



The search for suitable sites for deep geological repositories as a socio-political process: experiences with the participation of those concerned in Switzerland

Dr. Michael Aebersold, Stefan Jordi

March 2015

The process of determining the sites for storing radioactive waste in Switzerland is politically controversial and it has failed a number of times. A site selection procedure was initiated in 2008, which uses different forms of participation. The focus is a major effort to integrate the regional population through “regional conferences”, which have been specifically set up for this purpose. We describe the procedure used to establish participation and derive some findings from the experience gathered up to now.

The sources of radioactive waste

Radioactive waste mainly arises from electricity production at the five Swiss nuclear power plants (NPP). Some waste comes from uses in medicine, industry and research facilities (MIR waste). It is assumed that if the existing NPPs operate for 50 years the total volume of waste to be disposed of in suitable containers in Switzerland will be about 100,000 m³. The user-pays principle applies to the disposal of radioactive waste. NPP operators are responsible for the disposal of spent fuel elements and radioactive waste from operating, decommissioning and final dismantling of NPPs. The federal state is responsible for the disposal of MIR waste. In 1972, the NPP operators and the federal state founded the National Co-operative for the Disposal of Radioactive Waste (Nagra) and gave it the mandate of disposing of radioactive waste.

Use of nuclear energy has long been a politically controversial topic in Switzerland. In the latter half of the 1960s, parts of the population began to oppose the construction of NPPs. In the last 30 years more than half a dozen popular initiatives on the nuclear and energy questions have been submitted and subsequently rejected, with the exception of a ten-



year moratorium on the construction of new plants in 1990. The “nuclear energy option” remained an open proposition for a long time in Switzerland with three NPPs planned. The nuclear accident in 2011 at Fukushima signalled a change. In that year the government and parliament decided to phase out nuclear energy. The five existing NPPs can still be operated as long as safety is guaranteed.

What should be done with radioactive waste?

The principal objective in the disposal of radioactive waste is to guarantee the long-term safety of humans and the environment. Experts throughout the world agree that storage in suitable geologically stable rock layers is the only way to guarantee safe disposal over the necessary lengthy period of time for high-level and long-lived intermediate level radioactive waste. Between 1998 and 2000, a working group set up by the Federal Council compiled the fundamental Swiss disposal plan, which envisages a deep geological repository which would permit easy recovery of waste over a lengthy period of time. This plan is anchored in the Swiss Federal Nuclear Energy Act for all waste categories. According to the Act radioactive waste also has to be disposed of within the country.

Selection procedure for deep geological repositories

The past has shown that determining sites for deep geological repositories is a politically controversial topic. Today, the selection procedure for Switzerland is laid down in the “Sectoral Plan for Deep Geological Repositories”. The sectoral plan is the most important planning instrument available to the federal state in the spatial planning sector, a sector which is normally within the competence of the cantons. The sectoral plan consists of a conceptual part and an implementation part. The Federal Council approved the conceptual part on 2 April 2008 and determined the procedures and criteria in the search for suitable sites (SFOE 2008). Site selection takes place in three stages lasting over 20 years. Beginning with a “blank map of Switzerland” geological information will be gathered gradually leading to a reduction in the number of prospective sites. Safety is the main criterion in site selection.

Stage 1 ended on 30 November 2011 when six siting areas were determined which would fulfil the technical safety requirements for a deep geological repository (Fig. 1). A



significant milestone was reached in Stage 2 on 30 January 2015 when a suggestion for further narrowing down of the process was published – of the six areas identified only two would be studied further in Stage 3. The final selection of the site will take place during Stage 3 based on further geological exploration such as seismic studies and the results of drilling. Stage 3 will last about 10 years and lead on to the general licensing procedure as outlined in the Swiss Federal Nuclear Energy Act. The general permit will be issued by the Federal Council and will have to be approved by parliament. If a referendum is proposed, voters can make the final decision within a national plebiscite. According to the current schedule a storage facility for low and intermediate level waste could be operational by 2050 and a high-level waste repository could be functional by 2060.

