Toward Renewed Legitimacy? Nuclear Power, Global Warming, and Security

Peter J. Stoett

Global Environmental Politics, Volume 3, Number 1, February 2003, pp. 99-116
(Article)

Published by The MIT Press

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Introduction

Legitimacy is one of the perennially contested concepts in political theory, and it is of central concern to students of global environmental politics. While it is most commonly understood to refer to the democratic claims of governments, it can apply on a wider basis to transnational actors with regard to the validity of their knowledge claims and impact of their behavior. It can be achieved through truthfulness, or through the strategic image-presentation one finds in the public relations departments of transnational corporations and non-governmental organizations. Public safety is a matter of perception, and the battle for the hearts and souls of voters and consumers extends to the realm of dominant ideas when we are asked to accept the externalities of certain means of energy production, transportation infrastructure, and other large-scale, highly centralized, and yet often privatized, developments.

The largest problem facing the global nuclear power industry has been not one of technical or even cost difficulties, but of maintaining a veneer of political legitimacy in order to justify what has become an export-oriented market. This involved detaching in the popular imagination nuclear energy production from nuclear weapons proliferation fears, promoting the industry through a supposedly neutral international institution, feeding into the broader project of espousing a modernization project for developing states, and—most recently—the argument that nuclear energy use can mitigate global warming, since it is "free" of carbon dioxide emissions. Indeed the latter is the last grasp for renewal by the industry. For example, Japan and Australia are arguing for investments in nuclear power stations in developing countries to be included as "clean development mechanisms" under the Kyoto Protocol, and the Finns (stressing the global warming argument) have expressed their intention to build a new reactor, marking the first solid proposal for new nuclear capacity in Western Europe since the mid-1980s.

* Special thanks to Matthew Paterson and three anonymous reviewers. I would also like to thank Dwayne Pretli, MA, for research assistance; and the Social Science and Humanities Research Council of Canada for funding.

Global Environmental Politics 3:1, February 2003

In the United States and elsewhere, periodic renewals in the hopes for nuclear power have been aided by active state support; indeed nuclear power was managed as a state-building exercise by many states, such as India and Pakistan, but also states such as Canada and France. The recent United States energy plan (the so-called Bush-Cheney plan) provides direct state assistance to the nuclear industry, and has once again raised hopes that it will play a larger role in future electricity supplies. Ultimately, however, nuclear power faces severe challenges to its legitimacy, especially in terms of global nuclear commerce; and, though the global warming debate offers some promise, nuclear power cannot present itself as a neutral power source free of massive capital consolidation and state assistance. If one accepts the benefits of nuclear power and overlooks its safety and political implications, there is no need to question the latest period of rhetorical renewal. However, analysts concerned with these questions must confront the ideational power wielded by this industry and its cohorts, and critically examine the role nuclear power could play in delaying the progression towards a more sustainable global energy path. Arguably, concerns with the terrorist threat make nuclear installations an even greater concern, and yet we have seen relatively little public debate over the wisdom of directing fiscal resources to the nuclear industry in the United States after September 11, 2001.

After a brief history of the evolution of global nuclear commerce, and the development of a pro-nuclear power export regime, we will examine the current situation, with emphasis on the global warming argument and the problematic securitization issue in the post-September 11 context. The nuclear industry is global in scope, but the following discussion will necessarily make frequent reference to the United States and the United Kingdom. Though other states, notably Japan and France, have increased their reliance on nuclear power, and smaller states, most notably Canada, have pursued aggressively subsidized export policies, large American and British firms remain the most important players. Their linkages with the oil and gas industries, and their influence on the general American economy and the White House, are significant causal factors when explaining the worldwide persistence of an industry that has been largely discredited at home. Recent efforts to revive the nuclear industry, under the guise of global warming and national energy security concerns, and at the expense of investment in the larger social good of developing renewable energies such as solar, wind, and hydro power, suggest the industry maintains considerable influence in Washington and abroad.

Though some states, such as Germany and Sweden, have made pledges (unrealized to date) to phase out nuclear power use altogether, it is increasing in Asia and an active campaign continues to recruit and intensify African participation in the global nuclear commerce fuel cycle through uranium exploration and mining. Wherever one finds nuclear power, from India to Romania, it is heavily invested with state support, often part of a broader campaign to promote nationalism. Canada subsidizes its industry by financing and insuring sales abroad, most controversially to China. And the Bush-Cheney plan makes

it perfectly clear that nuclear energy has both a domestic and export future, despite the current concerns with nuclear terrorism and the proliferation of weapons of mass destruction. However it can also be argued that the political foundations of the industry's fragile legitimacy are under fire from continued concern over environmental impacts (in particular, the storage of nuclear waste), and the national and international security concerns raised by the development of nuclear power. As such the stage is set for an intensification of the continued propaganda war between the industry and its opponents, with the state most often playing the role of supporting actor to the former.

