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Shifting strategies and precarious progress: Nuclear waste management in Canada

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HIGHLIGHTS

- Canada has set up a process for siting a geological repository for nuclear waste.
- The current challenge is to find a community willing to host such a repository.
- Authorities are luring communities with the promise of jobs and local investment.
- Potential new nuclear reactor construction might become a locus of conflict.
- Success in actually setting up a repository is by no means guaranteed.

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ABSTRACT

Canada has a lengthy history of trying to find a path for dealing with radioactive spent fuel and nuclear waste from its nuclear reactors. In the last decade, it has taken major strides towards this goal by evolving a process through which a site for a geological repository to sequester nuclear waste is to be selected. The Canadian Nuclear Waste Management Organization (NWMO) is in the early stages of the process of finding a community that is willing to host such a repository. Differences between the broad principles underlying siting and the processes for actually selecting the site have emerged as the NWMO proceeds with engaging local governments and specific communities. These differences and other conflicts, especially over new nuclear reactor construction, might pose hurdles in the path of successfully setting up a repository.

1. Introduction

The management of radioactive wastes, especially spent fuel, has been a key challenge to the acceptance of nuclear power (Berkhout, 1991; Slovic et al., 1994). The debate over how to deal with spent fuel has been marked by a striking diversity of ideas, proposals and arguments (Högselius, 2009). Within the technical community, there is widespread consensus in different countries that spent fuel and other forms of waste can be safely disposed of in a deep geological repository (Meserve, 2004; Rempe, 2007).[1] Nevertheless, finding actual sites where such a repository could be built has proven politically very difficult and almost all countries that have tried to site repositories have had one or more failures (Feiveson et al., 2011).

In the last decade or more, Canada has emerged as one of the front-runners among countries dealing with this problem by evolving a process through which a site for a geological repository to sequester nuclear waste would be selected. Its Nuclear Waste Management Organization (NWMO) has recommended an approach that it terms “Adaptive Phased Management” which involves disposing of waste in a deep geological repository, but with the possibility of monitoring and retrieving the fuel for approximately 240 years after emplacement. NWMO is in the process of selecting what it calls an informed and willing community to host such a repository. Other countries, especially the United States, have been influenced by these developments in Canada.

This paper describes how this process emerged, how it is developing, and what challenges remain. We first describe the quantities of spent fuel involved and how they are managed currently. This is followed by a historical overview of nuclear waste management in Canada and a description of the NWMO and its consultation process. The next section discusses the relationship between the nuclear waste management efforts in Canada and those in other countries, in particular the United States. Finally, we discuss how this process is being implemented on the ground and three potential sources of discord that may be emerging.

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[1] However, there remain significant uncertainties in projecting the performance of such repositories far into the future (Macfarlane and Ewing, 2006).

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2. Nuclear power and waste

Canada was part of the U.S. Manhattan Project to build the first nuclear weapons. In 1945, it set up its first reactor, the Zero Energy Experimental Pile at Chalk River, Ontario, followed by the National Research Experimental (NRX) reactor in 1947. Canada also set up facilities that recovered plutonium and uranium-233; these facilities were shut down by 1956 (AECL, 1997, pp. 67–68). The first power reactor was the 20-MWe Nuclear Power Demonstration reactor completed in 1962.

As of March, 2013, the International Atomic Energy Agency (IAEA) listed 19 power reactors operating with a total generating capacity of 13.5 GWe (net) located in the provinces of Ontario, Quebec, and New Brunswick.[2] All are operated by utilities owned by the provinces. Nuclear power contributed about 15.1% and 15.3% in 2010 and 2011 respectively of Canada's total electricity (IAEA, 2011, 2012, p. 12).

Table 1 lists the inventories of spent fuel at different sites in Canada. As of June 30, 2012, Canada had about 2.35 million fuel bundles in storage, 1.53 million in wet storage and 0.82 million in dry storage (Garamszeghy, 2012). Since each bundle contains about 20 kg of uranium, the total inventory is about 46,000 t of heavy metal.[3] The existing reactor fleet is projected to produce 3–5.2 million fuel bundles, i.e., approximately 61,000–104,000 t of heavy metal, over their lifetime.[4] There appears to be adequate available storage for the foreseeable future (Ramana, 2011). Therefore, there is no imminent necessity to construct a geological repository, allowing for a more deliberative and protracted process to be adopted.

2.1. History of nuclear waste management

The history of Canada's nuclear waste management policy dates back to the mid-1960s, two decades after the country embarked on nuclear power (Johnson, 2007). In 1969, the Atomic Energy Control Board (AECB, which became the Canadian Nuclear Safety Commission [CNSC] in May, 2000) officially requested Atomic Energy of Canada Ltd. (AECL) to conduct research on storing and disposing of nuclear waste. AECL joined with Ontario Hydro (OH, which became Ontario Power Generation [OPG] in April, 1999) and Hydro Quebec to form a committee of waste owners. The committee initially advocated monitored retrievable storage on the grounds that permanent disposal had yet to be proven and that incorporating the ability to retrieve allowed greater flexibility (AECL 1972; Durant 2009a).[5]

Retrievability also kept open the option of reprocessing the spent fuel to extract plutonium for potential fueling of reactors. AECL had considered reprocessing in the 1950s because of the concern that uranium reserves were limited. By the 1960s, however, abundant domestic uranium resources had been identified and the focus shifted to a once-through fuel cycle. Interest in reprocessing persisted within AECL's nuclear-energy R&D establishment, fueled in part by the assumption that nuclear power would expand rapidly in Canada.[6] This changed after the Indian nuclear test of 1974, which used plutonium from a research reactor supplied by Canada. After that, retrievability "became a political liability for commercial nuclear power, while permanent disposal lent support by removing waste from possible military uses" (Durant, 2009a, p. 901). Deep geological disposal was first endorsed in a joint statement by the federal government and the government of Ontario in 1974 after India's test.

In August, 1977, the Federal Department of Energy, Mines and Resources released a report that surveyed various spent-fuel management and disposal options, including reprocessing and immobilization; surface storage; and disposal in ice sheets, in space, on or beneath the sea floor, or in various types of underground rock (Aikin et al., 1977). This report, which became known as the Hare report, after its Chairman F.K. Hare, recommended burying the spent fuel at depths of 800–1000 m in the Canadian Shield, a large area of ancient igneous rock in eastern and central Canada (Aikin et al., 1977, p. 5).

