

Unaccomplished ‘Deliberative Turn’ in German Nuclear Waste Management

— Theoretical and Comparative Study of Final Repository Site Selection —

ONO Hajime

Abstract

Nuclear waste management (NWM) has never been implemented. In Germany, the 2016 report of the Commission on the Storage of High-Level Radioactive Waste posed new procedures: instead of decide–announce–defend (DAD) approach, consensus-building became indispensable for choosing a final repository. Has Germany accomplished a ‘deliberative turn’? Theoretical consideration whether deliberative democracy will contribute to solving NWM problems comprises preliminary questions about public and stakeholder engagement (PSE), not in my backyard (NIMBY), voluntary acceptance, and compensation measures. These findings should be tested through comparative study. By examining functions of NWM deliberative institutions, this article shows that advisory commissions have potentialities to develop in two directions: civil participation based on ‘mini-publics’ model, or stakeholder integration. The latter can be shown by regional consultation in the UK, which failed to select a final repository because host communities had a ‘right of withdrawal’. Several factors make German NWM unique, providing clues to approaching disbenefit–distributive justice.

1 Introduction

The German federal government under Chancellor Angela Merkel, impressed deeply by the nuclear disaster of Fukushima Daiichi in March 2011, adopted a phasing out of all nuclear power plants (NPPs) by 2022. Researchers have since devoted more attention to nuclear waste management (NWM) including final repositories for deep geological disposal (DGD) of high-level radioactive waste (HLW), which had been on the agenda but which had remained a rather peripheral issue even among people concerned with nuclear energy policy. Today, we encounter the words ‘deliberative turn’ often in the related political science literature. Has Germany ‘turned’ its NWM policy so decisively? Does an application of deliberative democratic measures ‘solve’ the *wicked problem*¹ of our age?

This research question should be rigidly redefined for an academic analysis. The aim of this study is clarification of the problem structure of NWM, referring to recent German experiences in site selection process for a final repository. Also, we undertake verification of the applicability of deliberative democracy theory. This inquiry comprises several preliminary questions to describe deliberative democratic measures based on the *StandAG* concretely, to clarify the implications of the retrieval debate, to grasp the political value changes which encourage new thinking, to reconsider the potentiality of deliberative democracy as a theoretical clue to transcend NIMBY thinking, to examine arguments about voluntarism and compensation, and to verify these findings through comparative study of other countries. Our concern about the functions of deliberative institutions will be concentrated on the potential expansion of advisory commissions in two directions.

The first section of this article presents a historical survey of German NWM. A new law (*StandAG*) and the Commission report 2016 played important roles in a transitional phase: transition not only from the decide–announce–defend (DAD) approach to deliberative consensus–building, but also from the techno–optimistic disposal concept to final repository with retrieval. The second section is a theoretical examination in which some of the preliminary questions are answered. In our concern, it is important to correlate the deliberative democracy theory with real–political ideas such as conversion of NIMBY into ‘constructive IMBY’, voluntary acceptance, and compensation for host communities. These are tested through a case study in the third section, related to the advisory commissions in the USA, Canada and the UK. The intention of comparison with countries of quite different political systems is explained there. In the fourth section, we conclude our discussion with renewed knowledge of the complicated problem structure and German peculiarities in NWM.

This article is expected to contribute to promotion of academic discussion about NWM, especially through reconsidering the German experiences in a broader context. However, some difficulties remain unresolved. Such difficulties are partly attributable to the multiple character of this theme. Evaluation of political outcomes depends on the respective standpoints and value judgements. Someone expect a ‘quick’ resolution of NWM issue, irrespective of top–down or bottom–up methods. Others emphasise justice and deliberation of decision–making. Extremely speaking, whereas nuclear proponents are only interested in finding sites for final repositories, some opposition groups regard it as a victory if they hinder the construction of disliked facilities in their own areas. NWM is not only an uncertain, but also a large–scale issue of intra–generational and inter–generational disbenefit distribution with uncertainty. A million–year perspective is overdemanding for humankind.

Although NWM requires inter–disciplinary engagement including natural science and technology, the scope of this article, which includes analyses of the deliberative democratic meanings in NWM policy, is very restricted. Someone might want to know why we do not address some important topics of German environmental policy, e.g. *Energiewende* (change of energy) by the Ethics Commission².

In parallel to the phase-out debate, the NWM issue has existed for decades. More attention should be devoted to this continuity rather than to an abrupt change of NPP policy. Germany has been immune to 'nuclear renaissance' discourse, which holds NPPs, because they have no CO₂-emissions, are ecologically profitable to fight against climate change. That controversy is excluded from this article. Some countries persist in using nuclear energy; others do not. But all suffer from a nuclear legacy. For our comparative study, for a while, determinative factors are disregarded, whether occurring in a phase-out country or not, and whether a country possesses nuclear weapons.

There are numerous preceding studies. ENTRIA³, supported by the German Federal Ministry of Education and Research, is an inter-disciplinary study integrating natural, social and human sciences. A series of comparative studies has been conducted by the Environmental Policy Research Center of Free University Berlin (Brunnengräber et al. 2015 ; Brunnengräber and Di Nucci 2019). Blowers presents the 'nuclear oases' thesis (2017). Regarding environmental ethics, Cotton (2017), Johnson (2008), and others have contributed to the literature. In addition, many reports have addressed related subjects, such as democracy theory, environmental policy, and social movement.

2 German Political Processes of NWM

First, we review the prehistory of the German NWM. The Repository Site Selection Act (*StandAG*) and the Commission report of 2016 were turning points.

From AkEnd to StandAG

In February 1977, the prime minister of Lower-Saxony state launched a plan to construct a nuclear disposal centre including a reprocessing plant, a concentrated interim repository, and a final repository in Gorleben, a village at the former East German border. Because of fierce protests and the 'Gorleben Hearing' held in Hannover in 1979, the reprocessing factory plans were cancelled. Joachim Radkau interpreted that the anti-nuclear movement, which had formerly targeted only technical safety issues, evolved into an environmental movement in a strict sense (Radkau and Hahn 2013: 304). Subsequently, the waste repository and the suitability of the Gorleben salt formation became the main targets of anti-nuclear protests (Tiggemann 2019: 77). Private institutes such as *Öko-Institut*⁴ published their survey reports to assist anti-nuclear movements.

Spent nuclear fuel reprocessed in La Hague in France or in Sellafield in the United Kingdom was packed in Casks for Storage and Transport of Radioactive Material (CASTOR) and was returned to Germany. Protest actions against CASTOR transport made Gorleben known worldwide. According to Achim Brunnengräber, 13 HLW transports to Gorleben interim storage occurred between April 1995

and November 2011: total CASTORs amounted to 113 (Brunnengräber 2015: 56). Because of the enormous costs of safety precautions, some business leaders were suspicious of NPPs' economic merits, which paved the way for a German nuclear phase-out.

