Relatively few social scientists have studied citizen protest groups concerned with civilian nuclear power, and the relationship between political conflict over risk and regulation of the nuclear industry. Drawing from social movement research, the paper argues that anti-nuclear protests can be viewed as collective risk movements which reject conventional forms of political decision-making in favour of more proactive forms that expand civil rights and the resources of the public. Examples from the Canadian anti-nuclear context are explored.

Introduction

For years the advantages of living in industrial society appeared to eclipse the dangers created by unsafe industrial practices. This attitude steadily changed since the early 1970s with environmentalism. For example, nuclear energy has become both a symbol of industrial progress and energy self-sufficiency, and perceived as a threat to human health and the ecosystem. The risks associated with nuclear energy have galvanized individuals into two distinct camps: those who support it and those who oppose this energy source and prefer what has been called "sustainable" or "appropriate" technology (Mehta, 1995a). In seeking to overcome pervasive risks to human health and environment, democratic societies typically provide citizens the right to comprehend or review and take part in governmental decision-making. However, creating participatory mechanisms for the public to assess and debate nuclear energy policy or a nuclear plant license is difficult when decision-making is dominated by technical expertise (Jasanoff, 1986). Even the language of political debate about nuclear power is highly technical and requires, many argue, specialized knowledge in the assessment and management of technologically-generated risks. Such specialization raises concern that public decision-making will shift from politically responsible authorities to those who best understand the technical issues of a particular hazard (Brickman, Jasanoff and Ilgen, 1985). This concern is heightened by our society's tendency to bestow status and legitimacy on those participants in a socio-technological conflict who have scientific credentials (Sclove, 1978). Plough and Krimsky warn (1987: 4) "That those who control the discourse on risk, will most likely control the political battles as well."

Such observations suggest that debates about risk are not, in essence, scientific disputes; rather, arenas of social and political conflict, albeit arenas in which the public is kept at arms length. In Canada, most nuclear power plant development and considerable public debate about their risks, has occurred in the Province of Ontario. The public policy questions raised by the nuclear energy debate in Ontario are clear: What is the suitable balance between the influence of technical expertise and the influence of citizens in assessing and managing environmental risks? How much weight should public perceptions of risks have in regulating hazardous technologies like nuclear power?

Risk Assessment and Public Participation: A Theoretical Puzzle

Although Krimsky and Plough (1988) point out that risk analysis can be traced back to the Babylonians of 3200 B.C.E., the formal regulation of technological innovations began with the Industrial Revolution. What follows is a skeletal view of how regulation shifted from crude standard setting to dealing with risk. This portrayal is prefaced by my contention that danger exists independently of human activity and innovation, but risk is a social construct designed to help us manage danger.

In the beginning of the industrialized era, satisfactory public protection was assumed to be ensured by the enlightened self-interest of industry (Otway and Ravetz, 1984). Regulation emerged due to outrage at the insufferable working conditions and loss of life associated with unsafe industrial practices. Standards, the most familiar regulatory tool, were the outcome of a consensus between governments and industry experts. As risks from industrialization became better understood and more dispersed the movement toward protecting the health and safety of workers in industry shifted to protection of the general population. In both planning and policy, this broader appreciation of risk coincided with scientific research which allowed for the quantification and comparison of specific health and
environmental hazards.

One consequence of using science in politics (Douglas, 1992) is that complex issues become entangled in a web of epistemological vorticities which spin scientific uncertainty into a shimmering chimera of political alignments (Nelkin, 1984) and incestuous institutional interactions. Politics requires from science its authority—its certainty (Douglas, 1992). Thus, under the veil of modern science, the state acquires legitimacy.

Often debates about risk frame issues to exclude public opposition to hazardous technology, invalidating risk perception of the public, and expunging the values and visions that influence the experts and scientists who determine levels of acceptable risk, and legitimate scientific modes of inquiry. Since modern science generates knowledge which is technically exploitable, the nature of real power relations, which cannot be revealed by science, remains immune not only to scientific probing, but also hidden from public awareness. Jurgen Habermas explains that decision-making becomes narrowed when technical issues are excluded from the public domain. Science and no longer religion becomes an "opiate of the masses", absolving the "public" from the responsibility of making a choice about technologies which in fact are always hazardous and possess uncertain outcomes. Science and morality become indissoluble, wedded in a political arena where cost-benefit calculations and "value-for-life" assessments become the most expedient way to examine both technical and non-technical issues (Mehta, 1995b). Presumably, the "free market" and representative government will weed out those technologies and industrial practices which prove unprofitable or unpopular. In fact, profitable—or heavily subsidized—industries which generate risk become exempt from the normal democratic decision-making process and pressures of the free market, precisely because of the alienation science engenders in the uninformed. The use of science in assessing and managing environmental risks has replaced the "will of the people" with the will of industrial elites, who exclude and repress the rights of the individual for the sake of the individual.

German sociologist Niklas Luhmann (1980: 91) describes the trust that modern societies put in science:

Due to the perceived competence and honesty of the entrusted entity, one does not need to bother with assessing the outcomes of actions [policies] and with controlling the decision-making process of that entity.

In a de-politicized world, perhaps such trust in a rationalistic approach to risk would work quite well. Scientific knowledge about hazardous technologies would reduce risk through iteration and trial and error. However, this approach to regulation assumes: that science is value-free and risk an objective phenomenon that can be systematically controlled and balanced with benefits; that the public has confidence in government, industry, and science; that risk is equitably distributed among those who reap the benefits; and that no collusive relationships exist between industry and regulator. But ours is a political world, where any critique by public interest groups of the risks associated with nuclear power becomes futile. Huge disparities in access to resources and credibility often crush any chance of such groups winning a debate with the nuclear industry on technical grounds alone. A further consequence of orchestrating debates about risk using analysis which mirrors logico-deductive modes of scientific inquiry is that alternative forms of knowledge carry little or no weight.

In such a society, nuclear risk becomes a tangible product which can be sold, traded, or re-defined according to the will of politically active members of society who have access to scientific legitimation. Conceptualizing risk as a tradable commodity tends to make it into an environmental strategy used by powerful interest groups for optimizing current forms of development, not challenging them (Mehta, 1997). Environmental policy fosters a risk strategy of mitigation which serves to minimize the mismatch between economic development and ecological sustainability. And, risk becomes merely a minor player in determining how best to ensure profitability and continued growth without threatening human health and environmental quality.