The Hare report drew much criticism and started a public debate over nuclear waste disposal that may have played some role in reducing public support for expanding Canada's nuclear-power capacity (Mehta, 2005, p. 40). Attempts by the AECL to investigate locations in Ontario for waste disposal resulted in considerable local opposition.[7] Petitions against repository proposals garnered tens of thousands of signatures and Ontario parliamentary support dwindled (Durant, 2009a). This led the Governments of Canada and Ontario to announce in 1981 that no disposal site selection activities would be undertaken until after the repository concept had gone through a full federal public hearing and approval by both governments (King, 2002).

Soon after, AECL set up an underground research laboratory in the province of Manitoba (Chandler, 2003). A shaft was sunk to a depth of 445 m in granite and a number of galleries and rooms were excavated in which various experiments were carried out (Tammemagi and Jackson, 2009). The laboratory was also used for joint international work on waste management and included participation from France, Japan, South Korea, Sweden, and the United States. The United States repository program, for example, spent millions of dollars each year on work at the laboratory because, at that time, the U.S. repository program was not allowed by law to work at Yucca Mountain (Isaacs, 2008).

In June, 1978, the Governments of Canada and Ontario established the Canadian Nuclear Fuel Waste Management Program (Johnson, 2007).[8] AECL, with the assistance of Ontario Hydro, was directed to develop a generic concept for the deep geological disposal of nuclear waste.[9] The program's goals were "to develop and demonstrate technology to site, design, build and operate a

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[2] This includes the Point Lepreau nuclear power station in New Brunswick that has been undergoing refurbishment since 2008; the refurbishment project is 3 years behind schedule and about one billion dollars over the original budget of $1.4 billion (Canadian Press, 2012). This does not include Bruce 1 and 2 reactors. All these reactors are moderated and cooled by heavy-water, and fueled with natural uranium.

[3] CANDU fuel bundles contain 19 kg of uranium, but NWMO estimates round this off to 20 kg.

[4] The low scenario assumes that reactors are shut down at the end of the projected life of the fuel channels, i.e., nominal 25 effective full power years (equivalent to about 30 calendar years of operation). In the high scenario, the reactors would be refurbished with a new set of pressure tubes and other major components, then operated for a further 25 effective full power years.

[5] According to AECL, "With the current state of knowledge… there is no proven safe permanent disposal method" (AECL, 1972; Durant, 2009a).

[6] For example, on February 28, 1977, the AECL organized a seminar on "Proposed Canadian Fuel Cycle Program" for Federal Government Agencies in Ottawa, where it projected between 67 and 90 GW by the year 2000, and added that "there is no indication of saturation in nuclear capacity by the end of the century" (CCNR, 2012a). Based on this, AECL projected that Canada would have committed its "measured resources" of natural uranium by 1978, its "indicated resources" by 1985, its "inferred resources" in the early 1990s and its "prognosticated resources" before 2006. This was used as an argument to embark on a program of reprocessing and fast breeder reactor construction.

[7] The first location to be chosen was Mount Moriah in Ontario, where AECL initiated a program of geophysical work with possible drilling, but was met with an overwhelmingly negative public response (CCNR, 2012b; NRCAN, 2012).

[8] The statement, however, explicitly stated that this "joint undertaking is not to be construed as a Canadian position on the question of the reprocessing of irradiated fuel. Canada's position in respect to its fuel cycle development program will be reviewed following the completion of the International Nuclear Fuel Cycle Evaluation now underway" (Boulton, 1978, p. 127).

[9] Ontario Hydro was to work on interim storage and transportation of radioactive wastes whereas AECL was to work on the immobilization and disposal of radioactive wastes from nuclear power reactors, including geological field and laboratory studies.

Table 1
Inventory of spent fuel in Canada as of June 30, 2012.
Source: Garamszeghy (2012).

Site	Current net power capacity (GWe)	Number of fuel bundles in wet storage	Number of fuel bundles in dry storage
Bruce A and B Nuclear Generating Stations (ON)	4.693	711,379	284,918
Darlington Nuclear Generating Station (ON)	3.512	336,233	86,745
Douglas Point Waste Management Facility	–	0	22,256
Gentilly-1 Waste Management Facility (QC)		0	3213
Gentilly-2 Nuclear Generating Station (QC)	0.635	36,933	87,120
Pickering A and B Nuclear Generating Station (ON)	3.094	406,908	243,435
Point Lepreau Nuclear Generating Station (NB)	0.635	40,758	81,000
Chalk River Laboratories (ON)	–	0	4886
Whiteshell Laboratories (MB)	–	0	2268

disposal facility", "to develop and demonstrate a methodology to evaluate the performance of a disposal system against… safety criteria", and "to show that suitable sites in plutonic [igneous] rock are likely to exist that, when combined with a suitably designed facility, would meet the safety criteria" (Hancox and Nuttall, 1991).

After 10 years of research and development, in 1988, AECL and OH submitted their concept to the government, and this was then put to a public assessment. The repository concept submitted by AECL followed the recommendation of the Hare Report and involved burying the waste 500–1000 m deep in the Canadian Shield (Durant, 2006). The rationale for the choice of the Canadian Shield was its relatively geological stability for at least 600 million years (Hancox and Nuttall, 1991). Following a Swedish design proposal, the waste would be held in containers made of copper with an inner steel vessel (Durant, 2006).[10] These containers would be emplaced in boreholes in the surrounding rock or in the tunnels themselves with a layer of compacted bentonite clay placed between the container and the rock mass (Hancox and Nuttall, 1991). Thus, the AECL concept included the use of both geological and engineered barriers, and envisioned no provisions for monitoring or retrieval. In 1987, the Atomic Energy Control Board issued a Regulatory Policy Statement that endorsed geological disposal.

The fundamental safety requirement imposed on the disposal concept was that, for the first ten thousand years following closure of a potential facility,[11] the predicted probability that an individual in a "critical group" would incur a fatal cancer or serious genetic defect due to exposure to radiation from the waste should be less than one in a million per year. The critical group is a hypothetical set of people assumed to live at a time and place such that their risk from the repository is likely to be the highest (Dormuth et al., 1995). In developing its models for doses, AECL has assumed that the critical group live "above the vault location where nuclides are expected to enter the surface environment from below with discharging groundwater and where dilution and dispersion of nuclides are minimal" and consists of "a series of self-sufficient rural households that derive all their needs from local, potentially contaminated sources" (Zach et al., 1994, p. 220).[12]

There was a hurdle. Under the Federal Environmental Assessment and Review Process introduced in 1973, it was mandatory for such a project to carry out an environmental assessment (Hostovsky, 2006, p. 386). Because of its concerns about opposition from local communities at individual sites, AECL decided to do this in two-stages. First, an Environmental Impact Statement (EIS) would be prepared to compare the different approaches to radioactive waste management without any specific site identified.[13] Then, after approval of a recommended disposal technology, a separate environmental assessment process would be initiated for a specific site.

