

Extended reviewing or the role of potential siting cantons in the ongoing Swiss site selection procedure (“Sectoral Plan”)

Thomas Flüeler

Nuclear Technology Unit, Energy Dept., Office for Waste, Water, Energy and Air (AWEL)
Directorate of Public Works, Canton of Zurich
Switzerland

Introduction

The disposition of nuclear waste in Switzerland has a long-standing and sinuous history reflecting its complex socio-technical nature (Flüeler, 2006). Upon the twofold failure to site a repository for low- and intermediate-level radioactive waste at Wellenberg during the 1990s and 2000s, it was recognised that the respective site selections had not been fully transparent. The Swiss government, the Federal Council, accepted the lesson and, after an extensive nationwide consultation at that, established a new site selection process “from scratch”: a systematic, stepwise, traceable, fair and binding procedure with a safety-first approach, yet extensively participatory. The so-called Sectoral Plan for Deep Geological Repositories guarantees the inclusion of the affected and concerned cantons and communities, as well as the relevant authorities in neighbouring countries from an early stage (Swiss Nuclear Energy Act, 2003; BFE, 2008).¹ This contribution shares experience and insights in the ongoing procedure from a cantonal point of view that is an intermediate position between national needs and regional concerns, and with technical-regulatory expertise between highly specialised experts and involved publics.

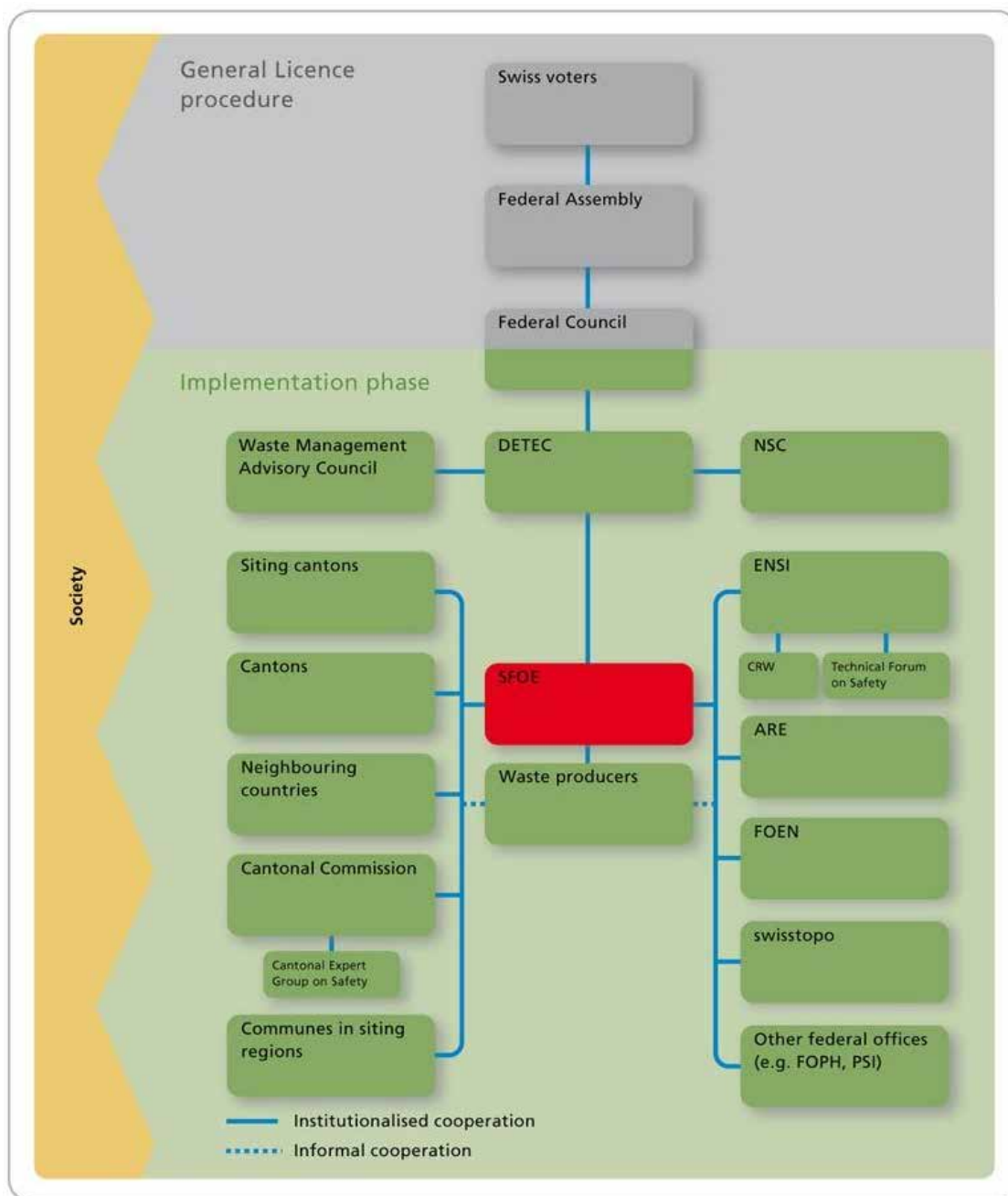
Beyond conventional reviewing: At the national-local interface