In June 2000, the red-green federal government of Chancellor Gerhard Schröder reached agreement with industry, stipulating that German NPPs would be shut down after an average 32 years of operation, and stipulating that reprocessing would be banned in five years. In addition, exploration of the proposed site of the final repository in Gorleben was to be suspended for a maximum of ten years. The federal government created the Working Group for the Selection of Repository Sites (*AkEnd*) composed of experts for and against nuclear energy to develop a proposal for a transparent, criterion-based, and convincing approach for a comparative site selection process. The *AkEnd* submitted a report in 2002. However, the environment minister of the successive grand coalition announced the end of the 'Gorleben moratorium'. The period of 2000–2010 can be characterised as a period of stagnation of deliberative politics (Hocke and Kallenbach-Herbert 2015: 193).

In 2011, the Merkel Administration decided to halt exploration in Gorleben formally and to restart site selection with a 'blank sheet of paper'. On July 5, 2013, the *Bundesrat* approved the *StandAG*, which passed through the *Bundestag* on June 28. It was aimed at selection of the candidate location at which domestically produced HLW is interred using transparent and scientific knowledge-based procedures. Maximal safety must be ensured for a million years. No international treaty will be concluded for disposal abroad (Article 1 (2)). Up to the final decision to be made in 2031, plural locations would be investigated. For the anti-nuclear movement, it was 'one of' the turning points because Gorleben would have been 'one of' the candidates.

Such a domestic political change was stimulated by the European Union's directive 2011/70/Euratom: EU legislation in September 2011 obligates all member states using nuclear energy to establish basic principles of NWM and to report to the European Commission until August 23, 2015. This embodies a multi-level governance. Article 194 of the Treaty on the Functioning of the European Union recognises the right of member states to 'determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply'. Therefore each country decides to use nuclear energy or not. Nevertheless, the EU-member states are subject to the Euratom treaty, which states in Article 77 that the European Commission shall satisfy itself that 'ores, source materials and special fissile materials are not diverted from their intended uses as declared by the users' and 'the provisions relating to supply and any particular safeguarding obligations assured by the Community under an agreement concluded with a third State or an international organisation are complied with.' Site selection can be implemented only in cooperation with local governments. In fact, the *StandAG* became possible because Baden-Württemberg conceded that areas in the state are potential candidates for a final repository (Hocke and Kallenbach-Herbert

2015: 195).

Commission Report 2016 and New Consensus-Building

The *StandAG* appointed the Commission on the Storage of High-Level Radioactive Waste. It comprised eight scientists, representatives of stakeholders (two from environmental groups, two from religion, two from industry and two from trade unions), eight members of *Bundesrat* and eight members of the *Bundestag*. On June 27, 2016, the Commission presented its final report and gave a recommendation that included prescription of knowledge-based open site selection procedures with comprehensive transparency and public participation (Kommission Lagerung hoch radioaktiver Abfallstoffe 2016: 65). The 2017 amendment⁵ of the *StandAG* relies on the Commission's work (Röhlig 2019: 317 ; Schreurs and Suckow 2019: 296). Some regard it as a new start (Brunnengräber 2015: 123). Nevertheless, it remains controversial whether the political confrontation structure has fundamentally changed. Environmental groups were sceptical and reluctant to join the Commission.

Development during the period from the *AkEnd* to the Commission's proposal endorses that the NWM is not only a technological but also a political matter. The Commission was obligated to hold its meetings as open to the public and to enable public participation in its work (Article 5 (3) of the *StandAG*). It conducted several events such as 'citizen dialog site selection', 'workshops with regions', 'workshops with young adults and involving practitioners', 'experts conference', 'online commentary' and the 'commission's report draft'. The Commission's idea of the extended and adaptive system of participation⁶ was taken over by the National Civil Society Board (*Nationales Begleitgremium*, NBG) with tasks, rights and duties defined in Article 8 of the amended *StandAG*.

The NBG advises public authorities and institutions in the site selection procedure. Its dozen individuals have no nuclear engineering or technical background. Appointments of the committee shall be made in a pluralistic manner. Those with any economic interest in site selection are disqualified (Isidoro Losada et al. 2019: 245 ; Schreurs and Suckow 2019: 301). Among almost 70,000 telephone calls made at random, about 120 interested participants met in five citizen forums and elected their representatives. In addition to monthly meetings, the NBG hosted several events to communicate with the public. They provided related information to a website.

The Commission and the NBG aimed to open the debate to actors who had been excluded earlier. Julia Olliges asks about the extent to which the participatory events conducted by them capture the procedural ideal of deliberative democracy (Olliges 2019: 263–264). However, some interpret that civil participatory committees including the NBG as results of the Commission's argument, which denied granting of veto rights and instead recommended legal protection to inhabitants of the candidate locations (Smeddinck 2018: 88). That interpretation alludes that the achievement of 'deliberative turn'

in NWM depends on the degree of stakeholder empowerment.

Implications of Retrieval

The principle of German NWM has been DGD. But what kind of DGD? The Commission report 2016 stipulates the following:

The conceptional novelty is in the Commission's standpoint based on future-oriented ethical principles and failure-correctability, which requires that once-established decisions should be reversible to accomplish the safest resolution through a learning process. The reversibility, i.e. the possibility of reorientation in the proceeding procedures, is necessary. For future generations, it enables correction of failures, reserves free dealing options perhaps based on new knowledge and contributes to making procedures more trustworthy. To main concepts belong retrievability (*Rückholbarkeit*) or salvageability (*Bergbarkeit*) of wastes and correctability of decisions (Kommission Lagerung hoch radioaktiver Abfallstoffe 2016: 31).

What a remarkable shift of emphasis! The reversibility of failure is a principal proposition of technology and modern ethics. Therefore, as one example, the Ethics Commission recommended 'to store radioactive waste in the safest and retrievable way' (Ethik-Kommission 2011: 105). Regarding the point of 2002, however, another view was given: 'The consideration of retrievability in the early phase of site selection process might result in a focus on realms, regions or siting places with geologically unfavourable circumstances'. Therefore, 'the *AkEnd* finds no occasion to consider the retrievability of waste from the final repository' (AkEnd 2002: 31–32). Has this not been the official policy of German NWM?

The International Atomic Energy Agency (IAEA) distinguishes 'disposal' from (interim) 'storage', i.e. 'the holding of radioactive resources, radioactive material, spent fuel or radioactive waste in a facility that provides for their/its containment, with the intention of retrieval'. The term 'disposal' implies that retrieval is not intended, but it does not mean that retrieval is not possible (IAEA 2016: 41, 170). The final repositories in deep-geological formation are based on an aftercare-free⁷ principle. Once such systems are closed, they must maintain safe over a long term, even with no additional work or repair, of course, premised upon eternal monitoring (Röhlig 2016: 45).

Although some wanted to admit retrieval to some degree⁸, German administration had been generally confident of the IAEA's principle of NWM. Some countries regarded it as unrealistic and

began investigating retrieval options in early phases. That is one reason why the IAEA's definition is so ambiguous. Indeed in France, retrievability is a requirement for permission for final repositories. The Netherlands, Italy, and Spain prefer long-term storage in surface repositories. The OECD/NEA research project of the Radioactive Waste Management Committee since 2007 led to an international conference held in Reims in December 2010⁹.