In 1989, the federal Minister of the Environment appointed an independent environmental assessment panel chaired by Blair Seaborn. From 1989 to 1998, this panel examined the disposal concept proposed by AECL (Johnson, 2007). It initiated its review by holding public "scoping" meetings in the provinces of Ontario, New Brunswick, Quebec, Saskatchewan, and Manitoba, which all mine uranium or fabricate it into fuel or host nuclear reactors, and worked to develop guidelines for AECL's impact statement. The panel finalized these guidelines and issued them to AECL in 1992.

In 1994, AECL submitted an Environmental Impact Statement (EIS) on the impacts both after and before closure of the repository, including interim storage and transportation (Murphy and Kuhn, 2001). This EIS was then the subject of a second round of public hearings in 1995. While these public hearings were underway, in 1996 the Government of Canada issued a *Policy Framework for Radioactive Waste* defining the roles of the government and the waste producers (CNSC, 2008, p. 13), which stated that:

- The federal government has the responsibility to develop policy and regulate and oversee radioactive waste producers and owners so that they meet their operational and funding responsibilities in accordance with approved long-term waste management plans, and
- Waste producers and owners are responsible, in accordance with the "polluter pays principle", for the funding, organization, management and operation of long-term waste management facilities and other facilities required for their waste.

  The policy framework recognized that arrangements may be different for the different categories of radioactive waste found in Canada: spent fuel, low- and intermediate-level radioactive waste and uranium-mine waste rock and mill tailings.

  The Seaborn Panel submitted its final report to the federal government in March, 1998. Its key conclusions were (CEAA, 1998, p. 2):

- broad public support is necessary to ensure the acceptability of a concept for managing nuclear fuel wastes;
- safety is a key part, but only one part, of acceptability. Safety must be viewed from two complementary perspectives: technical and social;

[10] Titanium has also been considered for the outer shell.

[11] In the United States, the Environmental Protection Agency's standard of 1985 also set limits on radioactive releases for ten thousand years, but this was vacated by the U.S. Court of Appeals for the District of Columbia Circuit in July 2004 on the basis that it differs from findings by the U.S. National Academy of Sciences that it was technical feasible to assess compliance for a period of about one million years. The environmental impact assessment for Yucca Mountain predicted that the greatest calculated doses to exposed individuals would occur between four and six hundred thousand years after site closure (Murphy, 2006).

[12] In addition to radiation doses, a more recent study listed about 17 chemical elements in CANDU spent fuel that could potentially reach concentrations in excess of guideline values for drinking water, surface water, soil, or air at point of discharge to soil (Hart and Lush, 2004).

[13] Critics termed this an environmental assessment "without an environment".

- from a technical perspective, the safety of the AECL concept had been on balance adequately demonstrated for a conceptual stage of development, but from a social perspective, it had not; and
- the AECL concept for deep geological disposal did not have the required level of acceptability to be adopted as Canada's approach for managing nuclear fuel wastes.

The Panel discussed the concept of social safety pointing out the many ways in which society at large might have different ideas on what constitutes safe disposal as compared to technical experts. For example, the Panel assessed that in the range of scenarios considered, the public will likely be focused on extreme cases and worst-case scenarios, and would not want to exclude these because they have a low probability of occurrence. Similarly, a social safety perspective would call for regulatory standards to be developed "through consultation processes involving varied groups" and "protect generations living in the distant future" (CEAA, 1998, p. 38). Another important social criterion laid out by the Panel was that any concept involving the use of Aboriginal lands would have to respect Aboriginal rights and concerns through a process that is appropriate to their cultural practices, values and language.

The Panel's chief recommendation for how to proceed was that a nuclear fuel waste management agency should be created "at arm's-length from the utilities and AECL" (CEAA, 1998, p. 68). It recommended that the board of directors appointed by the federal government be representative of key stakeholders. The Government of Canada, which commended "the Panel for its public consultation effort," rejected this recommendation. Instead, it reiterated its 1996 Policy Framework decision that the management organization should be established by the producers and owners of nuclear fuel waste, specifically the three utilities that operated nuclear reactors and that the utilities should appoint the organization's board of directors (NRCAN, 1998). The government seemed content as long as the organization was "incorporated as a separate legal entity" from the producers and owners of the waste. This response was codified through the 2002 Nuclear Fuel Waste Act (NFWA) that required the nuclear utilities to establish a waste management organization as a separate legal entity to "provide recommendations to the Government of Canada on the long-term management of used nuclear fuel" within three years, and "establish segregated funds to finance the long-term management of used fuel" (NWMO, 2004, p. 12).

3. Nuclear waste management organization

In 2002, Ontario Power Generation, Hydro Quebec, New Brunswick Power Corporation, and AECL created the Nuclear Waste Management Organization (NWMO) in accordance with the NFWA. The NWMO launched a national consultation process aimed at identifying a waste management option "that would be socially acceptable, technically sound, environmentally responsible and economically feasible" (NWMO, 2005, p. 4; Johnson, 2007).

NWMO described the consultation process as a "dialogue" and used a variety of means, including "nation-wide surveys, focus groups, issue-focused workshops and roundtables, e-dialogues and deliberative surveys, and public information and discussion sessions", to reach out to people (NWMO, 2005, p. 61). It specifically consulted with a number of Aboriginal organizations. Even critics of the nuclear establishment had to admit that "this was, by far, the most open, participatory, democratic, independent, attempt to find wisdom that this subject had ever had in Canada" (Johnson, 2007, p. 84). At the same time, the process has been criticized because although it "was characterized by a degree of procedural equality… this equality did not extend to the equal consideration of all perspectives" (Johnson, 2009, p. 103).

The consultation involved four phases. The first explored what expectations Canadians had for the study and identified the key questions that might be asked of the chosen waste-disposal option. The second phase tried to explore these questions for all the options. The third phase then went further in assessing the various disposal options and the fourth phase finalized the study findings. At the end of each phase, NWMO released a document summarizing the findings of the previous stage.

NWMO considered three options

1. Deep geological disposal in the Canadian Shield,
2. continued storage at nuclear reactor sites, and
3. centralized storage, above or below ground.

At the end of the three year process, in 2005, NWMO recommended what it described as an "Adaptive Phased Management" (APM), which is essentially the geological disposal option, but with a very long period of monitoring after emplacement (NWMO, 2005).[14] NWMO envisions three phases, with the first two phases each being 30 years long and the final phase lasting 240 years.