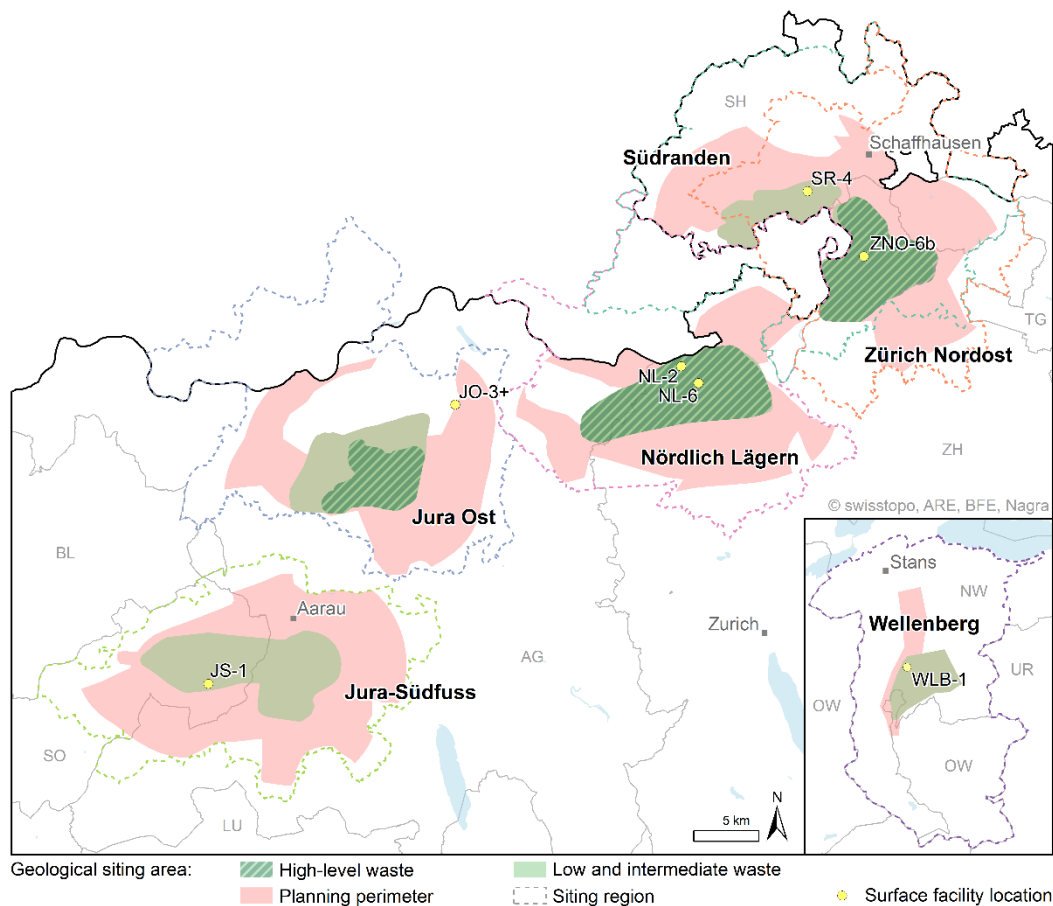


Fig. 1. Geological siting areas from the Sectoral Plan for Deep Geological Repositories with the corresponding planning perimeters for surface facilities. Five regions lie in the northern Mittelland, one in central Switzerland.



What is meant by participation?

In Switzerland, cooperation among citizens, organisations and parties is facilitated through instruments of direct democracy (votes, elections, referendums, initiatives) and through formal and/or legal procedures (hearings, consultation procedures, right to object and to lodge appeals). The disadvantage of such instruments is that they are generally implemented after a process has been concluded.

The lessons learned at home and abroad show that where long-term, complex controversial projects are concerned, such as that for the disposal of radioactive waste, it is necessary to include all the interested parties, weigh up what scope for action is available and look at the various alternatives early on in the procedure. For this reason in the Swiss process emphasis is placed on information and communication and on prompt and comprehensive participation by all the cantons, municipalities and neighbouring states.

What does this actually mean? Much is heard today about civic involvement, cooperation and participation and it is a modern trend to demand it in all sectors of life with respect to all sorts of topics. However, differing ideas prevail about what should be understood in this context. A classic model in political science is introduced in the “Ladder of Citizen Participation” (Arnstein 1969). The following steps in civic participation will be discussed based on this model:



Steps of participation

			Decision
		Cooperation	Vote Referendum Consensus principle
	Consultation/ hearings	Working groups Roundtables Planning cells Large group discussions	
Information	Public discussions Surveys Public meetings Consultation procedure Statements of position		
Information Posters Circulars Information events Public inspections			

Fig. 2. Steps of participation

- **Information:** Information is the lowest step on the ladder and does **not constitute a genuine form of participation**. However, it is a requirement for all other steps. No one can form an opinion about a topic in a responsible manner without having sufficient information to do so.
- **Consultation/hearings:** Such forms constitute the **preliminary steps toward participation**. Interest groups can present their viewpoint on a matter and their opinions and concerns are aired.
- **Cooperation or co-determination:** At this point the decision-makers co-determine the matter together with the target groups, e.g., those affected by a measure or project. Negotiations are conducted about important questions and aspects of the matter. In the process the participants exercise either **direct or indirect influence on the decision**.
- **Decision:** A target group (e.g., those affected, the electorate) have the power to decide. As a result of the direct democratic processes which exist in Switzerland, voters can vote at all state levels (municipality, canton, federal state) no matter



whether a proposal concerns constitutional change, legislation, specific propositions or the budget.

