

Reflections on Siting Approaches for Radioactive Waste Facilities: Synthesising Principles Based on International Learning

A report prepared for the
OECD NEA Forum on Stakeholder
Confidence



NUCLEAR ENERGY AGENCY

Radioactive Waste Management Committee**REFLECTIONS ON SITING APPROACHES FOR RADIOACTIVE WASTE FACILITIES:
SYNTHESIZING PRINCIPLES BASED ON INTERNATIONAL LEARNING**

This report synthesizes principles for socially responsive siting of radioactive waste management facilities that have emerged from over a decade of learning by the Forum on Stakeholder Confidence (FSC). It is based largely on the September 2010 presentation by Claudio Pescatore, of the NEA Secretariat, to the US "Blue Ribbon Committee on America's Nuclear Future". The FSC asked Hank C. Jenkins-Smith, a professor of political science and Associate Director of the Center for Applied Social Research at the University of Oklahoma, to review and augment this learning. Prof. Jenkins-Smith prepared this report in June 2011 and it was approved for publication by the FSC in September 2011.

Please note that this document is also available as a report in paper form as well as electronically on the NEA website: www.oecd-nea.org/rwm/fsc.

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FOREWORD

The Forum on Stakeholder Confidence (FSC) was established in 2000 by the Radioactive Waste Management Committee of the OECD Nuclear Energy Agency. Its goal is to foster learning about stakeholder dialogue and ways to develop shared confidence, consent and approval of solutions for managing radioactive waste. “Stakeholder” is defined as any individual, group or organization with a role to play or an interest in the process of deciding about radioactive waste management (RWM).

Siting national facilities in a local and regional territorial context is a central issue of RWM. There has been much experimentation and change in the past two decades, with accompanying institutional development. Throughout its tenure, the FSC has framed siting as the process of constructively engaging potential hosts in a decision making process, and building a mutually satisfactory, sustainable relationship among partners. Eight National Workshops and Community Visits to date have given a voice to the full range of stakeholders involved in building waste management solutions (find summaries and proceedings online at: www.oecd-nea.org/fsc). Topical sessions have allowed practitioners to present their experience in linking with communities.

The FSC’s formal studies and publications have moved from an early focus on traditional “communication” practices to a more critical perspective on how societal confidence in RWM solutions can be achieved within a *Stepwise Approach to Decision Making for Long-term Radioactive Waste Management* (NEA 2004a). The Forum first synthesized countries’ experience of relationship-building in the report *Learning and Adapting to Societal Requirements for Radioactive Waste Management* (NEA 2004b). Further publications in this vein have included *Fostering a Durable Relationship Between a Waste Management Facility and its Host Community* (NEA 2007) and finally *Partnering for Long-Term Management of Radioactive waste: Evolution and Current Practice in Thirteen Countries* (NEA 2010a).

This brief report, prepared by a scholar exterior to the FSC, synthesizes siting principles and practices identified by the FSC, indicates how these may be developed, and adds some further references.

Acknowledgements: This report is based largely on the 21 September 2010 presentation of Forum on Stakeholder Confidence learning made by Dr. Claudio Pescatore, of the NEA Secretariat, to the US “Blue Ribbon Committee on America’s Nuclear Future” (BRC). The FSC then asked Hank Jenkins-Smith, a professor of political science and Associate Director of the Center for Applied Social Research at the University of Oklahoma (USA), to review and augment the material. He prepared his report in June 2011 and presented his critical thinking to the FSC in September 2011. The FSC thereupon decided to publish this report online as the expression of his point of view. It is intended to encourage others to continue the reflection and express their position. Prof Jenkins-Smith’s presentation to the FSC and Dr. Pescatore’s presentation to the BRC are both provided in the Annex.

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INTRODUCTION

The evolution of approaches for siting radioactive waste storage and disposal facilities has resulted in a set of broadly defined principles that are intended to play a central role in constructively engaging potential host communities in siting efforts. These principles are intended to provide useful guidance; they are neither necessary nor sufficient conditions for “successful” siting of a radioactive waste storage or disposal facility. Indeed, understanding the meaning of “success” in this enterprise is an important precursor to effective assessment of siting policy design and implementation. Perhaps most important, however, is that the process and mechanisms of “engagement” in the context of collective decisions are, as yet, not well understood. This brief report describes facility siting principles, as they have been developed, and reflects on aspects of those principles that are most in need of further development.

The point of departure for these reflections is a cumulative body of understanding, based on the experiences of many nations, developed by the OECD’s Forum on Stakeholder Confidence (FSC) (NEA 2004a, 2004b, 2007, 2010a). The FSC has developed the most extensive catalogue of siting approaches employed internationally (NEA 2010a), and continues to monitor and evaluate these efforts. Central to the FSC’s contribution has been the articulation of a “partnership approach” to facility siting (NEA 2004b), elements of which have been employed in the radioactive waste management (RWM) siting efforts of most OECD countries (NEA 2010). Principles drawn from the partnership approach are briefly described here, with reflections on further development.

When considering general principles for RWM facility siting, it is important to place an individual siting initiative within the broader context of nuclear energy and radioactive waste disposal programs of the nation-state, and the still more general international effort to frame solutions for radioactive waste disposal. The time-spans involved in radioactive waste management require that one take the “long view”, and the ongoing nature of nuclear activities (including the production of energy, medical and research isotopes, and reactor research) requires that siting be understood as an activity that will involve repeated iterations of efforts to site disposal facilities. Moreover, globalization has assured that the effects of radioactive waste siting efforts in one nation-state will have implications for similar efforts elsewhere. In short, there is no isolated siting initiative in time or space. Therefore these reflections consider siting in the broader policy context, as programmatic initiatives integral to the larger RWM policy of a nation, and with implications for RWM policies within the international community.

