2012

Japanese Nuclear Power Policy: Forty Years of Construction, Confusion, and Conflict

Sarah Fries
Oberlin College

JAPANESE NUCLEAR POWER POLICY:
FORTY YEARS OF CONSTRUCTION, CONFUSION, AND CONFLICT

SARAH FRIES

Honors Thesis Submitted to the East Asian Studies Program

Seeking an honors degree in East Asian Studies

Advised by Prof. Suzanne Gay

Oberlin College

April 2012

ACKNOWLEDGEMENTS

Accomplishments often stem from the support of others. I wish to use this chance to acknowledge a few of the many of people who brought me to this point.

When I first arrived at Oberlin College in 2008, I had a strong desire to learn about Japanese language and culture but, thinking that I would pursue a major in the natural sciences, I was hesitant to register for Japanese language courses, which would have resulted in a full-course load. The weekend before classes commenced, I emailed Professor Gay asking for her advice. Her response came within minutes and encouraged me to come to the first Japanese class. Acting more on gut instinct than reason, I skipped my first morning class to attend a Japanese class with Professor Gay. After that fifty-minute period, I dropped my morning class and threw myself into learning and experiencing Asian culture.

Since that first class, I have been fortunate to study with phenomenal professors who both challenged and inspired me. This led me to volunteer at cultural festivals, study at Middlebury College's intensive summer language program, organize intensive Winter Term projects on Asian culture, pursue a grant-funded research project in Tokyo, and travel abroad in Japan during a tumultuous time. The accumulation of these experiences is not only reflected in this thesis, but also entrenched in my character and passion in world affairs. These adventures and accomplishments were possible only through the kindness, support, and inspiration provided by the East Asian Studies department.

I would also like to extend special thanks my advisor, Professor Suzanne Gay, for reaching out to me as a freshman and encouraging me to follow my curiosity, and all the advice and support she has provided since then. I would also like to thank Professor Ann Sherif for putting together the mini-course on the Fukushima Crisis. In addition, I wish to thank Professor Daniel Aldrich for generously providing time to discuss topics in my thesis and guide my research.

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CHAPTER I

INTRODUCTION

In March 2011, the 9.0 magnitude Tohoku earthquake triggered a large tsunami, which slammed into the northeastern Pacific coast of Japan where fourteen nuclear reactors are located. Most nuclear power facilities affected by the tsunami were able to shut down properly, but the tsunami knocked out the Fukushima Daiichi plant's backup generators, causing the coolant system to lose power and preventing the reactor from cooling down. I was studying in Osaka, Japan when the earthquake hit and during the subsequent nuclear crisis. My experiences while in Japan and my correspondence with family and friends in America during this crisis inspired me to pursue a thesis on Japanese nuclear power policy. Although the 2011 Fukushima Incident was a major catalyst for my interest in Japanese nuclear power policy, my thesis focuses mainly on policy prior to March 2011. Japan's nuclear power policy has a history that far predates the Fukushima Incident and must be understood in order to comprehend the complexities involved in the recent debate.

I will analyze the evolution of Japanese nuclear power policy and tactics from 1950 to 2010 by looking at static and dynamic variables, the groups that opposed or supported the use of nuclear power, and the interactions between these groups. The main questions I am asking are: what elements in society or the government allow a pro-nuclear agenda; how has the news media and technology affected the nuclear power debate; and will Japan continue to use nuclear power? My research shows that Japan's government and business elite consistently supported the development and growth of nuclear power, both domestically and in Asia, despite nuclear accidents and the public's concern. Evidence also suggests that Japan may not fundamentally alter its pro-nuclear power policy after the 2011 Fukushima Incident.

Using the Advocacy Coalition Framework, as described in *Policy Change and Learning: an Advocacy Coalition Approach*,[1] my project analyzes policy from the 1950s till 2010, and accounts for the complexities of multiple factors influencing it from different levels of society. The Advocacy Coalition Framework involves an analysis of policy at all levels of government, which is suitable for my project since nuclear policy transcends more than one branch or level of government. Power plant siting, or the process of deciding and gaining permission to site a power plant, and construction are examples of policies that span multiple governmental levels. The Advocacy Coalition Framework allows for nuclear policy aspects that span local, prefectural, central, and international levels. The framework is also useful because it accounts for "policy subsystems"[2] that influence policy. Instead of solely

looking at the government, I include local groups, fishermen's cooperatives, national organizations, and other groups that actively influence policy.

Lastly, the Advocacy Coalition Framework conceptualizes the positions of each coalition, taking fully into account the values or beliefs that are the foundations of each coalition's platform. I identify various groups that influence nuclear policy and I analyze their positions in the same manner as one would analyze beliefs. Like beliefs, the interest groups prioritized their positions, from fundamental axioms that do not easily change to secondary beliefs that can evolve. For example, an anti-nuclear power group would believe that nuclear power plants are dangerous. This would be a fundamental, axiomatic belief because it is a value that is critical to their cause and does not easily change. A secondary belief might be that government cannot control nuclear power plants. This idea can change due to pressures such as internal stratification, economic change, new information, improved technology, and dialogue and debate with pro-nuclear advocates.

The structure of this project is as follows. In the first section, a brief history of nuclear power in Japan, I trace the rise and fall of pro-nuclear and anti-nuclear sentiment from the 1950s till 2010. The second and third sections contain analyses of the anti-nuclear and pro-nuclear coalitions. In both of these sections, I break down the active members of the coalition, their core and secondary values, and their tactics. The fourth section further discusses how the informal relationships between industrial companies, political parties, and certain ministries of the central government enforced a predominantly pro-nuclear policy. The fifth section examines how media and technology have shaped the nuclear debate in Japan, particularly how they have affected the tactics of the anti-nuclear and pro-nuclear coalitions. The sixth section showcases nuclear accidents at Tsuruga (1981), Monju (1995), Tokaimura (1999), and Fukushima (2011) to illustrate how all the factors discussed above coalesce in a crisis. The concluding section of the thesis summarizes the main issues surrounding nuclear energy policy in Japan, including the argument that Japan may not immediately abandon its pro-nuclear policy.

Thesis Outline	Description
1. Historical Background	Background information
2. Anti-Nuclear Coalition	Members, values, and tactics of groups that oppose nuclear power in Japan
3. Pro-Nuclear Coalition	Members, values, and tactics of groups that support nuclear power in Japan
4. The "Iron Triangle"	Structure and relationships between utility companies, bureaucracies, and politicians
5. News Media and Technology	Roles of news media and media-related technology in Japanese nuclear policy
6. Nuclear Accidents since 1980	How the Tsuruga, Mihama, Monju, Tokaimura, and Fukushima accidents exemplify sections 2-5 of the thesis.
7. Conclusion	Why nuclear power will continue in Japan after the Fukushima Incident.

Table I. Thesis structure

Methodology: Implementing the Advocacy Coalition Framework

The best way to understand policy is to understand the groups that influence it, for policy is the outcome of interactions between advocacy coalitions. Using the Advocacy Coalition Framework, I identify static and dynamic variables, two advocacy coalitions to represent supporters and opponents of nuclear power, trends in the interactions between coalitions, and how the interactions ultimately influenced nuclear power policy.

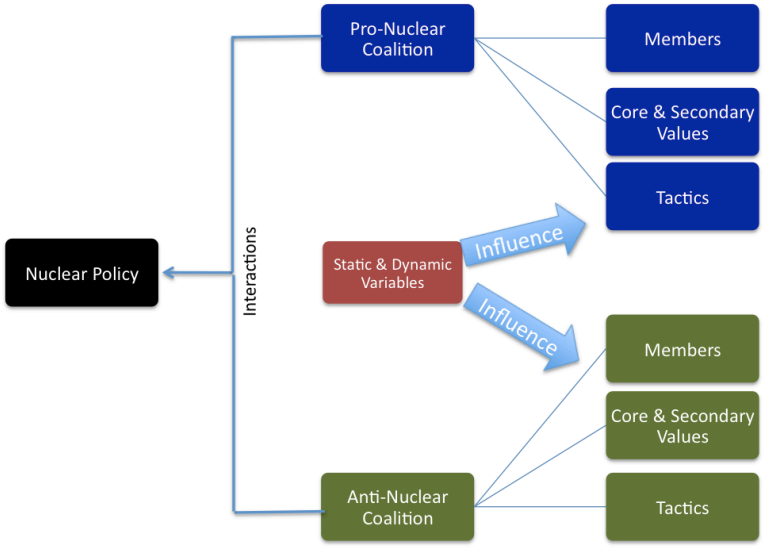

Figure I. A simple diagram of the Advocacy Coalition Framework. It is important to identify each coalition's members, values, and tactics as well as how static and dynamic variables influence these factors.

The first stage is to identify the static and dynamic variables that shaped the relevant interest groups' organization, tactics, and belief systems. The first of these, static variables, are consistent over long periods of time. Static variables that influenced interest groups include the reign of the Liberal Democratic Party (LDP) from 1955 to 2009, the central bureaucracy (ministries), legislation and framework of government, and the belief that electricity and industrial growth are essential to Japan's prosperity. These institutions and beliefs did not

significantly change from 1950 to the present; for most of that period, the LDP remained in power, the central bureaucracy's influence remained extensive, legislation procedures and other opportunities for the public to influence policy or voice dissent did not drastically change, and most people consistently believed that industrialization and manufacturing improved Japan's standard of living. The bureaucracy in particular is very powerful in creating legislation and setting agendas. They also have close relationships to the industrial centers they supervise. I explore this further in section four of this thesis. In contrast, dynamic variables are subject to fluctuations and stimuli. They include technological development, domestic and international nuclear incidents, the surge of environmental awareness in the 1960s, the OPEC oil shock of 1973-1974, ideas of nuclear safety, news media, and nuclear power business ventures with foreign nations. These variables were not consistent from 1950 to 2009, but nonetheless affected both pro-nuclear and anti-nuclear interest groups.

After identifying static and dynamic variables, I identify individuals, organizations, governments, companies and other forces that opposed or supported nuclear power in Japan. I have grouped these forces into the advocacy coalition framework by identifying those that were active (e.g., groups frequently involved with influencing nuclear power policy) and similar to each other in terms of beliefs. The sum of the grouping process is two opposing factions that encompassed active influencers with similar tactics and belief priorities. In this paper, I call these two factions the "Anti-Nuclear Coalition" and the "Pro-Nuclear Coalition."

The next step is to understand how these two coalitions interact on local, prefectural, national, and international levels. I look at the tactics of each coalition, how the interactions between the coalitions changed secondary beliefs, and any agreements they reached. The final step is to understand how the interactions and evolution of the coalitions affected Japanese nuclear power policy and implementation. I also consider static and dynamic variables and how the variables and coalitions together affected policy. Through this process, I identify evidence that suggests Japan will not abandon its nuclear power program. Despite the current phenomenon of local governments refusing to restart nuclear plants, evidence over time implies that nuclear power will continue to be an energy source for Japan in the near and distant future. I suggest that, however, nuclear policy could change if the current NIMBY politics resist the tactics of the pro-nuclear coalition.

CHAPTER II

HISTORICAL BACKGROUND

Since the end of the American occupation in the 1950s, Japan has almost consistently promoted a nuclear power program. There have been numerous fluctuations in public opinion about nuclear power and they can be organized into three periods. In the first period, from the end of WWII to the 1960s, the public's anti-nuclear sentiment stemmed from an association of nuclear power with nuclear weapons. In the second period, from the 1960s to 1979, the public was more accepting of nuclear power as a form of eco-friendly and stable energy. This was also a period of enhanced civil society and anti-nuclear organization. In the last period, from 1979 till 2011, the public became increasingly concerned about nuclear power as the United States, Soviet Russia, and Japan all experienced high-profile nuclear accidents. Despite periods of anti-nuclear sentiment among the public, the Japanese state nonetheless successfully promoted a pro-nuclear agenda.

Nuclear Weapons Create Wariness of Pro-Nuclear Policy (1945-mid 1960s)

On 6 August 1945, the American B-29 bomber Enola Gay dropped an atomic bomb over Hiroshima. The bomb blasted through buildings, vaporized people, and flattened the landscape. Moisture in the atmosphere absorbed dust and then produced radioactive black rain. Over 80,000 people died instantly. Radiation claimed the lives of thousands more. Three days later on 9 August, another American B-29 bomber dropped a second bomb over Nagasaki, killing over 40,000 people.

These sudden and deadly attacks defined nuclear power in Japanese memory. Japanese textbooks since then have focused on the horrors of the Hiroshima and Nagasaki blasts and radiation. Memories, photos, and descriptions of those exposed to radiation in Hiroshima and Nagasaki further branded nuclear power as dangerous. Nuclear power evoked both tangible and intangible fears: Japanese citizens associated it with the visible destruction of the Hiroshima and Nagasaki landscape, as well as the invisible poison of radiation sickness. The government's emphasis on Japan's unique history with nuclear weapons later caused Hiroshima and Nagasaki to become rallying cries for anti-nuclear power protests.