The Commission report of 2016 eventually approved retrieval from a final repository. It corresponds to an international trend by which several countries acknowledge that aftercare-free repositories are technologically so infeasible that a concept inherent to interim storage facilities has been extended to final repository. To understand the core of the argument, the question should be so redefined: Why has the concept of aftercare-free DGD facilities, i.e. an official stance on nuclear waste disposal, retreated into a compromise resolution that allows retrieval for final repositories?

Conceptually, aftercare-free DGD has two pillars: safety and justice. From the latter criterion, a desirable option is an aftercare-free final repository, which would release future generations from the nuclear legacy imposed by the present generation. In a decade, however, it was clarified that the safety of aftercare-free DGD is not guaranteed by today's technology. Our duty not to burden later generations is difficult to carry out. In a dilemma between safety and generational justice, the notion of a final repository without retrieval reduces its relevance. Instead, the concept of retrieval seems to be more attractive even though such an expectation of increasing options for future on the premise of technological advancement conceals theoretical vulnerability. The weight shift of German NWM is attributed to a failure of techno-optimism rather than to an ethical deliberation.

Disputes about retrieval are not new, but its reappearance in a changing situation is symbolic. After the fall of the myth of aftercare-free DGD facilities, the concept of retrieval acquired new political, social, ethical and philosophical implications. New approaches associated with the *StandAG* and the Commission report 2016 will have many influences not only on NWM procedures but also on democratic participation in Western societies.

3 What Does It Matter?

Although many NWM reports refer to deliberative turn, it remains uncertain whether deliberative democracy is adequate to address the polemic issues of risk distribution, especially NIMBY facilities such as final repositories. Increasing concern about NWM and social justice might engender voluntary acceptance and would thereby ease conversion of NIMBY into 'constructive IMBY'. However, voluntarism of the host communities is often accompanied with compensatory measures. Radioactive substances would be gathered in so-called 'nuclear oases'. There are many inquiries around deliberative democracy theory.

Fall of the DAD Approach

Has Germany really made a ‘deliberative turn’ in NWM? Such an ambiguous inquiry allows various answers reflecting the multi-dimensionality of the problem structure. Generally speaking, deliberative democracy rests on the idea that legitimate governance depends on the right, opportunity, and capacity of those subject to a collective decision (or their representatives) to participate in consequential deliberation about that decision (Dryzek 2013: 236). From an egalitarian ethical position that concerns the meta-ethics of technology decision, it is assumed that participatory–deliberative decision is *a priori* fairer than non-participatory decision (Cotton 2017: 188). Since the *StandAG*, people increased opportunities to be involved in decision-making. However, public participation does not always represent a transfer of power to the level of civil society. Even if DGD proponents are hostile to those who resist the construction of a final repository, they might share the same opinion: Deliberative democracy is no miracle. Judging the adaptability of deliberative democracy theory demands the review of a recent argument.

In the early phase of the nuclear development, whether in support of military or civilian use, the issue of radioactive waste was almost ignored. An optimistic expectation prevailed: technological advances would resolve all difficulties. As spent fuel amounts increased and many countries withdrew from a nuclear fuel cycle project, humankind came to believe that NWM is a difficult struggle involving very limited feasible options. The prevailing belief was that HLW must be isolated semi-permanently in the final repository built in a rigid and stable deep-underground formation. Who wants such a dangerous facility? To date, no country has begun operation, or has even found candidate locations, other than the exceptional cases of Finland and Sweden, where the local communities of Olkiluodon and Forsmark have accepted DGD facilities.

Difficulties of siting disliked infrastructure have long been known. Authorities used to impose them on powerless groups or regions through a decide–announce–defend (DAD) approach. This top-down decision-making caused social conflicts and protest actions. As demands for democracy intensified throughout the world, both government and industry have been forced to change their strategies. In a shift to a broader model of communication, participation and influence, progress was apparently difficult without intense dialogue, participation, information availability, and the right of veto (Brunnengräber and Schreurs 2015: 72–73).

Today, public policy requires transparent and participatory consensus-building. The Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention)¹⁰ signed in June 1998 set a precedent as the world’s first multilateral agreement to establish a firm set of environmental rights for people and linked protection of the natural environment with social and legal justice, all within a broadly participatory–deliberative

democratic framework (Cotton 2017: 158). The German NWM since the *StandAG* can be regarded as a product of changing discourses in domestic and international environmental policies.

Deliberation and Participation

Simultaneously, a theoretical innovation was taking place. In the era when political parties and interest groups no more fulfil conventional functions, political theory must complement representative democracy and bridge the gap separating politics and civil society. By virtue of Joshua Cohen's article on Deliberation and Democratic Legitimacy (1989), and Jürgen Habermas' *Faktizität und Geltung* (1992), the ideals of deliberative democracy have spread worldwide. One of its forms is deliberative polling (DP), by which the researchers compare participants' opinions before and after their intensive discussions in small groups (mini-publics) chosen by random sampling. DP continued to find new applications in several countries (Fishkin 2011). In summer 2012, the Japanese administration held 'National Deliberative Polling on Energy and Environmental Policy Options' (Yanase 2013).

Some people might imagine lively discussion among ordinary citizens, but others do not use this normative term in such a narrow sense. Discrepant interpretation might be a source of confusion or overestimation. It cannot be denied that the authority might pretend to hear grass-roots opinions but neglect unwanted results arrived at through the deliberative democracy. Such was the case of the DP in Japan¹¹ and the Canadian Seaborn panel, as explained below. Perhaps a border exists which government officials and scientists can never cross.

However, some difficulties lie in the theory itself. Different attitudes of Anthony Giddens, who emphasises the radicalising of modernity as processes of evacuation, disinterring and problematizing of tradition (Beck, Giddens, and Lash 1994: 57) and of Ulrich Beck, who regards individuals as now expected to master 'risky opportunities' without being able to make necessary decisions on a well-founded and responsible basis considering the possible consequences (*ibid.*: 8) represent both the optimistic and pessimistic sides of the reflexive modernisation theory. It seems wonderful to seek means of increasing the potentialities of our individualised and diversity-oriented societies. To this purpose, people are willing to participate in dialogues. However, not all topics are exciting ones. Another side of reflexive modernity is related to risk and uncertainty. Mutual dialogue among parties relying thoroughly on their insistence or value judgements is only barely thinkable, especially for serious themes such as Northern Ireland, Palestine conflict, and abortion. The attractiveness of deliberative democracy might fade if all participants must set aside confrontational or power-related issues beforehand.

Another important criticism to deliberative democracy is that discussion among laypersons is inferior to expert judgement. It is likely that the involvement of specialists, even though arrogant and

authoritarian, would engender rational and knowledge-based consequences. Is this better for technical issues such as NWM? We must admit that the best location of a final repository is not always certain from deliberative processes with civil participation. A feud between deliberation and expertise will arise again in the case of the UK.