1. REFLECTIONS ON THE MEANING OF “SUCCESS” IN SITING PROGRAMS

It is often implicit from a project proponent’s viewpoint that a “successful” RWM siting initiative is one that results in finding a willing host community, and constructing and opening a storage or disposal facility. This perspective is, in part, a holdover from perspectives on industrial facility siting (O’Hare et al. 1983). For typical industrial siting, considering time-spans of decades, the need for sustained host community support has led to calls for continued engagement over time. For radioactive waste disposal facilities, in which time-spans are greatly extended, the necessity for sustained community support is of even greater importance (NEA 2007). The consideration of sustainability of host community support over time, and the implications any one siting initiative may have for siting efforts elsewhere, have altered what success may mean.

The definition of a siting *process* success need not be restricted to cases in which a site is selected and accepted by a willing host community.¹ In some instances, a successful result is one in which a community decides *not* to engage in a process of site selection, or in which a potential host community *opts out* after initially engaging in such a process. Consider the following programmatic objectives:

- To increase familiarity and control by potential stakeholders.
- To enhance and maintain trust and confidence among the institutional actors and other stakeholders.
- To establish legitimacy and sustainability of the decision(s).
- To promote “ownership” of the policy and of current and future siting decisions, both now and in the future.

As part of a larger siting process, a decision by some potential hosts not to participate in that process, and/or by others to withdraw after initial consideration, can provide an important signal about the legitimacy of the overall siting policy. The perception that a site has been pre-selected by authorities, and will be pursued regardless of the host community’s concerns or preferences, can delegitimize a nation’s RWM program and may have negative repercussions for programs in other countries.² Experience with industrial (landfill) siting in the U.S. indicates that, once it is made clear that a local community has the authority to opt out of the site selection process, the perceived legitimacy of the process and willingness to engage is increased. The same has been observed in RWM contexts in countries such as Finland (NEA 2002), Sweden and Belgium (NEA 2000). For that reason, a myopic notion of success – focusing on opening a facility at a particular site – may overlook the important legitimating effect of having some potential sites refrain from, or opt out of, participation.

¹ Another way to say this is that successfully siting a repository at a particular locale is not equivalent with programmatic siting success.

² In the United States, according to Kunreuther et al. (1990) the perception of many Nevada residents was that the Yucca Mountain project (at the time under consideration for development of a centralized deep geologic repository) was that the facility would be sited regardless of whether the site met the technical safety criteria. This perception further delegitimized a siting initiative that was already believed to have resulted from an unfair process.

More generally, the bases for a decision not to proceed with a specific site may consist of an array of factors including (but not limited to) demographics (e.g., population concentrations) and the technical qualities of site. Appropriately applied, the decision not to proceed with a site due to these kinds of considerations would constitute a success for the program.

A useful principle to consider in evaluating whether a siting decision, as part of a RWM program, contributes to success is to ask whether the decision enhances or erodes prospects for future efforts to engage potential host communities in subsequent iterations of the siting process. Keeping in mind that each encounter has implications for siting efforts over time and in other countries, the maxim employed might be as follows: *Endeavour to leave conditions for engagement with potential host communities in as good shape as you found them – or better.*

2. PRINCIPLES FOR ENGAGEMENT OF POTENTIAL HOST COMMUNITIES

The development of the FSC's principles for engagement with potential host communities has paralleled, in important respects, the changing consensus on how to approach facility siting more generally. Early efforts in RWM programs sought to impose rigid milestones from initial design through full-scale waste emplacement and disposal. Learning from these efforts has shifted emphasis to "adaptive staging" which involves programmatic focus on systematic learning, flexibility, reversibility, transparency and – above all – responsiveness to new learning and information (NAS 2003; NEA 2004a). While the understanding of many of these concepts is subject to differing understandings (NEA 2010b), the general emphasis is on permitting the RWM program, and siting in particular, to remain flexible and adaptively responsive to new learning. In the context of engagement with potential host communities, the implications are evident in principles for policy decision-making processes (and the context in which those processes are exercised), siting processes, storage and disposal facility design, and host community compensation.

General principles for decision-making processes

The FSC's general principle guiding the decision-making processes affecting programs for siting RWM facilities is as follows: *the decisions should be taken through iterative stages, providing the flexibility to understand and adapt to contextual changes* (NEA 2004a). This can be accomplished by implementing a stepwise approach that assures sufficient time for development of a competent and fair discourse with the host community and other stakeholders. The sequential decision stages permit programmatic and design adaptation to new learning over time.

One of the difficulties addressed in adaptive staging is the problem of policy learning, or how concrete experience is applied to improve policy (Sabatier & Jenkins-Smith 1993). Particularly in the context of high levels of conflict, policy learning tends to be difficult. Designing and implementing processes that facilitate *mutual* social learning is very challenging, particularly when the participants are initially suspicious of the intentions of other actors in the process (see, e.g., Jenkins-Smith 1988; Sabatier & Weible 2007). The FSC has emphasized the utilization of mechanisms that promote interaction between the various stakeholders and specialists, including expert oversight groups that are responsive to (and report to) stakeholders (NEA 2004b). The mechanisms are intended to promote public involvement in decision-making processes, e.g., by promoting constructive and high-quality communication between individuals with different levels of knowledge, beliefs, interests, values, and worldviews.