Seven years after the Hiroshima and Nagasaki bombings, the 1952 San Francisco treaty lifted the U.S. ban on nuclear research in Japan, and powerful elements in the government pushed for nuclear power research despite widespread popular opposition. Some argue that America's "Atoms for Peace" program played a large role in the selling of nuclear power in Japan. For example, "The Peaceful Use of Nuclear Power," an exhibition endorsed

by the United States, travelled to Tokyo, Hiroshima, and six other cities in 1955 to promote "peaceful" uses of nuclear power: medical treatment, preserving food, killing insects, and generating electricity. Propaganda in the Japanese media, such as the output of the *Yomiuri Shimbun* and Nippon Television Network, succeeded in convincing some that nuclear power was not synonymous with danger.[3]

Anti-nuclear sentiment after the Hiroshima and Nagasaki bombings simmered until 1 March 1954 when the United States conducted a hydrogen bomb test near the Bikini Atoll. The nuclear test contaminated twenty-three crew members of a nearby Japanese fishing boat, the *Daigo Fukuryu-maru*, whose chief radio officer died from radiation exposure. In addition to sparking anti-American sentiment, this event, called the Lucky Dragon Incident, reinforced anti-nuclear sentiment and reminded civilians of the Hiroshima and Nagasaki bombings that had occurred nearly a decade earlier. A few months later, the Toho film company released the anti-nuclear film *Gojira* (Godzilla), one of several films that adopted an anti-nuclear weapon tone.

Despite growing opposition nationwide, the Japanese government decided to invest in nuclear power. For instance, the young politician and future prime minister Yasuhiro Nakasone urged the Japanese government to invest in nuclear research. Not even a month after the Lucky Dragon Incident, the Diet approved Nakasone's motion to allot ¥235 million yen for nuclear power research.[4] The budget for nuclear research was the first of many instances in which the Japanese government continued to promote nuclear power despite widespread anti-nuclear sentiment. A survey conducted in 1955 found that about one-third of Japanese citizens supported a ban on nuclear weapons, and many of those also opposed nuclear power.[5] Until about the 1970s, therefore, many Japanese citizens strongly associated nuclear power with nuclear weapons. The memory of Hiroshima, Nagasaki, and the Lucky Dragon Incident still persist in nuclear power politics today, but not to the same degree as in the 1950s and 1960s.

Protests and Oil Shocks (mid-1960s- 1979)

Whereas nuclear weapons created a negative image of nuclear power in the 1950s, environmentalism and industrialization encouraged a more positive image of nuclear power in the 1960s and 1970s. The environmental movement supported nuclear energy research to decrease Japan's dependence on fossil fuels while simultaneously opposing nuclear power. Over these two decades, both pro-nuclear groups and anti-nuclear groups became more active.

Local resistance to nuclear power plants can be traced back to the very first Japanese nuclear power plant. The Japan Atomic Power Company completed the first Japanese commercial nuclear reactor in 1966 in Tokaimura, a town located northeast of Tokyo. Three years later, over 1,000 fishermen protested against the plan to build a new fuel recycling plant at Tokaimura. Additional local protests occurred in the 1960s and 1970s, but national, well-funded protests were rare. Resistance was mostly local; communities and fishermen mainly sought compensation in return for allowing the construction of a local nuclear power plant.

Although Japanese nuclear plants faced early opposition, economic pressures in the 1970s caused people to become more accepting of nuclear power. In the fall of 1973 and winter of 1974, an oil embargo by the Organization of the Petroleum Exporting Countries OPEC) severely restricted Japan's energy supply. As a result of this "oil shock," the Japanese government reinforced its nuclear energy policy efforts in order to supply its growing economy with energy that was independent of unstable countries. After the OPEC embargo, the government treated nuclear plant construction as a national security issue. The oil crisis is significant in that it greatly expanded the role of the central government in promoting nuclear power.

One way the government garnered local support for nuclear power was to provide monetary incentives to build nuclear plants. In 1974, the government passed the *Dengen Sanpō* laws (the Three Power Source Development Laws) that placed an invisible tax on electricity consumption and allowed the government to use that money to pay for roads, improve schools and hospitals, and invest in local businesses in communities that host nuclear plants. The *Dengen Sanpō* laws were a significant step in the government's streamlining of nuclear power construction that continues to play a major role in nuclear power politics today.

The increase in nuclear plant siting spurred a backlash of local resistance. Protests prior to the 1970s were primarily by local groups. But in 1977, twenty-three geographically scattered anti-nuclear groups co-organized a protest. The 1977 protest showed an improvement in the organization of anti-nuclear protest organizations and, for the first time, cooperation between distant groups. In this period, both anti-nuclear and pro-nuclear groups became more active. But despite widespread protests, the oil shock caused the central government to promote nuclear power.

1979-2011: Nuclear Power Accidents

While the oil shocks in the mid 1970s encouraged the idea that nuclear power is a reliable energy source, nuclear accidents since 1979 have led to a sense that nuclear power is dangerous and unpredictable. On 28 March

1979, the reactor at Three Mile Island in Pennsylvania (USA) failed to cool down, causing part of the core to melt. Just as with the Lucky Dragon Incident, Three Mile Island sparked opposition in Japan to nuclear power, but the government refused to bend its pro-nuclear policy. The government instead tried to calm its people, reassuring them that nuclear power in Japan was clean and safe. A Japanese correspondent from the *Los Angeles Time*s wrote, "Following the Pennsylvania accident, both the government and the nuclear industry here maintained that such a mishap was impossible in Japan, since its reactors differed from those at Three Miles Island."[6] The government further emphasized, as it continues to do today, the importance of nuclear power to Japan's economic development and further prosperity.[7]

Despite the government's efforts to downplay the dangers of nuclear power in Japan, there was an increase of local resistance to nuclear power in the 1980s, in part due to international nuclear incidents like Chernobyl that caused nations worldwide to question the safety of nuclear power. Anti-nuclear power activists became more successful in the 1990s when the government and utility companies received poor press for high-profile nuclear accidents, political scandals, and nuclear accident cover-ups. Cover-up scandals as well as accidents in Tsuruga (1981), Fukushima (1989), Mihama (1991, 2004), Monju (1995), Tokaimura (1999), and Kashiwazaki (2007) put into question the safety of nuclear power and the government's ability to regulate the utility companies. The 2011 Fukushima Daiichi incident was different from previous Japanese nuclear accidents in that it not only caught domestic and international attention, but it affected a wider area and received enormous press attention even as it unfolded.

Although nuclear power sentiment and its impact on policy can be generalized into three time periods, it is important to realize that nuclear power in Japan is often defined by the climate of the times. The Hiroshima, Nagasaki, and nuclear test bombings shaped perceptions of nuclear power as a threat from 1945 till the early 1960s. The environmental movement, industrialization, and oil shocks shaped perceptions of nuclear power as a progressive and advantageous energy source in the 1960s and 1970s. The international and domestic nuclear accidents since 1979 shaped perceptions of nuclear power as an uncontrollable force despite technological safeguards. Throughout these three time periods, anti-nuclear and pro-nuclear groups have adapted new strategies to influence nuclear policy. In the next two sections, I will analyze the membership, values, and tactics of these two groups.

Static Variables	Dynamic Variables
- Japanese central bureaucracy - Laws (Ex: as procedures for public to influence policy or voice dissent; referendums don't make policy unless elected official choose to take them into account) - Political party in power (LDP for the most part) - Idea that industry requires electric power - Lack of natural resources	- Technology development (Nuclear safety, nuclear efficiency, satellites, internet) - Domestic nuclear plant incidents/accidents (Tsuruga, Monju, Tokaimura 1999, Mihama, Fukushima, etc) - International nuclear incidents (Three Mile Island 1979, Chernobyl 1986) - Focus on environmental protection (Kyoto Protocol, 1960s Environmental Movement) - OPEC oil shock of 1973-1974 - Ideas of nuclear safety - Media (News media coverage, number of people who use TV or radio, media bias) - Nuclear power contracts with other nations (France, Great Britain, India, South Korea, Vietnam, United States, etc) - Changes in local governments (Use of referendums, change of ruling political party)

Table II. Static and dynamic variables affecting the anti-nuclear and pro-nuclear coalitions.

	Anti-Nuclear Coalition	Pro-Nuclear Coalition
Active Members	• Farmers • Fishermen's cooperatives • Housewives • Scientists • Socialist Party • Students • Teachers	• Central bureaucracy • Industrial leaders • Liberal Democratic Party (LDP) • Scientists • Utility companies
Core Values	• Nuclear power is unsafe	• Desirability of independence from foreign energy sources • Nuclear power as vital for the economy • International prestige of nuclear power • International business opportunities
Secondary Values	• Local residents should be compensated for hosting a nuclear plant; • Nuclear plants are harmful to the local economy and ecosystems; • Utility companies value efficiency over safety, and thus working conditions and company ethics are unsuitable for such a dangerous industry; • Japanese government is unable to regulate the utility companies; • Must get rid of nuclear plants to escape the "cycle of dependence."	• Nuclear power lowers greenhouse gases; • Citizens have an obligation to support Japan's energy needs, and thus should support nuclear power; • Japan should spread and regulate nuclear power technology in Asia.
Tactics	○ Education material ○ *Hito-tsubo* strategy ○ Purchase of stocks of utility companies to influence company activities ○ Referendums ○ Host community officials withhold from utility companies permission to restart (NIMBY politics)	○ Land expropriation ○ Compensation ○ Showcasing local goods and products ○ Investing in pro-nuclear research ○ Sponsoring "open" town meetings ○ *Dengen Sanpō* laws tax to raise funds ○ Stalling NGO applications of anti-nuclear groups ○ Law suits ○ Pro-nuclear educational material ○ Target communities with low civil society for siting nuclear plants (e.g., communities with decreasing fishermen's cooperative membership, rapid changes in population, and weak or sympathetic political leaders)

Table III. Active members, core and secondary values, and tactics of anti-nuclear and pro-nuclear coalitions.

CHAPTER III

THE ANTI-NUCLEAR COALITION

Membership

The anti-nuclear coalition covers a wide demographic range, but the most active members are housewives, students, teachers, farmers, and fishermen. These active members perceive nuclear power as inherently dangerous: housewives worry about the effects of radiation on their families, farmers and fishermen worry about a nuclear plant's impact on their livelihood, and students and teachers worry about the effects of nuclear power on society. Organizations such as the Socialist Party, Japan Consumer's Union, Japan Scientists' Congress, and housewives' groups have organized to oppose the siting and operation of nuclear power plants. In particular, fishermen's cooperatives, publishing organizations like the Citizen's Nuclear Information Center (CNIC), and housewives' groups make up influential networks that help drive the anti-nuclear coalition's agenda.

The presence of fishermen's cooperatives in communities is an indication of strong civil society and the ability to fight off nuclear power plant siting.[8] Fishermen are concerned that nuclear plants will damage the coastal ecosystem or that the stigma of the nuclear radiation will hamper their abilities to sell goods. Communities with large and active fishermen's cooperatives are more effective in preventing the siting of a proposed nuclear plant than others.[9] Much of this influence comes from the legally-protected rights of fishermen over water resources. To gain access to water resources for their nuclear cooling system, a utility company must first gain at least two-thirds of the cooperative's approval.[10] Fishermen's cooperatives can refuse to grant the rights and delay the siting process, which can be extremely expensive for utility companies. Fishermen receive higher compensation packages the longer they delay the siting process, and have employed this tactic in Iwai-shima, Kaminoseki, Ashihama, Maki, and Shimane.[11] Local fishermen's cooperatives, therefore, are extremely important for the anti-nuclear coalition because they hold such power over the nuclear plant approval process. If the fishermen refuse to compromise or demand higher compensation, a utility company may reevaluate the site as too costly and abandon its plans to site a nuclear plant there. The fact that the utility company must gain the rights at the outset of the siting process is significant since this is when the anti-nuclear coalition is most effective in preventing a nuclear plant siting; anti-nuclear activists lose most of their bargaining power in the later stages. Fishermen's cooperatives therefore constitute one of the most powerful components in the anti-nuclear coalition.

Other powerful anti-nuclear forces are national umbrella organizations that have developed since the 1970s to inform citizens of the dangers of nuclear power and to serve as watchdogs of the nuclear power industry.

For example, CNIC publishes informative, anti-nuclear articles in Japanese and English that target average citizens who are unaware or uneducated in nuclear science, politics, or current events. The National Liaison Conference of the Anti-Nuclear Movement also publishes a monthly newspaper, *Hangenpatsu Shimbun*, which monitors the activities of important pro-nuclear officials. Both of these umbrella organizations inform average citizens of nuclear power issues and serve as watchdogs for the nuclear power industry.