During the first phase, spent fuel would be stored and monitored at nuclear reactor sites while a central site "that has rock formations suitable for shallow underground storage, an underground characterization facility and a deep geological repository" is selected (NWMO, 2005, p. 24). In parallel, the NWMO would decide "whether or not to proceed with construction of a shallow underground storage facility and to transport used fuel to the central site for storage". Should it be decided to construct a shallow storage facility, then the construction and operating licenses also would be obtained during the first phase.

The second phase would focus on completing the final design and safety analyses required for the operating. If shallow underground storage is approved, this phase would involve transport of used fuel from the reactor sites to the central site for extended storage.

The third and final phase would involve transferring spent fuel from the centralized underground shallow storage or reactor sites, repackaging it, and placing the used fuel containers into the deep geological repository for final containment and isolation. Then, for approximately 240 years, access to the deep repository would be maintained and it would be monitored to assess the performance of the repository system and to allow retrieval of used fuel, if required.[15] During this phase, however, the long-term isolation containers would be backfilled and sealed within the placement rooms, making retrieval more difficult.

For a scenario involving the disposal of 3.6 million spent fuel bundles,[16] NWMO's current estimate for the cost of the 300 year APM program is about $17.9 billion (2010 Canadian Dollars) without including interim storage in a centralized underground facility (NWMO, 2012a, p. 61). When discounted, the present value (as updated to January 2013) is estimated at $8.1 billion. This does not include the costs of interim storage at the reactor sites and recovery of the used fuel from storage.

[14] That the NWMO would choose this option may be foreseen from the way it highlighted the requirements in the second and third options to completely refurbish or replace storage facilities "about every 300 years" and thus requiring an "indefinite cycle of replacement and refurbishing activities" (NWMO, 2005, p. 22).

[15] Other countries have insisted on retrievability. For example, France's 2006 radioactive waste law specifies that no license for a repository for long-lived intermediate and high-level radioactive wastes shall be granted if the reversibility of such a facility is not guaranteed (Schneider, 2011).

[16] For planning purposes, NWMO has adopted a base case of 3.6 million bundles, which represented a value between the lower and upper end forecasts to allow for some reactors being refurbished and some not.

Table 2
Potential sites in Stage 3.
Source: Documents on the NWMO website (http://www.nwmo.ca/sitingprocess_whatsnew (accessed 13.04.13)).

Location	Formal expression of interest	Results of evaluation transmitted to township by NWMO	Consulting company performing evaluation
Ignace	August 26, 2010	March 24, 2011	Golder Associates
Creighton	March 11, 2010	June 22, 2011	Golder Associates
Wawa	May 3, 2011	October 7, 2011	Geofirma Engg. Ltd.
Schreiber	September 28, 2010	June 9, 2011	Golder Associates
English River First Nation	September 13, 2010	March 4, 2011	Golder Associates
Pinehouse	August 17, 2010	March 4, 2011	Golder Associates
Ear Falls	August 26, 2010	May 5, 2011	Golder Associates
Hornepayne	March 21, 2011	June 10, 2011	Golder Associates
Brockton	January 9, 2012	May 14, 2012	AECOM
Nipigon	November 9, 2011	February 21, 2012	Golder Associates
South Bruce	March 27, 2012	August 9, 2012	AECOM
Huron-Kinloss	April 16, 2012	August 9, 2012	AECOM
Elliot Lake	March 12, 2012	August 27, 2012	Geofirma Engg. Ltd.
Blind River	March 19, 2012	August 27, 2012	Geofirma Engg. Ltd.
The North Shore	March 21, 2012	August 27, 2012	Geofirma Engg. Ltd.
Spanish	March 21, 2012	August 27, 2012	Geofirma Engg. Ltd.
Saugeen Shores	May 14, 2012	September 19, 2012	AECOM
Arran-Elderslie	June 25, 2012	September 21, 2012	AECOM

On June 14, 2007, the Canadian government accepted the recommendations of NWMO and gave the organization the responsibility for implementing the program (CNSC, 2008, p. 7). In the interim, the utilities and AECL continue to be responsible for spent fuel at their respective sites.

The first step adopted as part of the APM approach was to develop the process through which sites would be selected. In 2008, NWMO invited “interested organizations and individuals to contribute their suggestions and expectations for the principles, objectives and key elements that should guide the development of a fair and inclusive site selection process” (NWMO, 2012a, 2012b, 2012c, 2012d, 2012e). The following year, NWMO put up a draft document with its proposal for comments, and finalized a multi-step process in 2010.

In May, 2010, NWMO began the process for selecting an informed and willing community to host the deep geological repository for Canada's used nuclear fuel. The process involves nine steps, including a multi-step approach to assess and select sites, to perform a safety review, and to oversee construction and operation of the facility (NWMO, 2012b). Step 1 involves a “broad program to provide information, answer questions and build awareness among Canadians about the project and the siting process”, Step 2 involves providing a “detailed briefing” to communities interested in “learning more” and conducting an “initial screening”, and Step 3 involves communities that successfully go through the initial screening “learning more” and going through “preliminary assessments”.

As part of the first step, NWMO participated and made presentations in numerous meetings of municipalities both at the Federal level and in the provinces of Saskatchewan, New Brunswick, Quebec, and Ontario (NWMO, 2011). Table 2 lists the communities that have entered Step 3 of the siting process. As of December, 2012, 17 communities had formally entered Step 3 in the siting process, and four were in Step 2 (NWMO, 2013). Eighteen of these were in Ontario while three were in Saskatchewan. The NWMO suspended new expressions of interest effective September 30, 2012 “to focus on working with the large number of communities already engaged in learning more about the process” (NWMO, 2013, p. 44).

4. Relationship between nuclear waste management efforts in Canada and other countries

Canada's efforts at finding a path forward for its accumulating stockpile of nuclear waste has been affected by, and has affected, efforts in other countries.[17] We have already discussed some of the technical overlaps: the use of copper containers based on a Swedish design is an important example. The NWMO continues to undertake joint research projects with its counterparts in other countries, especially those of Sweden, Switzerland, Finland, and France (NWMO, 2013, p. 59). The NWMO also follows international programs “in advanced fuel cycles, including reprocessing, partitioning and transmutation” to decide on “whether used nuclear fuel…can be recycled or reused” (NWMO, 2013, p. 91).[18] Finally, the NWMO has established an Independent Technical Review Group with members from Sweden, Switzerland and the United Kingdom, in addition to one from Canada.