Though its proponents argue nuclear power is the victim of exaggerated dangers, few would deny its significance from an environmental security perspective. And yet, since it supplies electricity on a national basis (though there are partial exceptions to this, since electricity is a viable export product for many states), it is rarely treated as an issue for the domain of global environmental politics. I would argue, however, that it should be, because the industry is clearly global in scope, reliant on trade, intersecting with the more traditional IR area of proliferation studies, and impacted by international debates and arrangements concerning global warming. As such, this article is based upon the "ecological approach to the study of global political economy" developed by Dennis Pirages. This approach "stresses the impact of population, resource and technology variables on economic, political and social institutions as well as on ideologies and beliefs which guide human behaviour."[1] But it is also founded in the task of uncovering power relations shrouded by strategically oriented discourse and, in the broader sense, contributing to what Richard Falk terms the demystification of interstate (and state) power by way of the "critical realist tradition," as well as the Foucauldian emphasis on the generative power of ideas.[2] Beyond normative concerns, however, it may also be suggested that one empirical way to approach the question of legitimacy is to recognize a political space where a contest of image will take place, and monitor it for actors, methods, and outcomes. This article is intended largely to provide the necessary background for such a research project.

Global Nuclear Commerce

The nuclear industry, and its state protectors and promoters, offers an illustrative example of how an industry which has obtained a global reach, is constantly in the process of further consolidation, and is challenged by fundamental discrepancies between its output and the physical and environmental security of citizens, has managed to survive through self-reinvention, aided by the technocratic strivings of the age of modernity. Energy and related resource use planning takes place at every level of the global economy. This includes fam-

1. Pirages 1984, 67.
2. Falk 1997; and Foucault 1980.

ily or household decision-making, such as womens' use of fuel wood in rural African areas, or western middle-class consumers' decisions to use oil or electric heating. But the level of decision-making responsible for the need for energy paths involving large-scale infrastructure development has been the technocratic, state, and capital one. And, as is the case historically in international energy markets, we witness a great deal of collusion between the state and private concerns, as the international history of oil production and consumption, for example, makes clear, and the symbiotic relationship between the nuclear energy industry and the Cold War security state made even clearer.

The complexity of the international nuclear export industry is illustrated by a quick reference to the actors involved, including those standing in opposition to industry discourse. Governments both produce and consume energy and have central planning responsibility, if not always ability. This is especially the case with nuclear technology, the most technocratic and securitized source of energy. At the intergovernmental level, there is no OPEC-style cartel of nuclear suppliers (the "Nuclear Suppliers Group," and the Uranium Institute presented partial exceptions, though they were arguably more fixated on legitimizing the trade than inflating prices). However, consumers' organizations such as the OECD's International Energy Agency (IEA) and "promotional/regulatory" organizations such as the International Atomic Energy Agency (IAEA) do represent the industry's interests.[3] In addition, there are many nonstate actors involved: multinational corporations, such as British Energy and General Electric; and scientific—perhaps even "epistemic"—communities, such as the International Council of Scientific Unions or the more industry-oriented World Energy Council; and, in the role of opposition, global environmental or conservationist organizations, such as Greenpeace or the Sierra Club.

At the national level are a plethora of related interest groups—energy associations such as the American[4] Nuclear Society, private and public power utilities, green movements, political coalitions (note the Green Party's success in the September, 2002 elections in Germany)—essentially, the players in the games of lobbying and public relations. In addition there are many *governmental subunits* involved. These include provincial and municipal governments as well as planning commissions, which act as both producers and consumers of energy and have great planning impact, especially in federal states. They also however include *individuals:* scholars, technical elites, consumers, anti-nuclear activists. The international political economy of global nuclear commerce further overlaps various conventional categories of analysis. While it is clearly an economic issue, it is also a security issue of highest importance, since nuclear proliferation

3. Industry representatives recently formed the World Nuclear Association (WNA)—derived from the Uranium Institute, formed in 1975. The WNA expressed unbridled enthusiasm for its prospects at its inaugural meeting in London in September 2001, shortly before the September 11 terrorist attacks. See MacLachlan 2001.
4. Note that even here the international dimensions are apparent, since there are several non-American members in this society, such as British Energy, ESKOM (South Africa), and Kansai (Japan).

has become a parcel of the contemporary "war on terrorism," a major concern related to "rogue states" such as Iraq, as well as a primary concern for environmental policy analysts, nuclear physicists, risk analysts, and others. But what needs reiteration is that, despite all its complications, the industry has in fact been actively involved in global commerce for many decades.