One distinguishing characteristic of the anti-nuclear coalition is the participation of women. Housewives and educated women are active members of the anti-nuclear movement and have taken on increased responsibility in that movement since the 1980s. This may be partially a result of housewives having more time to engage in anti-nuclear activities than working women or men, or it may be related to social expectations of women to act as caregivers of the family. The traditional "good wife, wise mother" concept of the ideal Japanese woman, with its emphasis on women as caregivers, may encourage women to join the anti-nuclear movement. It is her job to cook nourishing food, spend frugally, support her husband, raise cultured children, and ensure the health of the family. According to David H. Slater of Sophia University,

> Women, and in particular, mothers, have been quite active in radiation measurement, calls for contaminated soil removal, and efforts to secure safe food since the early months of the crisis… In many of these protests, it is as mothers that women speak out against corporate interests and government policy. They speak as they protect their children, their families; in this capacity, they are forced but also entitled to protest nuclear threats. They have been charged with something more fundamental than capital accumulation, more important than the postwar protection of corporate health. Feeding children healthy food is more important than feeding the energy demands of a hungry urban population.[12]

The anti-nuclear movement is built on the idea that nuclear power is dangerous, and thus ties directly to a woman's traditional role in society. In her work *The Virtue of Japanese Mothers*, Merry White writes that "the value placed on the role of women in Japan derives directly from the national consensus that Japan's most important resource is its children, and the nation's most important job is their children."[13] In this sense, mothers, as well as fathers, have a moral and societal role within the anti-nuclear movement to protect Japan's posterity and their families.

Although housewives groups and mothers are active in the anti-nuclear movement, they are by no means the only women involved. Women have become more involved in the anti-nuclear movement since the 1980s in part because of an overall increase in their political activism and education. Gender gaps in opinion polls concerning nuclear power show that more women oppose the nuclear power program than men. In a 1988 opinion poll, 38% percent of men favored nuclear power whereas only 21% of women did so. In the same survey,

41% of men opposed nuclear power whereas 51% of women opposed it.[14] Since the 1980s, housewives and women from a variety of educational backgrounds have become more involved in anti-nuclear power movements as they became convinced that nuclear power was dangerous to their families and communities.

Core and Secondary Values

The anti-nuclear coalition has core values that are nearly universal throughout its active, member base. One value is that nuclear power is inherently dangerous. This idea stems of course from the Hiroshima and Nagasaki bombings, and has been amplified with the Three Mile Island Incident, the Chernobyl Incident, and other scientific studies. One protestor in 1979 said, "What really clinched my opposition to the plant was an instinctive feeling that nuclear power and nuclear bombs that fell on Hiroshima and Nagasaki were essentially the same phenomenon. That was the root of our opposition; it still is."[15] The Japanese strongly identify with the Hiroshima and Nagasaki bombings, emphasizing Japan's unique status as the only nation to be attacked by nuclear weapons. Yasushi Haka of the *Los Angeles Times* commented, "Given the country's unique atomic experience, however, [the government] cannot push ahead in the field without furnishing genuine guarantees to an educated and perceptive population that nuclear energy is safe."[16] The Three Mile Island and Chernobyl only reinforced the perception that nuclear energy is dangerous.

The anti-nuclear coalition also insists that nuclear power plants are unsafe even with safety precautions, deeming evacuation plans in some densely populated districts at times "inadequate."[17] The public in accident areas tends to agree; in an opinion poll conducted in Tokaimura and the nearby town of Nakamura after the 1999 Tokaimura accident, residents in Nakamura expressed "a strong dissatisfaction with the delay in the town's response" and complained that information was only available via television.[18] Only 17.4% of polled Nakamura residents approved of the town's response to the nuclear accident. In contrast, a majority (60.7%) of Tokaimura residents approved of their town's response, mostly because Tokaimura "made its own decisions to evacuate without waiting for orders from the central government."[19] Anti-nuclear groups argue that established protocols are ineffective in making nuclear plants safe for local residents. The conviction that nuclear power plants are fundamentally dangerous is a core value of the anti-nuclear coalition that cannot be easily influenced by the pro-nuclear coalition.

Nuclear Power As Harmful to Communities

Secondary values are beliefs that are not as fundamental as core values and can more easily change or evolve. One secondary value of the anti-nuclear coalition is that a nuclear power plant is harmful to the community's local economy and ecosystem. Farmers and fishermen are particularly concerned about a "nuclear blight," the stigma of radiation contamination of goods that scares away customers. Farmers and fishermen are not so much worried about the safety of the nuclear plant per se, but rather about the nuclear plant's threat to their livelihoods: they would not be able to sell their products if consumers thought the merchandise had trace amounts of radiation. Fishermen, for their part, worry not only of nuclear blight, but also of the overall health of the coastal ecosystem. Seaweed absorbs any radiation that may escape from a power plant, as occurred in the 1981 Tsuruga accident. Fishermen also worry that the expelled water from the plant's cooling system will affect the ecosystem.[20] Power plants have been operating for half a century already and local residents worry that long-term effects will damage the ecosystem and their local economy.

International Security Hazard

Opponents of nuclear power further argue that nuclear power is an environmental and international security hazard. One environmental concern is the storage of nuclear waste and its impact on future generations. The immense half-life of the waste guarantees that nuclear power will be an environmental issue for future generations. In addition, nuclear power also causes international security concerns. For example, British and French processing plants supply Japan with its uranium fuel, and the transportation of this radioactive material causes international concerns about a variety of issues: terrorist or pirate groups attacking the transport vessel, the age of the transport vessels (many of which were built in the 1970s and have poor fire safety records), marine pollution during transportation, and the possibility of accidents or collisions. Between 1991 and 2000, for example, there were twenty accidents on transport ships containing radioactive material.[21] These concerns have caused international rifts between Japan and other countries. One such country is New Zealand, which forbids Japanese transport carriers with radioactive material from entering its waters. The environmental concerns and international security of transporting radioactive material have become liabilities for Japan.

Nuclear weapons proliferation is an additional international security hazard, given the close connection between the materials used for nuclear power and nuclear weapons. Japan already has a stockpile of radioactive material: in 2010, there were 10 tons of stored plutonium within its borders.[22] Japan's Monju fast-breeder reactor,

which in theory would produce more plutonium than it consumes as fuel, would enable Japan to further increase its stockpile. These Japanese stockpiles make Asian countries in particular nervous, further hurting Japan's relations with its neighbors. Stockpiling, after all, provides Japan the potential to promote nuclear weapons proliferation. Japan signed an international agreement that traded items would not be used for the development of nuclear weapons, but anti-nuclear activists assert that the use of nuclear power inevitably leads to nuclear weapon capabilities. The anti-nuclear newsletter *Nuke Info* wrote:

> There is no way of ensuring that Japanese exports are not used in Russia's nuclear weapons program, or that they are not transferred to potential nuclear proliferators such as Iran… In its eagerness to win a piece of the global nuclear energy market, the Japanese government risks sacrificing its reputation as a leading advocate of nuclear disarmament and non-proliferation.[23]

The anti-nuclear coalition clearly views nuclear weapons proliferation as closely tied to nuclear power, and questions whether economic motivations have outpaced moral obligations.

Ethics at Nuclear Plants

Anti-nuclear groups fear that utility companies value efficiency over safety, making working conditions and company ethics unsuitable for such a dangerous industry. There are two types of workers at nuclear power plants: temporary and regular. Utility companies typically hire temporary workers from other nuclear power plants to work for a short time before sending them elsewhere. The temporary workers earn lower wages and are relatively untrained or are unfamiliar with the nuclear power plant design to which they are assigned. Although nuclear plants have safety protocols, the temporary workers' lack of training creates a dangerous working environment. Many of the workers are uninformed about the dangers of radiation and undertake risky tasks without fully realizing the dangers. Inquiries by the *Los Angeles Times* found that, on average, a temporary worker receives twice as much radiation as regular workers and noted that "officials of Tokyo Electric Power Co. and the Ministry of International Trade and Industry (MITI) said it was uneconomical to hire all full-time employees."[24] Utility companies hire cheap labor to increase efficiency but do not invest in adequate training and other types of capital that would make the plant safer. Many of the reported accidents since the 1980s were a result of worker mistakes or inadequate machinery that was not replaced. The workers' inadequate training therefore creates a dangerous environment and increases the likelihood of human errors.

Anti-nuclear advocates further argue that the Japanese government cannot adequately regulate the utility companies, despite the government's success in investigating scandals and publicly criticizing utility companies in

the aftermath of high-profile accidents. The bureaucracy has close ties to the industrial sector and the companies it regulates. This conflict of interest could result in lax regulation of the nuclear power industry. The relationship between the Japanese bureaucracy and the nuclear power industry will be further explored in a later chapter.

Cycle of Dependence

One of the most challenging problems for anti-nuclear activists has been the "cycle of dependence" of host communities. Not only do the plants provide a stable source of energy, but they also provide monetary compensation to the community for hosting a nuclear plant.[25] The community becomes dependent on the funds from the central government, and thus has a powerful incentive not only to continue to host a power plant, but also to accept the building of additional reactors at the same site.[26] But what happens if a local community wishes to shut down a nuclear plant? In this case, the government will no longer give the community the benefits. The threat of losing this money encourages residents and community members to accept nuclear plants despite misgivings.

Cycle of Dependence in Saga, Japan

Many of the communities that host nuclear plants have good infrastructure and new schools and hospitals. The money from the central government enables the community to invest in such improvements without increasing taxes.

For example, the town of Saga hosts four nuclear power reactors at the Genkai power plant. The town receives about $100 million each year, which provides about two-thirds of the community's annual budget. The community will lose the subsidies if the local leaders refuse to allow the utility company to operate the plants. This will cause Saga leaders to either decrease their spending on local programs and services, or increase local taxes.

Local politicians and residents thus become dependent on the subsidies provided to the community to host nuclear plants. The anti-nuclear coalition is very aware of the temptation of the subsidy funding. Once it has a plant, a host community has two choices. The first choice is to continue to host an operating plant and receive the government's funding, thereby continuing the community's "cycle of dependence" and filling the town's coffers. The second choice is to shut down the local nuclear plant and forego the compensation funding, thereby breaking out of the "cycle of dependence" but greatly reducing the budget of the town. This is a difficult situation that Japanese politicians face whenever NIMBY ("Not in my backyard") politics cause powerful anti-nuclear sentiment.

Tactics

Unlike the pro-nuclear coalition, the anti-nuclear movement is not internally cohesive; their active members are local and each opposition movement's tactics differ greatly. Nevertheless, there are two important tactics that have been effective: fishermen veto rights and NIMBY politics that prevent a local nuclear plant from restarting. As described earlier, the fishermen's cooperatives have veto power over the siting process by refusing

to grant permission to use the water resources. Organizing a united defense in the fishermen's cooperative against the utility companies is one way to prevent the construction of nuclear plants. The second important tactic is to use NIMBY politics to prevent local plants from restarting after completing a maintenance cycle. Nuclear reactors go offline when they undergo annual inspections or during emergency shutdowns, and company officials are required by law to get the written permission of the local government to restart the plants. This provides an annual opportunity for anti-nuclear activists to prevent the nuclear plant from restarting. This has rarely been effective in the past since operating nuclear plants allows communities to receive large amounts of money from the government. However, this tactic has been remarkably powerful in the wake of the Fukushima accident: as of April 2012, it has been successful in keeping nearly all nuclear reactors offline.

In addition to these two tactics, there are various less direct methods used by the anti-nuclear coalition. One is to educate Japanese citizens about nuclear power. They believe that the more information people know about nuclear power, the more likely they will recognize the dangers of radiation, nuclear proliferation, and unchecked violations of safety regulations. Education is certainly needed, for even residents living near a nuclear plant may know little about the facility. Before the 1999 Tokaimura accident, for example, most residents were not even aware of the plant's existence.[27] The Citizens' Nuclear Information Center, National Liaison Conference of the Anti-Nuclear Movement, and Japan Scientists' Congress publish articles, journals, and newsletters to educate people and increase awareness.

Anti-nuclear activists have also strategically purchased land and company stock to oppose nuclear power plant siting. Called *Hito-tsubo*, this tactic involves many people buying tiny subplots and then co-owning the land in a location targeted for a nuclear power plant. Utility companies must purchase or compensate people for acquiring their land for the power plant. It is much more difficult to do this when there are a dozen or more owners of individual plots, each of whom refuses to sell. After the Mihama accident in 1991, protestors also bought stock in major utility companies to force high officials to address nuclear questions in public.[28] These two strategies require the participation of multiple people but they can effectively delay the siting of nuclear plants.

Anti-nuclear groups have additionally tried to use referendums, with partial success. It is important to note that, unlike in the United States, local and national referendums in Japan are not necessarily binding. Thus, government officials can approve a proposed nuclear power plant even if the citizens have voted to reject it. In 1972, for example, anti-nuclear groups in Kashiwazaki gained a majority in the local council and initiated a referendum that rejected a proposed nuclear power plant. In the same year, citizens in Noto (Ishikawa prefecture)

voted in a referendum against nuclear power plant construction. However, prefectural officials prevented the results from being counted.[29] A notable shift in referendum use occurred in 1996 in a town called Maki when the mayor honored a citizen referendum to reject a proposed nuclear power plant. Since then, more communities have used referendums to express dissent and influence local nuclear power politics.[30]

The anti-nuclear coalition utilizes an assortment of tactics including education, purchasing company stocks or land, and voting in referendums. The anti-nuclear coalition has been most successful when it organizes fast and opposes the siting process in the earliest stages, since this is when locals have the strongest influence. A successful anti-nuclear campaign involves swift and effective organization, influencing local officials, and uniting fishermen and agricultural cooperatives behind a strong policy.