The Sectoral Plan is led by the Swiss Federal Office of Energy (SFOE/BFE, see Figure 1 and Table 1). The safety authorities and various federal commissions are responsible for reviewing and assessing all aspects relating to safety. The objective is to, within about a decade, single out a site for each repository type, i.e. spent fuel, vitrified high-level waste, long-lived intermediate-level waste, as well as low-level and short-lived intermediate-level waste. Yet, the potential siting cantons also have an important role to play.

A canton is both affected by the national issue of waste disposal and responsible for the health and safety of its residents, as well as providing them with an attractive environment (these principles are embedded in the mission statement of the Canton of Zurich, based on the cantonal constitution). Learning can take place in the interactions of all state levels (national, cantonal, regional). Even if potential siting cantons have no final say, they have some expert competence and are sought after especially in the ongoing selection procedure for technically sound yet socially tolerated repository sites, an unprecedented long-term undertaking that takes place not only in Switzerland. Even

1. See contributions by the technical regulator ENSI and the proponent Nagra in Session 3.2 for details on the three-staged procedure.

Figure 1: Principal actors as organised in the Swiss site selection procedure; explained in Table 1



Source: BFE (2008), p. 26.

Table 1: Functions, roles and activities of main actors in the site selection procedure, subnational levels highlighted in italics

Swiss voters	May call for an optional national referendum and thus decide on the general licence for geological repositories
Federal Assembly	Approves the general licence
Federal Council	At the end of the three stages, approves the result(s) reports and object sheets and grants the general licence
Ministry of Environment (DETEC)	Monitors and guides work on the Sectoral Plan
Federal Nuclear Safety Commission (NSC)	Advises ENSI, DETEC and the Federal Council on fundamental aspects of safety and prepares opinions on the evaluations made by ENSI in the three stages
Waste Management Advisory Council	Advises DETEC on implementing the site selection process for geological repositories
Federal Office of Energy (BFE/SFOE)	(Constitutes the) lead authority for implementing the Sectoral Plan process; prepares and updates result(s) reports and object sheets
Nuclear Safety Inspectorate (ENSI)	Reviews and evaluates the siting proposals of the waste producers from a safety viewpoint and advises the SFOE on safety issues
<i>Technical Forum on Safety</i>	Discusses and answers technical and scientific questions on safety and geology within the framework of the Sectoral Plan process
CRW, now Expert Group on Nuclear Waste Disposal (EGT)	Advises ENSI on geological aspects
(Federal) swisstopo	Supports ENSI on geological questions
Federal Office for Spatial Development ARE	Reviews and evaluates spatial planning aspects
Federal Office for the Environment (FOEN)	Reviews and evaluates environmental aspects
Other federal offices (e.g. FOPH, PSI)	Support the SFOE in specific technical areas [Federal Office of Public Health (FOPH), Paul Scherrer Institute (PSI)]
Waste producers	In accordance with the requirements specified in the conceptual part of the plan, search for geological siting areas and finally sites for disposal of high-level and low-/intermediate-level waste, evaluate these sites and propose that they be integrated into the plan; responsible for preparing and submitting the general licence application together with the necessary supporting documentation
<i>Potential siting cantons</i>	Work together with the federal government and support it in carrying out the site selection process; co-ordinate the procedure for modifying the cantonal structure plans and ensure co-operation with the (communities) in the siting region
<i>Cantons</i>	As part of the official hearing process, express opinions on drafts of the results reports and object sheets and participate in the process as specified in the Nuclear Energy Act and Spatial Planning Act
<i>Cantonal commission (Committee of the Cantons)</i>	Ensures co-operation between government representatives of the siting cantons and affected neighbouring cantons and countries and supports the federal government in implementing the selection procedure
<i>Cantonal Expert Group on Safety</i>	Supports and advises the cantons in evaluating safety-related documentation
<i>(Communities) in the siting regions</i>	Work together with the SFOE in organising and implementing regional participation and represent regional interests
Neighbouring countries	Express opinions on the results reports and object sheets as part of the hearing process and participate (according to Swiss regulations and joint agreements)