We cannot say confidently that deliberative democracy is immediately adaptable to themes of risk management or disbenefit distribution. In the case of nuclear energy, the discourses of ‘security’ and ‘cooperation and consensus’ coexist to form a hybrid discourse: The former has encouraged the revival of approaches to policy-making that is redolent of earlier periods and has weakened the more participative and democratic approach of the latter discourse of cooperation and consensus (Blowers 2017: 20).

‘Constructive IMBY’ and Compensation

When the construction of disliked infrastructure, such as a garbage incinerator, is planned, fierce protest actions arise with respect to the candidate locations. Probably, most residents are not opposed to garbage incinerators *per se*, without which a lifestyle of mass production and mass consumption is impossible. They merely oppose its construction in their own area with the slogan ‘Not In My Back Yard.’ Such NIMBY-style movements derive from human sentiments, but they are entirely unconcerned with the siting of disliked facilities elsewhere.

Infrastructure that benefits society as a whole while adversely affecting host communities is called ‘negative public goods’. Such goods tend to burden minorities and benefit majorities, but the patterns of (dis)benefit distribution vary. Daniel P. Aldrich, after sociological assessment of where and how Japanese NPPs, dams and airports have been sited, points out that authorities have been most likely to attempt to situate reactors in communities with low solidarity and diminished or decreasing levels of social capital (Aldrich 2008: 38). Governmental policy tools are classified as coercion, hard social control, incentives and soft social control. He concludes that ‘the choice of policy tools is not determined by factors such as national bureaucratic or political culture, juridical environment, time period, or increasing citizen expectations about democratic procedures and instruments. Rather, tool choices depend heavily on the strength of contentious political opponents within civil society’ (*ibid.*: 68).

Although comparison with other disliked facilities might be too hasty, the NPPs, including their related plants, are conceptually a ‘negative public goods’. The final repository for HLW is a typical NIMBY facility. As described above, dysfunction of the DAD approach has reinforced inclination to consensus-building through public participation. Is it a chance to overcome the NIMBY mentality?

Brunnengräber denies the notion that small groups are merely resisting the public interest: Such a

NIMBY understanding is problematic if it is applied not as a social scientific category to analyse acceptance problems, but as a justification of political decisions. Authorities sometimes compel local residents to accept unwanted siting in exchange for compensation measures. In other words, room for compromise exists if all stakeholders are sufficiently informed and included in the site selection process. Acknowledging that NWM is a common duty for all society, procedural justice represents a main concern. It enables substitution of NIMBY by 'constructive IMBY' (Brunnengräber 2015: 109). Is it too optimistic, or unrealistic? A point of importance is that Brunnengräber relies on pragmatic thinking, not on any ethical or philosophical consideration.

After all, site selection processes in NWM-advanced countries have been concluded through 'voluntary' willingness of the host communities. Voluntarism is closely correlated with compensation. In a comparative study analysing commonality and differences of voluntary acceptance, Maria Rosaria Di Nucci points out that one can talk of trust-based 'confident' or of 'longstanding competitive' voluntarism in Sweden and Finland, of 'bought' or 'precarious voluntarism' in the UK, and of 'passive' voluntarism in France (Di Nucci 2019: 158). She concludes: If voluntary approaches should have a chance and be enshrined in siting processes, factors such as the early involvement of the community in the decision-making process, granting veto rights and appropriate compensation and trust in the institutions involved are of crucial importance (*ibid.*: 166).

Di Nucci has been committed to the 'constructive IMBY' argument. Her rather anguished assessment is that voluntary processes with compensation are important, but not ideal (*Königsweg*) (Di Nucci 2016: 138). Those who recognise the importance of NWM as a common duty would not always consent to siting NIMBY facilities in their own region. No one accepts final repositories 'voluntarily'. The deliberative theory is confronted by this aporia. Increased participation and transparent procedures are insufficient to alter prevailing opinion.

Voluntarism of Host Communities and 'Nuclear Oases'

In the *AkEnd* final report of 2002, one encounters the following statement:

From inhabitants' view, the most important duty of the regional politics is to improve their economic location, to promote economic activities and to fight against unemployment. Therefore, the *AkEnd* recommends that the prospect of regional development and the national encouragement for this purpose should be offered to the potential host regions. The regional development may never be understood as the compensation for inhabitants' anxieties (AkEnd 2002: 217–218).

The *AkEnd* is regarded as the first official attempt to terminate the DAD approach (Hocke and Kallenbach-Herbert 2015: 194). It was sufficiently realistic to acknowledge that no voluntary acceptance could be considered if separated from regional assistance for potential host communities of a final repository. However, we must hear the counterargument. It is far from a free decision if poor or disadvantaged communities in a peripheral area have no choice but to accept unwanted facilities in place of a regional development program. One can wonder if it is a true alternative to the DAD approach. Emphasis on voluntarism might hide a real-political asymmetric power relation between marginal groups and those who seek an ‘intelligent’ resolution in NWM, whether for industrial or environmental intentions.

Although DGD site selection in Sweden and Finland was implemented with little conflict, one cannot overlook the fact that host communities are located as neighbouring the present NPPs. Bure, the site for an underground research DGD laboratory in France, and Villar de Cañas, where the construction of a Spanish interim storage facility is being planned, are small and economically declining villages. They seem to fit the prototype of ‘nuclear oases’ better than a success story of voluntary acceptance. Andrew Blowers describes nuclear oases as places where substantial volumes of waste, radioactive emissions and contaminated land pose risks to local communities that are dependent on the industry. ‘They are peripheral in the sense that they are geographically remote, inaccessible and isolated. Dependence on a dominant employer renders them monocultural, subject to economic risk as well as powerless, their fortunes controlled by external influences. As a consequence, they exhibit an inward-looking, defensive and acquiescent culture.’ Typical examples are Hanford in the USA, La Hague, Sellafield and Gorleben (Blowers 2003: 72).

Some disagree with the classification of Gorleben as a nuclear oasis. Gorleben has been an important foothold for German anti-nuclear movements. As Blowers admitted later, it ‘is distinctive and different from the other three communities in several key respects’ (Blowers 2017: 182). Its peculiarities should be analysed precisely through comparative study among nuclear oases. Moreover, our earlier theories must be complemented.

4 Comparison with Other Countries

It is worthwhile to compare German NWM with cases in other countries. Someone might wonder why advisory commissions in the USA, Canada and the UK can be included for comparison despite having political systems that differ greatly from those in Germany.

Policy-making is influenced by multiple factors. No single phenomenon such as deliberative democracy determines political outcomes. Nevertheless, scientific analysis sometimes requires extraction of an independent variable, with control of other factors. Researchers of German politics

are apt to emphasise its remarkable features such as party-political dynamics, culture of social movement, and environmental consciousness of electors, but these are not central themes of this article. Through comparison with Anglo-Saxon countries, it will be possible to concentrate on arguments about the functions of deliberative institutions, especially those of consultative processes open to civil participation. Afterwards, we will return to a discussion of German peculiarity.