CHAPTER IV

THE PRO-NUCLEAR COALITION

Membership

The most active members of the pro-nuclear coalition are the utility companies, leading industries, and certain ministries of the central bureaucracy. The Japanese government grants monopolies to ten nuclear power utility companies.[31] Industrial companies for their part depend on energy generated from nuclear plants; some even receive business from the nuclear program. Mitsubishi, for example, builds nuclear reactors for Japan and other Asian countries. The Ministry of Economy, Trade and Industry (METI)[32] is a powerful ministry of the central bureaucracy charged with providing legislation and researching, developing, and regulating sustainable energy in Japan. In addition to these major players, there have also been local politicians and communities that welcome nuclear plants to bolster their economy or attract residents; the town of Tomari in Hokkaido and the town of Futaba in Fukushima both invited utility companies to build nuclear plants.[33] Therefore, pro-nuclear can be found at all levels of society.

Core and Secondary Values

Core values of the pro-nuclear coalition include the conviction that nuclear power is essential to energy independence, economic prosperity, and international prestige. One core belief is that nuclear power enables Japan to become more energy self-sufficient, since Japan's lack of resources makes it heavily dependent on raw material and fuel imports. To understand the gravity of Japan's need for energy, it is important to look at its energy consumption and economy. Japan is the fourth greatest energy consumer in the world and in 2008, consumed more energy than South Korea, the United Kingdom, and Mexico combined. Japan imports about 4.394 million barrels of oil per day (2009 est.) and about 98.01 billion cubic meters of natural gas (2010 est.).[34] In comparison, France imports less than half as much oil and natural gas. Japan's dependency not only sends yen overseas, but it also creates a dependency on foreign markets. The OPEC embargo and the resulting oil shocks in the 1970s revealed the dangers of energy dependence. At that time, oil generated over half of Japan's energy.[35] The price of one barrel of oil, about $3 in 1973, rose to about $12 in 1974. Before the oil shock, people optimistically referred to energy in terms of "growth and progress," but during and after the oil shock, many viewed production of energy as a predicament that limits growth.[36] Some feared that a lack of energy sources would cause an economic depression after the prosperity of the 1960s. As the oil shocks rocked the Japanese economy, energy diversification and a

stable, domestic nuclear power program came to be seen as a better alternative than energy dependency on unstable nations.

In addition to providing energy independence, nuclear power also supports the Japanese economy. After the Three Mile Island Incident in 1979, newspapers reported that Japan's Atomic Energy Commission said that "nuclear power is 'indispensable' to the nation's economic future," and that "nuclear energy development would be essential in the next few decades to maintain economic growth and a high level of employment."[37] In 2001, a *New York Times* reporter wrote, "Nuclear-generated electricity has been the bedrock of Japan's energy policy since the oil shocks of the 1970s, which hit Japan far worse than the United States, considering that Japan was a manufacturing economy without local supplies of oil."[38] When accidents and scandals of the 1990s and early 2000s caused the government to suspend power plants, the utility companies warned in the spring of 2003 that "unless 10 of its suspended reactors come back online before the hottest days in summer, there will be a crisis."[39] Since the oil shock of the 1970s, pro-nuclear power advocates insist that Japan's prosperity depends on of its nuclear power program.

A third core value of the pro-nuclear coalition is that nuclear power provides Japan with international prestige and leverage. A Japan not dependent on foreign energy can be more assertive in international debates. The very existence of a domestic nuclear program can also be seen as power in international politics. In the 1970s, Japanese officials argued that the nuclear power program is one way that Japan can assert its independence. In 1977, Ryokichi Imai, the head of engineering at the Japan Atomic Generator Company, said, "We have the right to reprocess or do anything in the nuclear fuel cycle—and we do not need to be told by anybody about our own rights."[40] A thriving nuclear power program signifies scientific and technological progress, and also gives a country leverage in international affairs.

Perhaps a direct way nuclear power affects international leverage is the access it provides to the development of nuclear weapons. Although Japan does not have nuclear weapons, it has the scientific and material means to develop them swiftly. Nuclear power plants provide Japan the reactors and, if successful, the Monju fast-breeder plant could domestically manufacture weapon-grade plutonium.[41] Japanese politicians have commented on the availability of radioactive material to score political points. In 1994, for instance, Prime Minister Hata Tsutomu stated that Japan could build a weapon in a matter of weeks. Politician Ozawa Ichiro echoed Tsutomu's statement in 2003.[42] A nuclear power program therefore provides Japanese officials leverage in international affairs.

Another core value of the pro-nuclear coalition is that a nuclear power program brings Japanese companies business by providing the opportunity to sell reactors, energy, or material to neighboring countries. Japan already has contracts with India, Kazakhstan, Russia, South Korea, Taiwan, Thailand, and Vietnam.[43] Anti-nuclear advocates argue that these contracts promote nuclear arms proliferation. Nonetheless, a nuclear power program provides Japanese utility companies lucrative overseas opportunities.

Like the anti-nuclear coalition, the pro-nuclear coalition has some secondary values that are less fundamental to their movement and are more susceptible to change. One such value is the idea that nuclear power plants have low greenhouse gas emissions, and utilize the top expertise of Japanese industry including innovation, science, and technology. The environmental movement in the 1960s and the utilities' promotion of nuclear power as "clean and safe" led to more widespread support of nuclear power. On 11 December 1997, Japan and 36 other post-industrial nations signed the Kyoto Protocol, a commitment to lower greenhouse gas emissions. Under the commitment, Japan pledged to reduce carbon dioxide emissions to less than six percent than 1990 levels by 2012. Nuclear and solar research and development increased in the 1990s to help meet this goal.[44] Nuclear power became seen as a means to lower greenhouse gas emissions.

Another secondary value is the idea that Japanese citizens have a duty to support the nuclear power program. In his book *Site Fights*, Professor Daniel Aldrich writes, "Japanese authorities, far more than most Western nations, regularly use moral suasion as one of a variety of tactics of 'social management' to bring citizen preferences into line with state plans."[45] The pro-nuclear coalition argues that local residents should accept a nuclear plant since nuclear power is vital to Japan's economy and prosperity. This idea is especially popular with those who do not live near nuclear plants and do not personally bear the repercussions of the policy. Since most citizens do not live near a power plant, many felt that the risks of nuclear plants were a small price to pay to ensure economic sustainability of the whole country.

Another secondary value is the idea that Japan has a duty to spread and regulate nuclear power in Asia. Whereas anti-nuclear groups fear this will lead to nuclear weapon proliferation, pro-nuclear groups see this as a chance for Japan to join a coalition of powerful, stable countries that would distribute and regulate nuclear material and capabilities. It is impossible to deny a country with a nuclear power program access to nuclear weapons, as demonstrated by India in 1974.[46] Pro-nuclear advocates argue that it is vital for the world to have a powerful nation in Asia to regulate nuclear power use, and that Japan should take this role.[47]

Tactics

In the 1950s, the pro-nuclear coalition had little difficulty passing pro-nuclear legislation despite widespread opposition, such as Nakasone's budget for nuclear research a mere month after the Lucky Dragon Incident in 1954. However, the anti-nuclear movement in the 1960s organized interest groups in various sectors of Japanese society and, as a result, became more successful with their protests. This in turn caused the pro-nuclear coalition to adopt new approaches for siting nuclear plants. Many of these tactics are in effect today.

Land expropriation is one tactic the pro-nuclear coalition uses to acquire land for power plants. In 2001, the Japanese government passed the Land Expropriation Law, which made the land seizure process by utility companies more efficient. It enabled bureaucrats to overcome the anti-nuclear coalition's *hito-tsubo* strategy and to reject compensation requests. It also shortened the compensation period from four years to two years.[48] The law enabled utility companies better access to land to build power plants.

Although the Japanese bureaucracy utilizes the coercive Land Expropriation Law to streamline a pro-nuclear agenda, the pro-nuclear coalition as a whole employs "soft power" tactics, or subtle methods designed to change people's thinking. These tactics include compensation, local economic aid, scientific research that supports the idea of "safe and clean" nuclear energy, "open" town meetings for local residents' input, an invisible tax on electricity that funds the pro-nuclear agenda, and pro-nuclear educational materials. These soft power tactics target communities with low civil societies that are less resistant to a utility company's plans to site a nuclear plant.

Compensation

One such soft power tactic has been compensation. During the early 1970s, MITI gave about 900,000 yen (about $2,500 in 1970 exchange rates) to each community every year to provide incentives to host nuclear plants.[49] Much of this funding came from the central Japanese government. Although the utility companies are responsible for siting a nuclear power plant, METI of the central government provides funds to compensate host communities. Through the *Dengen Sanpō* laws, METI uses funds from hidden taxes on energy consumption to distribute up to $20 million a year to host communities. In other words, every Japanese citizen's electricity bill includes a tax on the citizen's consumption, which METI uses to fund nuclear research and the development of host communities.[50] METI's use of the *Dengen Sanpō* legislation provides vast resources for the government and utility companies to compensate host communities.

Aiding the Local Economy & Funding Scientific Research

To counter the idea that nuclear plants are detrimental to local economies and fisheries, utility companies employ various tactics, including showcasing local businesses and funding scientific research at fish farms. When lobbying a community to host a power plant, utility companies may provide excursions for community members to visit a nuclear plant facility and witness a host community's prosperity. The utility companies design the trips to advertise the nuclear power plants as safe and beneficial to the local community. These trips are useful for showcasing participant communities that accepted risks in exchange for benefits.

The pro-nuclear coalition further demonstrates that nuclear power plants aid the local economy by showcasing local retailers. For instance, the Center for the Development of Power Supply Regions sponsors the annual "Electric Hometown Fair" in Tokyo where farmers, craftsmen, and venders of host communities come to sell their products. The organization sponsors the fair not only to support the businesses of host communities, but also to promote implicitly the idea that power plants are safe. The market is a success, drawing up to 138,000 visitors each year.[51]

In addition to promoting the economies of host communities, utility companies also invest in research to "prove" that nuclear plants are harmless to the environment. Since the 1970s, they have funded and conducted studies at fish farms that were heated by power plants, such as Fubata's fish farm near the Fukushima nuclear plants and an aquaculture plant near the Tokai plants in Ibaraki prefecture.[52] The studies at these farms aim to show that nuclear plants have little adverse impact on the ecosystem. The research results were published in journals sponsored by the accredited Japan Fisheries Association.

The utility companies also hire scientists to reassure the public of the safety of nuclear power plants. The scientists insist that Japanese nuclear power plants are safer than American or French reactors. In 1988, the average number of unplanned shutdowns per reactor was 0.4 in Japan, 4.0 in the United States, and 5.3 in France.[53] Although this suggests that the Japanese nuclear program is safer, some question these statistics: the scandals of the 1990s and 2000s uncovered instances where workers and managers had covered up mistakes, or had not immediately reported problems. These statistics likely do not include cases where plant operators failed to report shutdowns or when they operated the plants under unsafe conditions. Nonetheless, the nuclear power industry employs experts to testify that nuclear power is safe.

Town Meetings

Many such experts appear at town meetings, promoted by the utility companies as an open dialogue between the local community and the utility company representatives. Evidence shows that most of these meetings are staged: the company often designs the meetings so that only certain segments of the population can attend, or the company will prescreen locals' questions. Residents of nearby towns, who would be affected by a nuclear accident, are prevented from expressing their opinions.[54]

Pro-nuclear groups sponsor "open" discussions of nuclear power on nonlocal levels as well. Eric Johnston, an American journalist of the *Japan Times* who has written anti-nuclear power articles, was invited to a symposium in Fukui Prefecture about nuclear power. When he arrived, he noted that the symposium was composed of nearly all pro-nuclear sympathizers and that he served as "the opposing foreign voice who would add a small degree of public legitimacy to what was obviously a rigged game."[55] In this case, pro-nuclear organizers arranged for the symposium to conclude with overwhelming support for the nuclear power program. Anti-nuclear activists, like Johnston, call the siting process "undemocratic" since the locals and opposition have little influence. The utility companies use these meetings to suggest that they take into account the opinions of the locals but, in actuality, the meetings are often no more than staged public relations events.

Uses of the Law

Besides holding "open" town meetings to muffle the voices of their opponents, pro-nuclear groups can also restrict anti-nuclear groups from obtaining a nongovernmental organization (NGO) status. An NGO status would give anti-nuclear groups benefits like cheaper mailing rates and tax-deductible donations.[56] The bureaucracy can shelve the organization's application or delay it, thereby weakening anti-nuclear effectiveness.

