific site. The radioactivity release must stay below the threshold in the long term safety proof to qualify the site for disposal. The concept provides all sites that have been investigated and being equally suitable in terms of safety if the release is under the threshold. Sweden and Finland developed similar concepts.

Insofar other safety criteria may and should therefore be used to finalize the decision about a specific site.

f. Time required for the siting process

The procedure until the final decision for one site is supposed to be finished by 2031, giving the participants about 16 years after the start of the evaluation procedure. This schedule does not represent an adequate time scale. The procedural steps are:

1. Principles for the decision,
2. Regions, sites for exploration above the surface,
3. Definition, programs, criteria for exploration above the surface,
4. Realization of the exploration from above surface, recommendations for sites to be explored underground,
5. Stipulation of sites to be explored underground,
6. Definition, programs, criteria for exploration underground,
7. Realization of the exploration underground,
8. Recommendation of one site,
9. Stipulation of one site for licensing.

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After the particular site was stipulated, the actual exploration underground, the facility planning and design, developing the proof of safety and the licensing procedure will take place. After the plan approval decision and construction of the facility the operational phase may start, but law suits delaying operation must be considered.

	Tasks	Duration (target) [a]	Duration (realistic) [a]	Target [year]	Realistic [year]
1	Basics for decision review of alternatives	2	3	2015	2016
2	Recommendations regions/sites	2	6		
3	Program exploration above surface	1	3		
4	Site exploration from above surface	3	6,5		
5	Recommendation of sites	2	3	2023	2035
6	Program exploration underground	1	3		
7	Exploration underground	6	15,5		
8	Stipulation of one site	1	5		
	Σ	18	45	2031	2058
9	Exploration, licensing procedure, construction	19	25		
	Σ	37	70		
	Commissioning			2050	2083

Table 1: duration of site selection

Following these regulations it can be shown that the siting procedure will easily take a minimum of 70 years until operation can start, even if short time frames are assumed for each procedural step.

Determining a site until 2031 – like it is stipulated within the siting law- seems to be unrealistic. Today`s generation will not find a solution for final disposal. Therefore, the entire process should be accelerated.

g. Consequences

In any case, a restart of the siting procedure will cause the licensed operational phase of all interim stores to exceed. The idea to store wastes for a maximum of 40 years in an interim facility is no more achievable.

ASSESSMENT

The siting law should build the framework to perform the site selection for a repository in a national consensus with the federal government and the states, society and citizens. After years of socio-political controversy, a restart should overcome concerns by considering all regions in Germany to be a potential site without any prerequisites. Several goals are provided by the siting law. Two of them have a special relevance: the organizational structure and the selection process.

- The organizational structure does not comply to guidelines of the particular European directive
- The selection process is too long to find a solution within this generation

It should be pointed out that the “best” or the “safest” site will not to be found by a selection/siting procedure. Insofar, the siting law/act only describes a “best possible” site. The federal and states commission is responsible to elaborate existing deficiencies regarding organization and time scale and to develop an approach to come to a solution. It must be appreciated that one of the main determinations of the siting law is to perform an evaluation of the law itself.

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