Nuclear Power: Government policy and public opinion in the United States and Japan

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Abstract

The United States and Japan are currently two of the world's top three nuclear energy producers, with both countries initiating strong commercial nuclear industries in the 1950s. Since that time, however, factors such as culture, economics and natural resource base have dictated very different experiences in this field. This paper compares the histories and present state of each country's nuclear industry, as well as the dominant influencing factors.

One key distinction between the two countries is the American nuclear regulatory structure and lack of a nationally unified energy policy, contrasting Japan's clear energy policy and regularly updated nuclear energy Long Term Plan. Further, since Eisenhower's "Atoms for Peace" approach, the American government has not publicly supported nuclear power. The Nuclear Regulatory Commission's contribution to the American nuclear energy experience has increasingly shifted to hinder nuclear plants' competitiveness and advancement, although recent relaxing of rules may change this role.

Japan's central government has always firmly supported and promoted nuclear power, primarily because domestic resources are scarce and this energy source provides hope for self-sufficiency. Increasing problems with public acceptance and nuclear related accidents have impeded Japan's goals of rapid advancement and expansion.

It is likely that for the near future, the Americans and Japanese will continue on their respective paths, with the US government not addressing nuclear power explicitly even as it contributes significantly to the American electricity supply and public support is increasing. Conversely, Japan's central government will press onward, overtly embracing nuclear energy amid public concern, siting problems and increasingly frequent incidents. The existence of Japan's Long Term Plan, however, undoubtedly improves the country's prospects for continued success and growth of its nuclear program.

Introduction

From its very beginnings, commercial nuclear power has been controversial, associated with uncertainty and hazard. Both the United States and Japan embraced nuclear energy in the 1950s and initiated grand schemes for this emerging energy source. In this paper, I address the changes in governmental policies and public views toward nuclear energy over the past 50 years, and look at the factors influencing these changes. The US and Japan, while two of the world's top three nuclear energy producers, have had rather different experiences with it. The US shifted its popular focus away from nuclear power in the 1970s, yet it continues to supply a significant share of American electricity. The Japanese government has remained earnestly committed to nuclear power's role in its energy portfolio, but with increasing problems regarding public acceptance and facility accidents. In examining the histories and influencing factors of each country's nuclear industry, I believe that although Japan has generally followed a similar path to the US, the circumstances of its nuclear development involve uniquely Japanese considerations.

Early History of Nuclear Power

During the early 1950s, after the terrible demonstration of nuclear technology during World War II, the international community sought to push nuclear power's peaceful, commercial use. In 1953, President Eisenhower gave a speech entitled "Atoms for Peace", lending his support to a foreign policy objective and offering to share commercial nuclear technology with other countries in exchange for inspection privileges and safeguards against nuclear weapons. This speech essentially marked the birth of the American commercial nuclear industry, with the US Atomic Energy Commission (AEC) promoting plants and publishing pro-nuclear information. Initially, electric utilities were uninterested in nuclear power due to ample supplies of coal and

oil, but the AEC continued pushing, going as far as constructing the first large scale (60 MWe) reactor for electricity generation. When this plant went on-line in 1957, it sent a message to utilities: use nuclear technology or the federal government could become a competitor in electricity generation.

The US government was essentially steering the country's technological development to support its national objectives. Advancement of nuclear technology was considered paramount for national prestige and foreign policy, as well as national security.

Throughout the 1950s, the AEC was pressured to develop nuclear power as fast as possible, as the US was at risk of falling behind globally during this period of international development (and competition) regarding nuclear technology. During this time, the media response was generally co-operative and supportive of such efforts.

