

THE NUCLEAR OPTION: A CONTRACT BETWEEN SCIENCE AND SOCIETY

Notes for Dinner Remarks

Liz Dowdeswell

CAETS 2009, Calgary Alberta, July 16, 2009

How to meet our ever-increasing energy needs in a responsible and environmentally sustainable way is one of the most vexing social and technological conundrums facing the world today. Any analysis of the current state of geopolitics and economic development reveals a pervasive sense of insecurity about future energy supply.

And, as energy demand grows, climate change is forcing us to face the inevitability of a carbon-constrained world. Global climate disruption has thus opened the door for many discussions around the world about a potential nuclear renaissance.

Tonight I speak neither as an advocate nor an apologist for the nuclear industry. My focus is on designing effective public policy. Over the past 15 years I have had a part in dealing with both the challenge of mobilizing an international regime to address climate change and more recently, the challenge of managing used nuclear fuel in Canada.

Is there a case for nuclear? Certainly there are those who advocate that nuclear is at present the only safe large-scale energy source available for base load power. Soothing corporate advocacy campaigns claim that nuclear is clean, affordable and reliable. Industry advocates have been joined by some well-known environmentalists who believe that the risks from failing to reduce atmospheric carbon dioxide outweigh the risks associated with the use of nuclear power.

More than 400 nuclear power plants are in operation in 30 countries and after a couple of decades of relative inactivity, scenarios suggest that nuclear capacity will grow. For example:

- China plans a five-fold increase in nuclear generation by 2020;
- Serious consideration is being given to new build in countries such as the United Kingdom, the US, Canada and South Africa;
- And, countries as diverse as Algeria, Indonesia, Vietnam and Yemen are among those voicing the possibility of nuclear power generation as a contribution to realizing their development ambitions.

But nuclear energy has not been fully embraced. There are unanswered questions and interrelated challenges in implementation.

For some it is a question of feasibility. Can nuclear expansion occur quickly enough and on a scale commensurate with the need?

For others it is a question of economics. Comparative to other energy supply options, is it worth the investment? Will future development have to rely on massive government subsidies?

Environmental concerns are often the first to surface. Arguably, through long-term monitoring for environmental impacts, through rigorous environmental assessment processes and regulatory regimes we are identifying and mitigating risk to the environment and to human health.

The fear of human error such as occurred at Chernobyl, or of technical failure like that at Three Mile Island, is very real in the minds of many citizens. Those citizens cannot be ignored. They have every right to feel secure from accidental radiation releases. Yet the threat of terrorism and the nuclear weapons ambitions of certain states guarantees that proliferation is on their minds. And always there is the matter of nuclear waste.

I believe that perhaps the most challenging of all of these issues are the many social and ethical concerns, both real and perceived. Fundamentally the future of nuclear raises questions about how we make good public policy decisions. So, this evening I want to use Canada's recent policy exercise about nuclear waste to make some observations about approaches to dealing with these social and ethical concerns.

Responsible management of nuclear waste is a quintessential public policy challenge. It is an issue of scientific and technical complexity. It is also an issue that has the potential to inspire fear and insecurity and to polarize citizens.

In my view, the selection of an approach for the long-term management of used nuclear fuel is really about developing a contract between science and society – a contract that allows us to continue to benefit from emerging technologies, while mitigating risks, and also respecting the values of our citizens. Yet research shows that public trust in governments and major institutions is eroding while society's expectations to be involved in decision-making have become more intense and sophisticated.

Canadian Context: Let me set the context. Canada, like most other nuclear producing countries, has undertaken this quest for many years. We have more than 2 million used fuel bundles, safely stored on an interim basis at licensed facilities at reactor sites. Although radioactivity decreases with time, we recognize that nuclear fuel remains a potential health, safety and security hazard for thousands of years – some say indefinitely.

The Nuclear Waste Management Organization (NWMO) was established in late 2002 in response to federal legislation requiring Canada's nuclear energy corporations to create an organization to investigate and develop an approach for the long-term management of their used nuclear fuel. This followed a lengthy and extensive environmental assessment of geological disposal that concluded that while the concept had been adequately demonstrated from a technical perspective, from a social perspective it had not, lacking the required level of public acceptability to be adopted.

We asked ourselves, "What would make our attempt any different than those of the past?" We decided that the answer might lie in a search to understand the deeply held values of citizens and to review our options through a multidimensional lens that is in part shaped by citizens themselves.