The export industry really began to gain in importance as the pioneering American firms, particularly General Electric and Westinghouse, realized the domestic marketplace would be insufficient for sustained growth. During the early Cold War period, when technological secrets became highly important national security issues, it was quite clear that heavy state involvement would be necessary to regulate such trade because of the dangers of nuclear proliferation. Trade in nuclear commodities was initially liberalized by the "Atoms for Peace" policy, but the development of an export industry would follow several years later. While it may have been predictable, under strategic trade theory, that a hegemon such as post-WWII America would insist on self-advantageous trade restrictions, the overall goal was clearly the expansion of foreign markets through trade liberalisation. However with such sensitive materials there was a need to establish a greater surveillance function at the international level.

The IAEA was officially in operation by 1957, with a mandate to spread nuclear power to the south (this mandate would be enshrined in the Non-Proliferation Treaty several years later).[5] The Export-Import Bank in Washington provided well over $2 billion dollars, between 1958 and 1974, for the construction and fuelling of 42 exported nuclear power projects and, during the sales slump of 1974–1980, made over twice that amount available in direct loans and guarantees, mainly to South Korea, Taiwan, and the Philippines.[6] This took place as other industrial states in the west (the Soviets had a captive market for their reactor exports) began to resent the American "early monopoly in civil nuclear production . . . Escaping that monopoly became the object, at corporate and governmental levels, of vigorous policies of industrial and technological development in Europe and elsewhere."[7] Not only did western states such as Canada, West Germany, France, and the UK become involved, but the "emerging" nuclear suppliers such as Argentina, Brazil, India, Israel, Japan, Pakistan, China, South Africa, Spain, and Taiwan became either small-scale or potential exporters of nuclear technology, further complicating the safeguards regime and challenging American domination of the western marketplace.

At the same time industrial contraction plagued the export business in the 1970s, as public confidence in nuclear power, presented as a panacea for the energy problems brought about by the OPEC cartel in the early 1970s, began to dwindle in the core states of the industry. The state, a heavy investor in the industry, actively pursued industrial renewal through public relations campaigns. Joseph Camilleri wrote of an institutionalised *nucleocracy* that developed, where

5. See Stoett 1995, 73–104.
6. Camilleri 1984, 240.
7. Walker and Lonnroth 1983, 18.

"the state was obligated to allocate vast resources in order to persuade the public that nuclear technology was the answer to the 'energy crisis.'"[8] But even this was a strained project after renewed concern over "Third World" nuclear weapons proliferation following the atomic explosion in India (made possible, initially, by Canadian nuclear technology exports); and the 1979 Three-Mile Island meltdown. Nuclear energy "in its different guises was demystified, challenged, put on the ideological defensive: it appeared as a carrier of heavy counter-goals spotlighted by political ecologists."[9] With the fall in demand for nuclear power in the 1970s and 1980s, the principal concern was that a buyer's market was emerging where regulatory safeguards designed to prevent weapons proliferation would be overlooked in favour of increased sales. The global uranium export-industry, encouraged by IAEA exploratory funding, has undergone similar periods of expansion and contraction, but now involves many states with rich deposits, beyond the United States and Canada: Australia, Russia, South Africa, Uzbekistan, Namibia, Niger, China, and the Czech Republic.

More recently, efforts to privatize nuclear energy have raised new concerns over control of such dangerous substances. Traditionally, the nucleocracy described above was the most state-intensive form of energy investment. But the neoliberal agenda has spread into the energy sector as it has any other, and the obvious financial failings of state or parastatal nuclear power production have encouraged a move into private hands. At the same time, it is obvious that the heavy regulation demanded by sensitive material such as plutonium, and long-term need for waste storage, will grant the state an unending license for heavy involvement, thus making the congruence between the interests of state and private capital even firmer in the future. The fall of the Soviet Union, and the disarray of the nuclear weapons stockpiles and nuclear power plants in the former Soviet state and its satellites, increases concerns, in the post-Chernobyl era, that safety questions related to radioactive material are perceived as a grave threat by citizens in the west and east.

The 1990s were not much kinder to nuclear commerce, though sporadic sales of reactor projects, usually financed by western export guarantees, continued. Asia was the primary marketplace, but the meltdown of 1997–98 stymied growth in this area.[10] Concerns over the nuclear intentions of so-called rogue states continue to make headlines, particularly in light of the US-Iraqi conflict and the North Korean situation. While a complex web of international agreements exist to encourage non-proliferation policies, and some states such as South Africa have in fact renounced weapons construction, the proliferation question continues to hound the industry. But an even more popular concern lies with reactor safety (the accident at Chernobyl is perhaps the most infamous

8. Camilleri 1984, 132.
9. Debeir, Deleage, and Hemery 1991, 173.
10. In 1999, nuclear power reactors were under construction, in descending order of volume, in: China, Ukraine, Russia, South Korea, Japan, India, Slovakia, Iran, Czech Republic, Taiwan, Argentina, Brazil, Pakistan, and Romania. IAEA 2000.

industrial disaster in history) and the environmental consequences of the long-term storage of radioactive waste. However, and despite nuclear energy's apparent decline, recent concern with an even larger ecological threat, global warming, may breathe life back into the industry on a global level.