Japan entered the world of commercial nuclear power from an entirely different direction: as the only nation to be devastated by nuclear weapons, it held a unique view of the benefits and dangers of this technology. The Japanese nuclear program began with the Atomic Energy Basic Law in 1955, focussing on peaceful nuclear energy research and the prohibition of research on nuclear weapons. It was against a backdrop of intense fear that Japan began to promote its nuclear power program, subject to strict public monitoring, and with early technologies imported from Europe and the United States. From its start, the Japanese nuclear energy program was strictly separated from nuclear weapons technology, unlike that of the US. The Japan Atomic Energy Research Institute's power demonstration reactor first generated electricity in 1963, marking the start of nuclear power generation.

It may seem surprising that Japan readily embraced nuclear power after its horrific WWII experience, however the country had set a path for needed economic growth, with high expectations for technology's role, particularly that involving nuclear energy. Opposition was limited because the country, including the general public, media and local governments,

understood the need for such developments. With its poor resource base, Japan viewed nuclear power as a major component in its long-term energy strategy to reduce dependence on imported oil. As recently as 1990, Japan imported 83.9% of its total energy, compared to 17.5% in the US (Sekine, 1993). Uranium use was hoped to solve problems of transportation and storage of imported energy, but nuclear reactor fuel must also be imported. A significant aspect of Japan's nuclear program involves the use of recycled plutonium in breeder reactors, theoretically creating an inexhaustible energy source. The breeder reactor was central to the vision of the Ministry of International Trade and Industry (MITI) for its potential contribution to self-sufficiency. The majority of industrialised countries abandoned breeder reactor use early on, due to economic inefficiencies, technical difficulties and the dangers associated with plutonium and its potential use in nuclear weapons. Japan partly promoted and justified the safety of nuclear power based on other countries' progress; international trends to some extent affected domestic patterns of acceptance. Some small opposition groups arose in the 1960s, but most often grew out of disputes over compensation paid to ill-affected citizens. Siting new plants became increasingly problematic.

1960s through 1980s

The 1960s saw the environmental movement gain momentum in the US, becoming a powerful and influential political force. In 1969, the National Environmental Policy Act (NEPA) was passed, and negative developments in the form of media publications on the risks of radiation became more frequent. Environmental activism increased, with some groups promoting themselves through an anti-nuclear stance. Despite reductions in air pollution, nuclear power did not fit into the new environmental vision; plants used much land and water, generated waste heat and more importantly, radioactive waste.

The first major environmental nuclear power debate occurred over radioactive emissions, and the AEC actively responded by changing regulations for radioactive releases, reducing allowable discharges during routine operations by 100 times previous levels. Practically, this translated into the addition of more tanks, pumps, filters, concrete buildings, etc., significantly adding to plant costs and reducing nuclear power's competitiveness. This action marked the first of many regulatory changes causing an efficient and profitable nuclear industry to be increasingly difficult to achieve. Further, anti-nuclear activity was growing with the formation of a powerful group, the Union of Concerned Scientists, who published reports about the failure of the emergency core cooling system in a reactor accident in 1972. Although technical issues were readily resolved, the public continued to hold that reactors were vulnerable to accidents, and the media began to take that belief. Such activism continued with Ralph Nader's unification of small anti-nuclear groups into "Critical Mass" in 1974, and the joining of former Vietnam activists, now without a cause, to this growing movement.

Developments in nuclear power quietly continued throughout this period, improving efficiency of construction and operation. During the same time the Nuclear Regulatory Commission (NRC) was created. Its policy regarding nuclear power was took a more cautious approach, tripling the number of nuclear regulatory documents in its first year. The mid 1970s oil crisis (when Arab members of the Organisation of Petroleum Exporting Countries (OPEC) banned exports) looked to be beneficial for the nuclear industry, but ultimately had little effect. India's 1974 nuclear device launch did have an effect, however, initiating calls for more intense regulation of the nuclear industry and heightening public anxiety. The link between nuclear power and nuclear weapons was re-emphasised and received increasing media attention. Interest grew in the possibility of terrorists stealing plutonium to make bombs, and the anti-proliferation movement gained strength. In 1977, President Carter's view on nuclear power was clearly negative: he sought alternative sources

and the restraining of nuclear development as a non-proliferation example to the world. He essentially reversed the pro-nuclear policy in place since 1954.