For three years the NWMO had the privilege of engaging with Canadians. I say “privilege” because there is an inherent wisdom among citizens that policymakers would be wise to tap. Nevertheless the evidence of past attempts to satisfactorily resolve this issue have failed the world over.

Our mission statement was rooted in the concept of sustainable development - to *develop collaboratively with Canadians a management approach for the long-term care of Canada’s used nuclear fuel that is socially acceptable, technically sound, environmentally responsible and economically feasible*. And our analytical framework was integrative and systemic, featuring 8 objectives ranging from environmental integrity and economic viability to safety, community well being and fairness.

One of our main goals was to gather and document the terms and conditions that would make such a project acceptable to our society and to reflect a fundamental understanding and respect for these factors in the project’s actual design and implementation.

During the course of our work we were often asked why we thought it necessary to consider the ethical and social issues at all? The implication being that what we must do is simply seek the best technical approach.

The obvious answer is that members of the public have a right to be engaged in discussions about matters that affect their lives fundamentally. But it’s not just a matter of recognizing rights. It’s also about better decision-making. Astute decision-makers, whether in government or the private sector have come to understand that people who are affected by policies bring special insights and expertise to the discussion. Just as importantly, policies and decisions that are developed in an environment of trust and confidence have a much greater likelihood of being supported by public consensus. Participants who feel as if they “own” the process are more likely to sustain its outcome.

The answer also lies in how we as a society manage risk. The NWMO began its study with the understanding that technical and scientific specialists would articulate the nature of the risk and help us understand the technical adequacy of each of the management approaches available. They would also help us understand the impacts each approach might have on the environment, and whether the approaches are economically feasible. Experts could also propose mitigation measures. However, we strongly believed that the analysis of scientific and technical evidence, while essential, could not be the sole determining factor.

We were also profoundly influenced by the time dimension of this issue. Effectively we were being asked to develop public policy that would require implementation over a period longer than recorded history. Just a little humbling! Given the longevity of the hazard it was imperative that we consider explicitly how we might meet our obligations to future generations.

We concluded that values and ethics are absolutely central. Since ethical questions rarely have unambiguous or definitive answers, we observed that past attempts to solve them through technical arguments alone have not been satisfactory. As in any complex issue, trade-offs among competing objectives are going to be inevitable. In order to best determine and then satisfy the primary objectives of a large socio-scientific project such as this, the process had to be transparent, open to input from any and all points of view,

and rigorously discussed. In a democratic society the inclusiveness and integrity of the process by which decisions are taken are key to their success and acceptance.

The underlying philosophy of NWMO was that ultimately it is society at large that would determine which risks it is prepared to accept. We needed to understand society's views of the benefits, risks and social implications if we were to develop a socially acceptable recommendation. In essence, if the general population concluded, after extensive and informed public dialogue, that there was sufficient assurance of safety, then we would have obtained a "social license" to proceed.

We listened and learned. Our study process was iterative. Through 4 phases, each with its own "milestone document" we sought to: make transparent our deliberations; elicit public feedback to shape and direct subsequent steps in the study, and, test and validate NWMO's observations and conclusions as we developed them.

Our analysis used the best science and technology, building on years of study in Canada and internationally. Furthermore we integrated the input of citizens and specialists through continuous interaction between the analysis and the engagement components of our study.

Our approach was collaborative. We believed that progress in developing social acceptability would only come through genuine dialogue. Always we sought to bring multiple perspectives to the table to shape each major decision point.

We experimented with a broad range of engagement and dialogue initiatives, including traditional and more innovative approaches. This was an issue that demanded engagement, not just participation, dialogue not simply debate and thoughtful deliberation, not just consultation. Some methods were used to elicit the concerns of stakeholders directly interested in the issue while importantly, several techniques were adopted to hear from a statistically representative cross-section of citizens, including those who would not otherwise involve themselves in the study.

After dinner, I'd be pleased to informally elaborate further on the specific methods we employed, but I do want to draw attention to a few specific activities.

- *A Roundtable on Ethics* involving ethicists from fields as diverse as medicine, biotechnology, business and religion, who met over the course of the study to help identify the ethical issues associated with both the issue and the conduct of the study;
- *A National citizens dialogue on values* involving deliberative dialogue sessions with a representative cross-section of Canadians to learn about their deeply held beliefs and values,
- *A program of Aboriginal dialogues* designed, conducted and reported on by Aboriginal Peoples themselves;
- *A Scenarios Exercise* involving a diverse group of 26 individuals who met over a period of 6 months to explore a range of plausible futures and conditions which might need to be faced in managing used nuclear fuel over the long term.