In turn, Canada's nuclear waste management effort has had an impact on similar efforts in other countries. Most important of these was the United States, which, in 2010, halted its attempt to construct a repository in Yucca Mountain, Nevada, and set up a Blue Ribbon Commission (BRC) to develop a new approach to nuclear waste disposal. Unlike earlier proposals in the United States, the BRC recommended an “adaptive, staged, and consent-based” siting process (BRC, 2012, p. ix). The BRC called for the process to “start by encouraging expressions of interest from a large variety of communities that can offer a potentially suitable environment for the type of facility under consideration” (BRC, 2012, p. 54).

The manifest parallel with the NWMO's approach was not accidental. The BRC studied the experiences with siting a nuclear waste facility in a number of countries including Canada and heard a presentation on its nuclear waste management program (BRC, 2012, p. 26). The Commission's call for “meaningful consultation with stakeholders to inform them of the status of the siting process and make needed adjustments” to build credibility and

[17] While we do not elaborate on it here, setbacks in other countries have the potential to affect the Canadian nuclear waste management program. Specifically, the fate of the application to build a repository in Sweden might affect NWMO's efforts to do the same. A key question that has emerged during the course of the Swedish Radiation Safety Authority examination of the repository's environmental impact assessment, following on earlier research findings, has been the long-term integrity of the copper canisters used to encapsulate spent fuel. The Swedish review has been closely followed by grassroots groups opposed to the construction of a nuclear waste repository (Northwatch, 2012).

[18] The NWMO agrees with the “current scientific consensus… that existing reprocessing technologies are not economically viable, especially for the unenriched CANDU fuel used in Canadian nuclear power plants. In addition, they do not eliminate the need for a deep geological repository, as they result in a large number of chemically very complicated radioactive waste streams with long-lived radionuclides. These are often more difficult to manage than the original used fuel”.

confidence in the implementing organization explicitly added the qualifier “much as was done by the NWMO in Canada” (BRC, 2012, p. 54).

5. Looking forward: Three sources of discord

Despite the progress in the nuclear waste management process over the decades, as the NWMO tries to find an actual site, several minor and major differences between the principles underlying siting and their implementation have emerged. Some of these were apparent even as the NWMO went about finalizing its process plan, but have become more important due to either exogenous reasons or simply during the course of actually wooing communities into becoming the host for the repository. We describe three of these differences in some detail. As the process moves to finalizing the project location, it is quite possible that some of these differences will widen.

5.1. Principles, economics, democracy

According to NWMO, its process of identifying a site is underpinned by the “values that Canadians said are important” and these values formed the basis of the “eight objectives: fairness, public health and safety, worker health and safety, community wellbeing, security, environmental integrity, economic viability, and adaptability” against which “different options were evaluated” (NWMO, n.d.). Similar sets of values were expressed by AECL in its Environmental Impact Statement (AECL, 1994). All of these statements of lofty principles should suggest that “neither technical argument, nor the carrot of economic incentives, would impinge upon the ability of specific communities or broader society to be the final arbiter of safety” (Durant, 2009b, p. 152).

Yet, the actual process of trying to find a community to host a repository has not highlighted the importance of ascertaining these values. Instead, it seems to have mostly involved dangling a carrot, i.e., jobs and other economic benefits, in front of potential communities. The process started even before the NWMO's APM process was finalized and in November, 2004, the NWMO retained two consulting companies to “carry out a comparative assessment of the benefits, risks and costs of implementing the above noted approaches in illustrative economic regions of Canada” (Golder Associates Ltd., 2005, p. 1). For the Adaptive Phased Management approach, the companies estimated, inter alia, that “employment benefits” range from “just over 91,000 jobs to nearly 159,000 jobs in the first 59 years of activity” and “income (wealth)… ranges from nearly $5 billion to nearly $7 billion” (Golder Associates Ltd., 2005, p. 63).

Emphasizing this aspect of the cost-benefit assessment has become a significant component of the NWMO's strategy. In May, 2010, as Step 1 of the siting process started, NWMO released another report, this time by a different consulting company, that highlighted the employment benefits to a host community, economic region, and province from the APM project (NWMO, 2010a). Its cover letter to potential sites describes the initiative as a “multi-billion-dollar project… also [involving] the creation of a center of expertise for technical, environmental and community studies” and predicts that it “will become a hub for national and international scientific collaboration, and… will generate thousands of jobs in a host region and hundreds of jobs in a host community for many decades”, while offering the assurance that dedicated funding for the project was “already in place” (NWMO, 2012c). Its May 2010 report, *Moving Forward Together*, promises that “the operation of the facility will create wealth in the form of business profits and personal income throughout the host region during the operation phase, amounting to hundreds of millions of dollars per year” (NWMO, 2010b, 2010c, p. 16). In their public presentations on the project, NWMO spokespersons have emphasized the economic benefits (“thousands of jobs”, “hundreds of millions of dollars for many years”, “transformational impact”) that would flow to the communities hosting the project (NWMO, 2010c). Likewise, consulting companies that have been hired by local towns and communities to help them make sense of the NWMO's proposed plan have also emphasized jobs and local spending.[19]

Response to the NWMO's outreach efforts have been mixed. By far, most communities do not seem interested in hosting the repository. To the extent that there has been interest in hosting a repository, it has been limited to only Saskatchewan and Ontario, the province with the largest capacity of nuclear power in the country. The lure seems to be the possibility of jobs and economic benefits flowing from the project, and much of the interest appears to be from localities that have fallen on hard economic times. A typical example is Ignace in northern Ontario, a town of 1200 people whose economy used to be based on forestry. But in recent years, the industry's earnings had declined and this had resulted in people migrating away from the community. Town officials reportedly see waste disposal as an economic engine generating hundreds of jobs for several years and a somewhat smaller number over the long term (Tremonti, 2009).

The usual process seems to involve local government officials writing to NWMO to find out more about the site selection process. NWMO then contracts with one of a few consulting companies to perform an initial screening to evaluate the potential suitability of the area “against five screening criteria using readily available information” (Golder Associates Ltd., 2011, p. 1).[20] These companies typically do “not identify any obvious conditions that would exclude” the locality from “further consideration in the NWMO site selection process” (Golder Associates Ltd., 2011, p. 6).[21] NWMO duly transmits this conclusion to the local officials and then funds a “learn more opportunity” wherein a delegation of officials from the local government are given a briefing by NWMO staff and taken on a tour of some facility that already stores nuclear waste or a visit to the Canadian Nuclear Safety Commission “to learn about the regulation of used nuclear fuel and how the public interest is protected” (Geofirma Engineering Ltd., 2011; Municipality of Wawa, 2011).