The judicial system has also been an arena for pro-nuclear advocates to limit the effectiveness of anti-nuclear efforts. The anti-nuclear coalition's defeats in lawsuits often stem from a lack of funding, whereas the pro-nuclear coalition has vast resources and is able to fund prolonged lawsuits. The utility companies are willing to wait and spend the resources in hopes of regaining its losses with a new reactor. For example, a utility company may wait twenty years to settle a lawsuit and gain rights to site a nuclear plant. They sustain losses by paying for the lawsuit, but they can regain the money from the new nuclear plant's profits. Furthermore, the utility company not only receives profits from the initial reactor, but also has a 20% greater chance to site one, two, or three additional reactors at the same location than siting a reactor at a new location without any reactors![57] In the end,

the wait is worthwhile to the nuclear power industry because they can efficiently site additional reactors at the same location. This is why Japan's nuclear reactors are concentrated in a few locations. For example, the Fukushima Daiichi plant has six reactors that were completed between 1971 and 1979. The Kashiwazaki Kariwa plant has seven reactors that were completed between 1985 and 1997. The nuclear power industry is willing to undertake an expensive lawsuit because successfully siting a plant in a new location greatly increases the chances of siting additional reactors in the same area. In contrast, anti-nuclear groups rarely have the funding or financial payoff for such a long lawsuit or opposition campaign. The difference in funds between the two coalitions makes lawsuits a successful defensive tactic for the pro-nuclear coalition.

Educational Materials

Lastly, the pro-nuclear coalition utilizes other soft power tactics to influence the young. In 1964, the government established National Nuclear Power Day where students enter an essay contest about the importance of nuclear power. The Japanese Atomic Relations Organization provides lecturers and course plans for about 300 free seminars designed to emphasize the importance of nuclear power. In 2001, over 4,500 people throughout Japan took these courses.[58] Schools and bookstores also sell manga comic books published by the industry to teach young audiences the importance of nuclear energy. Essay contests, free seminars, and reading material are among the ways pro-nuclear activists promote nuclear power to Japanese youth. Such measures can be a powerful way to indoctrinate the public.

Targeting Weak Civil Societies

Soft power tactics like those described above are most effective in communities with low civil societies since they are less able to unite to fend off a utility company's plans to site a nuclear power plant. Utility companies will target communities with decreasing fishermen's cooperative membership, rapidly changing populations, or sympathetic or weak leadership because they signify weakened civil societies.[59]

Perhaps one of the most effective strategies is to site nuclear plants in communities with sympathetic political leaders. For example, utility companies proposed a nuclear plant in the town of Kashima (in Shimane) not because of changes in fishermen's cooperatives or drastic population shifts, but because the national parliament contained pro-nuclear members representing the area who could override anti-nuclear authorities.[60] In Kagoshima prefecture, local politicians invited a utility company to site a nuclear plant there despite opposition

from 2,000 anti-nuclear residents.[61] Since the decisive struggle over a nuclear plant siting occurs on the local level, pro-nuclear local government officials have strong influence and success in propelling the pro-nuclear agenda. Pro-nuclear advocates in the ministries of the central government influence mayors and leaders by overriding local government decisions, such as in Kashima, or coaching local officials on how to sell the pro-nuclear agenda. They warn about situations to avoid and emphasize the compensation benefits of a nuclear power plant such as additional jobs, infrastructure improvements, or better schools and hospitals.

Another pro-nuclear tactic is to oust the leadership of opposing organizations and plant sympathetic leaders in their place. For example, pro-nuclear advocates influenced internal politics of the Fishing Alliance and alienated the leader from the mainstream position in the 1960s. The leader of the Fishing Alliance, who led the Sagara fishermen's cooperative since 1963 and organized local fishermen against the Chubu Electric Company, lost in an election in 15 April 1969.[62] Since leaders of anti-nuclear and pro-nuclear groups in the community have strong influence over the siting of a nuclear plant, pro-nuclear advocates strive to strengthen pro-nuclear representatives or to weaken the opposition's leadership.

A comparison of the anti-nuclear coalition and the pro-nuclear coalition finds membership and structural differences. The anti-nuclear coalition contains many women, whereas men dominate the pro-nuclear coalition. The anti-nuclear coalition relies on horizontal relationships, whereas the pro-nuclear coalition relies on strong vertical relationships. The anti-nuclear coalition is decentralized and rather diffuse whereas the pro-nuclear coalition is hierarchal, cohesive, centralized, rigidly organized, and dominated by industrial and bureaucratic elites. Since the mid 1950s, the pro-nuclear coalition had success in siting over 54 nuclear plants.[63] This achievement resulted from its vast funding resources, strong national network, and its relationships with industrial and governmental leaders. The peculiar, close relationship of the central bureaucracy, industry, and politicians is a major reason for the success of the pro-nuclear coalition and as such demands a deeper analysis. It will be discussed in the next section.

CHAPTER V

THE "IRON TRIANGLE"

The pro-nuclear coalition has powerful industrial and political ties, access to legislation, and extensive funding. Much of its power derives from the "Iron Triangle," the relations between certain ministries of the central bureaucracy, powerful industrial companies, and politicians. The network of industrial companies, politicians, and the central bureaucracy not only provides funding and efficiently streamlines legislation, but also creates an infrastructure that resists changes to their pro-nuclear agenda.

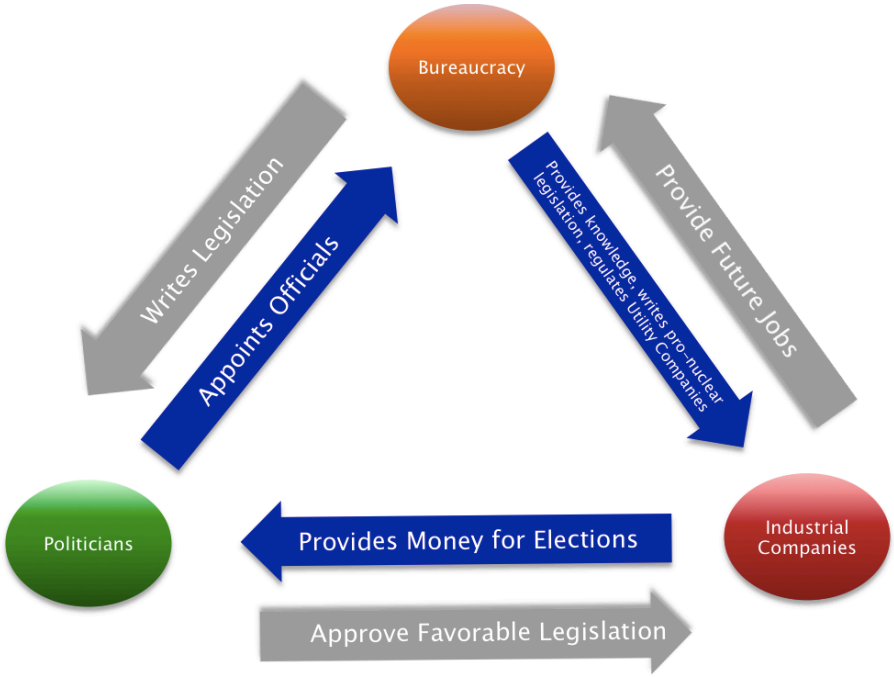

Figure II. Dependent relationships between members of the "Iron Triangle"

Bureaucracy

First and foremost, it is important to stress the power of the central Japanese bureaucracy. One of the main functions of the bureaucracy is to write legislation that the party in power then shepherds through the Diet. Since the postwar era, the bureaucracy has promoted itself as a technocratic group of experts responsible for writing most legislation that comes before the national Diet, whose members routinely approve it. Certainly during the LDP's long reign from 1955 to 1993, the "elite bureaucracy in Japan [made] most major decisions, [drafted] virtually all legislation, [controlled] the national budget, and [was] the source of all major policy innovations in the system."[64]

The power of the Japanese bureaucracy can be appreciated by comparing it to the American central government bureaucracy. The American bureaucracy functions within the executive branch under a system of checks and balances, whereas the Japanese bureaucracy operates outside the parliamentary system and with no specified restrictions listed in the Japanese Constitution. Secondly, the American system has two powerful political parties that frequently exchange power. This prevents parties from fully enforcing their agendas and, more importantly, frequently reshuffles the top ranks of the central bureaucracy. In contrast, the LDP was the undisputed ruling party for nearly half a century. This has allowed long-term policy continuity and long-term, large investments like the nuclear power program. This results in a powerful Japanese central bureaucracy that is efficient in streamlining pro-nuclear legislation.

Besides the long reign of a pro-nuclear political party, the dominance of pro-nuclear thinking in the bureaucracy can result in lack of enforcement of some duties. For example, METI, the most powerful ministry in terms of influence over nuclear power policy, has the dual tasks of both promoting nuclear power and also regulating the utility industry. These two tasks are not always independent; to further its energy goals, METI has often been lenient or overlooked problems with the utility companies.

The bureaucracy's role in the "Iron Triangle" is to write pro-nuclear legislation like the *Dengen Sanpō* laws, that decrease the nuclear plant siting and operating costs. Other legislation provides funds for research and development of nuclear technology or provides subsidies for nuclear power development using loans with the lowest rates from the Japanese Development Bank.[65] Other examples include laws that subsidize the costs paid by utility companies promote standardization of reactors, and decrease the number of licenses required to site and operate a nuclear plant. The bureaucracy accordingly plays a key role in the "Iron Triangle" by writing pro-nuclear legislation to decrease the risks of financing nuclear plant construction.

For example, the 2001 Land Expropriation Law decreased risk by enabling utility companies to acquire land rights in half the time and with less compensation.[66] Oftentimes the mere threat of land seizure will convince residents to sell their land. In addition, legislation that standardized Japanese nuclear reactor construction further reduces financial risks, since utility companies buy nuclear reactors with turnkey contracts whereby a manufacturer delivers an operational reactor at a set price. In contrast, American companies stopped using turnkey contracts in 1966 and private companies assumed the full risk and investment for the reactor's engineering.[67] The result is a broad array of custom nuclear reactors in America that are designed and manufactured at a higher price than the Japanese, turnkey-contracted reactors.

Additional risks are minimized by the bureaucracy's legislation that decreased the number of licenses required to site, test, and operate a nuclear plant in Japan. A 1977 Japanese law decreased the number of licenses from 160 to 66 licenses, which decreased the effectiveness of opposition forces since every license is an opportunity for the anti-nuclear coalition to delay or prevent a nuclear plant. The lower number of licenses greatly reduced costs and the period it takes to site a nuclear plant as well. In the 1970s, it took about 11.2 years to site a nuclear plant in the United States, but only 5.3 years to site a nuclear plant in Japan at half the cost.[68] Japanese utility companies can site reactors more cheaply and with shorter siting periods than American reactors primarily because the Japanese companies must acquire a fewer number of licenses.[69]

By using their influence over legislation, bureaucrats streamline pro-nuclear laws that use government funds to decrease the private utility companies' risks of building a nuclear plant. The laws decrease risk by compensating host communities, subsidizing private utility companies with low-interest loans, making it easier to seize land, standardizing nuclear reactor manufacturing, and decreasing the number of licenses needed to site a plant. Although the bureaucracy writes pro-nuclear bills, the legislation does not become effective without the cooperation of the industrial companies and politicians in the "Iron Triangle."

Industry

Another element of the "Iron Triangle" is industry, from large enterprises like Mitsubishi and Tokyo Electric to small subcontractors and technology businesses. A large portion of Japan's economy is the development and manufacturing of technology, which in turn depends on stable sources of energy. Japanese businesses suffered substantial losses in productivity during the oil shocks of the 1970s, demonstrating the importance of a stable, domestic source of energy. Since then, utility and industrial companies have become more active in promoting the Japanese nuclear power program by creating ties to the central bureaucracy and political parties. Industry provides bureaucrats with high-paying jobs and politicians with election donations. In return, the bureaucracy and politicians write and pass pro-nuclear legislation.

Industries depend on certain ministries of the central bureaucracy to write pro-nuclear legislation. To make its relationship with the bureaucracy mutually beneficial, companies hire past bureaucratic leaders in a practice called *amakudari*. Literally meaning "heavenly descent," *amakudari* is a practice in Japan where bureaucrats of the central government retire to work in the industrial sector. Bureaucrats are valuable as experts in their field but also because their ties to the bureaucracy may result in more lenient treatment of the utility

company. A bureaucrat is less likely to criticize or anger the utility company if he hopes to work for it in the future. They also know from the inside how the bureaucracy functions. Many of the TEPCO vice presidents were originally MITI or METI officials.[70] The *amakudari* practice creates a cozy relationship between the bureaucracy and the utility companies in the "Iron Triangle."

Dates as Vice-Minister of MITI	Name	*Amakudari* Company and Positions
1949-1952	Yamamoto Takauki	Fuji Iron and Steel, Vice-president
1952-1953	Tamaki Keizo	Toshiba Electric Co., President and chairman
1953-1955	Hirai Tomisaburo	New Japan Steel Corp., President and advisor
1955-1957	Ishihara Takeo	Tokyo Electric Co., Vice-president and auditor
1957-1960	Ueno Koshichi	Kansai Electric Power Co., Vice-president and advisor
1960-1961	Tokunaga Hisatsugu	New Japan Steel Corp., Vice-president Japan Petroleum Development Corp., President
1961-1963	Matsuo Kinzo	Nippon Kokan Steel Co., Chairman
1963-1964	Imai Zen'ei	Japan Petrochemical Corp., President
1964-1966	Sahashi Shigeru	Sahashi Economic Research Institute Japan Leisure Development Center, Chairman
1966-1968	Yamamoto Shigenobu	Toyota Motor Co., Executive Director
1968-1969	Kumagai Yoshifumi	Sumitomo Metals Corp., President
1969-1971	Ojimi Yoshihisa	Arabian Oil Co., President
1971-1973	Morozumi Yoshihiko	Electric Power Development Company, President
1973-1974	Yamashita Eimei	Mitsui Trading Co., Managing Director Iran Chemical Development Co., President
1974-1976	Komatsu Yugoro	Kobe Steel Corp., Director

Table IV. A list of the vice-ministers of MITI and their *amakudari* positions from 1949-1976.[71] These men worked in high positions at industrial companies and utility companies after their time at MITI.