In parallel the organization was conducting the necessary scientific and technical analysis of the management approaches. Our work was advanced through the contributions of a multidisciplinary Assessment Team. These 8 individuals – the best in their respective fields - brought rigour and discipline to consideration and assessment of various technical methods. They illustrated the wisdom of an holistic systems approach.

What differentiated this exercise from so many others was that it was grounded in the basic issues identified by Canadians. The development of a framework for analysis started with guidance from the Roundtable on Ethics about the social and ethical issues that needed to be central while industry experts provided technical information.

We found that the public was both capable and pragmatic. While they may lack awareness and knowledge about the characteristics of used nuclear fuel and the technological choices for its management, our experience was that citizens could participate effectively in identifying a path forward. In fact, we found that common ground emerged among citizens and specialists:

- They felt a responsibility to deal with the waste we have created and for taking action now. They sought fairness to current and future generations and did not want a legacy to be left for their children;
- They saw safety and security as pre-eminent objectives;
- They wanted flexibility to accommodate advances in knowledge and the inevitable technological and societal changes over such long timeframes.

The public also demonstrated consistently that it is both willing and capable of thinking through difficult trade-offs. And they understood that decisions would have to be taken in a dynamic and adaptive rather than static manner.

The public gravitated towards a precautionary approach instinctively. Why? Because they were humble about the state of our current knowledge and uncertainties over time, optimistic about the future and respectful of decisions made today for future generations. The public did not shun risk; instead they sought to manage it in the best way possible with decision-making processes that were phased, adaptive, inclusive and deliberative.

We observed that the public was not prepared to simply delegate responsibility to any one expert or specialist group, including the government, because those individuals and organizations were not seen as bringing forward and considering adequately the full breadth of objectives. Only a process that considered diverse views deliberately and transparently would be considered trustworthy of protecting the public interest.

The Canadian public defined complementary and inextricable requirements of the socio-scientific contract: safety, fairness and flexibility. NWMO's response was to propose Adaptive Phased Management: a technical approach of isolation and containment in a centralized underground facility, using a system of multiple natural and engineered barriers married with a management approach that was phased, flexible and collaborative. (See www.nwmo.ca)

The case we made to government was that Adaptive Phased Management was both responsible and responsive. Adaptive Phased Management commits this generation of Canadians to take the **first steps now** to manage the used nuclear fuel that we have created. It employs the **best available science and technology** in pursuit of safety and security. . It includes **sequential and collaborative decision-making** and provides capacity to be transferred from one generation to another. Fundamentally it is **rooted in values and ethics**.

Our journey from dialogue to decision reached an important milestone in June of 2007 when the Government accepted our recommended approach.

The hard part has now begun. We know that the success of any management approach, no matter how well conceived, will depend on how well it is executed. Matters of implementation were uppermost in the minds of most people that we encountered: they wanted to talk about the decision-making process, what institutions and systems would have to be put in place, and how citizens would be involved on an ongoing basis.

Very much a sign of the times, there were calls for strong governance, extensive oversight and clear accountability, along with greater and continued opportunity for citizen engagement. We concluded that just as a considerable investment was made in examining and understanding the technical options, so too an investment in examining and developing a process of implementation would be essential.

Designing the process of site selection is now underway, building on the same collaborative approach we fostered in the study phase. Sustained engagement with people and communities—whether they welcome, oppose, or seek modifications to our observations and conclusions—is vital.

Final Thoughts. I present these thoughts about the nuclear option this evening, not necessarily as a blueprint for other countries to follow, but rather because they illustrate an approach that deliberately sought to strike a bargain between science and society. This will be of particular importance as countries consider the future of nuclear. An industry or government mind-set of exaggerated self-confidence or arrogance with a strong belief in their power to win political battles is no longer appropriate or successful (if it ever was).

I learned much during NWMO's infancy. I learned that humility was an absolute imperative. It is important to acknowledge that there will always be some uncertainties. It would be sheer hubris to think that we could anticipate new knowledge and societal change over hundreds of thousands of years. But that need not nor should not paralyze us.

And furthermore I learned that there is no reservoir of trust and confidence in decision-makers at this time. I am now more convinced than ever of the imperative to design processes that earn and retain the trust of Canadians. That is surely the key to any contract between science and society.