As a rule participative processes supplement a democratic decision and are mostly provided for *prior* to this step. All the stages of participation mentioned are addressed within Switzerland's selection procedure for deep geological repositories. Regional participation, which is the matter in focus, corresponds to the “Cooperation” step on the ladder.

Regional participation: development of the concept

With a view to drawing up the basic principles and framework conditions for regional participation, a study was made of the experiences of others and of projects at home and abroad. “Local Partnerships” in Belgium (Dessel) were studied closely, recommendations made by the working group for the Selection Procedure for Locations for Final Repositories (AkEND 2002) were included and guidelines for a participative selection procedure were drawn up on the basis of a study by Jordi (2006).

Even the conceptual part of the Sectoral Plan for Deep Geological Repositories was developed with a variety of opportunities for participation. Drafts of the conceptual part were presented and discussed with parties, organisations and public authorities at two national workshops (Synergo 2006 a and b). In addition, in five regions focus groups put together at random but nevertheless representative of the population discussed the procedure and voiced their opinion (Isopublic 2006). The findings from this process were used to draw up the conceptual part, which was in turn approved by the Federal Council after broad public consultation in 2008. Among other things the conceptual part describes the roles and tasks of all the players.

Regional participation: set-up in the regions

When drawing up the concept and setting up the regional participation structure (BFE 2009a) there was no experience on which to rely upon because the procedure as such was new and unique to Switzerland. Neither are the authors aware of a participative process of this size in the international field. In the municipality of Dessel in Belgium 76 persons participated in the procedure for six years. In Sweden participation centred on public



authorities from just two municipalities (the area of which are much greater than that of municipalities in Switzerland).

Once Nagra had selected and proposed six potential sites in Stage 1, between 2009 and 2011 the BFE and the representatives of the regional authorities defined the organisational structure (c.f. Fig. 3), responsibilities, procedures and rules for cooperation and financing, and set up the structures for regional participation (SFOE 2011). In the sectoral plan, participation has been defined as follows:

“Within the terms of the Sectoral Plan for Deep Geological Repositories, regional participation refers to the means available to a siting region to co-determine outcomes by inclusion and being accorded a voice in matters. By means of regional participation the population, institutions and interest groups based inside or outside the siting regions can present their demands, concerns, questions, needs and interests to the federal state (Swiss Confederation) and to the communes in the siting regions.”

Similarly, during Stage 1 discussions were held to determine which municipalities would be counted as belonging to the siting region, that is which municipalities would be “affected by” the proposal (SFOE 2009b).

In all six proposed siting regions initial meetings were held in 2011 and 2012 to establish “regional conferences”. The composition of the conferences varies from region to region: representatives of public authorities and special interest organisations make up between 30% and 50% of the members, non-aligned individuals from the population constitute about 10% of the members.