Social Movements and Public Participation

Examining the social context of social movements Joppke (1993) finds fault with studies of the interactions between states and social movements. Where interaction is depicted as passive sets of opportunity structures that have little influence on mobilizing public concern, Joppke finds controversial interventions by groups against nuclear energy and other hazardous technologies that are helping to change public opinion.

Historically, central conflicts within liberal democracies occurred over the implementation of citizenship rights (Marshall, 1977; Lipset and Rokkan, 1967). As Ralf Dahrendorf (1988: 37) put it:

The modern social conflict is about attacking inequalities which restrict full civic participation by social, economic or political means, and establishing the entitlements which make up a rich and full status of citizenship.

Early citizenship conflicts were founded on political and social inequalities between well-defined groups and classes. Emerging energy and ecological conflicts in the early 1970s, however, created forms of political mobilization that cut across traditional group boundaries. Transformations in the physical world most likely stimulated a series of changes in the political world of risk processing and environmental regulation. Such changes coincided with a sweeping diagnosis of an emergent risk society as identified by German sociologist Ulrich Beck. Beck (1992) believes that we are nearing the end of an era concerned with building an industrial society, and moving into a post-industrial "risk distributing" society, concerned chiefly with controlling environmental risks created by modern technology.

For Beck, Western society is in a transition period and we are heading towards a second stage of modernity rather than into post-modernity. In the first stage of modernity, industrial society was concerned primarily with distributing material wealth. A newly emerging second stage of modernity—called by Beck the "risk society"—is concerned with distributing risk or harm. In essence, this shift represents
In contrast to all earlier epochs (including industrial society), the risk society is characterized essentially by a lack: the impossibility of an external attribution of hazards. In other words, risks depend on decisions; they are industrially produced and in this sense politically reflexive. While all earlier cultures and phases of social development confronted threats in various ways, society is confronted by itself through its dealing with risk. Consequently, a period of transition exists where distribution of both wealth and risks overlap. Perhaps this exposed surface is where environmental protest groups make their most noticeable dent.

Environment, anti-nuclear, and peace movements can be viewed as collective risk movements. They reject those conventional forms of political decision-making which have created ecologically unstable and non-sustainable patterns of consumption. Risk movements react against the encroachments of large-scale technologies on everyday life, as well as other externalities associated with industrial modernization. According to Christian Joppke (1993), citizenship movements are also proactively oriented towards obtaining new resources and expanding civil rights.

For nearly two decades, nuclear power has been embroiled in controversy (Dunlap, Kraft, and Rosa, 1993). Some reject nuclear power on the basis that it encourages a concentration of political power, social rigidity, and other cultural transformations which they deem undesirable (Sclove, 1978). Opponents to nuclear power often prefer smaller scale technologies which are de-centralized, environmentally benign, sustainable, foster more equitable distribution of wealth and political power, and allow citizens to understand and participate in the formulation of social and technological policy. Defenders of nuclear power are most likely to defend technology in general, as well as economic and industrial growth. Olsen, Lodwick, and Dunlap (1992) would most likely agree that the latter set of values matches their definition of an "industrial world view;" whereas, the former cluster of values more accurately belongs to those possessing a "post-industrial worldview."

Differences between proponents and opponents of nuclear power suggests that risk contains elements which activate, or contain ingredients of, sets of values, norms, beliefs, attitudes, and political orientations. If in a democracy consideration of public opinion is a cardinal tenet, then a multiplicity of values should be included in judging risks which affect the health and well-being of many. This way of conceptualizing risk demands that a "democratically-open" model of regulation (Doern, 1976) be followed by the Canadian nuclear industry. Such a model permits broad participation in regulation-making, licensing, and compliance proceedings. Public hearings are also part of this model, as are greater opportunities for arbitration and judicial review. Opponents of public participation maintain that it encourages conflict and discord, and that issues are too technical for the public.

Douglas Torgerson (1985: 245) wrote:

In the context of advanced society, there is a distinct and widely noted tendency for public policy analysis to become virtually absorbed in narrow, technical issues. This tendency has been especially noted in the case of efforts to rationalize the operations of the administrative state... Under sway of positivist logic of inquiry, analysis tends to be guided by an interest in calculating solutions for specific problems -- ones which pertain, moreover, to strictly delimited frameworks.

Torgerson notes that "professionalism" may fortify a "technocratic gulf" between expert and citizen, allying professionals with current administrative institutions. Increasing concern for environmental values has meant the search for political formulations that could broach such a gulf, recognize the limits of science and expertise, and defend a plurality of interests. It should be no surprise that public distrust of nuclear establishment science and technical expertise has increased as predictions about the reliability and cost-effectiveness of nuclear power plants failed to materialize. The early years of nuclear power were saturated with statements about the certainty of science's ability to solve social problems (e.g., "energy too cheap to meter"), as well as solving technical problems that may ensue following commercialization of nuclear power. Growing evidence of power plant accidents (e.g., Three Mile Island, Chernobyl) and waste management problems undermined this credibility. Growth of anti-nuclear activism and anti-utility groups is not a surprising development (Rudolph and Ridley, 1986).

Paehlke (1989) explains that a crisis of legitimation may stem from political movements which insert new values into political life. As Canadians are attracted to new ideals of environmental quality, or a nuclear-free society, the crisis of legitimation has taken the form of a reaction to the "scientization of politics" – that is, a rejection of politics which has been reduced to arcane technical questions and expert decision-making. This state of alienation consists of more than competing political interests, rather it points to the inability of existing institutions to respond and adapt to changes in their environment (Giddens, 1985). Essentially, a crisis of legitimacy occurs when an industry fails to control the environment in which it operates. Ideally, public regulatory agencies should not solely set standards and rules for the environment, but themselves become participants in a trilateral regulatory process, including public interest groups, government, and industry (Linnerooth, 1984). In the Canadian case, the nuclear establishment has until very recently been doing a reasonably good job of controlling its environment, fortifying their position by actively destroying opposition through attrition.