Source: BFE (2008), p. 27 *passim*, adjusted.

though representatives from the potential host regions sit in technical committees of the Sectoral Plan, they have to trust the upper levels. In contrast, the cantons are resourced with experts and have close access to the (making of the) safety case. It is also their duty that participation on the regional level is more than just a buzzword or sophisticated public relations (Stauffacher, 2012). Thus they may be intermediaries between national deciders/experts and local affected/concerned laypersons (Flüeler, 2012) and help transcend the traditional roles of experts vs. the public by adopting a national commitment as well as a regional embedding (OECD/NEA, 2012b). By way of this concept, reviewing goes beyond traditional (peer) reviewing and can considerably augment the “statement of confidence” required by the safety-case methodology; it even has the potential to enhance credibility in the safety case (OECD/NEA, 2013, p. 9), “[convince]...all relevant groups...the public...of the adequacy of the analysis” (OECD/NEA, 2012a, p. 81), even foster trust in the – wider – waste community.

The cantons work together with the federal government and provide support in implementing the site selection process, collaborating with the regions and communities and modifying their cantonal structure plans. The Sectoral Plan requires them to act in the place of regions in case a region refused collaboration (which has not occurred so far). A cantonal commission (Committee of the Cantons) was established to ensure co-operation among the government representatives of the siting cantons and the concerned neighbouring cantons and countries. The commission also makes recommendations to the federal government. It set up an independent Cantonal Expert Group on Safety to get advice when evaluating safety-related issues. The Technical Forum on Safety with all major players, including representatives of the potential siting cantons and regions, discusses and answers questions on safety and geology received from anywhere, such as the public, the communities, siting regions, organisations, cantons and public entities in neighbouring countries.

Beyond conventional proof of safety: The “hybrid” level to integrate different views and interests

Even though the nuclear community has long recognised that the required long-term safety of repositories “is not intended to imply a rigorous proof of safety, in a mathematical sense, but rather a convincing set of arguments that support a case for safety” (OECD/NEA, et al., 1991, p. 11; OECD/NEA, 1999, p. 10 *passim*), it has been difficult to truly internalise and “live” its socio-technical nature (OECD/NEA, et al., 1991; OECD/NEA, 2004). The famous question of “How safe is safe enough?” (Fischhoff, 1978) cannot be answered technically because it is a political question. Thus, albeit the waste problem is inherently driven by technology and, indeed, a technological constraint, in the end, it has to be solved by society (Flüeler, 2001). In such a situation, a “hybrid” level – on which the cantons are in the nuclear waste case – lends itself to integrate or, at least, bring the technical and the social-political worlds together. The fact that disposal is seen as a national duty assigns them quite a portion of responsibility (some of them even are shareholders of electric supply companies with nuclear power plants producing the bulk of the waste). As they are in charge of spatial planning according to the Federal Constitution (1999, status as of 2012), it is also their duty to integrate different concerns and subjects, and that supra-regionally and in the long run.

Authentic guardian of a transparent and open outcome procedure

Nuclear issues have internationally been contentious and still suffer from a traditional decide–announce–defend paradigm of decision making (Kemp, 1992), traceable to a historically rather secretive environment and technocratic approach of the “nuclear establishment” (Jacob, 1990, p. 21 *passim*). Unlike other controversial technical issues, “nuclear waste policy was”, in Jacob’s words, “not the engine that drove politics, but the

product of political, economic, and social engines which drove the politics of nuclear waste.” Furthermore, non-experts (have to) use availability heuristics to assess risk issues; many anchor the issue of nuclear waste, new and unfamiliar to them, to military and/or civil management of (legacy) waste, weapon production, or even bomb testing (Flüeler, 2006, p. 67 *passim*, p. 119 *passim*).