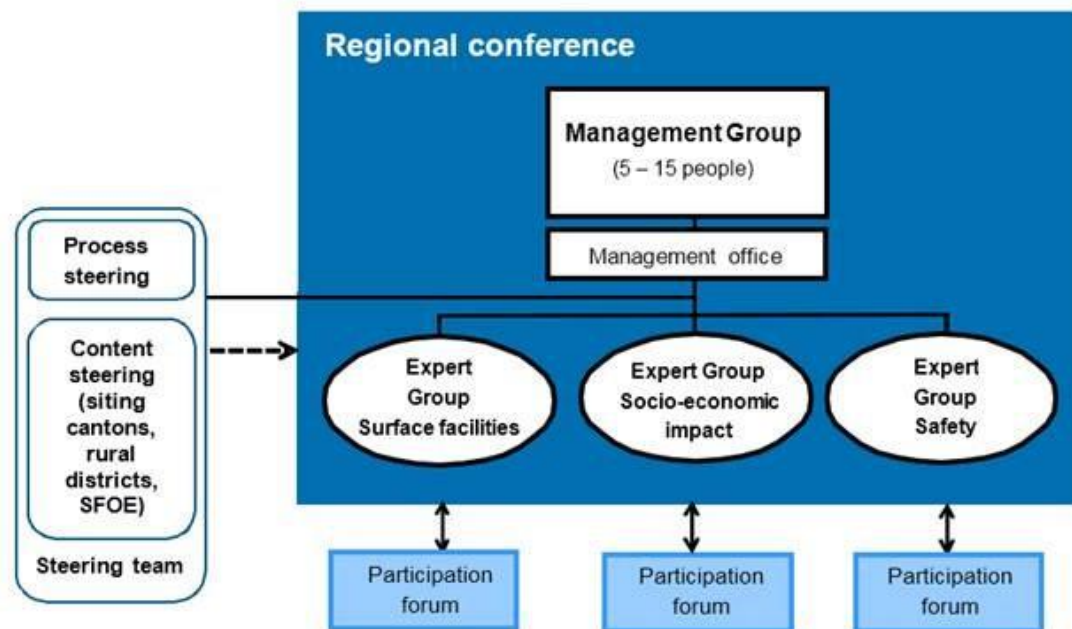


Fig. 3: Organisation of the regional conferences.

Regional participation: implementation of the selection procedure

In the procedures outlined in the sectoral plan the levels of participation are presented as in Figure 2:

- **Information:** Stage 2 began with *Information*. Initially, in January 2012, the Swiss Federal Office of Energy published the names of the 20 locations proposed by Nagra as potential sites for surface facilities.
- **Cooperation:** Then the intensive cooperation phase began – the phase of active participation in the sectoral plan procedure. The regional conferences discussed the proposals for surface facilities, visited the sites, consulted experts, created evaluation tools and made proposals with the support of the siting cantons. The SFOE had to adapt the schedule for the procedure to make sure enough time remained for discussions. Fourteen further suggestions for sites were made in addition to the original twenty. All the regional conferences had stated their case by May 2014. Based on this information Nagra has designated at least one site for surface facilities in all the proposed siting regions.



- **Consultation:** By the beginning of 2016, Nagra will have the sites on its short list checked by the supervisory authority (Swiss Federal Nuclear Safety Inspectorate, ENSI) and other state agencies. The siting cantons and regions will draw up further statements. The resulting overall evaluation will be the subject of a three month *hearing* at which the municipalities, cantons, neighbouring states, organisations and the population will be able to express their opinion.
- **Decision:** Based on the safety report and the statements made at the hearing, the Federal Council will make a *decision* whether the stage can be concluded.

Facts and figures on regional participation

- **Extent of participation** (2014, summary of all six regions):
 - Number of municipalities: 199
 - Population in the proposed siting regions: about 710,000
 - Participants: 550
- **Region:** extends over cantonal and national boundaries (German municipalities are represented in the four siting regions near the border)
- **Duration:**
 - Stage 1: Start-up phase 2009–2011
 - Stage 2: Implementation 2012–2017
 - Stage 3: Implementation 2017–2027
- **Resources:** Costs of over CHF 11.2 million (2009–2014)
- **Expenditure** for participants:
 - Meetings held by regional conferences: 175 (2012), 161 (2013), 113 (2014)
 - Meetings held by supra-regional bodies: 21 (2013), 10 (2014)

Challenges of regional participation

Length of time required and complexity: The twenty years required for the selection procedure and the fifteen years needed for regional participation lead to a number of



challenges with respect to maintaining the motivation of the participants, the scientific content, knowledge transfer and fluctuation in personnel.

Need for knowledge versus procedural situation: Current participants demand answers to questions that cannot be given in the depth anticipated at a certain time in the procedure, because the knowledge available comes from a preliminary project and findings can often only be presented on a generic level. To some extent detailed studies are only planned as part of later processes.

Acceptance of the framework conditions: The Swiss Federal Nuclear Energy Act and the conceptual part of the Sectoral Plan for Deep Geological Repositories were compiled and authorised many years before the participation procedure began. Today, many are questioning the predetermined framework conditions because they are not, or are no longer, aware that these conditions too were elaborated in a participation process.

Knowledge transfer: Sufficient knowledge of a matter is crucial to well-founded opinion making. The state of knowledge among participants varied as it did within the bodies that participated.

Coordination: A procedure with many players places high demands on the coordination. Different approaches and work rates in the regional conferences make coordination on the process very demanding for those at a higher level.

Experience to date

The following lessons were learned on the basis of the experience gained in participation from 2011 to 2014 and the evaluation of the set up process for regional participation (Planval 2014).