NWM in the USA and Blue Ribbon Commission

As a result of military and civilian use, more than 70,000 metric tons of HLW have accumulated in the USA, with some 3,000 additional tons generated annually (Forrest 2015: 266). The US Congress passed the Nuclear Waste Policy Act (NWP) in 1982, entrusting the Department of Energy (DOE) with responsibility for studying candidate DGD sites. When the NWP was amended in 1987, it included the added obligation to open a final repository by 1998. Cost difficulties restricted the exploration for suitable sites to a single candidate: Yucca Mountain.

Yucca Mountain is located about 150 km northwest of Las Vegas, Nevada in an uninhabited federally owned desert area. It is nonetheless a sacred place to indigenous peoples (Paiute, Shoshone). After intensive exploration to the degree that it has been called 'the most studied real estate on the planet', a repository with 125,000 ton capacity was planned for construction at approximately 300 m depth, but 300 m above the water table. The site is adjacent to the Nevada National Security Site, formerly the Nevada Test Site, which had been used for above-ground and below-ground testing of nuclear weapons. The DOE recommended this location for the Yucca Mountain Nuclear Waste Repository (YMNWR) in 2002, with the expectation that the repository would open in 2017. In 2008, the George W. Bush Administration formally applied to the Nuclear Regulatory Commission for approval to place YMNWR into operation.

This plan was interrupted unexpectedly as politicians in the host state voiced their opposition. Harry Reid, Democratic Party Senator from Nevada who had become Senate Majority Leader in January 2007 and contributed to Barack Obama's election as president, was a long-time opponent of the Yucca Mountain project. The first official budget proposal of the Obama Administration in 2009 stated that 'the Yucca Mountain program will be scaled back to those costs necessary to answer inquiries from the Nuclear Regulatory Commission, while the Administration devises a new strategy toward nuclear waste disposal.' Consequently, funding for the YMNWR was halted, spurring the filing of a lawsuit. A decision reached on August 13, 2013 favoured the plaintiffs, who demanded fulfilment of the revised NWP, which mandates the opening of the Yucca Mountain national repository. Finally, funding for this project was recovered under Republican President Donald Trump.

Often, nuclear development embodies structural discrimination. In the case of Yucca Mountain,

the opponents' argument was connected with the rights of indigenous peoples. Its NIMBY character is apparent from the fact that all states except Nevada supported the federal government's intention to promote the YMNWR program (Lersow 2018: 262). Noteworthy is the political process by which influential opponents were able to suspend the project during the Democratic administration, during which human rights activists and minority group representatives usually prevailed. Richard Forrest presents the criticism that 'powerful political actors have decided to derail what they see as a politically inexpedient course of action, thereby ignoring a clear 'scientific consensus' justifying actions that conflict with their perceived political goals,' and concludes that decades of accumulated actions and decisions add up merely to a decision to not decide (Forrest 2015: 274-275). Nevertheless, the Yucca Mountain project seems to be more meaningful than he thought.

From the viewpoint of participatory deliberation, the existence of a special commission is noticeable. While the 'U.S. Department of Energy's Motion to Withdraw' of March 3, 2010 alluded to advancements in science and the lack of 'broad public support' as reasons to 'focus on alternative methods' of dealing with nuclear waste, the Obama Administration established the Blue Ribbon Commission on America's Nuclear Future (BRC). Its final report of January 26, 2012 recommended a strategy with eight key elements: (1) a new consent-based approach to siting future nuclear waste management facilities; (2) a new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed; (3) access to the funds nuclear utility ratepayers are providing for nuclear waste management; (4) prompt efforts to develop one or more geologic disposal facilities; (5) prompt efforts to develop one or more consolidated storage facilities; (6) prompt efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available; (7) support for continued U.S. innovation in nuclear energy technology and for workforce development; and (8) active U.S. leadership in international efforts to address safety, waste management, non-proliferation, and security concerns (BRC 2012: vii). In light of failure to secure political support for the Yucca Mountain project, the BRC highlighted the importance of a 'consent-based approach' to siting that secures host community approval (Forrest 2015: 273).

As with European countries, American people have learned the importance of consensus-building through transparency and participation in the twilight of the DAD approach. However, the BRC is not comparable to other well-known cases such as the Ethic Commission or the Commission on the Storage of High-Level Radioactive Waste in Germany because it was at the mercy of political tactical battles between the Democratic and the Republican parties. Its impact was minimal. A culture of social movements has prevailed in post-war West Germany, where the party system has been sensitive to value changes and where grass-roots opinion might present an alternative to the status quo in resonance with the mode of consensus-based policy-making by establishment members. In Anglo-

Saxon countries, which have majority representation (single-member district) election systems, it has been difficult for minorities or fringe groups to assert themselves in formal party-political competition. Ecological reform rarely arises as a political issue. The NWM of the Obama Administration was not more than a secondary one. By contrast, in Germany, the conservative Chancellor Merkel was able to seek a suitable mode of NWM under the precondition that the nuclear phase-out represented a social consensus. All parliamentary parties agreed with it.

Other factors to be controlled seem rather determinative. However, one must concentrate on the functions of deliberative institutions with respect to NWM decision-making. The BRC is a national-level *ad hoc* designated advisory board of experts and intellectuals. Although such commissions have not been unusual in the USA and Germany, they must increase participatory orientation to fulfil a deliberative requirement in our age. Advisory commissions can expand their activities in two directions: One direction is to include representatives of ordinary people based on a 'mini-publics' model. The German NBG is an example of it. The other direction is the principle of stakeholder integration. Instead of 'average' citizens, involved parties should have more opportunities to express their opinions. Host communities of final repositories, neighbour regions, occupational leagues, social movements, and disadvantaged groups (e.g. minorities) are imaginable as stakeholders. This article has no intention of deciding which functions better. The latter seems lively in Anglo-Saxon countries.

Seaborn Panel in Canada

In Canada, where senior civil servants and scientists had dominated NWM decision-making since the 1960s, non-traditional policy actors from a range of environmental and religious organisations, local communities, and aboriginal nations became increasingly active in decision-making processes in the first decade of the 21st century. Beforehand, the independent environmental assessment panel (Seaborn panel) hosted numerous public hearings between March 1996 and March 1997 to conduct an in-depth examination of the safety and acceptability of the disposal concept of Atomic Energy of Canada Limited. This represents an advisory commission's attempt to democratise the NWM decision-making through consultative processes open to both mini-publics and stakeholder deliberation.

That effort does not represent that public engagement in NWM has already been a custom in Canada. Very soon into the hearings, two discursive coalitions formed. The coalition of government and industry put much faith in the processes of technical risk assessment and argued for a dominant role of the industry, whereas the other coalition argued for the democratic incorporation into policy processes of a range of actors much broader than those of industry and government. Seeking to capture these competing positions, the Seaborn panel released a very carefully worded report in 1998¹².