The Global Warming Era

The last recourse of global nuclear commerce is the scientific argument that nuclear power offers a way to maintain current energy consumption levels, without producing the greenhouse gases associated with fossil fuels. Though this is not a new argument, it is being made with renewed vigor. For example, British Nuclear Fuels has recently argued that Britain should pay nuclear power generators extra for their electricity in recognition of the fact they do not produce greenhouse gases and to make it economic to build new plants.[11] There is much to debate concerning the validity of this claim, but there is no doubt that it is the current public relations stronghold for the industry. This comes at a time when, according to two nuclear advocates writing in *Foreign Affairs,* "[d]espite its outstanding record, [nuclear energy] has instead been relegated by its opponents to the same twilight zone of contentious ideological conflict as abortion and evolution."[12] That the potential renewal of nuclear energy at the expense of fossil fuel is taken seriously was demonstrated as early as 1992, when the Saudis made a point at the United Nations Conference on Environment and Development to strongly support statements that questioned the environmental safety of nuclear power.

Arguably, growing concerns over the consequences of global warming may result in the greater exploration and use of the nuclear alternative. The French, for example, argue that since the large-scale implementation of their nuclear power program in the 1980s, which currently accounts for 70% of their electrical power generation, they have reduced their emissions of sulphur dioxide by 90% and carbon dioxide by 85% from within all electrical generation related fields. The most visible appeal is that the types of reductions in emissions required to impact global warming cannot, in the short-run, be accomplished without a major shift away from carbon-based energy production, and it is often argued that nuclear power is the only viable alternative.[13] Various technological fixes are, without doubt, being investigated, including fusion technology.[14] That being said, fusion technologies are, at best, several decades away from becoming a viable option. Until then, current fission technologies will continue to be the only nuclear power source.

11. *Reuters,* November 14, 2001. Available at: http://www.planetark.org/dailynewsstory.cfm/newsid/13283/newsDate/14-Nov.
12. Rhodes and Beller 2000, 44.
13. See Morland 2001.
14. See for example Elliot 1997; J. Glanz, "Energy Independence," *The New York Times,* 22 October 2000, A4; and IEA 1997.

The Canadian Nuclear Association has embarked on a public relations campaign emphasizing the ability of nuclear power to avoid greenhouse and smog-producing gases. In short, though the current understanding amongst policy-makers is that the zero-emission potential of nuclear power could possibly lead to an increase in international motivation for expanding its production, especially in areas where natural gas and hydro are not readily available, there are still substantial technical, environmental, and political obstacles to overcome.

For example, uranium supplies are limited (and breeder technology, which recycles some of the spent uranium, cannot avoid the need for fresh uranium at some point in the cycle).[15] Perhaps the price of uranium itself tells a story: in a downward slide indicative of the contraction of the reactor industry, uranium, once priced at over $40(US) per pound, fell to less than $20 by the late 1970s and in 1991 was valued as low as $9.50. By May 30, 2001, it was down to $7.10 a pound, a record seven-year low.[16] Naturally, prices could rise again if there were significant movement toward nuclear power production, but this seems unlikely beyond a few core states that have integrated nuclear power so firmly into their grid that they have little choice but to continue an expansion if they wish to reduce fossil fuel consumption. And there are serious debates as to the availability and quantity of the world's uranium supply.[17] At the other end of the fuel cycle, radioactive waste will have to be stored for thousands of years, a prospect which raises further questions of storage location and security.

The Dutch Van Middelkoop Commission's *Parliamentary Report on Climatic Changes,* issued in 1996, cites nuclear power to be "an effective energy source, when solely evaluated on the aspect of carbon dioxide substitution." However, a plethora of problems complicate this position. There are ample possibilities (for example in the area of energy savings) that are for the greater part more efficient than extra investment in new nuclear capacities. Although France is often used as a classic example of how heavy reliance on nuclear power can reduce emissions, at least one-third of its emissions reductions between 1980 and 1994 could also be attributed to an effective conservation program.[18] Nuclear power generation cannot be CO_2 free, since the nuclear fuel cycle itself requires power generation that is still largely reliant on fossil fuels: constructing plants, mining

15. Fast-breeding was seen as a possibility to transform the enormous supplies of non-fissionable uranium into fissionable plutonium. This plutonium would then be made to serve as fuel. But breeders are seen by many analysts as technical and economic failures. The most evident concern is with weapons proliferation. In 1977, then US President Carter imposed a moratorium on the use of breeder technology because of his concerns over the security threats arising from plutonium proliferation. But, by 1994 approximately 50 tons of plutonium was produced by civilian reactors alone, enough to arm over six thousand missiles (see Imboden and Jaeger 1999).
16. See Patterson 1984, 131; *The Globe and Mail,* 21 March 1991, B1 and B2; and *The Casper Star-Tribune,* 30 May 2001.
17. Kernforschungszentrum Karlsruhe (recently renamed Forschungszentrum Technik und Umwelt) in Germany estimates the worldwide uranium supply to be 6.4 million tons (see Laka 1996).
18. OECD 1994, 121.