Participation in the site selection procedure requires . . .

- . . . *acceptance of the framework conditions by the participants:* As described above, basic legislation and the rules for the procedures were decided on at a higher level. However, these are not the object of negotiation in regional participation as such. In addition, safety comes first and is non-negotiable.
- . . . *flexibility within the framework conditions:* The course of the procedure has to be arranged so that there is flexibility in the time plan; the participants themselves should be able to manage the resources made available to the extent possible; if



necessary it should be possible to incorporate further “rounds” to investigate matters further and to hear other experts, and other interested parties should be able to get into the debate.

- ... *definition of the roles and duties of participants*: This step is central to the success of a functioning selection procedure. Procedure management, safety authorities, disposal managers and participants all have to know their tasks and fields of competence as well as their limits.
- ... *careful planning*: Even considering that the Swiss procedure is a pioneer project, precise planning is crucial – and this includes planning of sufficient time and leeway.
- ... *time and resources*: Participation procedures such as the one we describe here require time, funds and sufficient capacity on the part of procedure management and of the other players.
- ... *willingness and readiness on the part of procedure management to embark on a participation process*: Perhaps procedure management, or the disposal companies, may be sceptical about the longer or more expensive procedure. This would be to take the short-term view, because in the long term better acceptance of any decisions can only be achieved through a seriously conducted participation procedure. The way can also be eased for any subsidiary processes. If this readiness is lacking, the accusation that this was just token participation will not be long in coming.
- ... *participants' trust in experts and public authorities*: Establishing trust in the public authorities and disposal managers is a demanding, long-term process. Trust can be lost very quickly.
- ... *taking the findings seriously*: Voluntary bodies and laymen frequently come to different conclusions than the experts. Both sides of the argument should be taken seriously and have to be discussed until the matter is resolved.



Literature

- AKEND 2002: *Auswahlverfahren für Endlagerstandorte. Empfehlungen des Arbeitskreises Auswahlverfahren Endlagerstandorte* [Selection procedure for repository sites. Recommendations of the Selection procedure for repository sites working group]. Cologne, 2002.
- ARNSTEIN SHERRY R. 1969: A Ladder of Citizen Participation. JAIP, Vol. 35, No. 4, July 1969, pp. 216-224.
- SFOE 2008: Sectoral Plan for Deep Geological Repositories. Conceptual part. Bern: Swiss Federal Office of Energy SFOE 2008.
- SFOE 2009a: *Sachplan geologische Tiefenlager. Leitfaden Aufbau regionale Partizipation* [Sectoral Plan for Deep Geological Repositories. Guidelines for the establishment of regional participation]. Bern: Swiss Federal Office of Energy SFOE 2009d.
- SFOE 2009b: *Sachplan geologische Tiefenlager. Kriterien zur Definition der weiteren betroffenen Gemeinden* [Sectoral Plan for Deep Geological Repositories. Criteria to define the further municipalities affected]. Bern: Swiss Federal Office of Energy SFOE 2009e.
- SFOE 2011: *Sachplan geologische Tiefenlager. Konzept regionale Partizipation. Grundlagen und Umsetzung in Etappe 1 und 2* [Sectoral Plan for Deep Geological Repositories. Concept for regional participation. Basic principles and implementation in stages 1 and 2]. Bern: Swiss Federal Office of Energy SFOE 2011a.
- ISOPUBLIC 2006: *Sachplan Geologische Tiefenlager. Fokusgruppen. Schlussbericht* [Sectoral Plan for Deep Geological Repositories. Focus groups. Final report]. Bern, 2006.
- JORDI STEFAN 2006: *Die Anwendung partizipativer Verfahren in der Entsorgung radioaktiver Abfälle* [Use of participative procedures in the discussion about disposal of radioactive waste]. Bern: Swiss Federal Office of Energy SFOE 2006.
- PLANVAL 2014: Establishment of regional participation in the sectoral plan procedure to search for sites for deep geological repositories – implementation and experiences. Bern, 2014.



- SYNERGO 2006a: *Sachplan Geologische Tiefenlager. Workshop vom 16. Juni 2006. Protokollarischer Bericht* [Sectoral Plan for Deep Geological Repositories. Workshop of 16 June 2006. Protocol]. Bern, 2006.
- SYNERGO 2006b: *Sachplan Geologische Tiefenlager. Workshop II vom 29. November 2006. Protokollarischer Bericht* [Sectoral Plan for Deep Geological Repositories. Workshop II of 29 November 2006. Protocol]. Bern, 2006.