Town officials expressing interest in the NWMO proposal have often not gone through any community level processes to ascertain whether there is sufficient local support to build a repository. A good example is Saugeen Shores in southern Ontario, on the banks of Lake Huron. In late 2011, officials from the township met with NWMO,[22] evidently without consulting people in the community, “to learn

[19] For example, the township of Ignace, Ontario, retained the consulting firm Hardy Stevenson and Associates as a third party consultant to review NWMO's plan and “assist the residents of Ignace in beginning to build their understanding of Canada's plan for the long-term management of used nuclear fuel with a particular focus on safety” (Hardy Stevenson and Associates Limited, 2010, p. 1). One of the points emphasized by Hardy Stevenson and Associates is that there would be the “establishment of a center of expertise… [that] would involve several hundred workers at the site per year to build and staff the underground facility as well as a center of expertise, which will operate throughout construction and operation of the project. Spending during this phase would be in the order of 100 million dollars each year for a period of about five years” (Hardy Stevenson and Associates Limited, 2010, p. 18).

[20] The five initial screening criteria were: “having sufficient space to accommodate surface and underground facilities, being outside protected areas and heritage features, absence of known groundwater resources at repository depth, absence of known natural resources, and avoiding known hydrogeologic and geologic conditions that would make an area or site unsuitable for hosting a deep geological repository” (Golder Associates Ltd. 2011, p. 1).

[21] One exception was the township of Red Rock in Ontario, whose geological characteristics “did not appear suitable for the project” (NWMO, 2012a, p. 35).

[22] There is some disagreement over whether it was NWMO that approached the township or if it was the town council members who approached NWMO (The Canadian Press, 2011).

about Canada's plan for the long-term management of used nuclear fuel. The 'learn more' opportunity included a detailed briefing by NWMO staff and a tour of the Western Waste Management Facility at the Bruce Nuclear Site" (Town of Saugeen Shores, 2012). That they had little support from the community is made clear by a statement by a member of the Saugeen Shores Town Council to CBC News, "The public doesn't want us to even receive more information" (The Canadian Press, 2011). Once the community found out about the officials' dealings with NWMO, opposition grew and within a few months, township officials were confronted by protestors, who packed the Saugeen Shores council chambers at its meeting in March 2012 to voice their opposition to the proposed deep geological repository (Schleich, 2012). But this was to no effect. In May, 2012, the town councilors voted in favor of learning more about the process to become host to a repository (Sloan, 2012).

As in the case of Saugeen Shores, local citizens in other localities have opposed a nuclear waste storage site. In the township of Wawa, some 800 people signed a petition entitled "Take Wawa Off the Study List—We Do Not Want It" (Patterson, 2011). Many in Ignace oppose siting a repository because of the stigma associated with nuclear waste; as one resident put it, "No matter how safe the project is purported to be… the very idea of Ignace as a nuclear waste 'dump' will sully its name" (Castaldo, 2011).

Another dynamic that has become apparent is the tension between specific localities, which may desire waste disposal for economic reasons, and the provinces in which they are sited. Though three localities in the province has expressed an interest in siting a repository, Saskatchewan has opposed the idea of hosting a repository; in the words of the province's Premier Brad Wall, "This would be very much a provincial issue and while we would respect the fact that different communities do want this, there should be a sense that the province in general is supportive and I don't have that sense" (Wood, 2011). Not being satisfied with that, in May, 2012, more than 12,000 people signed a petition calling on the legislature to pass a law to permanently ban the storage of nuclear waste in the province (McGuire, 2012). The petition was largely in response to the three communities in Saskatchewan expressing an interest in being considered as a potential repository site (Hall, 2012).

Two organizations representing 88 First Nations in Ontario have opposed nuclear waste being buried anywhere in northern Ontario (Bell, 2012). Hornepayne, Wawa, Schreiber and Nipigon all fall within territories of First Nations that have opposed to nuclear waste storage and some chiefs have argued that siting a repository would violate international law (Thompson, 2012).

Other provinces have opposed importing nuclear waste. In October 2008, the national assembly of Quebec adopted a resolution banning the storage in the province of nuclear waste that comes from other provinces (Montpetit, 2011). It is not clear if the province opposes the export of spent fuel.

5.2. Safety: Technical or social?

Another shift that has become apparent is reverting to technical rather than social conceptions of safety. The Seaborn panel had emphasized that safety "must be viewed from two complementary perspectives: technical and social". Has the NWMO continued to adopt these complementary perspectives? This is perhaps best seen through the example of transportation.

Opposition to transportation has been a key factor in anti-nuclear protests around the world, and these have had some impact both on the growth of nuclear power in general as well as on the siting of nuclear waste repositories. In the United States, for example, a campaign to stop the transport of spent fuel to Yucca Mountain, dubbed "Mobile Chernobyl", was quite effective (Charman, 1999). In Canada too, there have been campaigns against the transport of nuclear waste. The petition against siting a waste repository in Saskatchewan also seeks to ban the transport of spent fuel through the province (McGuire, 2012).

In its 2005 report, the NWMO acknowledged "the concerns of many citizens about the transportation of used nuclear fuel" and stated that it needed "to demonstrate the safety of any transportation system to their satisfaction before beginning to transport used nuclear fuel to a centralized long term management facility," and, most crucial of all, noted that "decisions on risk and safety are societal ones" (NWMO, 2005, p. 34). In the Fall of 2012, on the other hand, NWMO put out a booklet, *Safe and Secure Transportation of Canada's Used Nuclear Fuel*, where most of the discussion relating to transportation focused on technical aspects. According to the NWMO, the "key to ensuring safety" was the "used fuel transport package" that is "made of a solid stainless steel box with walls nearly 30 cm thick and a lid attached by 32 bolts" and "designed to meet a series of challenging performance requirements—specified by CNSC regulations and based on international standards, to demonstrate the ability to withstand severe impact, fire and immersion in water" (NWMO, 2012b, p. 10). In its information sessions, the only non-technical aspect the NWMO seems to have emphasized is "the extent of government oversight of transportation"; the other, technical, aspects were "the robustness of containers, and the testing required by Transport Canada and the International Atomic Energy Agency". The NWMO also seems to have made extensive use of a "video of extreme tests conducted on used fuel containers" (NWMO, 2012a, p. 45).