American Nuclear Industry from Three Mile Island to Present Day

In 1979, amid the already substantial anti-nuclear forces, the most traumatic American nuclear accident occurred: the Unit 2 reactor at Three Mile Island (TMI) experienced a loss of feed-water to its core, causing damage. The accident itself led to little danger, but socially and politically it had a massive impact. Media coverage was beyond extensive and often biased, and the subsequent political process resulted in severe regulatory changes.

The NRC imposed new requirements on plants with respect to safety measures, leading to striking increases in costs, materials needed and construction times. During this time, the total cost of construction for a nuclear power plant increased by a factor of four (Cohen, 1996). Throughout the early 1980s, the NRC began to emphasise documentation and programmatic issues over hardware and technology. The licensing process also changed dramatically, moving towards legalistic as opposed to technical compliance. High level waste disposal remained unresolved, developing a reputation as an unsolved/unsolvable problem.

The Chernobyl accident of 1985 did surprisingly little to further inflame anti-nuclear forces, as the media did effectively explain that such an event could not happen in the US. The public was already convinced of radiation's extreme danger, however, and the extensive coverage of Chernobyl's health effects reiterated and strengthened fears.

Perhaps more important than the public's fears was the government and NRC's response to them. The escalating demands by the NRC correspond to a period of steep increases in plant costs (Parsons, 1995), affecting industry morale and competitiveness with other electricity producers. The regulatory changes during the 1980s added to the scope of nuclear energy plant engineering and construction, making new plants harder to build, while regulations also

mandated extensive backfitting of existing plants. Great increases in documentation and verification further contributed to the difficulties of coping with these regulatory changes. I believe that such national policy actions affected the American decline of nuclear power in the 1980s much more so than public opinion, as the direct effect of these regulatory changes was severe cost increases for nuclear plants.

1970s to Present Day, Japan

Through the 1970s-1980s, Japan continued to promote nuclear energy, with its central government strongly behind it and a fair level of public acceptance. The TMI accident stirred some fears and increased siting problems, but no notable opposition arose. Japan was advancing and encouraging nuclear power more aggressively than the US or Western Europe (with the exception of France), although the Chernobyl accident significantly increased public concern. Before Chernobyl's accident, the media generally avoided discussing nuclear power's dangers (especially in comparison to the American media), but changes began after 1985. Media coverage became more critical, and for the first time, opinion polls indicated that more Japanese opposed nuclear energy than supported it (Dauvergne, 1993).

The Japanese anti-nuclear forces were of a very different form than those in the US, reflecting societal and political differences. From the 1950s, Japan had actively pursued economic growth as the country's unified goal. Once the economy and country developed and people grew affluent, however, material wealth became less important than improvements in quality of life and the environment. It was now that questions of nuclear energy's effects on health and welfare arose. This new awareness was reflected in the media, with changing editorial tones and an increased anxiety regarding nuclear power. In 1988, the anti-nuclear movement grew tremendously, with homemakers and young people as its central figures. Such activity shocked the administration, and the MITI and power companies responded to concerns with

large-scale public relations campaigns. The first "Nuclear Power Day" was held in October of 1989, and Japan's government spent 4 billion Yen in 1990 to encourage public acceptance (Dauvergne, 1993). This new emphasis on public acceptance involved information provisions to the mass media and communications with civic groups. Effects of these efforts are uncertain, as a 1990 survey indicated that more Japanese trusted the opinions expressed by the television, radio and newspapers than those of the central government (Sekine, 1993).