The development of these kinds of engagement mechanisms, and the manner in which they can successfully be embedded in the governance structures of nation-states, is not yet well specified. Public policy scholars have begun to shed light on the manner in which societal problems, as understood by participants and stakeholders, can shape the kinds of mechanisms that may be beneficial for policy engagement³ and learning (Hoppe 2011; Jenkins-Smith 1990). RWM facility siting problems can be understood quite differently in different settings; the perceived level of certainty of the required and

³ Policy engagement involves a two-way interaction between policy officials and potentially affected communities through which the understandings and concerns of the latter become important ingredients in shaping the formulation of policies and processes that guide the policy initiative. In the public policy literature, understanding policy engagement requires integrating "bottom up" and "top down" perspectives on public policy (Sabatier 1986).

available knowledge may vary, as well as the perceived level of agreement on the norms and values that are at stake over appropriate policy decisions. When both the certainty on necessary and available knowledge and agreement on pertinent norms and values are high, the problem can be considered “well-structured” (Hoppe 2011: 169-170). Under these circumstances extant institutional mechanisms for collective choice are likely to be sufficient, and expansion of public engagement may involve provisions for legal standing and involvement in rule-making and judicial review. For RWM siting issues, however, it is often the case that agreement on pertinent norms and values is in dispute, and certainty about the necessary and available knowledge is contested. Such contexts lead to semi- or unstructured problems. In these instances, the kinds of mechanisms for effective public engagement will differ, and will depend importantly on the nature of the political institutions of the host country. In federal systems, for example, participants have multiple venues (legislatures, agencies and courts in both central and regional governments) through which to seek to influence the outcome of policy debates. In centralized systems, on the other hand, the opportunities for influence may be more limited.⁴ Hoppe (2011) has suggested that when the problem, as understood by participants, is semi-structured, the kinds of mechanisms that can successfully broaden public engagement include formal consultation arrangements, co-regulation, co-management, and partnership arrangements. When the problem is unstructured (certainty about the necessary and available knowledge is contested and there is substantial dispute over the pertinent norms and values), effective mechanisms for expanded public engagement may involve injecting participatory processes into existing institutions of representative democracy, such as citizen referenda. The FSC would add that partnership arrangements (NEA 2010), by fostering joint elaboration of knowledge and values, can help move unstructured problems towards more structured ones. The central point is that, to be effective, the nature of the mechanisms utilized must be matched to the problem and institutional context.

The problem of appropriate engagement mechanisms raises a fundamental issue that requires additional consideration: the fundamental institutional arrangements within a country that provide for representation may come to be in tension with the engagement mechanisms developed for RWM siting. In the U.S., for example, the development of site-specific advisory boards that advise federal agencies may conflict with the authority of elected local officials; provision of local veto authority may be over-ridden by subsequent changes legislation by the Congress; and funding arrangements for local oversight may be eclipsed by later legislative decisions on budgets. The fundamental point is that institutional arrangements allocate sovereignty to entities in ways that may undermine the successful and sustained operation of many of the engagement mechanisms employed in siting efforts. *Sustainability* of these mechanisms requires careful design attentive to the kinds of friction and conflict they may engender with the nation’s fundamental institutional arrangements.

Societal-Level Policy Framework

The FSC’s partnership approach understands disposal facility siting processes to operate within the context of larger societal decisions and commitments (NEA 2004a; NEA 2010). Successful program engagement is considerably enhanced when the facility siting programs are seen as integral to the larger framework of societal decisions and commitments of which RWM issue is a part.⁵ These societal decisions and commitments include:

⁴ This concept has been dubbed “political opportunity structures”. Drawing on case studies in the a wide array of national governance systems, political opportunity structures refer to factors such as resources and/or other constraints that affect the behavior of advocates to influence policy (Sabatier 2007).

⁵ This integration substantially shapes the structure of the problem, as discussed above (Hoppe 2011). When the siting process is well integrated into societal agreements and commitments, the problem becomes increasingly well-structured and amenable to engagement by existing participatory arrangements.

National energy production, focusing on strategic decisions on energy generally and nuclear power more specifically.

National radioactive waste management, including a national strategy responsible defining how waste is to be managed.

The national siting of waste facilities, including a societal plan for identifying sites, as well as defining host community benefits and oversight schemes for those communities.

The national implementation of decisions, with policy that assures a commitment to the process that was entered into, including decisions on facility construction, operation, monitoring, and potential closure.

The critical issue is that, if a community is asked to host a radioactive waste disposal facility, the request is made in the context of a broader set of societal agreements about energy production (including whether nuclear energy will be part of the mix), waste disposal, and methods of waste disposal facility siting. These commitments provide the basis for the policy discourse; without them the potential for disputes over relevant norms and values increases substantially.

While the outline of these commitments is evident, the specific content will be country (or even host-community) specific. Some of the critical ingredients have been identified as components of recommended procedures for siting processes (see, e.g., Kunreuther et al. 1993; Linnerooth-Bayer & E. Löfstedt 1996; Jenkins-Smith & Kunreuther 2001). These include (1) *a facility should not be sited if it is not broadly understood to be necessary*; (2) the host community (and other relevant stakeholders) must also *share in the perception that the facility is acceptably safe*; (3) *the process by which the facility is sited must be viewed as fair and trustworthy*. Moreover, because groups and individuals within the public tend to hold different and conflicting notions of what is fair (Douglas & Wildavsky 1983), it will be necessary to negotiate a process design that appeals to all or most of the interested parties. In some countries, the notion of "taking responsibility for ones' own wastes," whether by the individual generator, a region or a country, appears to be an important element of defining a fair outcome.⁶

⁶ The position that fairness requires each country to develop and operate a permanent repository within its own borders, while widespread, is not universal. Given the potential trans-boundary and intergenerational issues associate with permanent disposal, equity to adjacent and future generations may require siting permanent disposal facilities in geological formations that are not available in some countries. A decision to forego disposal opportunities outside the borders of such countries may therefore inflict unnecessary costs on neighboring countries and future generations. This is an example of the kind of implication of the fairness principle that may evolve as discourse concerning the meaning of fairness continues.