**Anti-Nuclear Movements as Risk Movements**

The social movements literature is replete with examples of how anti-nuclear groups have mobilized the public and affected government policy (Touraine, 1983; Price, 1982; Nelkin and Pollak, 1981; Sugai, 1987; Mattausch, 1989). Choice of political action by different anti-
nuclear groups is guided by their own distinctive orientations, which include beliefs about nuclear power, social values, and symbols that represent their opposition (Price, 1982). Jerome Price (1982) suggested that a group’s value orientations are intertwined with the motivation of its individual members to act. Adopting a typology developed by Talcott Parsons and Edward Shils (1959), Price classified anti-nuclear social action into four groups that exemplify modes of activity based upon specific social values and motives. These are intellectual, expressive, moral, and instrumental types of social action.

Anti-nuclear groups with intellectual patterns of social activism, such as the Union of Concerned Scientists in Cambridge, Massachusetts, critique technical problems associated with nuclear power. This small, yet influential type of activist group erodes the public’s trust in establishment science by revealing the often unfounded assumptions used by scientists to support their claims.

Expressive activists frequently link anti-nuclear protest to a more general criticism of social and political reality. These groups oppose nuclear power precisely because it is an affront to larger social values they hold. For example, anti-nuclear activists associated with the British Campaign for Nuclear Disarmament were also dissatisfied with the monarchy (Parkins, 1968).

Some anti-nuclear groups such as the National Council of Churches reacted against the moral implications of nuclear technology. For example, they often deal with issues such as the sale of nuclear technology to nations which may use it to develop nuclear weapons.

Instrumental activists are interested in changing current political culture through rationally planned mobilization of the public. They have specific goals such as stimulating changes in environmental policy and provoking improvements in regulatory culture. A variety of examples of anti-nuclear groups conforming to the principles of instrumental activism exist. The Sierra Club values the preservation of the natural environment and therefore attempts to impede future nuclear power plant construction on a national level.

On a larger scale, these protests exemplify a type of diffuse resistance to nuclear technology. For example, Wayne Sugai’s (1987) case study of ratepayer protest in the state of Washington shows how an anti-nuclear group halted construction of a local nuclear power plant due to concerns about economic viability. A precedent-setting U.S. Supreme Court case between Pacific Gulf and Western (a large U.S. utility company) and the State Energy Resources Conservation League (a coalition of community groups) established that a moratorium on new nuclear plant constructions can be passed by a state provided that local concern is based on economic reasons alone. Better known examples such as the New England Coalition on Nuclear Pollution, Clamshell Alliance of New England, People for Proof, and the Task Force Against Nuclear Pollution illustrates the effectiveness of regional protest.

The Canadian Anti-Nuclear Movement: Some History

In general, Canadian anti-nuclear activists are not only trying to phase out nuclear energy, but are also attempting to change the larger social and political powers behind it. As such, anti-nuclear protest is a product of the emerging “risk society” in that it aspires to replace technocratic power with participatory democracy.

Ronald Babin (1985) suggested that two stages characterize the evolution of Canada’s anti-nuclear movement. The first stage falls between the early 1970s and the March 1979 accident at Three Mile Island in Harrisburgh, Pennsylvania. This stage is characterized by swift growth and politicization of the movement. The second stage, beginning immediately after this accident, is characterized by a more flexible movement which attempts to forge alliances with other progressive social movements.

Babin suggested that the Canadian anti-nuclear movement first became visible when the implications of nuclear power became evident. However, historical links to earlier alternative lifestyle movements, peace and ecology movements of the 1960s probably layed fertile ground for a host of more focused attacks and protests against identifiable targets like the nuclear industry.

The 1960s heralded the emergence of several alternative lifestyle movements in Canada and elsewhere (Switzer, 1994). This change in consciousness occurred at a slow pace in Canada. Ripples from ecological battles raging through Europe, Japan, and the United States eventually reached supportive ears in Canada -- mostly among the scientific community. In the late 1960s and early 1970s organized ecology movements began raising public consciousness on a wide variety of issues like air pollution, pesticide and insecticide use, phosphates in detergents, and energy policy. Ecologists became increasingly aware of the interconnectedness of all life, and viewed industrial practices which threatened the harmony and equilibrium of the natural world as a major social problem requiring political action. Adherents of this movement tended to view these problems as emerging from a civilization obsessed with accumulation of wealth and division of labour.

During the 1950s, international tension mounted due to the atomic arms race. Scientists, in part, founded the peace movement when they began communicating their concerns about the risks associated with stockpiling atomic weapons. In the beginning, the “ban-the-bomb” movement was more concerned with raising public consciousness than with mobilizing political protest. In 1959, the Canadian Campaign for Nuclear Disarmament was born in the form of the Canadian Committee for the Control of Radiation Hazards. This organization was concerned with nuclear weapons testing and risks posed by radioactive fallout. A number of other groups also emerged at this time bringing together people from scientific, academic, and general community. The most noteworthy of these Canadian organizations were the Canadian Peace Research Institute, Project Ploughshares, Voice of Women, and Pugwash Conference. It was not until the early 1970s that these groups, and others, began criticizing Canada’s domestic nuclear power programme. The Canadian peace movement started to rally against the civilian use of nuclear power. In fact, a gradual conversion of the peace movement into an anti-nuclear movement was underway. A paper presented by Canadian scientist, Fred Knelman, at the 1975 annual Learned Societies Conference stimulated the formation of an anti-nuclear coalition which eventually included a variety of ecology groups and peace groups like Greenpeace and the Voice of Women. This newly constructed Canadian Coalition for Nuclear Responsibility called for a public inquiry into all aspects of nuclear power.
Scientific criticism of civilian nuclear power came mostly from the United States. A host of studies including the Rasmussen Report, studies by the Union of Concerned Scientists and Ford Foundation, and a report by the American Physical Society provided Canadian activists with technical information for lobbying against the Canadian nuclear programme. However, much of the criticism against American nuclear technology was quickly dismissed by the Canadian nuclear industry on the grounds that CANDU reactors were substantially different from and also safer than American designs. Access to Canadian studies became necessary if the anti-nuclear movement was to succeed in Canada.