In the point that it called for further deliberation among widely various citizens to the end of finding a safe and acceptable management option, Genevieve Fuji Johnson recognises the Seaborn panel report's democratic virtue. Although this discursive position was largely muffled in the subsequent political process, 2002 saw a surprising democratisation of the implementation of NWM (Johnson 2008: 31). The newly established Nuclear Waste Management Organization (NWMO) launched its national consultation process. The NWMO recommended an adaptive phased management approach in either the Canadian Shield or Ordovician sedimentary rock basins. In June 2007, the federal government formally accepted it.

Johnson's ethical policy analysis of Canadian NWM insists that deliberative democracy rises more fully to some challenges than welfare utilitarianism and modern deontology, which suffer from a persistent indeterminacy of substantive principles and lack of means for resolving this indeterminacy legitimately (Johnson 2008: 55). The environmental ethics is important, but we cannot enhance Johnson's argument here. For political process research, Seaborn panel's attempt poses a further question: What degree of power should (non-traditional) stakeholders retain in the consultative process? If the potential host communities have overly strong authority, e.g. a veto right, is it difficult to find a site for final repository? Contentious relations between deliberation and expertise remain. It will be worthwhile to examine another case.

CoRWM in the United Kingdom

The United Kingdom has produced great amounts of HLW during its years of nuclear development. A notorious symbol is Sellafield, where a high incidence rate of radiation-related disease has been reported¹³. The UK's NWM was doomed from its infancy by a negative legacy. It is now in a transitional phase, from neglect of nuclear waste in earlier years, to modern science-based disposal, and also from a DAD approach to consensus-based decision-making.

Also in the UK, Government and industry have advocated DGD as the end-point for HLW. In 2003, an independent Committee on Radioactive Waste Management (CoRWM) was formed to recommend the best options available for policy. This committee developed four knowledge streams: a scientific knowledge stream, a public and stakeholder engagement (PSE) programme, an ethical knowledge stream, and knowledge of overseas experience (Blowers 2017: 93). It was set up with a membership of 13 experts from various backgrounds including human rights, social sciences, and environmental activism as well as radiological protection and geology. Two of its initial members parted company because of their perception of a lack of rigorous scientific expertise on the panel. They argued that the CoRWM placed a great deal of emphasis upon gaining public confidence through engagement and consultation, but that this was done at the expense of recruiting and utilising the best

scientific expertise and up-to-date research in NWM. Balancing of the analytic and the deliberative was a delicate and politically fraught task (Cotton 2017: 177, 185–186).

One of CoRWM's advisers remarks that the German *AkEnd* has influenced on drawing up its recommendation (Blowers 2017: 214). It held meetings in public, published all internal and submitted documents, and engaged in four rounds of comprehensive PSE. Its report of 2006 argued for a voluntarist and participatory approach, granting potential host communities a right to withdraw (MacKerron 2015: 104, 114).

The CoRWM's recommendation was repeated in a White Paper of 2008, which was published by the Department of Environment Food and Rural Affairs (Defra). At the beginning of chapter 6, it stated the department's finding that an approach based on voluntarism and partnership is the best method of siting a geological disposal facility (Defra 2008: 47). For this purpose, the White Paper prescribed several steps: Stage 1 consists of five steps from 'Publication of White Paper and invitation for Expression of Interest' to 'Decision about Expression of Interest'. 'Expression of interest' is a decision to enter into discussion with Government, but without commitment. The final step of this stage will be a trigger point to initiate high-level geological screening and development of a programme of community engagement. Stages 2 and 3 divide the communal political procedures into eight steps from 'Communicate Expression of Interest to local stakeholders and communities' to 'Local Decision to Participate'. 'Decision to participate' is a point at which local authorities choose to enter into a commitment to participate in a repository siting process, but again without a commitment to host. The concept of 'community' is considered under three headings: The Host Community, the Decision Making Body and Wider Local Interests. They negotiate based on 'Community Siting Partnerships'. The 'Right of Withdrawal' is an important part of the voluntarism approach: Up until a late stage, when underground operation and construction are set to begin, if a community wishes to withdraw, then its involvement in the process would cease (*ibid.*: 56). Additionally prepared are 'Engagement Packages' and 'Community Benefits Packages'. The former are resources made available to local communities to allow them to participate in negotiations without high local costs. The latter are facilities that Government can offer local communities in exchange for their willingness to host a DGD. They might include such features as improved local training, public services, transport infrastructure, and healthcare.

When Government issued its invitations for communities to declare a potential 'expression of interest', only the three relevant authorities around Sellafield (Cumbria County Council, and the two lower level district councils of Allerdale and Copeland) pursued the possibility. All three entered into the West Cumbrian Managing Radioactive Waste Safely (MRWS)¹⁴ Partnership, which was set up under the auspices of the Nuclear Decommissioning Authority (NDA) to discuss the 'expression of interest' of local communities. Here, the wider public and the stakeholders were actively involved in

deliberation including local authorities, trade unions, chambers of commerce, religious groups and tourist promotion organisations. Great amounts of information were provided at all stages. The NDA had a sophisticated system for managing issues raised by any stakeholder or member of the public (MacKerron 2015: 113–114). However, Cumbria County Council¹⁵ exercised its ‘right of withdrawal’.

To the present day, no other community has made any ‘expression of interest’. The Government attempted to move the voluntarist process forward, although the White Paper 2008 had already had a reservation clause: ‘If the event that at some point in the future, voluntarism and partnership does not look likely to work Government reserves the right to explore other approaches’ (Defra 2008: 47). Under the new framework of the White Paper amended in 2014, national screening of geology moved ‘upfront’ before a volunteer steps forward. The DGD was a ‘major infrastructure project of national significance’ which would house not only legacy wastes but also wastes from new nuclear build (Cotton 2017: 221). Although laws enabling Government to develop candidate sites for final repository against the refusal of local decision-makers were enacted in 2015, one wondered if the energy policy renewed in 2006, including nuclear expansion, would make voluntary acceptance and consensus much more problematic (MacKerron 2015: 114 ; Josipovic 2018: 148).

The NWM process in the UK reveals that the partnership-based voluntary approach is not the shortest route to choosing a final repository. The ‘Community Siting Partnerships’ might be an attempt to correct past disparity relations between authorities and majorities on the one side and powerless minorities on the other and to empower stakeholders. Its culminant form is the ‘right of withdrawal’. However, if no one makes an ‘expression of interest’, or if volunteer sites have no suitable geology, what would be the next step? The fact that all three communities of ‘expression of interest’ were in the West Cumbria area brings to mind the ‘nuclear oases’ hypothesis, but they reserved the ‘right of withdrawal’. The awareness that voluntarism is no panacea for site selection recalls Di Nucci’s argument, who advocates ‘constructive IMBY’, but who concedes that acceptance through compensation is not the best path.

European societies have undergone numerous political changes, which does not mean that the DAD approach has been discarded irretrievably or that our political structure has been transformed irreversibly. Occasionally, consensus-building through public participation falls into difficulty. NIMBY thinking remains stubborn. Furthermore, top-down decision-making for NWM can occur in non-European authoritarian countries. Consideration of that point is beyond the scope of this article. However, no political science researcher is free from such an unpleasant reflection: Is democracy that is reliant on deliberation and participation superior to authoritarianism for issues related to NWM? A revival of the DAD approach cannot be excluded, even in Western societies.