3. PRINCIPLES FOR SITING PROCESS AND DESIGN ATTRIBUTES

The FSC has recommended that the RWM facility siting process should be flexible, and it should be adaptive to the array of governmental institutions (national, regional, local, and international) that will play a part in facility acceptance, implementation and oversight (NEA 2004b). The siting strategy itself affects the ability and the inclination of localities to facilitate or block the project. For instance, the extent and nature of public involvement, the choice to perform parallel or sequential characterization of sites, the schedule for siting activities, and the existence of waste storage capability are all likely to have an impact on the potential for the success of the siting initiative.

The FSC has suggested that the ideal site selection process will be a stepwise process, which combines procedures for excluding sites that do not meet criteria with procedures for identifying one(s) where residents are willing to discuss acceptance of the facility (NEA 2004a; NEA 2004b). The initial stages should identify a (preferably broad) set of potential sites, rather than a single (list of) technically optimal site(s). Experience indicates that success is more likely using a voluntary siting process, in which communities are allowed to withdraw from consideration for some time after the process is initiated (see NEA 2010a). This strategy increases the likelihood of community willingness to participate in the process.

Host communities have proved capable of *de facto* veto power in many instances, across a wide array of countries (NEA 2010a). A siting strategy therefore should anticipate effective veto power by host community, or regional government, and build that veto into the process as a legitimate exercise by the potential host. Once anticipated by the agency charged with developing and regulating the RWM facility, the authority of the host community to veto the project will help assure that potential sticking points and problems are recognized and addressed in ways that consider the host communities' perspectives.

An effective process is one that is designed to encourage multiple communities to consider accepting a RWM facility, and provide for a competitive site-selection process among those who indicate willingness to engage in the process. A clear safety threshold should be defined, but competition urged among the set of potential host that meet that threshold. The process should anticipate a special role for communities with extensive prior experience nuclear facilities, and especially those that have waste already on site. Some of these communities are likely to have levels of familiarity and trust that will encourage participation in the siting process (Greenberg 2009). The FSC (NEA 2007) has analyzed this familiarity as a complex cultural integration, whereby numerous links have been formed between the nuclear activity and everyday economic and social practices in the community. Such "industry awareness" should not be seen primarily as a sign of economic dependency, and certainly not as a willingness to sacrifice safety. Instead, the FSC suggests, "it should be recognized that host communities have already integrated the industrial activity and cognitive understanding into their local culture. This has been referred to in the past simply as 'familiarity' but in fact it may be called an existing cultural basis for facility development" (NEA 2007 pp 41-2). This interpretation is borne out by e.g. Kari, Kojo & Litmanen (2010) in a detailed study of community perceptions in Eurajoki, Finland.

4. FACILITY DESIGN CONSIDERATIONS

In initial stages of the siting process, potential host communities should be provided a “reasonably-safe stamped” facility design concept. However, the proposed design should not be a “turn-key package” that attempts to fully anticipate the completed RWM facility (NAS 2003). The process should assure that the details of the waste management method, including establishment of safety standards, monitoring and mitigation measures, would be finalized in the siting phase of the process and thereafter through deliberations and engagement with the host community (NEA 2004b; 2010a). This way, refinement of the technical method is an iterative, stepwise process itself. The stepwise design of the facility should be undertaken with designated governmental regulators engaged as “the people’s experts” (NEA 2003; forthcoming) and not as advocates for siting the facility.

Elements of the design of the facility can be of great significance (NEA 2007). Recent policy debates have suggested that “reversible” repository and disposal policy designs, permitting future generations to have a voice in safety or resource recovery, can substantially increase host community (and broader public) support for disposal facility siting (Jenkins-Smith 2011). Co-location of disposal facilities with non-disposal functions (energy production, nuclear research laboratories, or non-nuclear functions such as community centers) – have also been shown to increase host community support even in contentious siting efforts. The appropriateness of these kinds of design elements are, of course, dependent on the nature of the waste (e.g., HLNW versus used nuclear fuel assemblies) and the agreements embedded in the societal-level policy framework.

5. HOST COMMUNITY COMPENSATION

The potential host community, including the stakeholders in the region and neighboring communities, should see hosting the facility as a win/win arrangement. This goal can be achieved only if the host community and its neighbor communities and regional governments are involved in negotiations regarding decision-making process as well as benefit packages. The FSC recommends that benefits packages to be tailored to the concerns and needs of those affected and decided jointly with them (NEA 2007).

Benefit packages do not ensure public support unless the public feels that the facility is safe and there is sufficient monitoring and public control over its development and operation. However, the available evidence suggests that in some contexts offering benefits may be seen by residents of potential host communities as a bribe, and may even lead participants to doubt that assurances of safety can be relied upon (Jenkins-Smith & Kunreuther 2001). Careful consideration should be given to the sequence in which safety and benefit packages are negotiated in the design of engagement processes.

Sometimes, non-financial incentives, including community oversight schemes, may promote public acceptance and ownership more strongly than financial incentives. (A related concept has been explored in NEA (2010a) under the term “empowerment measures”.) The provision of non-financial benefits that directly address the perceptions of possible harm posed by the facility can be particularly effective. For example, when the facility is seen to impose risks on future generations through potential exposures to radiation, coupling the facility with a research laboratory that is focused on reducing such risks may substantially increase support for siting the facility within the potential host community (Jenkins-Smith 2011).