Another major effect of public opposition was the escalating problems of siting nuclear power plants. In 1974, the Japanese Diet enacted three laws to financially support local communities, help nuclear expansion and promote new sites. As in the US, increasing public anxiety increased the time required for obtaining legal authorisation for a plant, and the number of new plants being authorised began to decrease because of intense local opposition. With these delays came increasing uncertainty within the local nuclear development community, and the industry has experienced difficulties with establishing long-term plans. As siting has been one of the nuclear industry's primary dilemmas (due to public opposition, not lack of physical space), new technologies are under investigation. One involves constructing plants on the Quaternary bed lying in broad plains around Japan's big cities. Current regulations permit nuclear plant construction on the Tertiary or older rock beds only. Underground siting is another option to ease public opposition, but locating a large, strong rock bed may be difficult. Offshore siting presents possibilities of constructing plants on manmade islands on undersea bedrock, or on barges moored in water surrounded by breakwater (Sekine, 1993). These areas of research indicate that the government is looking for ways around the anti-nuclear movement if Japan's nuclear industry continues to be hindered by it.

Unlike the US, Japan's chief response to public opposition was not to clamp down on the nuclear industry and alter governmental industrial policies. Focus was placed on public relations, striving to alleviate concerns and create a positive consensus. Japan's poor natural

resource base lends it few options for domestic power, and rather than reacting to public criticism by altering long-term plans, the government launched extensive public acceptance campaigns. In comparison to other industrial countries, particularly the US, Japan's anti-nuclear movement had relatively little effect on the overall direction and central government's view of nuclear energy development.

Japan's Current Nuclear Energy Status

Japan's nuclear industry began to face increasing uncertainty in the 1990s. Although in the mid 1990s Japan had become the world's third largest producer of nuclear power, behind the US and France (Mashimo, 1996), electricity demand continued to rise. The MITI called for great expansion of nuclear energy to meet these increases, although many energy officials have wondered if electric utilities will find sites and money for the proposed new reactors. Traditionally the government has offered subsidies to communities willing to live near a nuclear facility, and power companies have paid billions of yen to fisherman in compensation for fishery rights damaged by plant construction and operation. Even with these compensation packages, utilities are not easily winning local consent for new plants. Such concerns result in long delays in bringing new plants online, and the public's worries have added costly measures to construction and operation design and procedures.

This situation seems quite similar to the state of American commercial nuclear technology in the late 1970s. In the US, the nuclear industry's most significant delays and changes arose in the mid-construction phase, however, while Japan's have occurred in the pre-construction period (Lesbirel, 1990). Japan's progress is slowing regarding nuclear energy, but the power demand continues to rise, and already Japanese electricity costs are among the world's highest. Nuclear power is still projected to be an important part of Japan's profile, but ideas of continual, rapid growth and advancement are less widely held.

The Japanese nuclear industry's handling of the public has itself become an issue, as has lack of trust in officials. In 1997, letters from the Power Reactor and Nuclear Fuel Development Corporation (PNC) were hand-delivered to members of the Tokai farming community, apologising for the "betrayal" of trust. A fire in the nearby nuclear processing plant had been masked by false reports, which were later discovered. Such cover-ups have occurred before, involving edited video footage to downplay incident severity, and failure to report accidents and leaks. This practice may be due to the press' tendency to ignore nuclear energy except when something goes wrong, and the growing acknowledgement of public opinion's power in retarding progress. Japan's nuclear safety record has become increasingly dubious and industry morale is declining.

In September of 1999, the worst nuclear accident since Chernobyl occurred just over 100 kilometres outside of Tokyo, making the Japanese public even more fearful of nuclear power, as well as sceptical of Tokyo's efforts to ensure public safety. The accident took place at the JCO Tokai Works uranium-processing plant in Tokaimura, when official safety procedures were violated and employees were working without special training, protective gear or automatic equipment. One worker was killed, and over 400 civilians were exposed to radiation, marking the first time the Japanese have suffered from the use of commercial, peaceful nuclear energy. The accident was officially blamed on human error, but nuclear regulations did not anticipate such a severe accident at a fuel processing plant, casting further doubt on the reliability of the government's nuclear power policy.