5 Conclusions: German Peculiarity?

Tackling our research question and related preliminary questions, we have reached a finding. The NWM advisory institutions can expand their functions in two directions: open participation of ordinary citizens based on 'mini-publics' model and integration of stakeholders such as host communities, social organisations, and disadvantaged groups. German development since the *StandAG* resembles the former. The UK's regional consultation for site selection represents the latter. Compared to reluctance of German authorities to award veto rights, the NWM policy derived from CoRWM proposal was thoroughly deliberative democratic because it respected the voluntarism of host communities and granted a 'right of withdrawal' (at first). The fact that site selection has failed because of the very 'right of withdrawal' alludes that the top-down and expert-led thinking would revive, as Blowers describes the transition from the third period of 'cooperation and consensus' discourse in nuclear development to the fourth period of 'security' discourse.

Without any certain perspectives for its disposal, HLW still exists. Problems have not been resolved at all. The structural difficulties of NWM are so multi-dimensional that no consensus exists about what its 'resolution' should be. It is also true about evaluation of deliberative democracy. Some regard it as a normative paradigm. Others regard it merely as a mode of decision-making. That determines the answers to questions of whether Germany has accomplished a 'deliberative turn'.

To test the potentiality of deliberative institutions in real-political practice, German peculiarities, i.e. the controlled factors, should be brought back into consideration. The author infers that the German NWM can be described as an as-yet incomplete 'deliberative turn' of an ex-nuclear power without military use. Nuclear armament states such as the USA, the UK, and France have already disposed of HLW using questionable methods. In this sense, Germany is no NWM front-runner. It must initiate site selection procedures for DGD from the first step. The nuclear phase-out makes it possible to estimate inventories of nuclear waste that require disposal. Therefore, German position is advantageous to those of other countries which persist in nuclear energy, including non-nuclear weapon states such as Canada and Japan. In addition, Germany is a country with a tradition of social movement culture and a party system that responds sensitively to changing values. Those characteristics render Gorleben as distinguishable from other 'nuclear oases' or local communities which accepted facilities 'voluntarily', such as Olkiluodon, Forsmark, Bure, and Villar de Cañas.

Related to the actual and future NWM, several advisory commissions, documents, public discussions, and attempts at inter-disciplinary study have been launched. In this sense, Germany is a front-runner. This does not mean that Germany has approached a goal of siting a final repository. As the honeymoon period between the administration and anti-nuclear movements expires, all must acknowledge the true difficulty: 'All these efforts will be tested in the coming years, when the first

regions are announced as possible sites for a final repository for HLW. The ‘window of opportunity’ for negotiations and the setup of a robust nuclear waste governance is closing; it is very likely that the latent conflicts will escalate’ (Häfner 2019: 42).

Notes

- 1 Brunnengräber proposes to understand the NWM as a wicked problem and describe its ten characteristics (Brunnengräber 2019 ; Brunnengräber 2015: 82–84).
- 2 After the Fukushima nuclear accident, Chancellor Merkel convened this commission. It gave its final report on May 30, 2011 (Ethik-Kommission 2011), with the proposed phase-out of all German NPPs within ten years (*Energiewende*). The federal government’s decision almost coincided with this proposal. The commission comprised 17 members: academics, moral philosophers, theologians, business persons, trade unionists and ex-ministers.
- 3 <https://www.entria.de/entria-arbeitsberichte.html>
- 4 The Institute for Applied Ecology, established in Freiburg in 1977 and once regarded as an anti-nuclear think tank, is now an organisation working for sustainable development at global, national and local levels (<https://www.oeko.de>).
- 5 http://www.gesetze-im-internet.de/standag_2017/BJNR107410017.html
- 6 Das lernfähige Beteiligungssystem (Kommission Lagerung hoch radioaktiver Abfallstoffe 2016: 40).
- 7 The antonym of ‘retrieval’ is aftercare-free (*nachsorgefrei*) or maintenance-free disposal. The terminology of ‘passive’ nuclear management system seems misleading: ‘Aftercare-free’ repository requires the highest level of security and constant monitoring.
- 8 For example, retrievability of waste packages from the repository for a period of 500 years and salvageability for 500 years were stipulated in German safety regulations for waste disposal, which were declared in the document of the federal environmental department in 2010 (Hocke and Kallenbach-Herbert 2015: 187 ; Röhlig 2016: 49).
- 9 Proceedings are available as NEA 2012.
- 10 <http://www.unece.org/index.php?id=35869&L=0>
- 11 After intensive discussion, support for a zero-percent-scenario of nuclear energy increased from 32.6 percent to 46.7 percent, which was unacceptable for the authority.
- 12 Its conclusion includes a noncommittal statement: ‘From a technical perspective, safety of the AECL concept has been on balance adequately demonstrated for a conceptual stage of development, but from a social perspective, it has not’ (Johnson 2008: 28).
- 13 Nuclear issues achieved public awareness in 1983, a pivotal point year. Yorkshire Television’s documentary ‘Windscale – the Nuclear Laundry’ on November 1 drew attention to a possible link between nuclear installations and leukaemia clusters (Blowers 2017: 82).
- 14 After the parliamentary vote on 25 March 2015, the MRWS process was folded into the nationally significant infrastructure planning framework. The decision about siting now lies in the hands of the Secretary of State for Business, Energy and Industrial Strategy (Cotton 2017: 229–230).
- 15 The attitudes of the council, which represent regional interests as a whole, were slightly different from those of Allerdale and Copeland.

References

- Aldrich, Daniel P. (2008) *Site Fights: Divisive Facilities and Civil Society in Japan and the West*. New York: Cornell University Press.
- Arbeitskreis Auswahlverfahren Endlagerstandorte (AkEnd) (2002) Auswahlverfahren für Endlagerstandorte: Empfehlungen des AkEnd – Arbeitskreis Auswahlverfahren Endlagerstandorte.
- Beck, U., Giddens, A., and Lash, S. (1994) *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order*. Cambridge: Polity Press.