CONCLUSION

The FSC has provided useful guidance for RWM facility siting, based both on extensive international experience and deliberation among experts and stakeholders. The primary principles for decision-making processes, siting programs, facility design and compensation have been addressed here, and reflections on aspects of those principles highlighted. In the author's assessment, further progress on delineation of principles and program development guidance will benefit from focus on three key elements: (i) better understanding of the relationship between the effectiveness of stakeholder engagement mechanisms and the manner in which the problem is structured as described in the sub-section on "General principles for decision-making" (in section 2 above); (ii) development of guidance for sustainable programs for public involvement and negotiation in RWM given the diversity of fundamental institutional arrangements for collective choice within countries; and (iii) closer analysis of the relationship between the nature of benefits packages (broadly understood) and potential host community acceptance of RWM facilities.

REFERENCES

Publications by the OECD Nuclear Energy Agency (NEA) may be accessed online through:

www.oecd-nea.org/fsc.

- Douglas, M. & Wildavsky, A. (1983) *Risk and Culture: An Essay on the Selection of Environmental Dangers*. Berkeley, CA: University of California Press.
- Greenberg, M. (2009) “NIMBY, CLAMP, and the location of new nuclear-related facilities: U.S. national and 11 site-specific surveys.” *Risk Analysis* 29: 1242-1254.
- Hoppe, R. (2011) “Institutional constraints and practical problems in deliberative and participatory policy making.” *Policy and Politics* 39: 163-186.
- Jenkins-Smith, H. (1988) "Analytical debates and policy learning: Analysis and change in the federal bureaucracy." *Policy Sciences* 21:169-212
- Jenkins-Smith, H. (1990) *Democratic Politics and Policy Analysis*. Pacific Grove, Calif.: Brooks/Cole.
- Jenkins-Smith, H. (2011) “Public beliefs, concerns and preferences regarding the management of used nuclear fuel and high level radioactive waste.” Paper commissioned by the Blue Ribbon Commission on America’s Nuclear Future (available from the author on request).
- Jenkins-Smith, H. & Kunreuther, H. (2001) “Mitigation and benefits measures as policy tools for siting potentially hazardous facilities: Determinants of effectiveness and appropriateness.” *Risk Analysis* 21: 371-382.
- Kari, M., Kojo, M. & Litmanen, T. (2010) *Community Divided: Adaptation and Aversion towards the Spent Nuclear Fuel Repository in Eurajoki and its Neighbouring Municipalities*. Jyvaskyla, Finland: University of Jyvaskyla and University of Tampere. (ISBN 978-951-39-4149-9).
- Kunreuther, H., Easterling, D., Desvousges, W. & Slovic, P. (1990) “Public attitudes toward siting a high level radioactive waste repository in Nevada.” *Risk Analysis* 10: 469–484.
- Kunreuther, H., Fitzgerald, K. & Aarts, T.D. (1993) “Siting noxious facilities: A test of the Facility Siting Credo.” *Risk Analysis* 13: 301–318.
- Linnerooth-Bayer, J. & Löfstedt, R. (1996) “Fairness and siting: Introduction to a symposium.” *Risk: Health, Safety and Environment* 7: Special Spring Issue.
- National Academy of Sciences [NAS] (2003) *One Step at a Time: The Staged Development of Geologic Repositories for High-Level Radioactive Waste*. National Academies Press, Washington D.C.

- Nuclear Energy Agency [NEA] (2000) *Proceedings of the FSC Launching Workshop “Stakeholder Confidence and Radioactive Waste Disposal - Inauguration, First Workshop and Meeting of the NEA Forum on Stakeholder Confidence in the Area of Radioactive Waste Management”, Paris, France, 28-31 August 2000*. Paris: OECD.
- Nuclear Energy Agency (2002) *Stepwise Decision Making in Finland for the Disposal of Spent Nuclear Fuel. Workshop Proceedings - Turku, Finland - 15-16 November 2001*. Paris: OECD.
- Nuclear Energy Agency (2012) *The Evolving Role and Image of the Regulator: Trends over two Decades*. Paris: OECD.
- Nuclear Energy Agency (2004a) *Stepwise Approach to Decision Making for Long-term Radioactive Waste Management – Experience, Issues and Guiding Principles*. Paris: OECD.
- Nuclear Energy Agency (2004b) *Learning and Adapting to Societal Requirements for Radioactive Waste Management – Key Findings and Experience of the Forum of Stakeholder Confidence*. Paris: OECD.
- Nuclear Energy Agency (2007) *Fostering a Durable Relationship Between a Waste Management Facility and Its Host Community. Adding Value Through Design and Process*. Paris: OECD.
- Nuclear Energy Agency (2010a) *Partnering for Long-Term Management of Radioactive waste: Evolution and Current Practice in Thirteen Countries*. Paris: OECD.
- Nuclear Energy Agency (2010b) *More Than Just Concrete Realities: The Symbolic Dimension of Radioactive Waste Management*. Paris: OECD.
- O'Hare, M., Bacow, L. & Sanderson, D. (1983) *Facility Siting and Public Opposition*. New York: Van Nostrand Reinhold.
- Sabatier, P. (1986) “Top-Down and bottom-up approaches to implementation research: A critical analysis and suggested synthesis.” *Journal of Public Policy* 19(1): 21-48.
- Sabatier, P. & Jenkins-Smith, H. (eds) (1993) *Policy Change and Learning: An Advocacy Coalition Approach*. Boulder, CO: Westview Press.
- Sabatier, P. & Weible, C. (2007) “The Advocacy Coalition Framework: Innovations and clarifications.” In: P. Sabatier, ed., *Theories of the Policy Process*, pp. 189-220. Boulder: Westview Press.