and distributing uranium, disposing of waste. Further, a large contributor of carbon emissions is the transportation sector and nuclear energy cannot contribute directly to reducing these emissions, (though there were retrospectively rather optimistic dreams of nuclear-powered cars in the early days of the industry).[19]

Organizations promoting nuclear energy are collaborating closely to ensure that the case for nuclear energy is properly presented at the ongoing series of Conference of the Parties meetings to negotiate the Kyoto regime. Among the organizations involved in the effort are Foratom, representing the interests of the European nuclear industry, the WNA, with a world-wide membership engaged in all stages of the nuclear fuel cycle, the Nuclear Energy Institute, for the US nuclear industry, and the Japan Atomic Industrial Forum, which co-hosted a symposium on non-fossil energies during the initial Kyoto conference. At this point it appears as though the Kyoto regime will not permit industrialised states to claim emissions credits (through the Clean Development Mechanism established in Kyoto) if they contribute to developing nuclear power in the southern hemisphere. But the WNA and other representatives, especially core state governments dependent on exporting nuclear technology to maintain the domestic industry (the United States and Canada are two prime examples), will no doubt continue to press for this formal acknowledgement of the role nuclear power can play in reducing greenhouse gas emissions.

Persistent Problems: Nuclear Power's Dilemmas

There are other arguments advanced by nuclear advocates. Perhaps the most specious is that the energy crunch experienced in California in the summer of 2001 can only be avoided with increased electricity production, regardless of the long-term impact. Another argument is more in line with the traditional realist paradigm in international relations: in terms of national security, nuclear power can be touted as a path toward energy independence, especially for states with high deposits of uranium, such as the United States and Canada. This could be an avenue towards reducing reliance on imported fossil fuel. Of course, if nuclear energy were a more significant factor in global production then smaller uranium-rich states, such as Namibia, Niger, and other African countries, might well find themselves affected by the familiar resource curse analyzed by Ross.[20] Further, given natural gas reserves and the possibilities of renewable resources, it can be easily argued that nuclear power is not necessary for energy independence, though its preservation does encourage the diversity of sources.

19. Of course, nuclear power stations can be utilized for the production of electricity, and this could be used to power battery-operated cars, though solar energy or hydrogen fuel cells could do the same.
20. Ross 1999. Canada is the world's largest producer of uranium, an industry susceptible to frequent price fluctuations and responsible for uranium debris containing radium, radon gas, thorium, and other known carcinogens. Australia and the United States are other large producers, but several African countries are either exporting or exploring.

More to the point, it can be argued that nuclear reactors in fact decrease national security because they are vulnerable installations, and the technology has afforded the possibility of horizontal proliferation, again a major international security concern about which many observers are rather pessimistic following the Indian and Pakistani explosions of 1998.[21] The industry has been virtually reviled in the UK, United States, and elsewhere: no new plants have been built in the United States since 1978 and, before the global warming concerns and the Bush administration, it was generally believed they would all be out of operation by the expiry of their 40 year operating licenses.

Not only are the plants considered hazardous, they are notoriously expensive to operate and almost always run over budget. For example, five power plants were brought on line in Japan in the 1980s. The time required to complete these plants, from initial planning to operation, averaged 17.4 years. The single plant brought on line in the 1990s required 25.7 years.[22] There is also a long trail of nuclear plant accidents, from Three Mile Island in 1979, to Chernobyl in what is now Ukraine in 1986, to Japan's experimental fuel-processing plant in Tokaimura in 1999, where two workers were killed. Worse, the world's largest nuclear firm, British Nuclear Fuels, was found in 1999 to have falsified records relating to shipments of nuclear fuel to Japan, sparking outrage in both countries. The same firm reportedly understated the costs of nuclear cleanups in Britain by some $13billion as well. It is hardly surprising, given the reputation of the industry, that insurance companies are not fond of nuclear energy either, and require special legislative assistance to become involved in projects.[23]

To this must be added the controversial nature of the export industry. For example, critics charge that Canada's nuclear sales have bordered on the reckless: a recent sale to China took place without the usual environmental impact assessment, and was guaranteed by way of a loan from the Export Development Corporation.[24] In addition, many of Canada's clients, such as Argentina, Romania, South Korea, Turkey, and Pakistan, have had dubious human rights records (however, this is certainly not a connection unique to nuclear exports). A major contract with Turkey was cancelled in 2000 not because of concerns with the human rights record of the latter, but because of Turkey's limiting financial difficulties.[25] While policy-makers struggle with various, but always unappetizing, options for nuclear waste storage in the Canadian shield, it may be even less likely to expect such states to deal with their own storage problems. Even in the

21. See several of the essays in Thomas 1998; and Perkovich 1999.
22. MITI/ANRE 1998b.
23. Indeed the United States government has habitually limited liability in the event of a nuclear disaster, through legislation (the 1957 "Price-Anderson Act"). The current liability limit is $9 billion dollars, which the Bush administration is arguing should be extended another ten years (Grossman 2001, 39).
24. See Martin 1996. On equally controversial sales to Romania, see J. Wells, "Going Critical," *Report on Business Magazine, The Globe and Mail,* June 1995, 34–59.
25. Bratt 2001, 243.