- Blowers, Andrew (2003) Inequality and Community and the Challenge to Modernization: Evidence from the Nuclear Oases. In: J. Agyeman, R. D. Bullard, and B. Evans, eds. *Just Sustainability: Development in an Unequal World*, London: Earthscan Publications Ltd., pp.64–80.
- Blowers, Andrew (2017) *The Legacy of Nuclear Power*. Oxon: Routledge.
- Blue Ribbon Commission on America's Nuclear Future (BRC) (2012) Report to the Secretary of Energy: January 2012. Washington D.C.
- Brunnengräber, Achim (2015) *Ewigkeitslasten: Die 'Endlagerung' radioaktiver Abfälle als soziales, politisches und wissenschaftliches Projekt – eine Einführung*. Baden-Baden: Nomos Verlagsgesellschaft.
- Brunnengräber, Achim, ed. (2016) *Problemfälle Endlager: Gesellschaftliche Herausforderungen im Umgang mit Atommüll*. Baden-Baden: Nomos Verlagsgesellschaft.
- Brunnengräber, Achim (2019) The Wicked Problem of Long Term Radioactive Waste Governance: Ten Characteristics of a Complex Technical Societal Challenge. In: Brunnengräber, and Di Nucci, eds., 2019, pp.335–355.
- Brunnengräber, A., and Di Nucci, M.R., eds. (2019) *Conflicts, Participation and Acceptability in Nuclear Waste Governance: An International Comparison Volume III*. Wiesbaden: Springer VS.
- Brunnengräber, A., Di Nucci, M.R., Isidoro Losada, A.M., Mez, L., and Schreurs, M.A., eds. (2015) *Nuclear Waste Governance: An International Comparison*. Wiesbaden: Springer VS.
- Brunnengräber, A., and Schreurs, M. (2015) Nuclear Energy and Nuclear Waste Governance: Perspectives after the Fukushima Nuclear Disaster. In: Brunnengräber et al., eds., 2015, pp.47–78.
- Cotton, Matthew (2017) *Nuclear Waste Politics: An Incrementalist Perspective*. New York: Routledge.
- Department of Environment Food and Rural Affairs (Defra) (2008) Managing Radioactive Waste Safely: A Framework for Implementing Geological Disposal: A White Paper by Defra, BERR and the devolved administrations for Wales and Northern Ireland.
- Di Nucci, Maria Rosaria (2016) NIMBY oder IMBY: Akzeptanz, Freiwilligkeit und Kompensationen in der Standortsuche für die Endlagerung radioaktiver Abfälle. In: Brunnengräber, ed., 2016, pp.119–143.
- Di Nucci, Maria Rosaria (2019) Voluntarism in Siting Nuclear Waste Disposal Facilities: Just a Matter of Trust? In: Brunnengräber, and Di Nucci, eds., 2019, pp.147–174.
- Dryzek, John S. (2013) *The Politics of the Earth: Environmental Discourses* (Third Edition). Oxford: Oxford University Press.
- Ethik-Kommission Sichere Energieversorgung (2011) Deutschlands Energiewende: Ein Gemeinschaftswerk für die Zukunft. Berlin.
- Fishkin, James S. (2011) *When the People Speak: Deliberative Democracy and Public Consultation*. (Paperback). Oxford: Oxford University Press.
- Forrest, Richard A. (2015) 'Yucca Mountain is Dead': The Challenge of Nuclear Waste Governance in the United States. In: Brunnengräber et al., eds., 2015, pp.265–277.
- Häfner, Daniel (2019) The Future is Still Unwritten – History Too: Overcoming the Conflicts of the Past in Germany. In: Brunnengräber, and Di Nucci, eds., 2019, pp.41–54.
- Hocke, P., and Kallenbach-Herbert, B. (2015) Always the Same Old Story? Nuclear Waste Governance in Germany. In: Brunnengräber et al., eds., 2015, pp.177–201.
- International Atomic Energy Agency (IAEA) (2016) *IAEA Safety Glossary: Terminology Used in Nuclear Safety and Radiation Protection: 2016 Revision*. Vienna.
- Isidoro Losada, A.M., Themann, D., and Di Nucci, M.R. (2019) Experts and Politics in the German Nuclear Waste Governance: Advisory Bodies between Ambition and Reality. In: Brunnengräber, and Di Nucci, eds., 2019, pp.231–259.
- Johnson, Genevieve Fuji (2008) *Deliberative Democracy for the Future: The Case of Nuclear Waste Management in Canada*. Toronto: University of Toronto Press.
- Josipovic, Neven (2018) Chancen und Risiken von 'Freiwilligkeitsansätzen' bei der Endlagersuche: Eine Untersuchung am Beispiel von Schweden, Frankreich und Großbritannien. In: Ott, and Smeddinck, eds., 2018, pp.125–159.
- Kommission Lagerung hoch radioaktiver Abfallstoffe (2016) Abschlussbericht: Verantwortung für die Zukunft: Ein faires und transparentes Verfahren für die Auswahl eines nationalen Endlagerstandortes.

- Lersow, Michael (2018) *Endlagerung aller Arten von radioaktiven Abfällen und Rückständen: Langzeitstabile, langzeitsichere Verwahrung in Geotechnischen Umweltbauwerken – Sachstand, Diskussion und Ausblick*. Berlin: Springer Spektrum.
- MacKerron, Gordon (2015) Multiple Challenges: Nuclear Waste Governance in the United Kingdom. In: Brunnengräber et al., eds., 2015, pp.101–116.
- Nuclear Energy Agency (NEA) (2012) Reversibility and Retrievalability in Planning for Geological Disposal of Radioactive Waste: Proceedings of the ‘R&R’ International Conference and Dialogue. 14–17 December 2010, Reims, France.
- Olliges, Julia (2019) A ‘Deliberative Turn’ in German Nuclear Waste Governance? The Participation Process of the Commission on the Storage of High-Level Radioactive Waste. In: Brunnengräber, and Di Nucci, eds., 2019, pp.261–292.
- Ott, K., and Smeddinck, U., eds. (2018) *Umwelt, Gerechtigkeit, Freiwilligkeit – insbesondere bei der Realisierung eines Endlagers: Beiträge aus Ethik und Recht*. Berlin: BWV.
- Radkau, J., and Hahn, L. (2013) *Aufstieg und Fall der deutschen Atomwirtschaft*. München: oekom.
- Röhlig, Klaus-Jürgen (2016) Techniken – Konzepte – Herausforderungen: Zur Endlagerung radioaktiver Reststoffe. In: Brunnengräber, ed., 2016, pp.33–54.
- Röhlig, Klaus-Jürgen (2019) The ENTRIA Project (2013–2018): First Steps towards Sociotechnical Radioactive Waste Management Research in Germany. In: Brunnengräber, and Di Nucci, eds., 2019, pp.311–322.
- Schreurs, M.A. and Suckow J. (2019) Bringing Transparency and Voice into the Search for a Deep Geological Repository: Nuclear Waste Governance in Germany and the Role of the National Civil Society Board – Nationales Begleitgremium (NBG). In: Brunnengräber, and Di Nucci, eds., 2019, pp.293–310.
- Smeddinck, Ulrich (2018) ‘Freiwilligkeit’ bei der Realisierung eines Endlagers für Atommüll: Zu Kompensationen ohne Beeinträchtigung konkreter Rechtspositionen. In: Ott, and Smeddinck, eds., 2018, pp.59–100.
- Tiggemann, Anselm (2019) The Elephant in the Room: The Role of Gorleben and its Site Selection in the German Nuclear Waste Debate. In: Brunnengräber, and Di Nucci, eds., 2019, pp.69–87.
- Yanase, Noboru (2013) Kokyo-Seisaku no Keisei heno Minshu-teki Togi no Ba no Jisso [the Implementation of the Deliberative Forum for Public Policy Making: Report on the National Deliberative Polling on Energy and Environmental Policy Options]. In: *Journal of the Faculty of Law*, 71, pp.53–186.

(おの はじめ 教育推進機構 教授)