ANNEX I: PRESENTATION BY PROFESSOR HANK C. JENKINS-SMITH TO THE 12TH REGULAR MEETING OF THE FORUM ON STAKEHOLDER CONFIDENCE, SEPT. 2011

Siting: State of the Art
Reflections on Siting Approaches for
Nuclear Waste Facilities

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9/14/11 FSC12 Session 12a 1

Three Primary Considerations

1. Better understanding the relationship between the effectiveness of stakeholder engagement mechanisms and the manner in which the problem is structured
2. Development of guidance for *sustainable* programs for public involvement and negotiation in RWM given the diversity of fundamental institutional arrangements for collective choice within countries
3. Closer analysis of the relationship between the nature of benefits packages (broadly understood) and potential host community acceptance of RWM facilities.

9/14/11 FSC12 Session 12a 2

Adaptive Approach and Stakeholder Engagement

- Adaptive staging is necessary for achieving broad stakeholder support
 - The problem of “learning” and compromise in potentially polarized contexts
 - Design and implementation of stakeholder engagement mechanisms
 - Experiments in collective decision-making
 - Importance of agreement on necessary knowledge (do we know enough?) and norms (do we agree on what we’re trying to accomplish and why?)

9/14/11

FSC12 Session 12a

3

Stakeholder Mechanisms

- Context matters for appropriate stakeholder design
 - *Well-structured problems* (knowledge and norm agreement) can be typically be well handled utilizing extant institutional mechanisms
 - *Partially or Unstructured problems* (disagreement on necessary knowledge and/or norms) may require more deliberative or participatory mechanisms
- We have accumulated very little systematic, empirical study of the appropriate match between types of facility siting engagement mechanisms and problem context

9/14/11

FSC12 Session 12a

4

Stakeholder Mechanisms and Institutional Legitimacy

- The introduction of new deliberative and participatory processes can conflict with existing institutional arrangements for representation and decision-making
 - Political representation (via elected representatives) can complicate the role played by stakeholder groups (and vice versa)
 - Agreements reached within stakeholder groups can easily be overturned at the national (or even regional) level
 - Corporatist governing arrangements can create resistance to the addition of new groups to forums for collective decision-making
 - The designs of political systems vary in allowing access to the policy process by those who seek change
 - Careful assessment is necessary to avoid conflict; engagement mechanisms are easily undermined
 - Unstable mechanisms can undermine the objective of obtaining sustainable support for NWM facilities

9/14/11

FSC12 Session 12a

5

Stakeholder Support and Policy Design

- Policy design shapes what we ask of potential host communities
 - The nature of the NW disposal facility
 - Retrievability, depth, number
 - Bundling options
 - Compensation (broadly understood)
 - Forms of compensation
 - Process of designing compensation schemes and perceptions of “Blood money”

9/14/11

FSC12 Session 12a



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Conclusions

- The FSC has articulated a widely-accepted set of processes
 - Stakeholder engagement mechanisms and policy design need to be fully context-sensitive
 - Critical domains for further research and understanding include:
 - The role of problem structure in design of effective stakeholder engagement mechanisms
 - Institutional legitimacy and sustainability of stakeholder mechanisms
 - Facility design and compensation

ANNEX II: PRESENTATION BY DR. CLAUDIO PESCATORE TO THE BLUE RIBBON COMMISSION ON AMERICA'S NUCLEAR FUTURE, SEPT. 2010

The slide features the NEA (Nuclear Energy Agency) logo in the top left and the OECD logo in the top right. The main title is centered in large, bold, black capital letters: "SITING OF RADIOACTIVE WASTE DISPOSAL FACILITIES - SYNTHESIS OF INTERNATIONAL LEARNING". Below the title is a photograph of a large, modern building with a grid-like facade. To the right of the photo, the presenter's name and affiliation are listed: "Claudio Pescatore, PhD", "NEA Radio active Waste Management and Decommissioning Programmes". At the bottom of the slide, a grey bar contains the text "Siting of Radioactive Waste Disposal Facilities" on the left and the number "1" on the right.

Plan of presentation

- Intro and key messages
- Giving a feel for the evolution of the understanding over the two last decades and the depth of learning that is available
- Formalizing the learning in the form of principles, governance areas and action goals
- Conclusions

Siting of Radioactive Waste Disposal Facilities 2






**NUCLEAR ENERGY IN EUROPE:
FROM ACCEPTANCE
TO OWNERSHIP**

CONFRONTATIONS
EUROPE

Services your to
LES ENTRETIENS ECONOMIQUES EUROPEENS

on **SEPTEMBER 16th and 17th, 2010**
at the **HUNGARIAN ACADEMY OF SCIENCES – BUDAPEST**

Siting of Radioactive Waste Disposal Facilities 3

NEA Nuclear Energy Agency OECD

The necessary goal of siting is continuous ownership of the facility ...


- It implies creating conscious, constructive and durable relationships between the (more affected) communities and the waste.
- It rests on people feeling
 - Comfortable about *safety*
 - That they are not condoning a *dubious practice*, but one that is in the broader *interest of society*
 - That the facility will contribute to the *quality of life* of the community and region *across generations*
- All of the above is *necessary*, and it takes *time*

Siting of Radioactive Waste Disposal Facilities 4

NEA Nuclear Energy Agency OECD

Resistance to “locally unwanted land uses” (LULU) projects

- **Radwaste repositories are not alone in the LULU category**
 - A 1995-“Fairness and Siting” Symposium observed that, out of 100 facilities needed in the US for Haz-waste management in 1981, only one land-disposal had been found (in Last Chance, Co) and fewer than ten, new hazardous-waste treatment and incinerators built.
- What also complicates RWM, when deliberating on a disposal facility, people feel they face the difficult issue of radioactivity and, also, must deliberate on “siding with” or “opposing” nuclear power. The debate quickly moves on to how trustworthy the various actors are, etc.