Dissident scientists began questioning the regulation of Canada's nuclear industry by harshly criticizing the role played by the Atomic Energy Control Board (AECB). Mounting concern about a lack of uniform standards regarding safe levels of exposure to ionizing radiation quickly polarized the scientific community. As well, specific decisions made by the AECB regarding power plant operation came under heavy attack. In 1977, this debate became particularly intense. The four operating generators--there are eight now--at the Pickering Nuclear Generating Station had only one emergency core shut-down system, whereas generators at the Bruce nuclear station have two. These problems, and others, led to a widespread debate on the safety of Canada's CANDU reactor design. The growing number of scientists opposed to nuclear power gave the movement an air of credibility and legitimacy that it had not previously enjoyed. No longer could the movement's adversaries claim that anti-nuclear forces were irrational and ignorant.

Concerns about the disposal of a growing stock of nuclear waste resulted in a report by the federal government. The Hare Report (1977), as it was subsequently called, raised considerable debate and criticism from the scientific community. Many opposed its conclusion that medium-level and high-level nuclear waste could be stored in vaults dug into granite formations in the Canadian Shield. Also, the report was criticised on technical grounds regarding the feasibility of deep geological burial of radioactive waste and for its interpretation of the effects of low-level radioactivity on human health and environment. Some also expressed moral indignation about leaving the responsibility to future generations.

Criticisms of the Hare Report in particular, and nuclear industry in general, had an effect on public opinion regarding the social acceptability of nuclear energy. Opinion polls conducted by the Gallup organization showed a large decrease in public support for continued growth of Canada's nuclear capacity between September 1976 and October 1983. Support dropped from 41 to 23 percent within this time frame. It was likely that much of this drop in support corresponded with a public becoming more educated on issues related to nuclear energy. A U.S. study by Olsen et al. (1988) on support for nuclear power revealed that 60 percent of Americans opposed building new nuclear plants, and that 20 percent want existing plants closed down. Concerns about the high cost of producing electricity from nuclear power generation plus waste disposal accounted for much of the low support reported. Some have suggested that negative attitudes toward nuclear energy may be due to a failure on the part of the public to understand this complex technology.

A national survey by Greer-Wootten and Mitson (1976) revealed that 44 percent of the Canadian population was not even aware that nuclear power was used to generate electricity. Dissident scientific opinion therefore played a significant function in giving the anti-nuclear movement greater momentum. If scientists could shake the public's faith in the infallibility of modern science, then policies which have traditionally relied on technical expertise could be influenced by non-technical considerations too.

In Canada, nuclear protest shifted from large national campaigns to smaller local campaigns, including some in the workplace. When the Atomic Energy Control Board tried to increase permissible levels of radiation exposure for atomic workers in 1983, several thousand atomic workers banded together to resist these changes. A variety of unions like the Public Service Alliance, Canadian Union of Public Employees, and the Nurses Union forced the AECB to capitulate and withdraw its controversial proposal.

Community protest groups first surfaced in Canada in the early 1970s to resist the location of specific nuclear projects and routing of power corridors on agricultural land. In Ontario, the organization CANTDU (obviously a pun on the name of Canada's CANDU reactor) began criticizing the ecological effects of power plants and their associated safety hazards in 1974. Also in that year, 20 activist groups from Nova Scotia, New Brunswick, and Price Edward Island formed an anti-nuclear coalition named the Maritime Energy Coalition. Their mandate was to oppose construction of nuclear plants in the Maritime provinces and to encourage promotion of sustainable energy and conservation. In 1975 a number of anti-nuclear organizations were formed. These groups were mainly involved in educating the public about nuclear power and mobilizing local populations to resist the construction of proposed nuclear facilities. Ecology groups such as Energy Probe of Toronto and Society to Overcome Pollution (STOP) of Montreal provided educational information to schools, other community groups, and public in general. Over the next decade, dozens of small anti-nuclear groups would spring up throughout the country. Well-known groups in Canada include Durham Nuclear Awareness (DNA), Canadian Coalition for Nuclear Responsibility, Greenpeace Canada, Ontario Energy and Environment Caucus, and Energy Probe. As well, labour unions have become part of the Canadian nuclear scene, particularly concerning the health and safety of uranium miners. The availability of intervenor funding (funds provided by government to groups for fighting proponents of particular projects) made it possible for many such groups to sustain protests within the confines of energy board hearings and Ontario Hydro Demand and Supply Proceedings.

Regulating the Canadian Nuclear Industry

Nuclear power symbolizes many of the problems of advanced, industrialized societies; namely, rapid technological change, concentration of decision-making power, and incursion of government bureaucracy. The Canadian nuclear industry is even more concentrated, bureaucratic, and inaccessible than most due to its strong public sector character, protective legislation, and industry-government interlocks. Canadian regulation of nuclear power closely parallels corporatist policy-making: complex interdependencies between manufacturers, suppliers, and regulators permit nuclear power to be promoted without serious concern for economic, environmental, or safety costs (McKay, 1983).

Beginning in 1946 the "Atomic Energy Control Act" gave the Atomic Energy Control Board authority to regulate and control atomic
energy in Canada. The AECB had broad powers that were exercised through the agency's "Atomic Energy Control Regulations." These included the power to license all facilities using radioactive substances, to regulate how such substances are used, stored, transported, and disposed of, to revoke or suspend licenses for violations of regulations, to form Crown enterprises, to require that agencies operating under the auspices of the Board submit reports and information about their operations, and to give grants for research and development. Canada's participation in the Manhattan Project combined with a security-conscious environment following World War II (Finch, 1986) explains the Act's proclivity to give the agency a scope and breadth of powers which far exceed those of other federal regulatory agencies. As such, the Act does not require public hearings at any stage of its regulatory activities. An independent environmental impact assessment (EIA) requested by the federal Minister of Environment is the sole external mechanism for invoking public review.

In North America, the concept of environmental impact assessment was introduced in the United States by the "National Environmental Policy Act" of 1969. In 1973, the Canadian government adopted a similar approach, the Environmental Assessment and Review Process (EARP), for assessing environmental consequences of construction projects, energy initiatives, and potentially hazardous facilities. During the following decade several provinces introduced their own environmental assessment processes, and in 1975 Ontario established a comprehensive "Environmental Assessment Act." However, since all nuclear power in Canada operates under federal jurisdiction, provincial EIA legislation only applies to non-nuclear projects.