American case current plans to bury waste in Yucca Mountain in Nevada are troubled, since the mountain is on or near 32 earthquake fault-lines.[26] There are further concerns about Canada's willingness to import over 100 tons of weapons grade plutonium from the United States and Russia for processing in the next 25 years.

Nuclear power problems and policies do not occur in a vacuum, but within an *ecopolitical context.* This can be illustrated with reference to recent developments in Europe. Very soon after the fall of the Soviet Union, it became clear that the safety of Europe itself is threatened by more than the resurgence of ethnic nationalism and disputes over the drawing of Post Cold War borders. From the standpoint of environmental security, it is plain that the present and immediate future present grave perils to the European Union and the nation-states of Eastern Europe. Reliance on the burning of soft brown coal, particularly in the Eastern European region, has resulted in unprecedented acid rain, and though western technology is being applied to this problem it will neither undo the damage done nor will it solve what remains a fundamental environmental crisis with regard to energy production, which is complicated by an understandable apprehension over nuclear power production there.

Despite the long-term threat to environmental security represented by these problems, consensus is emerging that the greatest immediate danger in both Eastern Europe and the Commonwealth of Independent States (CIS) is the decrepit condition of the outdated nuclear reactors located there. A low-level leak of radioactive inert gases and iodine from a reactor near St. Petersburg accentuated the fear that there are a number of Chernobyls waiting to happen.[27] Throughout the Cold War, Eastern Europe had served as a captive market for the Soviet nuclear industry, and Soviet-designed reactors (located in Czechoslovakia, Hungary, Bulgaria, and eastern Germany) have not always included sufficient emergency core cooling systems.[28] The European Union has committed money for the improved regulation of these plants, but many environmentalists are critical of what they view as too conciliatory an approach to the existing problem, arguing that this should be viewed within the context of the global nuclear power marketplace, which is currently a "buyer's market": western companies see a potential market in the new eastern Europe and, if they are too harsh in condemning the present reactors, "people might not want them to build new ones."[29] The establishment of the World Association of Nuclear Operators reflected what Martin List describes as "[t]he concern that the inadequate safety of Eastern nuclear power plants might discredit Western nuclear energy

26. Grossman 2001, 38.
27. For information on this leak as well as an interesting treatment of the problem in general see D. Fairhall, "Danger Blowing in the Wind," *The Manchester Guardian Weekly,* 29 March 1992, 1 and 12.
28. M. Wald, "Eastern Europe's Reactors Don't Seem so Distant Now," *New York Times,* 13 October 1991, E4.
29. A. Froggatt, of Greenpeace, quoted in *Ibid.*

programmes [which] was one of the main motivational forces for the post-Chernobyl activities of nuclear power plant operators."[30] In terms of west-east assistance, this situation lends itself easily to what Robert Darst refers to as *nuclear blackmail* by eastern European and CIS states.[31] On the other hand, it would be incomplete to ignore the potential marketplace for both technical sales and decommissioning opportunities this presents for the industry, at the expense of the western taxpayer.

Operational safety remains the primary problem for nuclear contractors, though terrorist threats will no doubt be a more emphatic concern in the future. The safety question is directly related to the theme of legitimacy, and public trust. As Robert Pool writes, "perhaps industrialized nations can operate nuclear plants safely—although the history of the US nuclear industry does include such whoppers as operators falling asleep in control rooms and a reactor being installed backwards—but will the public believe it?"[32] And if not, this might explain why the resumption of an export-oriented industry, especially involving states such as China and South Korea, where public opinion is actively suppressed on such matters, is the only policy option for the state-capital nuclear lobby today. The partial exception to this is what Timothy O'Riordan refers to as the "lucrative technological world of decommissioning" plants, another form of commerce with global links.[33]

As for the threat of terrorist attacks, this is again related to the legitimacy not only of the industry but also of the state itself. Nuclear power as it currently exists requires perhaps the most centralised process of all, and the most technocratic expertise. Radical environmentalists are opposed to it on these grounds especially, and the tight links between the industry and the modern state compound this objection. But the increased fear that reactors and waste sites are potential targets for nonstate actors will only encourage states, and even private security firms, to further disassociate the public from the nuclear industry. One observer notes that reactors are potential radiological weapons: "Half the nuclear power plants in the United States have failed to repel mock attacks—so-called force-on-force exercises supervised by the Nuclear Regulatory Commission. The NRC refuses to take enforcement action in response to the failures, and is in the process of weakening the rules of the game because of industry complaints."[34]