Siting of Radioactive Waste Disposal Facilities 5

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Successful Siting for RW ...



Jürgen Gies, Karlsruhe, 2010
Image: Gies, 2010

- Siting cannot be seen in isolation from a host of other issues, e.g, acceptance of nuclear, geographical fairness, origin and type of the waste, waste amounts, accountability of institutions, recent political and economic events, ...
- The stakeholders and many of the boundaries conditions will vary with time. ...The **process** of decision making needs to be **robust over time**. First of all it must be seen as being fair.

Siting of Radioactive Waste Disposal Facilities 6

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Evolution of knowledge over time

Siting of Radioactive Waste Disposal Facilities 7



SKN REPORT No. 60 – June 1992 "Survey of siting practices..." - 1

**Sweden, Finland, Canada, France, United Kingdom,
Switzerland, USA**

- "Siting for nuclear waste disposal changed in a major way during the 1980's. Systematic technical screening using geographic data did not lead to successful siting in many applications."
- "Systematic screening did not fail to achieve desired results every time it was used since the early 1980's, but it failed whenever used in a way that imposed a selection on a locality. Systematic technical screening has been effectively used for screening out unsuitable sites"
- "Current siting strategies which appear most promising are based on public involvement, with systematic technical screening in a reduced role"



Siting of Radioactive Waste Disposal Facilities 8



SKN Obs of 1992 - 2 ...

- Ranking sites for their technical suitability is a temptation, but not smart policy
- Ranking sites for their technical suitability on technical and safety grounds is hard to defend.

Siting of Radioactive Waste Disposal Facilities 9






SKN Obs of 1992 - 3 ...

- "Local Governments have demonstrated **effective veto power** in each of the seven countries surveyed, although this power is exercised in different ways"
- "The reasons for *SUCCESS* and *FAILURE* of siting projects are related to **political** and **legal** factors, the type of waste, demographics, and **EVEN** the technical quality of sites available for disposal"
- "The **siting strategy itself** affects the ability and the inclination of localities to block the project. For instance, public involvement, parallel vs sequential characterization, schedule for siting activities, and the existence of waste storage capability all have an impact on the success of siting."

Siting of Radioactive Waste
Disposal Facilities

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There is no recipe ...

-for **successfully siting a hazardous waste facility - or not siting a facility - but some of the critical ingredients are known:** (Linnerooth-Bayer & E. Löfstedt, 1995)
 - A facility should certainly **not be sited** if it is not **needed**, or if it is not perceived as acceptably **safe**.
 - Even for a facility for which a consensus exists that it is needed, it will not be "siteable" if a **process** is not in place that is viewed as fair and trustworthy.
 - Since the public holds different and conflicting notions of what is fair, it will be necessary to **negotiate** a **process** design that appeals to all or most of the interested parties. The notion of "taking responsibility for **ones' own wastes**," whether by the individual generator, a region or a country, appears to be an important element of a fair outcome.

Siting of Radioactive Waste
Disposal Facilities

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“Learning from the experience of others” (NWMO, 2006)- 1



- There is not a universal definition of willing host community.
- There are many approaches to measure community acceptance.
- The siting process can be lengthy and its outcome may be uncertain.
- In order to effectively incorporate traditional knowledge into the site selection process, build-in appropriate time allowances and culturally-sensitive communication and research methods.

Siting of Radioactive Waste Disposal Facilities 12



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“Learning from the experience of others” (NWMO 2006)- 2

- Building capacity (intervenor funding, media coverage, agreements..) can add rigor and value to the process.
- Partnerships can be an effective tool.
- Engage communities strategically and with transparency
- www.nwmo.ca/uploads_managed/MediaFiles/928_sr-2006-03_learningfromtheexpe.pdf
- and [SR-2006-01: Developing a Siting Strategy for a Nuclear Fuel Waste Management Facility](#)

Siting of Radioactive Waste Disposal Facilities 13

NEA

- 10 years of collaborative work on the societal dimension of RWM, especially disposal
- Practitioners from 16 countries (at least 60 of them over 10 years)
- 7 workshops in 7 countries to dialogue with national and local stakeholders (500-600 people) plus academics

FSC
Forum on Stakeholder Confidence



- Distill and document lessons with the help of practitioners, social scientists and a number of (local) stakeholders
- Create a record of "where we were" and of "where we stand".
www.nea.fr/fsc
- Probably the largest accessible library on governance of RWM

Siting of Radioactive Waste Disposal Facilities 14




Formalizing the learning

Siting of Radioactive Waste Disposal Facilities 15



NEA's three general principles for decision making

...

1. Decision-making should be performed through iterative processes, providing the flexibility to adapt to contextual changes, e.g., by implementing a stepwise approach that assures sufficient time for developing a competent and fair discourse
2. Social (mutual) learning should be facilitated, e.g., by promoting interaction between the various stakeholders and the experts
3. Public involvement in decision-making processes should be facilitated, e.g., by promoting constructive and high-quality communication between individuals with different knowledge, beliefs, interests, values, and worldviews



Siting of Radioactive Waste Disposal Facilities 16




... the aim being

- To increase familiarity and control by the stakeholders
- To enhance/maintain trust and confidence among the institutional actors and other stakeholders
- To establish legitimacy and sustainability of the decision(s)
- To promote "ownership" of the policy and of a project now and in the future

Siting of Radioactive Waste Disposal Facilities 17

EB 297 survey, nuclear waste, 2008



Information/Participation


Information

- How well informed are you about radioactive waste?
 - Well informed: 25%

Participation

- Who should be involved in a decision regarding underground disposal?
 - The citizens concerned: 56%
 - NGOs: 22%
 - Authorities: 15%



Siting of Radioactive Waste Disposal Facilities 16




Successful siting is embedded within four areas for decision making...