After bureaucrats write pro-nuclear legislation, the industry needs national-level politicians in the "Iron Triangle" to pass pro-nuclear legislation. Furthermore, the local government must give permission for a utility company to restart their nuclear plants after an emergency shutdown or after an annual maintenance shutdown. Industrial companies have found ways to make the politicians dependent on the industry's influence, especially through political contributions. For instance, the Japanese press found evidence that TEPCO donated more than $200,000 to the LDP over three years.[72] Major donors to political parties insist on policies like an extensive nuclear power program that favor Japanese industries.

Politicians

Like industrial companies, politicians also develop dependent relationships in the "Iron Triangle" to promote a pro-nuclear policy. One of the primary goals of a Japanese politician is re-election. Industrial companies that donate funds to political campaigns demand a more extensive nuclear power program. The politicians for their part promise to vote for pro-nuclear legislation, written by the bureaucracy. Politicians influence the bureaucracy by appointing top bureaucratic officials and are thus a component of the "Iron Triangle," forming dependent relationships with the bureaucracy and industry.

In the past, the nuclear power program could increase a local politician's approval ratings. A nuclear plant is a tremendous boost to the local economy since it creates jobs and enables the community to receive compensation funding from the central government to build roads, schools, hospitals, and other infrastructure. Local politicians have invited nuclear companies to their towns for these benefits. The Fukushima plants are the result of one such invitation. Nuclear plants have thus been a way for local politicians to increase their popularity by attracting jobs and developing their community without raising taxes.

Similarities Between Members of the "Iron Triangle"

The relationships between the bureaucracy, industry, and politicians constitute a self-sustaining network that defines the "Iron Triangle." An additional characteristic of the "Iron Triangle" is the homogenous work environment. The pro-nuclear coalition contains the elites of Japanese society from top tier schools such as Tokyo University (Tōdai), Tohoku University, Waseda University, Keio University, and Kyoto University. For instance, the current Minister of Economy, Trade and Industry, Yukio Edano, graduated from the University of Tohoku.[73] Between 1945 and 1978, seven of thirteen prime ministers had bureaucratic backgrounds and six of the prime ministers graduated from Tokyo University alone.[74]

Not only does the workforce originate from similar schools, but it also undergoes similar training. Although there is some employment movement within the "Iron Triangle," there is little movement of personnel outside the triangle. If there is a change in employment, a worker may move from one pro-nuclear institution to another within the "Iron Triangle." The result is that employees have the same education and training, take the same tests, receive the same job training, and share the same values. This broadly homogenized workplace resists policy change unless pressured by dynamic variables or changes in secondary values.

The homogenization and dependent relationships within the "Iron Triangle" create a cycle that promotes nuclear power and raises funds for the pro-nuclear coalition (see Figure III). To further their own goals, members of the "Iron Triangle" use institutions, like the government or businesses, to raise funds that they funnel into pro-nuclear agendas and tactics. As the nuclear power program grows, the "Iron Triangle" uses its growing influence to raise even more funds to streamline pro-nuclear policies. In summary, members of the "Iron Triangle" raise money, promote the pro-nuclear agenda, become more influential, and then raise more money. This cycle continues to repeat, though dynamic variables such as scandals, nuclear accidents, or economic fluctuations may weaken or strengthen the process. Ultimately, the "Iron Triangle" has been effective in creating a cycle of money and legislation that provides the pro-nuclear coalition with vast monetary resources and enables them to effectively employ their tactics on various institutional levels.

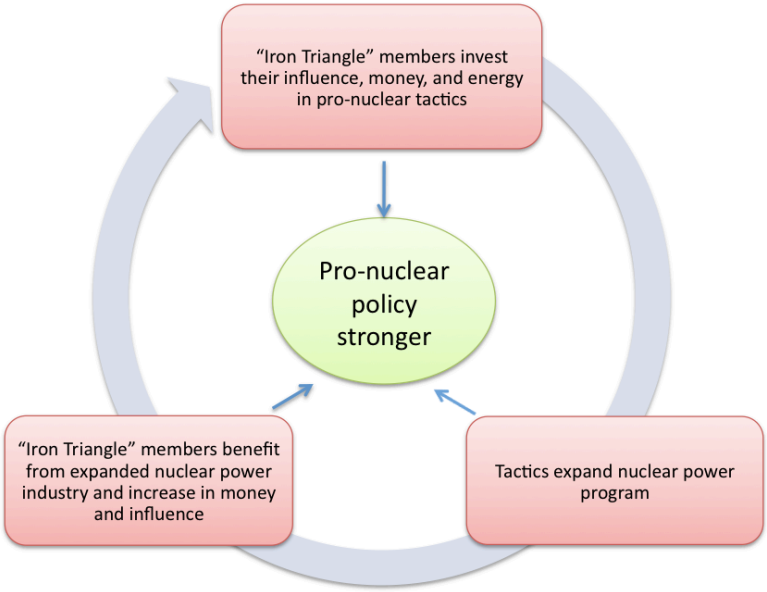

Figure III. The money and legislation cycle that provides the pro-nuclear coalition with funds while simultaneously promoting a pro-nuclear policy.

In pursuing their own goals, the bureaucracy, industries, and politicians create a system of interwoven dependence that supports a pro-nuclear agenda. Industrial demand for a stable energy source, political need for election funding, and dual bureaucratic interests drive a pro-nuclear power agenda. Besides the dependent relationships within the "Iron Triangle," the homogenizing workplace reinforces the pro-nuclear policy. The ultimate result is that the "Iron Triangle" is a tightly bound network with limited entry; it functions as an extensive, complex machine that enforces a pro-nuclear policy. With this titan as a rival, it is no wonder that the anti-nuclear coalition has been relatively unsuccessful in overturning a predominantly pro-nuclear Japanese policy.

CHAPTER VI

NEWS MEDIA AND TECHNOLOGY

Although many scholars cite news media as sources to support their arguments, few have specifically focused on the role of news media and news-related technology in the nuclear power debate. I will attempt to provide a deeper analysis of its role by examining how the anti-nuclear and pro-nuclear coalitions have used the news media and scientific or news-related technology.

Both coalitions utilized the press and technology to affect public opinion, attack the other coalition, and wage publicity campaigns. Since the 1950s, the pro-nuclear coalition used the news media as a mouthpiece to sell nuclear power as clean and safe, and has used scientific technology to argue that engineering increases the safety of the nuclear reactors. As for the anti-nuclear coalition, they focused primarily on the dangers of nuclear weapons in the post-war period and on the dangers of nuclear power plants after Three Mile Island and Chernobyl incidents. It has gained further influence since 1981, as nuclear power accidents in Japan increased in number. These events shifted the anti-nuclear media's attention to the dangers of the reactors themselves, instead of nuclear power's relation to the Hiroshima and Nagasaki bombings. In addition to nuclear accidents, political scandals in the early 1980s, a declining economy, decreased popularity of the LDP, and new broadcasting techniques also increased the influence of anti-nuclear news media. These factors enforced a news culture that criticizes the government, investigates ineptitude or scandals, and is skeptical of pro-nuclear news sources. Perhaps most importantly, the use of media-related technology, such as digital photos and helicopters, enable the anti-nuclear coalition better access to information and distant viewers. I argue that while the pro-nuclear coalition benefited from scientific technology and the news media since the 1950s, the anti-nuclear coalition has increasingly benefited from media-related technology since the 1980s.

Similar Uses of Mass Media

In many ways, the two coalitions use news media for the same purposes. For example, both groups use commercials and news publications for publicity. They encourage sympathizers to write letters that stress the importance or danger of nuclear power to their local newspapers. They also sponsor television series. For instance, NHK aired *Hatoko Comes Home* (*Hatoko no Umi*), a 1974 drama about a woman who overcomes her horrible memories of the Hiroshima bombing and learns to accept nuclear power. The drama aired months after the OPEC oil shock and carried a heavy pro-nuclear tone.[75] Not only does it show a person, and symbolically Japan,

overcoming her painful memory of the Hiroshima bombing, but it also stresses nuclear power's role in her, and symbolically the nation's, recovery and growth. *Hatoko Comes Home* uses the life of a fictional character to show the benefits of nuclear power and how it can synthesize with Japan's future, despite the country's history as a victim of nuclear weapons.

Whereas *Hatoko Comes Home* and other pro-nuclear media attempt to disassociate ideas of nuclear power from nuclear weapons, there are various films and dramas, such as the 1954 film *Gojira* (*Godzilla*), that carry an anti-nuclear message. Especially in the 1950s and 1960s, people closely associated nuclear power with their perceptions of nuclear weapons, which led to the emergence of films that protest against the development of nuclear weapons. Relatively few, however, single out the nuclear power industry as a danger. One recent example of a Japanese television show that carried an anti-nuclear power sentiment is the 2010 drama *Bloody Monday 2*. The plot centers on a terrorist attack, thought to be a highly contagious and lethal virus but turns out to be a terrorist hi-jacking of the nuclear power network. It alludes to the dangers of unregulated nuclear plants and the idea that advanced technology does not guarantee safety.

But although pro-nuclear and anti-nuclear groups wage similar campaigns, it is more interesting to see how the coalitions differ in their interaction with the news media franchise and the development of scientific or media-related technology. For instance, the pro-nuclear coalition benefited from media and technology from the 1950s through the 1980s. The framework and style of the broadcasts, typified by NHK as discussed below, limited the media's ability to criticize directly powerful people or institutions.[76] Furthermore, the news media derives most of its information from reporter clubs where journalists rely on bureaucrats and utility company officials for information. From the 1950s to the 1980s, the news media often served more as a public relations outlet for the pro-nuclear coalition, rather than as a watchdog for nuclear power activities.

In contrast, the news media has adopted a significantly different role as a watchdog since the late 1980s as a result of public distrust in the government, new broadcasting techniques, and the use of media-related technology like helicopters, digital cameras, and the Internet.[77] The 1980s and 1990s ushered in a technology age where information is cheap, easily accessible by distant audiences and, most importantly, fast. The news media now have access to vast amounts of information, such as expert opinions and witness accounts, from an almost unlimited number of sources. Pro-nuclear activists no longer have a monopoly over nuclear information and public sentiment is more distrustful of the government in the wake of many accidents and cover-ups—an atmosphere that encourages the media to investigate and criticize the government-sponsored nuclear program. The liberal

press has undertaken its investigative job with gusto, unveiling scandals and circulating information about nuclear accidents before the utility officials could tailor content and tone. As the pro-nuclear coalition loses its influence over the media, it becomes increasingly conservative and protective of its information. This ultimately creates a transparency problem in Japan where the public questions the safety of nuclear power and the ability of the government to regulate utility companies. Due to the combination of public distrust in the government, new broadcasting techniques, and the use of media-related technology in the 1990s, the news media has played a stronger role as a watchdog, whistleblower, and informant in nuclear power politics since the late 1980s. In the past two decades, the press has certainly been more of a benefit to the anti-nuclear coalition and an obstacle for the pro-nuclear coalition.

News Media's Role in the Pro-Nuclear Movement

Since the 1950s, the broadcast news media has relied on the head experts of nuclear power, who are often those in the pro-nuclear coalition. The bureaucracy, in particular, is the centerpiece of most news broadcasts.[78] NHK, one of Japan's popular and conservative broadcasting companies, has broadcasting practices that empower the pro-nuclear coalition in three main ways. First, they present the bureaucrats as a collective, preventing personal accountability. Additionally, the NHK also adopts an impersonal, "factual" tone, making it difficult to directly criticize the bureaucracy or the utility companies for mismanagement. Lastly, NHK reporters depend on nuclear experts, often pro-nuclear bureaucrats or utility company officials, for information.[79] These factors have given the pro-nuclear coalition considerable influence in the press since the 1950s.

Perhaps the most notable aspect of NHK's reporting style is the visual representation of the Japanese bureaucracy as a faceless, collective unit that guards the public's interests. The practice decreases accountability for honest mistakes, corruption, or structural flaws in safety protocol. This differs from American news coverage where the news media often criticize individuals, such as company CEOs or specific politicians. Whereas powerful American individuals face the brunt of public opinion in the news, no single person in the Japanese bureaucracy faces the same accountability. For example, the government and news media constantly blame the utility company headquarters, the strongest symbol of the entire company, for nuclear accidents, lack of transparency, or delayed action in the Tsuruga, Mihama, Monju, Tokaimura, and Fukushima accidents.[80] The press usually does not target individuals for blame and rather disperses it through the entire company. The collectivist representation by the

Japanese media disperses responsibility, thereby making it difficult to hold individuals accountable for mismanaging nuclear facilities.