The Japanese Diet sent the equivalent of 1.3 billion US dollars in aid, tightened safety regulations and developed plans to increase the Nuclear Safety Commission's staff. Two months after the incident, the government passed two bills to correct the worst deficiencies revealed by the accident, such as periodic inspections of nuclear fuel facilities and revision of emergency planning procedures. These new laws do not, however, address some fundamental problems of the industry. Japan's nuclear program tends to be driven by high-level

bureaucracy and its narrow focus on plutonium harms economic viability; thus pressures mount to cut costs and minimise safety measures. Secondly, the prevalent belief among officials that severe nuclear accidents are impossible seems to be unshaken by the Tokaimura event (Lyman and Dolley, 2000). Clearly this accident has not lessened the government's will to continue with Japan's nuclear power program, and although the issues raised provided an opportunity to reform the nuclear regulatory system, initial changes were fundamentally cosmetic.

Despite an increase in localised unrest, the Tokaimura accident did not immediately lead to serious anti-nuclear protests, and Japan's support for nuclear energy has been minimally affected. There exists a distinct difference in the belief of nuclear power's necessity between those in urban centres, where electricity consumption is high and public polls show over 50% of people believe nuclear power to be unavoidable in Japan, regardless of safety concerns (Matsumura, 1999), and the rural population who host the nuclear facilities. General support for the nuclear program is decreasing, however, with 51% of poll respondents feeling "very uneasy" about nuclear power after the accident, versus 21% before it (Wilson Quarterly, 2001).

Another setback for Japanese nuclear energy occurred in spring of 2001, when a utility abandoned plans for a nuclear plant at the request of the governor of the host site's prefecture. This marks the first time a high-ranking elected official has publicly opposed nuclear energy construction, and the industry fears a precedent could be set. The governor's rejection of the plant was not legally binding, but Chubu Electric Power Corporation cancelled its plans immediately. Industry officials continue to state that the need for nuclear power in Japan is unchanged. In fact, throughout each setback for Japan's nuclear program the central government has not wavered in its nuclear development policies. Currently, 52 reactors produce 30% of Japan's electricity needs (ENR, 2000), and the government maintains its plan to add 20 more plants by 2010 (Wilson Quarterly, 2001).

Amid this climate of changing public opinion and increased accident/incident frequency, the Japanese government has remained committed to its long-term nuclear strategy. In November 2000, the Japan Atomic Energy Commission (JAEC) officially released its latest long-term plan, the 9th since 1956. Government and administrative reforms are contributing to the changes surrounding nuclear power, among them the MITI becoming the Ministry of Economy, Trade and Industry (METI), now responsible for overall energy policy. This new plan effectively addresses issues involving information disclosure and community participation within nuclear policy and regulation, with the plan council itself consisting of members with different backgrounds, nuclear and non-nuclear. Japan's policy of retaining nuclear power as one of its principal energy sources is strongly endorsed by the plan. Although some uncertainty remains, the JAEC's report does tackle key elements of waste, public involvement, and nuclear power's competitiveness.

American Nuclear Power Today

American nuclear power has basically been pushed out of public view, with media attention focussed on other energy issues regarding oil prices and global warming. In this quiet time, nuclear regulation is seemingly taking a positive turn. The NRC revised its oversight process for operating plants in April of 2000, acknowledging the nuclear industry's maturity and continuously improving safety and reliability records. Some nuclear advocates believe that this rationalisation of the regulation process is directly related to the fact that, as of late, politicians and media have essentially ignored nuclear energy (Zink, June 2000).
This popular neglect is not completely helpful to the nuclear industry, however, especially when Nuclear Energy Institute (NEI) performance data for 1999 showed continuing trends toward higher reliability, greater safety and improved economics. The Republican government minimally addresses nuclear power in its energy strategy, focussing on oil and

gas prices and reserves. Further, the demise of the Kyoto Protocol essentially neutralises the benefits of reduced carbon dioxide emissions from nuclear power versus that obtained from fossil fuels. After the TMI accident, the nuclear industry naturally became wary of the media, believing the safest option to be staying completely out of the press. This strategy backfired somewhat, as it generally left the media and public to rely on regulators, the financial community or opposition groups for information. The media is extremely powerful in the US, as is its impact on public opinion; thus in these times of improving nuclear performance the industry would be better served to improve relations with the press.