In general, EIA is intended to scrutinize a development scheme early in the planning stage. Initially the concept of "environment" in EIA referred specifically to the natural world, but was later expanded to include social, cultural, and economic milieu as well (Richardson, 1989). Thus, historically, concern with the social impacts of technology emerged from an analysis of effects on the natural environment. Gordon Beanlands and Peter Duinker (1983: 37) state:

Environmental impact assessment in Canada, as elsewhere, is a socio-political phenomenon. It is grounded in the perceptions and values of society which find expression at the political level through administrative procedures of government. Science is called upon to explain the relationship between contemplated actions and these environmental perceptions and values.

Some key differences in environmental assessment between Canada and the United States can be explained by variations in political culture between the two countries. Barry Sadler (1990: 103) wrote:

Compared to the United States, the political culture in Canada is marked by a lesser degree of citizen activism, wide latitude traditionally granted to administrative discretion, and restricted rights to participate in decision making or to challenge the process in court.

Essentially, environmental impact assessment in Canada is an administrative rather than a legislative process (Notzke, 1994). Perhaps the Canadian EARP is an instance of what Seymour Lipset (1985) observed, that Canadians are more likely than Americans to rely on the state, and are therefore less inclined to participate as individuals in the environmental policy process.

From its inception the EARP process in Canada was administered by the Federal Environmental Assessment Review Office (FEARO) which reported directly to the federal Minister of Environment. Updated in 1977, the process was reinforced in 1984 when the EARP Guidelines Order was issued by an Order-in-Council. This impact assessment process is primarily a self-assessment process with two phases: an initial assessment phase followed by public review by an independent panel (Kansky, 1987). In the first phase, the government agency responsible for the project—in this case the regulator (AECB)—reviews a proposal. If the initiating department, agency, or regulator concludes that adverse environmental impacts are unlikely, there is no further review. The second phase of assessment is invoked, if in the regulator's opinion, there is potential for significant environmental problems. In this case, the proposal is automatically referred to the Minister of Environment for public review.

In essence, all significant or unacceptable environmental consequences of a specific proposal must be reported to the Minister of Environment. This reporting, however, does not mean that a public review will be called. Under Section 13 of the Guidelines Order it is up to the regulating agency to determine whether or not public concern is sufficient to recommend to the Minister of Environment a public review. Unfortunately, this last requirement is ambiguously worded and may differentially be interpreted by agencies like the AECB. For example, Section 13 of the Guidelines Order stated that a proposal for an environmental review can be suggested to the Minister of Environment if "... public concern about the proposal is such that a public review is desirable." In other words, the AECB must be convinced that public concern is significant enough to warrant recommending a public review. The AECB grants an exemption from public hearings before an environmental assessment review panel if they deem that the environmental impact of the project has not changed significantly from the previous re-licensing period, or if expression of public concern about the proposal is not sufficient.

The AECB's interpretation of what constituted significant public concern, and how levels of concern are linked to the triggering of a public review, is vague. The Board has complete authority to decide whether a referral is warranted, and of course the option to decide whether or not the granting of an operating license, or a renewal, should be a matter of public review.

The case of the 1994 Pickering nuclear generation station re-licensing is instructive. Like all nuclear plants in Canada, the Pickering plant is periodically relicensed by the AECB. The local environmental group Durham Nuclear Awareness (DNA) asked for public review and tried to establish under what conditions such a review would be required. In this case, whether or not the license was contingent on public review became the issue. David Martin, a founding member of DNA, asked AECB staff in a letter of 27 April 1993 "What specific quantitative and qualitative criteria does AECB staff use to judge the type and level of public concern that would make a review desirable or not?" His question raised a variety of unstated issues such as: How many letters must the AECB receive from the public in order to trigger a review? Do all letters carry equal weight, irrespective of the status of writer, gender of writer, region in which the writer resides,
will paralyse the state and public policy

distracts regulators from making the "right" choices based on science and scientific modes of thinking, then too much public participation

production and distribution of risks is independent from economic and political actors who may prefer to avoid public input or

erosion of democracy in post-industrial societies, their reliance on technically-oriented approaches to risk assumes that liberal

approach to assessing and managing risks clearly generates a democracy-technocracy quandary. Although not directly linked to the

The AECB's interpretation of the EARP Guidelines Order, its dealings with anti-nuclear protest groups, and its technically-oriented

only waste time and money.

In this case, public input and debate would add nothing valuable to these assessments.

yield the best possible risk estimates.

deepest, most complex secrets to the best scientific minds.

The assumption is that risk, treated as an objective phenomenon, can be assessed using scientific techniques which reveal their

of the differing impact of each competing risk paradigm for protection of health and environment allows us to re-frame

Two Risk Paradigms: The Technical and the Socially Constructed

The polarized nature of debate over the social acceptability of nuclear power in Canada can be characterized as a competition between

risk is central to political conflict.

The technically-oriented way of conceptualizing risk demands that decision-makers, and members of the public, trust scientific authority

and expertise. Furthermore, there must be a willingness to limit boundaries of analysis so that risks can be compared quantitatively to

one another in a rational and de-personalized manner. That is, risks from hazardous technologies like nuclear power stations can be

understood in terms of statistical probabilities which are based on engineered doses and cost-benefit calculations for large populations

but not for individuals. In this sense, risk is the relation between decision and damage where scientific knowledge-claims are true to the

extent that they adequately reflect reality.

Government agencies and regulators such as the Atomic Energy Control Board attempt to assess and manage risks from our modern

world by "objectively" analyzing the physical world through an iterative process of approximation. However, social and political

ramifications of their decisions ensure that safety guidelines or regulations for protecting human health and environment are the

inevitable consequence of technocratic decision-making. A reliance on expertise and belief that "objectivity" and "neutrality" are possible

only through the scientific method ensure this remains so.

The AECB's interpretation of the EARP Guidelines Order, its dealings with anti-nuclear protest groups, and its technically-oriented

approach to assessing and managing risks clearly generates a democracy-technocracy quandary. Although not directly linked to the

erosion of democracy in post-industrial societies, their reliance on technically-oriented approaches to risk assumes that liberal

individualistically-oriented policy-making cannot deal with modern, communal risks. Furthermore, their approach assumes that

production and distribution of risks is independent from economic and political actors who may prefer to avoid public input or

consultation. This is where the knowledge / power effects of technocratic decision-making reveal themselves. If public participation

distracts regulators from making the "right" choices based on science and scientific modes of thinking, then too much public participation

will paralyse the state and public policy process.