Until recent years, the broadcast news media has promoted the bureaucracy as capable of managing the utility companies by visually depicting the bureaucrats in a group and in motion. For instance, NHK video footage nearly always shows bureaucratic officials striding into a building, negotiating in a meeting, solving disputes, giving a speech at a podium, greeting other officials, conducting ritual activities, etc.[81] Using footage like this, the media portrayed the bureaucracy as "a parental and active guardian of the public's interests, taking care of the problems that arise in society."[82] This changed somewhat in the 1990s when the broadcast media began to capitalize on the public's distrust of the government. Nonetheless, conservative news footage often portrays the bureaucrats as purposeful and active, thus creating an impression of competence. Viewers will trust a bureaucracy whose members actually have no personal accountability nor face any consequences for their mistakes.

The lack of accountability together with the media's impersonal, factual tone, further limits the ability to directly criticize the utility companies or the bureaucracy. Unlike many American journalists, Japanese journalists rarely give opinions or report from a live newsfeed. News stations prerecord audio narration that chatters over prerecorded visual images. This differs from typical American broadcasts where the reporter responds to the news anchor's questions and speaks directly into the camera, often providing his/her own opinion. The American practice provides a human flavor to the news broadcast that can express personal perceptions, emotions, criticism, and expertise on the situation. The result in Japanese broadcasts, on the other hand, is an impersonal report that offers little criticism, comments, or opinions. Perhaps this is to avoid alienating important individuals or the source that provided the information. As a result, however, the Japanese news with its detached and factual tone is less condemning than an indignant or self-righteous reporting style.

Control over information is perhaps the most important influence that the pro-nuclear coalition has over the news media. Pro-nuclear bureaucrats, politicians, and utility company officials are the experts on nuclear power and control most information about nuclear accidents. Not only NHK and other conservative news agencies, but nearly all news agencies depend on the pro-nuclear expert's information and are therefore less willing to criticize them. While the LDP was in power, journalists received their information at *kisha kurabu*, or "reporters clubs," where journalists gather to meet their sources. These clubs have rules about the protocol for journalists to question sources, such as the types of questions to ask and the mannerisms to use when questioning a source. The reporters clubs have two effects on news reporting. First, since many of the journalists use the same sources, abide

by the same club rules, and socialize at the same clubs, the content of the news broadcasts across different agencies are homogeneous and conforming.[83] Second, the journalists have incentives to not criticize their sources, for fear of losing access to information. The ultimate outcome is a homogeneous media that is reluctant to attack or question their sources. This also sets a trend where "reporters were often too close to their sources, relied too heavily on their briefings, and were not used to investigating matters on their own."[84] Informants therefore have great influence over multiple news agencies at these clubs. In regard to nuclear power, the bureaucrats and utility company officials hold the most information and accordingly have the greatest influence over the news media in nuclear power affairs.

This does not imply that the journalists are helpless puppets of the pro-nuclear coalition. Rather than using its tone to criticize individuals, the media's bite can come from their presentation of information. For example, scholars contribute much of Koizumi Junichiro's successful election as prime minister to the news media, for giving him a human face, providing access to political and entertainment broadcasts, and portraying him as a dark horse in the election.[85] The news media can likewise promote the pro-nuclear or anti-nuclear coalition agendas by providing or limiting news coverage of certain events. An example of this is how many news stations in earlier decades stressed scientific advancements in technology as a way to argue that nuclear power is "clean and safe." The press provides coverage for the pro-nuclear coalition's promoted research, such as studies at fish farms that suggest that the nuclear plants are harmless to ecosystems. Improved engineering also created the illusion of infallible nuclear plant designs. After the Three Mile Island accident, the press reported that such an accident was impossible in Japan "since its reactors differed from those at Three Mile Island."[86] Pro-nuclear activists also use science to argue that improved engineering designs and safety protocols make the nuclear power program safer. Scientific technology, usually unquestioned by the news media, thus becomes a boon for the nuclear program since research and development create more effective safety protocols and engineering.

An additional tool television stations employ to affect the nuclear debate are subtitles that summarize or highlight "important" information. The subtitles at the bottom of the screen contain information that the news station deems important. Media outlets can influence the nuclear power debate by selectively choosing which information to broadcast and both which to highlight in the subtitles.

The pro-nuclear coalition had considerable influence over the news media since the 1950s, in part due to the news media' traditional reporting styles such as collective representations of the bureaucracy, impersonal representation of news, the portrayal of officials working purposefully, and dependence on reporters clubs. It is no

wonder that much of the news coverage before the 1990s was less critical towards nuclear power. But the expanded use of the Internet, digital cameras, and video in the 1990s gradually chiseled away at the pro-nuclear coalition's monopoly over information and made it increasingly difficult for them to deemphasize the dangers of nuclear power.

The Role of New Technologies in Promoting Anti-Nuclear Movement in the Media

Despite the pro-nuclear coalition's influence over the news media, the anti-nuclear coalition has gained significantly more presence in the news in recent years. A series of events in the late 1980s and early 1990s decreased the public's trust in the central government including political corruption, exposed scandals, and a declining economy. News agencies capitalized on public sentiment by becoming increasingly outspoken against the government. News techniques increased their coverage of politics not only on traditional news stations but also on soft news stations and entertainment shows.[87] The press' criticism of the nuclear power program became more aggressive as the severity of the nuclear accidents increased without, they deemed, suitable and appropriate improvements to safety and equipment.

Although distrustful public sentiment towards the government encouraged anti-nuclear news, perhaps the most important boost for the anti-nuclear coalition is news-related technology that brings distant audiences access to damaged nuclear plants and disaster victims. For example, after an earthquake damaged the Kashiwazaki nuclear plant in 2007, television footage showed "rescuers digging through buildings," "ruptured pipes, flooding and a fire that belched black smoke," and "many people sleeping on blankets and futons in school gymnasiums that were being used as shelters." [88] Coverage of the Fukushima Daiichi crisis provided similar footage from international news stations in addition to Japanese news stations. Protests since the Fukushima Daiichi Incident have utilized social networking sites such as Twitter and other web applications to organize rallies. In January 2012, a demonstration in Yokohama broadcast their movement on the Internet to reach distant audiences.[89] The anti-nuclear coalition benefits from technological advances that bring nuclear accidents and protest experiences home to the televisions, radios, computers, and newspapers of distant Japanese audiences. After all, the images of the victims and evacuees of nuclear accidents are powerful visual signs of the dangers of nuclear power.

Not only does Internet and video footage enable anti-nuclear advocates access to the homes of distant audiences, but also it is relatively cheap. Access to national funds and wealthy donors provide the pro-nuclear coalition an enormous advantage over the anti-nuclear coalition, but media-related technology partially nullifies

this advantage. Furthermore, the anti-nuclear coalition can better target its message to a desired audience. For example, an anti-nuclear coalition can advertise on a homemaker's website or a cooking show, thereby targeting homemakers with an anti-nuclear power message. Anti-nuclear groups can similarly target students and children with anti-nuclear manga comic books or anime.[90] Technology not only broadens the scope of the audience, but also enables activists to target its audience inexpensively and swiftly.

News-related technology also provides anti-nuclear activists access to nuclear accidents. Helicopters, digital cameras, and video technology played significant roles in promoting public awareness about the Mihama and Fukushima Daiichi accidents in particular. These technologies allowed the media better access to the situation, thus seizing control of the story from the utility companies, including how it broke to the public. As a result, pro-nuclear coalition groups have become less transparent and tightly control information to which the press does not yet have access.

In response to the utility companies withholding information and the public's distrust of the central government, the news media has stepped into the role of public informant and investigator on nuclear issues.[91] Since the 1980s, the press has become increasingly instrumental in pressuring the government into conducting investigations and presenting results to the public. For example, the media's attention to the Mihama accident in 2004 pressured the Japanese government to conduct an investigation. The *New York Times* wrote, "With television news helicopters swarming over the Mihama plant on Monday, government officials were quick to promise that a full investigation would take place." [92] Perhaps the press gives itself too much credit in instigating the investigations, but the numerous cases since the 1980s nonetheless suggest that the press has played a vital role in publicizing scandals and misdemeanors that prod the government into action.

The media not only pressures the government to investigate nuclear accidents and possible corruption, but the media also conducts its own investigations. In 2001, the media reported that TEPCO, the world's largest private utility company at the time, falsified safety inspection records at most of its nuclear reactors.[93] In 2011, the media revealed that the Kyushu Electric Company rigged an opinion poll that was designed to gauge the public's views on whether to allow the Genkai Saga nuclear plants to resume operation.[94] Unlike in previous decades when scandals and cover-ups were merely rumored, news agencies now present more concrete evidence and incite a bigger reaction from the utility companies and central bureaucrats. This may be a consequence of a wider use of media-based technology, like helicopters and digital cameras, which enable reporters to visit nuclear accident sites and publish visual evidence that utility company officials cannot dismiss as mere rumor. It also shows how the

press is extremely effective if it is persistent, conducting its own investigations and using news-related technologies to provide information to a wide audience.

The news media along with scientific and media-related technology have played various roles in the Japanese nuclear power debate. Since nuclear policy ultimately rests on the interactions between the pro-nuclear and anti-nuclear coalitions, it is crucial to consider how each group utilizes these two resources. In many aspects, the two coalitions have used the press and news technology in similar ways, such as for advertising, newsletters, and film. Prior to the 1990s, nuclear power advocates were more successful in influencing the news media. The anti-nuclear coalition has since then benefited from the distrustful public sentiment towards the central Japanese government and the press has exploited this to investigate nuclear accidents, publicize scandals, and promote an anti-nuclear message. In many ways, the pro-nuclear coalition's greatest advantage has been its vast resources to money, legislation, and information that allows it to manipulate public opinion and sell nuclear power as safe, clean, and necessary for Japan's prosperity. The development of the Internet, digital cameras, video cameras, and other technologies, however, enables the anti-nuclear coalition to affect public opinion to a degree that rivals that of the pro-nuclear coalition. This has certainly leveled the playing field in the past decade, but over three decades of nuclear power debate, the pro-nuclear coalition has been resourceful in devising new tactics to counter the activities of the anti-nuclear coalition. It will be interesting to see how the pro-nuclear coalition adapts its tactics to utilize more efficiently the media and new technology in the future.

CHAPTER VII

NUCLEAR ACCIDENTS SINCE 1980

Although Three Mile Island, Chernobyl, and Fukushima are the most well known nuclear disasters, a series of more obscure nuclear accidents occurred in Japan since the 1980s. A subset of the nuclear accidents serves to showcase the interactions of the factors discussed thus far: the anti-nuclear and pro-nuclear coalitions, the "Iron Triangle," and the roles of the news media and technology. The Tsuruga (1981), Mihama (1991), Monju (1995), Tokaimura (1999), and Fukushima (2011) nuclear accidents provided a catalyst for the nuclear coalitions to interact and employ their tactics.

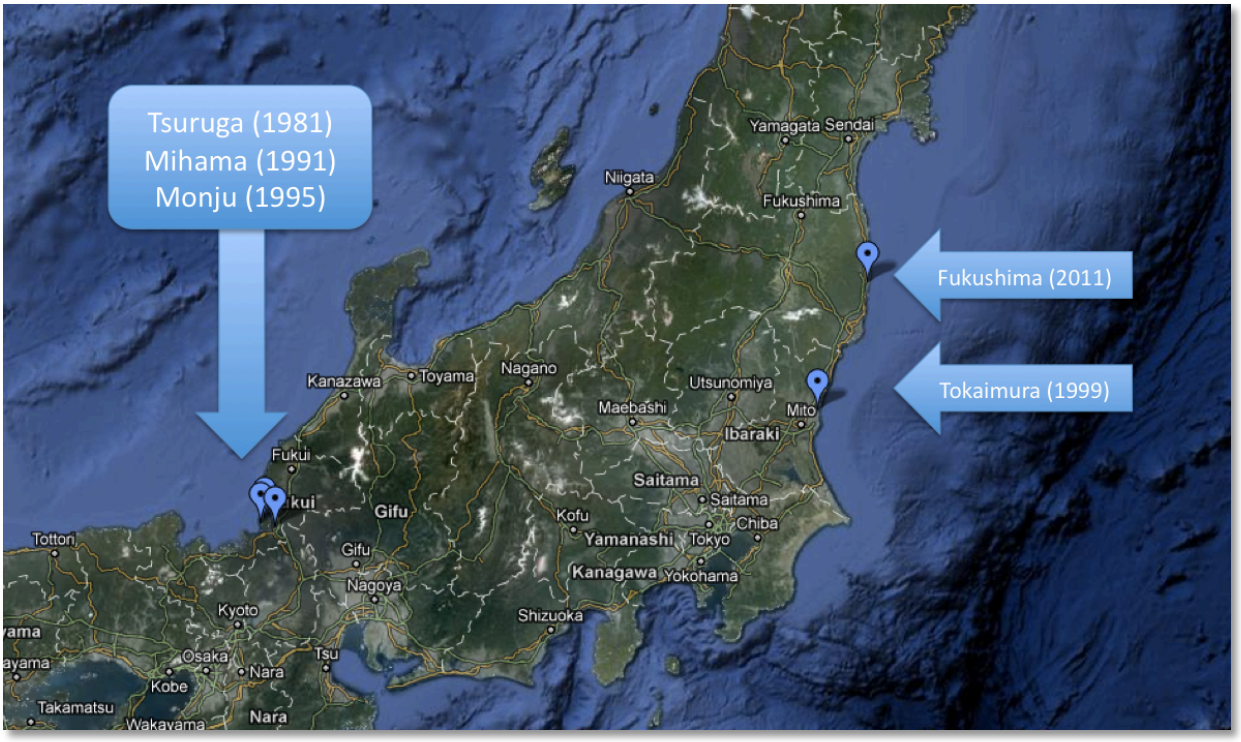

Figure IV. Locations of nuclear power plants where major accidents occurred.