Although nuclear energy has been out of the public eye, it supplied 20% of the American electricity supply in 1999 (Richardson, 1999) and that proportion holds steady today with 103 reactors supplying 20% or 571.2 billion kilowatt-hours in 2000, (NEI, 2001). Its current role is driven more by economics and regulatory reforms than technology. Safety and performance of plants continues to improve, while significant financial problems hinder their competitiveness. The NRC, an organisation historically viewed as slow to respond to changes that would accelerate the regulatory process and save costs to licence holders, has been reviewing its licensing process. At the 1999 Regulatory Information Conference, the NRC addressed the need for regulatory reform, moving towards a more risk-informed and performance-based framework.

Public opinion, a major preoccupation of the media and politicians alike, may be more encouraging to the nuclear industry than expected. Perhaps in response to the recent energy crises, attitudes toward nuclear power are generally positive. A Bisconti poll indicated that in January of 2001, 51% of respondents supported the building of nuclear plants, in all regions of the US (Bisconti, 2001). Further, 68% agreed with the statement that nuclear energy should play an important role in meeting future energy needs (Bisconti, 2001). These responses indicate that although the American anti-nuclear contingent is very vocal and well represented, the general public is not entirely opposed to nuclear power. One does tend to

think of Americans as being opposed to nuclear energy, and apparently politicians believe this to be true, but public opinion is definitely not the hindrance to the American nuclear industry as it was in the 1960s.

Factors in American Nuclear Power's Current State

A number of factors have contributed to the current obscure state of nuclear power in the US, involving technical, social/political and economic issues. Essentially, the problems regarding the American nuclear industry fall into the following categories: choice and management of reactor technology, regulatory approach, management of nuclear wastes, political support, nuclear weapon proliferation and public opinion.

Commercial nuclear technology is an extremely complex and large-scale field, and reactor development is a long-term process with inherent inflexibility. Once the light water reactor technology made progress in the early 1960s, its momentum was such that alternatives were no longer seriously considered, except for the distant future (Morgan, 1993). American reactors evolved incrementally from military systems, originally designed to push technology thus involving significant inherent risk. Once technologies were transferred to civilian applications, safety concerns grew, but as the basic design was unaltered, elaborate safety systems have increased reactor complexity such that complexity itself adds risk.

The widespread regulatory changes in reactor design and operation starting in the 1970s were ultimately variations and modifications in the basic approach. The scale of the development process further reinforced this inertia, involving billions of dollars, thousands of careers and massive research and development efforts. Different approaches have been suggested, and a systemic review of alternatives is needed, considering safety, reliability, complexity, cost, and ease of assembly and decommissioning.

Manufacturing these complex systems is inherently problematic, encompassing both technical and social organisation issues. US nuclear reactors have been built one at a time, affecting their cost, reliability, safety and efficiency. As each facility is slightly different, obtaining a licence consumes great quantities of time and labour, and because there is no ready information-sharing system, special training is needed for each reactor.

The regulatory system regarding nuclear power has had a tremendous impact on its current state. Part of the complexity of this system comes from the input of the various participants, including Congress, regulatory commissioners, the executive branch, local government and private interests. The nuclear industry could thrive more readily under a simpler set of organisations, with simple and realistic mandates and sufficient authority to be effective. Nuclear energy's general operations are presently regulated by the NRC, which grants licenses and monitors utilities for safety violations. The Environmental Protection Agency (EPA) sets standards for exposure, emissions and waste disposal. It is the Department of Energy (DOE), however, that implements these regulations, ultimately creating a messy and inefficient network.