The focus on these technical aspects of safety is, of course, not entirely misplaced. After all, if a cask that is used to transport spent fuel is leaky or can break upon even a slight impact, then it would certainly be unsafe. The problem is that there is almost no attention given to the social aspects of transportation safety and the perception of risk involved in the process. It is not clear if the NWMO is turning to those who have studied the social aspects of risk perception, and how to deal with these, a criticism that was also leveled at the U.S. nuclear waste management program (Rosa et al., 2010).[23]

To some extent this shift could have been foreseen. In the same 2005 report where it noted that risk decisions were societal ones, the NWMO pointed to the discussions "with regulatory authorities and waste management organizations in Canada and in other countries and the background research we have commissioned" as the basis of its belief that "used nuclear fuel can be transported safely". More important, the substantial argument it offers for this belief is that the "design of the transport container, which is the main safety feature in used fuel transport, is subject to high safety standards and rigorous and extensive testing. A range of accident scenarios has been considered and the regulations are under constant review. Radioactive materials have been transported around the world for 40 years. In that time, there have been no accidents that resulted in the release of significant amounts of radioactivity" (NWMO, 2005, p. 34).

Such technical arguments do not seem to have much resonance with the public and the transportation of spent fuel has been a target of opposition in Canada. This is exemplified in the case of the utility company Bruce Power's 2011 proposal to ship steam generators from decommissioned nuclear reactors through the Great Lakes to Sweden. In February, 2011, CNSC had issued a transport license to the company, noting that "the risk to the health and safety of the public and the environment posed by the proposed activity is negligible" (CNSC, 2011). This strongly worded

[23] The chief organization that the NWMO seems to be engaging with on the question of transport safety and risk is the CNSC (NWMO, 2012a, p. 78). The problem is that there is still considerable lack of community trust of the CNSC (Eyles and Fried, 2012).

assurance, and the technical fact that compared to spent fuel, steam generators have very low levels of radioactivity, did little to assuage public concerns. Opposition to the transport of these nuclear components continued and in May, 2011 Bruce Power was forced to withdrew its proposal (Iype, 2011).

The same sort of divergence between technical assessments of transportation risk and societal perceptions of the hazards associated with having shipments of spent fuel going through populated localities might well stymie the NWMO's proposal to site a centralized geological repository. Such a divergence between technical assessments and social perceptions will become more apparent as safety reviews for specific sites are prepared, especially by consultants who have a vested interest in furthering the project rather than raising concerns that may potentially threaten acceptance of the project.

A further caveat might be in order. Most discussions of “technical” vs. “social” perspectives on risk tend to imply that “technical” assessment of risk is rational and objective while “social” perception of risk is driven by subjective factors. This effaces the reality that there is a significant (at least in terms of influence among the organized opposition) cohort of those who oppose nuclear power and related projects who doubt the validity of the technical assessments themselves—but for “social” reasons, i.e., based on both historical experience and/or an analysis of how “technical” institutions generate risk analyses. The political economy of such projects is such that technical assessments err far more often on the side of underestimating rather than overestimating purely “technical” risk factors.

5.3. *Waste and the future of nuclear power*

Successfully dealing with nuclear waste through geological disposal is also tied up with the possibility of an expansion of nuclear power in Canada. One of the key sentiments driving the effort to find a repository for nuclear waste has been responsibility. In its 2010 report, NWMO noted the “strong sense of responsibility” that it encountered during its engagement with the public and stated “This generation wants to move forward in dealing with our used nuclear fuel, believing it to be imprudent and unfair to future generations to wait any longer” (NWMO, 2010b, p. 5). However, framing the necessity of disposing of spent fuel as resulting from the responsibility of the current generation to deal with the consequences of the benefits it has enjoyed from nuclear reactors automatically raises questions about whether such responsibility extends to reactors to be constructed in the future.

As part of setting up the process for spent fuel disposal, the NWMO took a narrow stance on its mandate, arguing: “Used fuel exists today and will continue to be produced to the end of the lives of Canada's existing nuclear facilities. The focus of our study is to recommend a responsible path forward for addressing the used fuel that requires management for the long term. Our study process and evaluation of options were intended neither to promote nor penalize Canada's decisions regarding the future of nuclear power” (NWMO, 2005, p. 20).[24] Likewise, in the United Kingdom, the Committee on Radioactive Waste Management, in drawing up a proposed national disposal policy, sought to draw a clear distinction between legacy waste and “new-build” waste (Mackerron and Berkhout, 2009).

Around the time when the NWMO was finalizing its plan, there were no definite prospects for a revival of nuclear power in Canada, and no reactor constructions were planned (Cadham, 2009). But this is no more the case. The nuclear industry in Canada has been bullish about the future of nuclear energy, even after the Fukushima accidents. Speaking at the Canadian Nuclear Association's annual conference in February, 2012, OPG's president Tom Mitchell announced, “While other jurisdictions may be scaling back their nuclear energy commitment because of Fukushima, we are not” (MacLeod, 2012).[25]

More important, the Canadian national government has been strongly supportive of constructing new nuclear reactors. In 2012, it offered the environmental clearances needed to build up to four new reactors at Darlington. Announcing the approval of these clearances, the Minister of Natural Resources went on to make the contestable claim “Nuclear energy is a safe, reliable and virtually emissions-free option for addressing Canada's energy and environmental needs” (WNN, 2012).

At the provincial level, however, there is variation. Some provinces are continuing to maintain and refurbish old nuclear plants while exploring the option of constructing new reactors. Other provinces that have no nuclear power currently are seriously considering building reactors. A good example is Saskatchewan. Over the last decade, the province's political leaders have encouraged the development of nuclear power in a number of ways, including “allowing a private sector company to undertake a feasibility study of a nuclear reactor, the establishment of an expert panel on uranium development and the undertaking of a public consultation” (Hurlbert et al., 2011). There has been a history of failed efforts to launch nuclear power as a power source in the province since the 1970s. Nevertheless, there appear to be many powerful political actors favoring nuclear power that it is possible that the province might embark on nuclear construction in the near to medium term future. But, as noted earlier, despite this interest in nuclear power, Saskatchewan's public and its leaders appear unwilling to allow for a repository to be sited in the province.

The construction of new nuclear reactors could well threaten the seeming consensus on the current strategy for siting a repository. The NWMO's 2005 report referred to “the impassioned arguments we heard about energy policy and the future of nuclear power”. The reason that the nuclear waste issue was tied to the future of nuclear power in the country was also clarified. “While some worried that the identification of a long-term management approach would serve as a *de facto* license for the expansion of nuclear energy without adequate public discussion, others acknowledged that it was important for the current economic viability of the industry that decisions be taken” (NWMO, 2005, p. 20). As Brennain Lloyd, Project Coordinator for Northwatch, an NGO based in Ontario put it, “To advance [the nuclear industry's] expansion ambitions they want to be able to say that they've solved their biggest problem, which is nuclear waste. The industry's end goal is to have a community say ‘yes' and then say ‘look, the problem is solved'” (Cornwell, 2012).