Against this background it is vital to respect and address the underlying critical attitude towards nuclear waste, especially when dealing with the very complex demonstration of long-term safety. For this reason the cantons have always emphasised the “process product” characteristics of the Sectoral Plan: the sense of responsibility to help find technically suitable and socially tolerable locations, based on a safety-first yet open-outcome approach, transparency, traceability and a questioning attitude. Such an attitude has lent itself as helpful and responsive in view of the recent point of criticism raised that the federal bodies suffered from “regulatory capture” supposedly by the proponent (Buser, 2012).²

Substantively, the cantons have been able to make various contributions to the safety case so far, for example (all publicly available at www.radioaktiveabfuelle.zh.ch > Ausschuss der Kantone):

- Stage 1 (to find geologically suitable siting areas in Switzerland): Factual comparability of the siting areas has been demanded as a prerogative for selection as the ones proposed by Nagra lie in seven different cantons and only one had been explored by 3-D seismics accompanied by a reference borehole in the project demonstration of disposal feasibility in 2002 (Nagra, 2002) The cantonal expert group recommends that host rocks be solely rejected on grounds of a robust – and comparable – knowledge base, or, inversely, all potential siting areas be kept until the remaining uncertainties are clarified through dedicated investigations (AG SiKa/KES, 2010, p. 10).
- Stage 2, underground programme (to select at least two sites for each repository type, ongoing): In order to achieve the recommendations from Stage 1, Nagra agreed to carry out 2-D seismics for all siting areas with heterogeneous host rocks (the interpretation is expected for winter 2013/14), and ENSI accepted to introduce so-called “stopover” sessions (AG SiKa/KES, 2011) to closely follow up on the progression of Nagra’s knowledge base. The methodology hereto was jointly developed with the cantonal experts (ENSI, 2012a, 2012b), to specify and put on a set timeline the so-called provisional safety analysis and the safety-related comparison (ENSI, 2010) according to the requirements (HSK, 2007) previously proposed by the technical regulator (then called HSK, now ENSI) and stated in the Sectoral Plan (BFE, 2008, p. 40, 51 *passim*). Only if the geological models and the other data base are sufficiently reliable and robust, Nagra is allowed to, at the end of Stage 2, submit the necessary documents to finalise this stage.
- Stage 2, above-ground programme (ongoing): In parallel with the geoscientific investigations, a selection process is underway to find a suitable site for the surface installations of the respective repository (such as the fuel packaging facility in case of the high-level waste repository), and that in each potential siting region. Originally, it was meant to be a regional-planning exercise only, together with the concerned and affected communities and other stakeholders under the sail of “regional participation” (BFE, 2008, p. 82). When the issue came nearer it became clear that the surface facilities, the access structures and the repository

2. According to separate investigations both the Federal Ministry of Environment and the ENSI Board came to the conclusion that neither SFOE nor ENSI have been taken in by any player in the Sectoral Plan (www.uvek.admin.ch/dokumentation > Verfahren des Sachplans, 3 December 2012; www.ensi-rat.ch > Externe Abklärung, 3 December 2012).

underground have to be assessed in an integrated manner (for example, the appraisal of thick groundwater layers as long-term reservoirs for drinking water). Technical rounds were carried out, the cantonal experts issued a respective report (AG SiKa/KES, 2012), and there is an intense public debate on ramps vs. shafts. This concern was recognised, and Nagra has to carry out a risk assessment of the access structures with regard to construction and (also long-term) operation issues (ENSI, 2012c).

All in all, many involved cantonal civil servants and experts are in intense scientific and technical discourse on the national level; they also advise and (in higher-level planning issues) somewhat lead the regional stakeholders, this in policy rounds as well as technical sessions of the respective regional committees (on surface facilities, on safety and on socio-economic issues). The site selection process is and continues to be a long and tough slog, but it is ongoing, slowly but surely, there are no major dropouts, critical comments were recognised, the work has been improved. And the cantons are willing to be guardians of a transparent, fair process with an open outcome as well as a safety-related and socially tolerable final product, the location for safe and accepted final repositories for nuclear waste (where construction, operation and regional embedding will have to take place in the steps to come).

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