Nuclear waste is a difficult issue, both technically and in terms of public relations, which cannot be easily resolved. Before nuclear energy can be fully accepted, however, progress must be made in this area. Current policy objectives aim to fix spent fuel and contaminated materials such that it can be forgotten forever, essentially setting the stage for failure (Morgan, 1993). A well-designed storage system should not cause later problems, but future geological processes and human activities are unpredictable. Occasional inspections of waste sites will be necessary, concentrating on such factors as erosion, groundwater and earthquakes. The lack of resolution regarding this issue negatively affects the nuclear industry, as it implies that nuclear energy is associated with insurmountable problems that no one is willing to tackle.

In order for any regulatory or waste management changes to be possible, high-level political leadership is necessary. In recent years, essentially since Carter's reversal of pro-nuclear policies, no American political leader has risked the nuclear issue in any meaningful way. During the Clinton administration, some progress was made, especially when the Kyoto Protocol was on the table and carbon dioxide emissions were a national concern. President Bush, however, has all but reneged on all CO_2 emissions reductions, which again moves nuclear energy to the political background. This issue is directly tied to the nuclear waste problem, as politically it is easier to let spent fuel pile up during an elected term than address the problem.

The current state is unlikely to change in the near future unless a major event occurs, either an accident, which will attract high-level attention, or another serious energy shortage, to the point where nuclear power is seriously considered as an energy option. As long as the public is ambivalent towards nuclear power, or more accurately that politicians believe them to have concerns, it seems that the political powers will exert no strong leadership in this area. International events periodically focus Americans on the nuclear proliferation issue, particularly in the developing world. Continued progress is needed regarding the management of nuclear weapons and the co-ordination of international efforts. The commercial nuclear industry has worked since its beginnings to separate itself from military weapons in the public's mind, with only partial success. Surveys indicate that the public tends to lump the risks of nuclear energy with those of nuclear weapons, and consequences of a reactor accident are imagined to be essentially the same as those of a nuclear war (Meyer, 1996). This association is partly due to differing degrees of the public's understanding of risk, as well as confusion regarding the technical aspects of nuclear power. At the same time, these perceived connections are justified in that nuclear proliferation is a real global threat. Complete acceptance of nuclear power may be impossible without notable improvement in

reducing the existing nuclear arsenal, and the commitment of developing countries to safe and responsible nuclear development.

Although the above issues affect the general public's degree of acceptance of nuclear power, safer technologies and public education will not be enough to sway members of the anti-nuclear or undecided contingent. It is less important that the general public strive to understand the mechanisms of nuclear energy than that they trust the officials and technologists in control of it. In order for efforts toward greater public acceptance to be effective, nuclear power must be treated more like a political candidate than a technology (Golay, 2001), because the public's opinion is not formed based on technical merits. The American public needs to be convinced of the benefits of nuclear power, making the risks worthwhile. This is especially problematic in the US, as energy resources are abundant and relatively inexpensive therefore the need for nuclear energy is not recognised. Nuclear energy's potential to improve American air quality problems and greenhouse gas emissions may be one such way to create a sense of "need", but such efforts may be more effective after George W. Bush's presidential term.

Present and Beyond - What will Affect Tomorrow's Nuclear Industry

In the US, nuclear power has seen a rise and fall in government support over the past 50 years, but even in these times of minimal discussion, let alone support, of commercial nuclear power, it provides 20% of the US electricity supply (NEI, 2001). Therefore although nuclear energy has faded somewhat from the public eye, it quietly makes a significant contribution to American electricity. Most likely, this pattern will continue where nuclear power remains a quiet yet key player, but no pro-nuclear movement pushes for an increased role. In part, this nebulous existence is due to the lack of a unified, central energy policy in the US, actively

promoting certain energy forms and influencing local governments' actions. The fragmented nature of decision and policy making in the US restrain possibilities of a focussed energy strategy, particularly one involving an increased contribution of nuclear energy.