Nonetheless, many analysts insist that in the global warming age, nuclear energy remains one of the few viable policy options.[35] This implies that the preemptive rejection by the current Bush Administration, and others, of the intense

30. List 1993.
31. Darst (2001) uses this term throughout his excellent overview of the nuclear/aid relationship in the new European context.
32. Pool 1997, 300.
33. O'Riordan 1990, 175.
34. Leventhal 2001.
35. Radetzki 2000, for example, suggests that American policy choices are limited to coal versus nuclear.

development of renewables such as solar and wind power may be the strongest factor working in global nuclear's favor. It has certainly been the case that research and development funding has affected this perception: for example, one researcher estimates that in the past fifty years, wind, solar, and nuclear power received approximately $150 billion in cumulative Federal subsidies in the United States, but that 95% of this went to nuclear.[36] (Indeed it is rather duplicitous to include nuclear energy with the renewable group, since uranium is ultimately spent and must be stored after use, while there are no similar waste products with solar or wind power). The Bush Administration's energy policy transition team included the president of the Nuclear Energy Institute, a leading consultant to the industry, the president of Edison Electric Institute, and the former head of the American Nuclear Energy Council, but had no representatives from renewable energy or environmental organizations.[37]

Security and Legitimacy: Nuclear Energy at the Crossroads?

We are often informed by environmentalists and ecological economists that we face a crossroads at this juncture; a need to move beyond a fossil fuel-based global economy, in spite of the entrenched power of the industries extracting and distributing those resources and the state apparatus which supports their position of dominance. Bridging the transition to renewable energy will be natural gas, which burns as a much cleaner fuel than coal or oil, and nuclear energy will certainly be a contributory factor as well. Yet, because of heightened security concerns after September 11, the continued public consternation over the safety of nuclear power, the active opposition of many civil society groups, local opposition to uranium mining, plutonium transport, and radioactive storage, and a host of other problems, its future is reliant not so much on perceived need but on the juggling act of legitimacy the industry and its state representatives can carry out.

This is needed at a time when there have been fundamental shifts in the structure of global nuclear commerce. The level of capital concentration in the energy industry is, indeed, dizzying. The major players in nuclear power supply (including not just electricity providers, but technology and uranium suppliers) include firms such as General Electric, BNF (which has acquired Westinghouse), Exelon (a merger of COMEd, PECO, and Unicom); the French firm COGEMA, which will be merging with Framatone to form Areva; USEC; and Cameco. Indeed the infamous Three Mile Island nuclear plant near Harrisburg, Pennsylvania, is still in operation, but is currently owned by AerGEn, a joint venture of Exelon and British Energy that bought it from GPU last year. These are all large firms with many multinational subsidiaries, and with investments in the fossil fuel industry as well. Even Russia has an international uranium distributor,

36. Goldberg 2000.
37. Grossman 2001, 35.

Nukem Techsnabexport, which deals mainly with the export of decommissioned nuclear weapons fuel to the United States and elsewhere for reprocessing.[38] Germany's power industry is rapidly consolidating, with the two biggest players, Veba and Viag, in the process of merging; whether Germany lives up to its promise to decommission all its nuclear plants may have as much to do with the long-term priorities of this new group as it does with the current government. Sweden's experience may be instructive. Despite a commitment to phase out nuclear power two decades ago, the country has yet to close a single nuclear power station.

Despite the neoliberal agenda's commitment to "free market" enterprise, we see that many of its primary advocates—those extolling the virtues of privatizing the energy supply industry—engage in market consolidation, with the absolutely essential support of the security apparatus of the contemporary industrial state. This contradiction in terms is washed over with calls for the public good of technological advancement, energy independence, and concerns with the global warming problem; yet it comes at a time when globalization is widely confronted by those who feel excluded or marginalized from its benefits, the very benefits large-scale electrical power production is supposed to facilitate. Indeed one might argue there exists a fundamental challenge to the nation-state today that will have collateral impact on the nuclear industry's prospects. Again, nuclear energy is the most centralized form available, and in an environment wherein the state has further increased its self-protective abilities it will be both attractive to states, and heavily securitized. This creation of further distance between the public and utilities on which they depend will only be tolerated if the former is convinced it is necessary and is the product of severe times. To some extent, then, the legitimacy of nuclear power relies on the legitimacy of states themselves, which remains dependent in turn on the prevalence of insecurity.

Meanwhile this remains a highly internationalised issue, due to both the weapons question and the transborder implications of nuclear disasters. A plethora of international agreements have been committed to the preservation of the industry, or at least partially contribute to that task, including several recent additions, which have a mixed signing and ratification record.[39] The instability concerning the former CIS, in terms of both reactor safety and decommissioned plutonium, is but one of the many concerns the industry must face. Although the global warming argument may be favourable, the terrorist threat imposed by the September 11 calamity, and the continued waste disposal dilemma, all suggest that hard times could be ahead for the public credibility of this industry—but that is, indeed, a normal state of affairs.