On 7 May 1993 AECB staff member J.G. McManus replied that the AECB:

[T]akes into consideration information received from many sources including elected officials at all levels, members of the public, special interest groups, intervenors and license applicants. Of particular interest are representations received from persons living in the vicinity of the facility in question, and anything offering new information. As such, if "sufficient" public concern reaches the ears of the AECB regarding the operating safety of the Pickering plant, then surely a public review should be recommended.

Since the AECB can interpret Section 13 of the Guidelines Order according to norms and standards internal to the agency, is it possible that this regulator uses what Bruce Doern (1976) referred to as a professionally-open model of regulation? Doern described the professionally-open model of regulation as being distinguished by a high degree of trust. Its supporters avow that it is internally open, encouraging open criticism and evaluation among professional and technically qualified individuals. Advocates of this model intimate that regulators who use this approach are perceived by regulated industries as professionals trying to achieve collective goals: health and safety, as well as production. As a result, professionals are more prone to divulge to their regulating peers what is working well, as well as what is not. This model of regulation is also characterized by minimal reporting requirements and few, if any, public hearings.

In Canada, opportunities for the public to be heard usually come from working on parliamentary committees, royal commissions, and environmental assessment public hearings. Adam Ashford (1990: 2) believes that royal commissions are "symbolic rituals within the modern state, theatres of power," that legitimate states and allow them to "sit above society as the embodiment of the common good." Brian Wynne (1982) views public hearings as rituals which can order and control the public by subverting their goals and values by showing internal contradictions and instability. Wynne (1982: 160-161) believes that the public falls victim to the hearing process technique such that:

Language, including technical language, can tacitly guide people into seeing the world in certain ways, influencing what is regarded as an accepted value, and what is inevitable, possible, desirable, or at least tolerable.

While these critiques of hearings give the impression that the public is a passive, unwitting victim of state and corporate manipulation, in their study of an environmental hearing Richardson, Sherman, and Gismondi (1993) show that the public can challenge expert knowledge and stop development projects, although as they indicate the Alberta government and industry quickly reasserted a technological solution and used another "expert review" to overturn the original decision which favoured the public.

Two Risk Paradigms: The Technical and the Socially Constructed

The polarized nature of debate over the social acceptability of nuclear power in Canada can be characterized as a competition between two risk paradigms: a technically-inclined, positivist-oriented concept of risk and a socially constructed, culturally embedded concept of risk. Awareness of the differing impact of each competing risk paradigm for protection of health and environment allows us to re-frame how risk is subject to social, economic, and political processing, and provide another understanding of modern social movements where risk is central to political conflict.

The technically-oriented way of conceptualizing risk demands that decision-makers, and members of the public, trust scientific authority and expertise. Furthermore, there must be a willingness to limit boundaries of analysis so that risks can be compared quantitatively to one another in a rational and de-personalized manner. That is, risks from hazardous technologies like nuclear power stations can be understood in terms of statistical probabilities which are based on engineered doses and cost-benefit calculations for large populations but not for individuals. In this sense, risk is the relation between decision and damage where scientific knowledge-claims are true to the extent that they adequately reflect reality.

The assumption is that risk, treated as an objective phenomenon, can be assessed using scientific techniques which reveal their deepest, most complex secrets to the best scientific minds. Empirical testing, peer review, and internal standards should consistently yield the best possible risk estimates. Managing hazards with access to such knowledge should also be a fairly straightforward process. In this case, public input and debate would add nothing valuable to these assessments. Interference from the "ignorant" masses would only waste time and money.

The AECB's interpretation of the EARP Guidelines Order, its dealings with anti-nuclear protest groups, and its technically-oriented approach to assessing and managing risks clearly generates a democracy-technocracy quandary. Although not directly linked to the erosion of democracy in post-industrial societies, their reliance on technically-oriented approaches to risk assumes that liberal individualistically-oriented policy-making cannot deal with modern, communal risks. Furthermore, their approach assumes that production and distribution of risks is independent from economic and political actors who may prefer to avoid public input or consultation. This is where the knowledge / power effects of technocratic decision-making reveal themselves. If public participation distracts regulators from making the "right" choices based on science and scientific modes of thinking, then too much public participation will paralyse the state and public policy process.

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Government agencies and regulators such as the Atomic Energy Control Board attempt to assess and manage risks from our modern world by "objectively" analyzing the physical world through an iterative process of approximation. However, social and political ramifications of their decisions ensure that safety guidelines or regulations for protecting human health and environment are the inevitable consequence of technocratic decision-making. A reliance on expertise and belief that "objectivity" and "neutrality" are possible only through the scientific method ensure this remains so.

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The concept of a "public" out there waiting to be heard from implies that those who actually make decisions do so without wide-scale support, and that such decisions are in the interest of an elite keen on maintaining control over ever scarcer resources. In a democracy, public opinion needs to be considered as a reflection of the "will of the people" (Schumpeter, 1942). Unfortunately, public opinion often plays a peripheral function in technical debates which tend to accord greater weight to "expert" scientific opinion when shaping environmental policy.

The rise of environmentalism, the growing number of arguments for appropriate, manageable technologies, and increasing antipathy towards social institutions are, in part, by-products of this struggle between competing risk paradigms and their respective supporters. In a sense, two opposing camps have evolved, one supporting and promoting large technologies and further economic growth, and another opposing large-scale technologies, supporting conservation efforts, and favouring a zero or low-growth economy. Generally speaking, the former ARE represented by the AECB and Canadian nuclear industry and the latter by anti-nuclear groups. The nuclear constituency relies on a technically-oriented concept of risk. Anti-nuclear groups follow an approach consistent with a socially constructed concept of risk which sees scientific knowledge as continually changing and contextual. Opponents of nuclear energy challenge the assumption that nuclear technology is in the best interest of the whole of society. Furthermore, they view nuclear power as unsafe, unnecessary, and uneconomical, and they oppose it because it produces a range of undesirable social consequences. Technocratic decision-making cultures are no longer able to ignore the will of the public when benefits of industrialization pose socially unprocessed risks. Combined with the failure of science to handle the ever more menacing risks of modern industrial life, the erosion of PUBLIC trust in science and authority is accelerated. As it becomes apparent how management of risks relies increasingly on political decisions, new forms of public participation will be demanded.