Despite the current administration's failure to acknowledge the carbon dioxide emissions problems of American energy producers, this issue will undoubtedly be raised in the future and demand action of some sort. Climate change and air quality problems are favourable for the nuclear industry, and its role may increase in response to environmental pressure. Environmental concerns could in fact become a major selling point for nuclear energy.

The public seems quite receptive to nuclear power, more so than I had anticipated, and with the NRC relaxing its regulatory procedures, nuclear plants could possibly regain their competitiveness in comparison to coal and oil-fired power plants. I do not believe that the US will become a strong advocate of nuclear energy in the near future, but do think that it will subtly increase its contribution to the electricity supply, perhaps beginning the upward leg of another oscillation in support and usage.

The critical factors affecting Japan's nuclear program are to some extent similar to those of the US, but other major aspects differ considerably. Japan's current nuclear developments have seen public support for the program decreasing over time and the dissent of local governments. Accidents at nuclear facilities, particularly the Tokaimura accident, have severely affected Japanese public opinion and increased fears regarding nuclear safety. Further, trust in officials, representing the nuclear industry as well as the government, is essentially lost. The history of lies and cover-ups created an atmosphere where any nuclear-related statement or action is looked on with suspicion.

As Japan is very poor in natural resources, it must depend on imported energy sources, and one of nuclear energy's primary selling points has been its potential for a self-sufficient energy supply. The public's continued acceptance, albeit reluctant, of nuclear power, is

primarily based on this concept of "need" (T. Suzuki e-mail, April 13, 2001). Strong support does exist for alternative domestic energy sources such as wind and solar power, and if real choices did exist, the Japanese people would likely choose to abandon nuclear power.

A particularly problematic aspect of public relations has been the way in which the nuclear industry has handled accidents. The practices of covering up incidents and downplaying their severity seem illogical, as inevitably the truth is uncovered, yet they continue. Some explanations include the fear of being treated badly in the media from previous experience, and the perceived difference in "common sense" between nuclear industry employees and the general public. Finally, the majority of public-relations personnel are untrained: these engineers and technologists are not capable of communicating effectively with the media and public, nor answering complicated, ambiguous questions (T. Suzuki e-mail, April 13 2001). The strong sense of loyalty to one's organisation further contributes to the downplaying of errors and oversights. It should be acknowledged, however, that secrecy and altering of events for public consumption are not limited to the Japanese thus the role of culture is significant but not all-encompassing.

The central government has never swayed from the pro-nuclear stance it adopted in the 1950s, despite shifts in public opinion, nuclear accidents and the threat of nuclear weapons proliferation. This strong support represents what may be the key difference between the US and Japan with respect to nuclear power, because the ultimate decline of nuclear power in the US was due to governmental and regulatory policy changes. The Japanese government's steadfast approach may be a reason why the public continues to feel that nuclear power is a necessity, despite its anxiety. Unlike the US, Japan has remained committed to achieving its Kyoto Protocol targets and nuclear energy plays an important role in the reduction of carbon dioxide emissions.

In order for Japan to successfully continue to use nuclear energy and increase its present capacity, some fundamental changes must be made to regain the public's trust in nuclear

power and in the government itself. The cover-ups and lies would best be stopped, although some cultural issues regarding loyalty, failure and "saving face" are involved and not readily changed. Further, nuclear energy's contribution to Japan's climate change policy is certainly a favourable aspect that should be increasingly highlighted. The 2000 Long-term Plan does seem to support nuclear industry modifications, with real effects on plant safety and compliance monitoring, reassuring the public, and more importantly, ensuring a safe and effective nuclear program.

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