38. GE alone supplies technical parts to 91 Boiling Water Reactors (BWR) in eleven countries, which comprises 4% of world energy production. See GE website at http:www.gepower.com.
39. OECD 1998, 127–128. This includes the 1960 Convention on the Protection of Workers, the 1963 Vienna Convention on Civil Liability for Nuclear Damage, the 1968 Non-Proliferation Treaty, the 1986 Early Notification Convention, the 1994 Nuclear Safety Convention, the 1997 Convention on the Safe Management of Spent Fuel and Nuclear Waste, and others.

Conclusion

I have argued that the lines of discourse employed by nuclear adherents, and those with a vested interest in global nuclear commerce, from nuclear technology to uranium exports, face continued challenges today. However, we should not underestimate the ability of public authorities, especially those involved with the military and energy industries, to influence public discourse. For example, the old line of thought was that nuclear deterrence was not only effective; it was the *most* effective manner of guaranteeing security. Now, with the missile shield once again in Washington vogue, it is suddenly apparent that deterrence does not work, at least not against irrational rogue states, and that pre-emptive conventional strikes are not destabilizing but in fact can create a more secure foreign policy environment.[40]

Similarly, the Japanese nuclear industry has gone to great pains to convince post-Hiroshima generations that plutonium is, in fact, good for them, including video campaigns aimed at the children of parents who suffered from the effects of atomic blasts. While exports of nuclear technology were once considered potential destabilizers of world peace, the Canadian government now boasts of its sales to China and Turkey. Presumably, nuclear power can offer a detour from the usual heavy reliance on oil imports, suggesting an improvement in national energy independence can be gained in spite of increased electricity consumption. Waste storage can be repackaged as a financial opportunity to financially troubled rural communities.[41] New technologies can—and most likely will—make nuclear plants much safer, and less vulnerable to terrorist attack. And, in the most ironic of turns in the story, nuclear energy can be presented as the solution to the global warming crisis.

But in all these cases success will be tempered by sustained opposition to the centralizing tendencies of nuclear power and globalization more generally. As a nuclear industry analyst noted two decades ago, "ownership of technologies is a major factor in constraining the degree to which people can participate in the decisions made about them."[42] The nuclear power issue has proven a fertile ground for public resistance movements at least partly because of this nonparticipatory aspect, which can only increase in the era of global privatisation and escalated anti-terrorist security measures.[43] Perhaps the continued anti-nuclear reflex, which has spread from a doubtful public in the core nuclear

40. See Gusterson 2001, for an interesting discussion. He writes: "Perhaps the most extraordinary achievement of these purveyors of the new nuclear discourse is to have appropriated anti-nuclear critiques of nuclear deterrence in the service of a new generation of weaponry" (2001, 67).
41. This will be weighed against local opposition, however, breeding further resentment over the centralized form of decision-making that can place, for example, the majority of American waste in one area, Yucca Mountain of Nevada. See D. Ballingrud, and A. Leary, "Nuclear Waste a Mountain of a Problem," *St. Petersburg Times,* 28 May 2002.
42. Falk 1982, 332.
43. For an interesting discussion of public opposition to nuclear power in the United States and Germany, see Joppke 1992.

countries to those in the periphery, will be the most significant obstacle faced by the legitimization process in the future as well.

One of the principal sectors in the legitimization process, the scientific community, has an ambiguous role overall in the specific case of nuclear power. Indeed, this role is fascinating in terms of what Michel Foucault has termed the "political economy" of truth. While a Foucauldian analysis by Karen Litfin suggests the approval of the scientific community was essential in moving states toward a regime to protect the ozone layer, the same community is sharply divided on the question of whether or not nuclear power is safe or dangerous, sustainable or short-lived.[44] Thus it is essentially neutralized, despite repeated efforts by the nuclear lobby to capture it. At the same time, selling the virtues of such centralized technology to rapidly industrializing states with limited public participation may, in the short-term, be a much easier path. Similarly, the virtues of uranium mining for export may be attractive to African elites, while the local communities own access to scientific assessments of the potential impacts is relatively limited, if not actively countered with appeals to nation-building and comparative advantage.

In conclusion, it is difficult to predict the future of nuclear energy at this time. However, we can assume that the entrenched economic interests—many of which have strong links to the fossil fuel-based units of global production as well as the military-industrial-complex—will prevail in keeping a nuclear export industry alive. Unfortunately, the long-term costs to environmental security and civil liberties may prove a much greater burden to bear than the benefits of limited "carbon-free" energy production and the survival of a troubled, and highly subsidised, nuclear industry.

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44. See Faubion 1994, 111–133; and Litfin 1994.

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