The developing literature on risk poorly addresses organizational behaviour, political processes, and social movements. This is probably due to a tendency to view risk assessment and management as tasks that require logical and rational decision-making rather than as forums for addressing issues of public acceptability and participation. However, the presence of modern risks heightens the necessity of rights-based democracy, and requires a renewed commitment to equal rights in public dialogue and enhanced citizenship rights within a participatory, communal and cooperative decision-making environment (Hiskses, 1988). In such a climate, risk would be evaluated in terms of its political and social consequences, its possible disruptions in the social fabric or a loss of communality (Fiorino, 1989), rather than exclusively consider the possible effects on a hazard on human health and environment.

This alternative form of decision-making is aptly illustrated by a concept of risk which is sensitive to social constructions of reality and an understanding of it through scientific knowledge. Like all social reality, risks are socially constructed to a certain degree. This is the classic insight of the sociology of science and more recently the direction in which research on risk and social movements is headed. In other words, all reality, ideas, meanings including ideologies are socially constructed. A cultural perspective on risk sensitive to these social constructions can address larger social issues which its technologically-oriented counterpart must ignore. Additionally, this approach to risk requires widespread trust in the democratic process since there exists an important difference between public acceptance and public participation. Expanded citizenship rights need to keep pace with change if risk is to be de-scientitized, and consequently withdrawn from technocratic decision-making environments, where an appeal to expertise is of little help since experts disagree on many scientific questions, let alone social ones.

Habermas uncovered a set of political problems which demonstrated how the public interest has been absorbed and subverted by an expansion of subsystems of purposive-rational action, where objective exigencies of technological progress become key problems for democratically controlling technology. Communication between politician, expert, and "lay" public is, for Habermas (1971: 68), a critically interacting set of relations where interactions between expert and politician are necessarily dependent on "mediation by the public as a political institution."

Since social conflicts involve the presence of differing values, visions, beliefs, and political orientations, Habermas (1971: 69) suggested that communication between competing agents should be "based on a historically determined pre-understanding, governed by social norms, of what is practically necessary in a concrete situation." This pre-understanding is a type of social consciousness shared by all members of a community. Consequently, public opinion can be considered as a "discourse of citizens in a community" where "removing restrictions on communication" encourages "communicative action" which is "governed by binding consensual norms, which define reciprocal expectations about behaviour and which must be understood and recognized by at least two acting subjects" (Habermas, 1971: 92).

Social movements like the anti-nuclear movement in Canada attempt to inject new values (such as environmental sustainability) into the political sphere by questioning and criticizing the trajectory of contemporary society and its reliance on purposive-instrumental rationality. Furthermore, such social movements question our decision-makers tendency to privilege science and expertise in an uncritical fashion while excluding the public from the political process simultaneously.

For individuals in such social movements, believing in the power of "tribes of experts" (Bobrow and Dryzek, 1987) leads to an inevitable erosion of democracy by according privileged status and enhanced legitimacy to participants in a socio-technological controversies with scientific credentials. As well, a romantic view of scientist as a modern magician or miracle worker is often paralleled by the negative image of "Dr. Faustus, Dr. Frankenstein, Dr. Jekyll...a fear that our scientists will go on being titans who create monsters" (Roszak, 1974:31).

For anti-nuclear protest groups like DNA, nuclear reactors represent the ultimate "monster" which has been unleashed on an unwary and trusting public. To make matters worse, this "monster" has been repackaged ideologically as a gift from nature and science to humanity giving us the potential for unlimited economic growth with minimal environmental and health impacts. For Halfmann and Japp (1993) social movements emerge in defence against threats to "life-chances" generated by risky technologies like nuclear power. Moreover, risks allow social movements to develop protest communication strategies that ensure internal solidarity and provide social movements...
For the anti-nuclear movement, the nature of nuclear risks over the past 25 to 30 years has led to a shift in emphasis from a "ban-the-bomb" movement to an anti-reactor movement and now toward a soft energy path, pro-conservation movement which emphasizes regional energy self-sufficiency, solar power, and technologies like solar and cogeneration. As risks from nuclear technology became more local and immediate in their consequences, citizen protests against nuclear reactors, waste disposal sites, and research laboratories replaced a more diffuse concern about global thermonuclear warfare. In a sense, the moribund state of the Canadian nuclear industry and reduced need for active opposition has led to a decline in the number and strength of anti-reactor movements. This is why the anti-nuclear movement can be seen as a "mature" social movement where "middle-class politics" is used to transform what is perceived to be the deficiencies of what Beck (1992) has called the "risk society."

The opposition of anti-nuclear groups like DNA to the Canadian nuclear industry and the AECB is not just a resistance to nuclear technology, it is more fundamentally emblematic of a larger social undercurrent composed of a wide range of individuals frustrated with a democratic system clogged by technocratic procedure.

Bringing the Public Back In

The regulation of nuclear power in Canada, and subsequent exclusion of the public through mechanisms which confound the intent of section 13 of the Environmental Assessment and Review Process Guidelines Order, do not have to produce such a gloomy picture. In democratic nations throughout the world, bringing the public into the arena where debates on social acceptability of technology unfolds, has had varying degrees of success. The technocratic decision-making culture of regulators like Canada's AECB is an extreme example.

In the United States nuclear power has been heavily criticized for several decades by citizen activist groups who use political lobbying and court challenges to ensure that they have a voice. The litigious culture in the United States combined with a strong history of resisting centralized authority resulted in successes for anti-nuclear groups that are unparalleled in Canada. In the United States an amendment to the "Atomic Energy Act" (1954) included a provision for ensuring that the public has a right to be heard in all nuclear licensing decisions. This amendment -- known as the "Government in the Sunshine Act" -- demanded that all federal regulatory bodies act as though they were living in "glass houses. In Canada, no such condition for facilitating either public observation or scrutiny of regulators exists. Regulation of nuclear power in Canada involves primarily the establishment of parliamentary or legislative committees, Royal commissions, and environmental assessment reviews which typically include only "token" citizen participants.