1. **National energy production**
 - responsible for strategic decisions on energy and nuclear power
2. **National radioactive waste management**
 - responsible for the defining how waste is to be managed
3. **The national siting of waste facilities**
 - responsible for identifying a site, as well as community benefits and oversight schemes for communities
4. **The national implementation of decisions**
 - responsible for keeping to the process that was entered into, including decisions on facility construction, operation, monitoring, and potential closure



Siting of Radioactive Waste Disposal Facilities 19

These four areas are fairly distinct in terms of stakeholder base

- Makes it possible to involve as many people as possible
- Promotes stability of higher-level decisions
 - Decisions need not be taken sequentially across areas. Parallel processes may very well work, depending on national circumstances {Some sequentiality is useful, however}
 - Within each governance domain a Stepwise Decision Making (SDM) process is applicable



Siting of Radioactive Waste Disposal Facilities 20

National Energy Policy

- Open national debate on energy policy and the place, current and future, of nuclear ; openly debated and accepted link between waste and nuclear
- Understanding and addressing of liabilities, legal responsibilities and financial provisions, especially for the longer term
- Clear, complementary roles and mandates of high-level actors: industry, the implementer, the regulatory system
- Role(s) of EIA and other tools identified to further involve people and society
 - If industry and government show transparency and the public is involved in policy making, prospects for agreement on radioactive waste management issues are better, even if debates on nuclear energy have not been fully settled.



Siting of Radioactive Waste Disposal Facilities 21

National Radioactive waste management system

- Define the waste envelope, and 1. establish end-points: which waste goes where; 2. establish that change in status quo is needed, even if interim facilities are available; 3. explain if or not more waste than that of the energy plan could be shipped without proper new process; and address relevant decision-making measures
- Establish broad safety principles
- Suggest a technically and societally acceptable WM approach for siting, including general technical exclusion criteria
 - Site first approach; Technical Method first approach; Parallel approach
- Never propose a turn-key package. Indicate that:
 - Details of the waste management method, including safety standards, monitoring and mitigation measures, will be finalised in the siting phase and thereafter through deliberations with the host community. This way, refinement of the technical method is an iterative, stepwise process itself.



Siting of Radioactive Waste Disposal Facilities 22

National Siting Policy - 1

- **The ideal site selection process is a stepwise process, which combines procedures for excluding sites that do not meet criteria with procedures for identifying one(s) where residents are willing to discuss acceptance of the facility.**
 - A voluntary process, in which communities are allowed to withdraw from consideration for some time, usually improves the chances for community willingness to participate and for a sustainable outcome.
 - Ideally, there will be multiple communities that are willing to accept the facility, and a competitive site-selection process is employed. Safety first is the discriminating criterion; if safety is the same, other criteria may be invoked.
 - Special role of nuclear communities, and especially those that have waste already
 - Go to a community with a "reasonably-safe stamped" concept and/or involve the regulators as people's experts.



Siting of Radioactive Waste Disposal Facilities 23

National Siting Policy - 2

- Hosting the facility should be seen as a *win/win* arrangement by the community and by its region or neighbouring communities. This goal can be achieved only if the host community and its neighbour communities and regional governments are involved in negotiations regarding decision making process as well as benefit packages. The latter ought to be tailored to the concerns and needs of those affected and decided with them.
- Benefit packages do not ensure public support unless the public feels that the facility is safe and there is sufficient monitoring and public control over its development and operation. Sometimes, non-financial incentives, including community oversight schemes, may promote public acceptance and ownership more strongly than financial incentives.

Siting of Radioactive Waste Disposal Facilities 24

National implementation of decisions

- Failure to honour decisions destroys the credibility of the foregoing process, and can result in the withdrawal of stakeholders who previously were active partners, or can disrupt their confidence in future steps of the process.
- When both the letter and the spirit of decisions are respected, credibility and confidence are accrued.
- Institutional actors need to be **active, visible, and understood** as they carry out their roles and. *Regulators have a special role to play.*

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Examples that seem to be leading to sustainable solutions ...

- Finland (SF) [SDM; EIA; Reg'r; local oversight]
- Sweden (SF) [SDM; EIA; Reg'r; broad oversight;]
- Belgium (LLW) [SDM; EIA; local oversight; region imp't]
- France (HLW, MLW) [SDM; local oversight; region imp't]
- Hungary (LLW) [SDM; local oversight; region imp't]
- Switzerland (HLW, LLW, MLW) [SDM; local oversight; region imp't]
- Canada (Spent fuel) [SDM; EIA; local oversight; region imp't]

Siting of Radioactive Waste Disposal Facilities

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Examples where it is still too early to tell ...

- Belgium (HLW)
- Germany (All waste)
- Japan (HLW)
- UK (ILW and HLW)
- USA (Spent fuel; HLW)

- Spain (SF) / Australia (LLW/ILW) / Korea (SF, HLW)

Siting of Radioactive Waste Disposal Facilities

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We are no longer in Kansas!

- Experience of siting exists – within and beyond RW – as well as a large body of analytical work. After many years of trials and errors but also of learning, the main ingredients are relatively clear.
- The last 10 years we have seen important shifts in policy and attitudes. Generally, countries have integrated the lessons, and are on a path of sustainable siting.
- For the more affected publics the key words are **SAFETY – PARTICIPATION WITH REAL INFLUENCE – DURABLE IMPROVEMENT OF QUALITY OF LIFE**

In Oesthammar Municipality, are you for or against the idea?

Response	Percentage
For	80
Against	20

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Thank you for your attention

www.nea.fr

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