If this assessment is correct, then progress on siting a nuclear waste repository would ease, albeit to a limited extent, the way to new reactor construction. In turn, such construction would increase the amount of spent fuel that may potentially be disposed of in the proposed repository, a realization that could increase opposition to both repository siting and transportation of spent fuel.

[24] However, this was clearly not the government's view and in its press statement announcing acceptance of the NWMO recommended approach, the Minister of Natural Resources referred to it as a step “toward a safe, long-term plan for nuclear power in Canada for future generations” (NR-CA, 2007).

[25] Mitchell also asserted that Fukushima had given the industry “a great opportunity” because it's “once again made people aware of nuclear energy. It may have put some aspects of the industry on the spot. But it's also put us in the spotlight.”

6. Conclusion

As the waste process in Canada has started moving towards actual site selection, the narrative about nuclear waste in Canada has taken a turn from lofty themes of inter-generational equity and fairness in siting to altogether more down to earth, perhaps even sordid, details about numbers of jobs and additions to the tax base. Clearly this narrative has had some impact, at least in the case of those few towns and villages that have taken the first steps to playing host to the repository.[26] But the use of jobs and local investment as lure means that public participation has been turned into approval for projects in exchange for what essentially constitutes a bribe. This by no means unique to Canada and there is a long history of siting hazardous facilities near economically depressed communities around the world. Proponents of environmental justice consider this a form of economic blackmail (Gould et al., 1996; Camacho, 1998).

The focus on such small poor communities is likely to emerge as a problem because decisions on siting a repository for nuclear waste are not decisions that merely involve the local community but also larger regions, especially the province as a whole. As described earlier, differences of opinion between these different geographical scales of decision-making have already emerged. Looking ahead, this focus on specific localities means that there is unlikely to be "a reliable mechanism for coordinating discussion and decision-making on issues that seem to be local but in fact jointly affect several communities" (Hunold, 2002). Thus, a process that starts off looking like a democratic one soon moves away from that ideal.

Democratic decision-making is undermined also through the processes by which the target publics are being informed of the issues at stake. In those townships where officials have expressed an interest in being the site of a repository, the vast majority of information on the subject of nuclear waste and its management was being provided by either the NWMO or township officials who had already decided that it was a good idea. At least in some cases, the bias involved has become apparent to locals. In Saugeen Shores, for example, one local citizen protested at being subject to propaganda from the township and NWMO: "I want more information and public meetings, not kiosks" (Schleich, 2012). A further wrinkle comes from the widespread use of consulting companies in such decision-making, with the potential for significant conflicts of interest.

Another potential locus of conflict is the possibility of new nuclear reactor construction. Several surveys have found that the public acceptability of an expansion of nuclear power would increase significantly if the waste storage problem could be more effectively solved (Ansolabehere, 2007). Most people, regardless of their views of nuclear power, realize that spent fuel and any radioactive waste generated by existing nuclear programs must be disposed of eventually. But proposals to construct more nuclear reactors, thereby producing more nuclear waste, destroys this near consensus.

Since substantial sections of Canadian society continue to be ambivalent about an expansion of nuclear power, their support for geological disposal of nuclear waste might be available only when such disposal is part of a commitment not to construct any new reactors. An IPSOS survey conducted in May 2011 found that 34% of Canadians "strongly oppose" nuclear power and 29% "somewhat oppose" nuclear power; about 80% thought that nuclear power was a "limited and soon obsolete form of producing energy for the future" (IPSOS, 2011). Even before the Fukushima accident, a 2005 poll commissioned by the IAEA found that only 34% supported construction of more plants (GlobeScan, 2005). At the same time, the Canadian government appears intent on expanding nuclear power and analysts suggest that an ideological battle is brewing between the federal government and the general public over the future of nuclear power (Sovacool and Valentine, 2012, pp. 169–189). Therefore, it is likely that public support for a repository might evaporate as plans for reactor construction become more concrete, except perhaps in those small localities that are open to the facility in exchange for the promise of jobs and economic income.

Canada's nuclear waste management policy has evolved considerably over the decades, acquiring a significant social and political dimension in the process. The 1977 Hare report and subsequent attempts to identify a site for a repository were met with strong public opposition, prompting the government to postpone these attempts till there was much greater public acceptance. It took over twenty years for the government to approved the "Adaptive Phased Management" (APM) concept that the NWMO came up with. The public consultation process adopted by the NWMO to evolve the APM concept appears to have had positive effects in the search for a repository site and NWMO can therefore claim to have taken the first few steps towards dealing with the social opposition towards nuclear waste disposal in Canada.

The NWMO's approach, in particular its emphasis on siting through community volunteering, offers useful lessons for other countries. However, the multiple axes of potential conflict identified above imply that there is still a considerable distance to be traversed in actually setting up a repository, and success is by no means guaranteed.

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Appendix A. The other geological repository

While most of the discussion on nuclear waste in Canada has focused on spent fuel and high level waste, another geological repository has been in the making. This repository has been proposed by Ontario Power Generation (OPG) and would be solely to sequester low- and intermediate-level radioactive wastes produced at the Bruce, Darlington, and Pickering nuclear power stations operated by OPG. The project's environmental impact statement was submitted to the Canadian Nuclear Safety Commission in April, 2011; as of March, 2013, the assessment was still open for public review.

The proposed location for this repository is Kincardine, the host community for the Bruce nuclear complex operated by OPG. Experiences elsewhere find that communities that already have nuclear power plants are more favorable to siting nuclear waste, primarily for two reasons (Van der Pligt, 1992, p. 87).[27] First, local residents near a nuclear reactor site are "familiar" with nuclear wastes. Second, there are extra local economic benefits when the waste disposal site is located next to an existing facility. Public polls in the United States show that people living near nuclear

[26] The importance of narrative to decisions about low-level nuclear waste has been emphasized earlier (Fried and Eyles, 2011).

[27] Although the "combined effects of familiarity and economic benefits do have some impact" they "fail to guarantee local acceptance" (Van der Pligt, 1992, p. 89).

power plants are more supportive of nuclear power than average (Greenberg, 2009).

In 2005, a poll of all adult Kincardine permanent and seasonal residents found a 60% support level. One explanation has been that the narrative among the local community regarding the idea of a nuclear waste repository found was one that emphasized "progressivism and optimism" (Fried and Eyles, 2011).

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