In parts of Europe such as France, Germany, Switzerland, and Finland, the role of the public in debates on nuclear safety is somewhat different from both Canada and United States. For example, in France -- one of the most heavily nuclearized countries in the world with approximately 80% of electricity production coming from nuclear reactors -- a public inquiry must be held by the federal government before any nuclear facility can be built. The French use a concept known as "la concertation," roughly translated as developing a common understanding as a basis for future projects, to ensure that civil liberties and constitutional rights for a majority of French citizens affected by a particular project are not violated. In Germany, citizens participate in public hearings primarily as a "third party" in a "multi-party" legal system which includes the licensing authority, applicant (also known as proponent), and members of the public. In Germany the legal system protects the rights of intervenors to participate without any fear of civil litigation. Additionally, "altruistic" objections in the interest of nature or creation can be raised in such hearings. In Switzerland, federalism and direct democracy make it impossible to impose a decision on a determined minority. Using cantonal referenda, the Swiss ensure that approaches for defining and solving risk problems are more democratic than technocratic. As a final example, Finland's "Nuclear Energy Act" required that a first step in licensing any new nuclear facility involves obtaining a "decision in principle" to proceed with a project. As in Sweden, consultative referenda, are used to ensure that the majority support, in principle, a planned facility. As well, municipal councils can veto the siting of such industrial facilities within their communities if they are perceived to have negative or dangerous impacts.

Conclusion

These examples of how the public can be brought into the decision-making process demonstrates how public participation varies with different approaches to public consultation. The Canadian nuclear industry and its regulator the Atomic Energy Control Board is not doomed to a life of technocratic decision-making. As a technologically-advanced nation with an excellent communications infrastructure, Canada has the potential to change the character of its public policy process. Perhaps an increased penetration of computer networks such the Internet will allow Canadians to exercise their democratic rights more directly through computer-mediated channels so that implementation and cost of regular referenda and plebiscites become more viable. Technological innovations do not necessarily have to lead to decision-making that is technocratic, elitist, and closed. Regulation of the Canadian nuclear industry can only become more open and thus more accurately reflect the will of the people. Thus, decisions on risky technologies can be seen as a two-way street where citizens are not expected to make choices based on technological criteria, but where regulators are expected to make socially "correct" decisions.

Future research in this area of inquiry can proceed in many possible directions. At a theoretical level, research on how modern society is moving toward being a "risk society" should be given more attention by sociologists. In the same vein, the relation between production of industrial risks by capitalist societies and the necessary synthesis of these two competing risk paradigms should also be examined. On a more applied level, questions about public participation and mechanisms for including the public in techno-social debates should also be examined. Some of the topics that need addressing are summarized by the following questions: Who is the public and how should they be recruited for participation? At what stage should this public begin participating in the consultation process, and when should such participation end? How much weight should public perceptions of risk be given relative to the opinions of scientists and experts?
types of evidence and arguments are considered (permissible) and valid in these public forums? Should public funds be used to support groups in the form of intervenor funding? Research dealing with these questions may also consider some specific questions on social movements too. For example, do modern risk conflicts lead to competition between different social movements such as the anti-nuclear movement and a fast growing "anti-environmentalist" movement? Will such competition lead to a "backlash" from governments, regulators, labour, and industries thus resulting in greater environmental and health risks? These questions suggest that modern social conflicts which involve risk are really debates about the future form of society and the role of citizens in shaping this future.

Presently, the Canadian nuclear industry is in a state of crisis. There is a moratorium on new plant construction in Ontario and Quebec, weak sales of CANDU reactors abroad, escalating costs associated with maintaining and repairing existing power plants, huge debt in Ontario Hydro (estimated to be $38 billion), concern about the disposal of an ever-increasing stockpile of radioactive waste, anxiety about who will be financially responsible for de-commissioning costs incurred when closing power plants, and declining demand for electricity all conspire to make nuclear power less attractive.

In August of 1997 Ontario Hydro was forced to shut-down seven of its 19 reactors in the province. An independent consulting team brought in from the United States by Ontario Hydro's President Allan Kupcis determined that safety was being compromised at many plants, including the Pickering plant, due to a rash of accidents and related safety problems. It is estimated that the costs associated with bringing these plants back on line could exceed $8 billion. Nuclear power in Canada has finally begun a downward spiral from which it is unlikely to recover. Ironically the anti-nuclear activists, including members of DNA, were not the ones responsible for this shift in attitude. A group of nuclear "experts" decided on their own that many of Ontario's nuclear facilities are unsafe and subsequently uneconomical.

Appendix 1 - Additional Materials

- Nuclear power in Korea - Candu
- Photo of nuclear workers in Korea
- Photo of the Pickering Nuclear Plant

References


The Canadian Nuclear Safety Commission (CNSC) has published REGDOC-3.5.1, Licensing Process for Class I Nuclear Facilities and Uranium Mines and Mills, version 2. REGDOC-3.5.1, version 2 provides an overview of the licensing process for Class I nuclear facilities and uranium mines and mills in Canada, taking into consideration the requirements of the Nuclear Safety and Control Act and associated regulations. This document provides information on the licensing process for all stages of licensing, from initial application to abandonment. New for version 2 is an appendix which provides information on communication with society on risks and benefits of nuclear energy, a key issue for policy makers. The study published in 2002 under the auspices of the Committee for Technical and Economic Studies on Nuclear Development and the Fuel Cycle (NDC) provided a comprehensive review of issues to be considered by policy makers to develop a consensual decision-making process in the nuclear energy sector. The OECD NEA (2002) desk study on Society and Nuclear Energy: Towards a Better Understanding differentiates seven levels of public participation in decision making. The Belgian case report appears to be close to the top level, reflecting public participation in assessing risks and recommending solutions (see Chapter 5 of the present document). For years the advantages of living in industrial society appeared to eclipse the dangers created by unsafe industrial practices. This attitude steadily changed since the early 1970s with environmentalism. For example, nuclear energy has become both a symbol of industrial progress and energy self-sufficiency, and perceived as a threat to human health and the ecosystem. The risks associated with nuclear energy have galvanized individuals into two distinct camps: those who support it and those who oppose this energy source and prefer what has been called “sustainable” or “appropriate”. In Canada, most nuclear power plant development and considerable public debate about their risks, has occurred in the Province of Ontario.