A common cycle observed during these accidents: an accident occurs due to human error or weak operational equipment, the anti-nuclear coalition rallies against the dangers of nuclear power, the pro-nuclear coalition de-emphasizes the dangers using the press as an outlet, and the utility company management publically apologizes, pays reparations, or forms new committees designed to prevent future mistakes in order to win back the public's trust. The utility companies nearly always shut down the damaged power plants, but resume operations once opposition dissipates.

In addition to this cyclic trend, a progression over time can also be discerned. The news media becomes increasingly critical of the utility companies and of the Japanese government, the press uncovers more problems that lie at the heart of the nuclear power industry, and the public becomes increasingly distrustful towards the nuclear power program. In 1984, a Japanese government poll showed that about 70 percent of the public favored nuclear power. In 1987, that number had dropped to 52 percent.[95] In March 2012, only about 4.5 percent of the Japanese favor nuclear power.[96] Much of this can be accounted for by the utility companies' manipulation of information to the public, the withholding of information, poor worker training, and inspection report falsifications uncovered since the 1980s. Along with the cyclic nature of events, there is also a progression whereby the nuclear power debate becomes more urgent and confrontational.

Tsuruga (1981)

On 8 March 1981, about forty tons of sludge escaped from a filter tank at the Tsuruga power plant. Although radioactive material seeped into the Japan Sea, the Japan Atomic Power Company that operated the plant did not notify the local government. The residents in the nearby town of Urazoko only suspected a leak when a monthly survey indicated that there were high radiation levels in the seaweed, which had soaked up much of the radiation. Subsequent investigations revealed that the Tsuruga plant had a history of smaller accidents. Within the previous six months, the Tsuruga plant experienced at least nine other accidents in which radioactive material escaped into the surrounding environment. Records show estimations that the nine previous accidents exposed over 200 workers to varying levels of radiation.[97] Many were temporary workers who were less trained than regular employees and faced significantly higher degrees of radiation.

How did nuclear-power advocates react? The pro-nuclear coalition relied on their considerable influence with the news media to downplay the extent of the spill. Most of the press' information about the accident came from nuclear experts, namely government officials or representatives from the utility company. These pro-nuclear officials therefore had control over the narration of the accident. The Tsuruga plant manager told the press that the accident was "nowhere near as serious as America's Three Mile Island" incident and that the biggest mistake was failing to report the spill to local authorities.[98] When the press requested details, the spokesman declined to answer and insisted that the "whole matter [was] under investigation."[99] The utility company representatives provided only the information that they wanted published and withheld information that they either could not confirm or did not wish to share. Later investigations discovered records of measurements of radiation exposure

in prior accidents that spokesmen avoided in press interviews, proving that the utility company did indeed withhold some information.

In addition to controlling information about accidents, the pro-nuclear coalition also used the press for public relations campaigns. Via the press, company representatives asserted that the spillage was minimal and that the dangers were blown out of proportion, thereby discrediting anti-nuclear concerns as "emotionalism towards anything nuclear."[100] Nevertheless, the chairman and the president of the Japan Atomic Power Company resigned their positions in order to placate the uneasy locals. The chairman and the president made public apologies to the citizens through the press, stating their wish that the nuclear program would continue to thrive under different leadership.[101] The pro-nuclear advocates used the news media as a means to control information about the accident and conduct public relation campaigns by offering the resignations and apologies of top officials. In this way, the news media became a tool to downplay the damage of the accident.

The pro-nuclear coalition also used their financial capabilities to placate the local town. As a result of the Tsuruga accident, as well as a large protest over the opening of a nuclear plant in Tomari (Hokkaido prefecture) in 1988 and the emergency shutdown of the Fukushima power plants in 1989, the government and utility companies spent more money trying to convince people that nuclear power was safe, clean, and necessary for Japan's prosperity. MITI increased its public relations budget by ten times, and spent more than four billion yen in 1990 alone to promote nuclear power.[102] Access to vast monetary funds has always been an advantage of the pro-nuclear coalition, and they wielded it with partial success.

Although weak to the pro-nuclear coalition in comparison, the anti-nuclear coalition nonetheless had a voice. It criticized the company officials for not notifying the local authorities about the spillage, promoted public awareness of the accident, and prompted the utility company's leadership to make a formal apology and resign. The media nonetheless relied on pro-nuclear experts for information, thus enabling the pro-nuclear coalition to dictate the narrative of the accident. As we move further into the 1990s, nuclear accidents increase in severity, the anti-nuclear coalition becomes more vocal, the press becomes more critical of the Japanese nuclear program, and the pro-nuclear coalition becomes less transparent. Perhaps most importantly, the government becomes more critical of the utility companies but still remains staunchly committed to the nuclear power program.

Mihama (1991)

On 9 February 1991, nearly ten years after the Tsuruga accident, there was another accident at the 19-year old Mihama power plant, located north of Kyoto and operated by Kansai Electric Power Co. A tube containing superheated water with radioactive material broke and contaminated the pipes that carried clean steam to the electric generators (see Figure V). The leak not only released radioactive material but also decreased the flow of water coolant from the reactor. The emergency protocol engaged and flooded the reactor to stop a meltdown. Despite the workers' efforts, radioactive material was released and the incident rated a level two (out of a scale of seven) on the International Nuclear and Radiological Event Scale.

As with the utility company that operated the Tsuruga plant, Kansai Electric failed to immediately notify the local government of the situation. The *New York Times* wrote, "The Japanese public only learned the more chilling details of last week's Mihama accident days later, after government and utility officials were finished with their no-problem, everything-under-control patter."[103] However, the Mihama accident differed from earlier ones in that the utility company and the manufacturer tried to cover up evidence of mismanagement. MITI and Kansai Electric first denied any suggestion of a radiation leak. Later reports confirmed that radioactive material was released and found that "Mitsubishi Heavy Industries, which built the reactor, made a series of major errors and then tried to cover them up… Investigators also found that Kansai [Electric Company] had failed to conduct proper maintenance on emergency pressure valves."[104] Inspections and equipment replacement are extremely expensive; the company's failure to properly replace the equipment led anti-nuclear groups to believe that the utility company valued profit over safety.

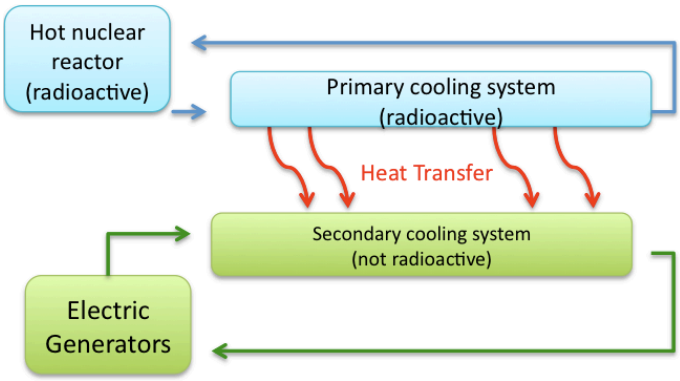

Figure V. Simple diagram of the primary and secondary cooling systems. Note how the radiation is contained to the nuclear reactor and the primary cooling system. The Mihama accident had a leak in the primary cooling system, which caused radioactive material to escape. In the 1995 Monju accident (described further below), there was an accident in the secondary cooling system, so no radioactive material was released.

The anti-nuclear coalition was much more outspoken in the Mihama accident than in the earlier one at Tsuruga. Much of the anti-nuclear momentum, which had dwindled after the pro-nuclear coalition's massive publicity campaign in the 1980s, came back in full force. NIMBY politics became the centerpiece of nuclear power

resistance. Protesters adopted new tactics, such as more visual protests and the purchase of stock in a utility company to have a say in company affairs. A *New York Times* corresponded reported,

> Street protests are relatively rare in Japan. Yet, since March, soon after the Mihama accident, anti-nuclear activists have lived in a tent city across the street from the headquarters of Kansai Electric. Protestors have recently bought stock in the major utilities, and at raucous shareholder meetings this week they forced clearly unhappy corporate managers to discuss nuclear questions in public.[105]

The anti-nuclear coalition started adopting new tactics to protest against nuclear power and to force the pro-nuclear coalition to consider their input.

Much of the protest was fuelled by the lack of transparency and information withheld by nuclear experts, namely the pro-nuclear utility companies and Japanese governmental bureaucracies. The local newspaper, called the *Sanyo Shimbun*, wrote that "the country's nuclear energy policy has been marked by secrecy, and disregard for public disclosure of information and data about nuclear power plants has helped increase the fears and suspicions of residents in the neighborhood of those plants."[106] The lack of transparency and information from the nuclear experts frustrated the Japanese press and encouraged them to increase their scrutiny. As a result, the Japanese press expanded their information source network to experts who were not necessarily pro-nuclear. For example, Kansai Electric Company officials did not initially give a cause for the accident, but Japanese newspapers quoted local experts who were "virtually certain that the cause was a broken pipe that allowed radioactive water to spill into the secondary cooling system."[107] These local sources were dead-on. The error occurred during the plant's construction and was not detected by any of the annual inspections over the previous two decades. The fact that the Japanese newspapers fished out this information while the utility company experts remained tight-lipped suggested that either the utility company did not know the cause and was therefore unable to regulate its own power plant, or that the company did know and was purposely withholding information. Either way, the public's distrust increased. The company may have withheld the information to wait for the investigations to confirm their suspicions before reporting to the public. However, the utility company did provide information that later proved inconsistent with the official investigation's findings, suggesting that the company tried to manipulate public opinion by using the press.

One such inconsistency was the amount of radiation released during the accident. Despite the government and Kansai Electric's initial assurances that no radiation escaped, the Japanese newspapers reported high levels of radiation in the area and claimed that the accident was the worst Japan had ever faced.[108] A few days later, the

utility company reversed its previous statement and said that there was a release of radioactive material during the accident.

A second inconsistency was the claim that the workers reacted immediately to the situation. The utility company provided a different story a few days later saying that workers continued to operate the plant at maximum capacity for nearly an hour after a computer warned them of high levels of radiation in the cooling system.[109] The inconsistencies of the initial reports provided by the government and utility company eroded the public's trust. As a result, the press sought other sources of information and exposed the inconsistencies and lack of transparency in the utility company's statements. In comparison to the press reports after the Tsuruga accident in 1981, the press took a more confrontational stance and depended less on pro-nuclear experts for information.

In response to the anti-nuclear coalition's increased momentum, the pro-nuclear coalition became more urgent. As with the Tsuruga accident, the pro-nuclear coalition used the press as a public relations outlet. The *New York Times* reported that a senior official representing Kansai Electric made "a series of comments dismissing the importance of the accident, and contending it was being blown out of proportion."[110] Later, however, the spokesman was later forced to make a public apology. This showed that while the press still received much of its information from the pro-nuclear coalition, they were more independent than they had been a decade earlier.

With their control over the news media slipping, the pro-nuclear coalition sought to win back the public's trust through acts of goodwill. For starters, Kansai Electric planned to shut down the reactor and keep it offline till 1994. It also replaced the steam generators, an expensive update that cost about 70 billion yen.[111] Furthermore, new legislation passed that would force Japanese nuclear plants to shutdown immediately if radiation levels rose to more than twenty percent.[112] Despite these signs of goodwill, the public remained wary of nuclear power and the companies that operated them.

The public's sentiment had heavy financial consequences. The pro-nuclear coalition's vast coffers were having more difficulty handling the expenses needed to entice communities to host nuclear plants. Bureaucrats also feared that construction and siting costs for nuclear plants would dramatically increase after the Mihama accident. Indeed, Japan's Agency of Natural Resources and Energy, a governmental bureau, projected that the time required to site nuclear plants increased from 17 years and 4 months in the 1980s to 25 years and 7 months after the Mihama accident.[113] Despite opposition, MITI "made it clear that it [did] not intend to change nuclear energy [siting] targets, although since the Mihama accident it has agreed to stricter plant safety measures."[114] In addition to the government, the utility companies gave their firm support to nuclear power.

The Mihama accident was similar to the Tsuruga accident in several respects: the utility company did not notify the local government of the situation; the anti-nuclear coalition improved in organization; the pro-nuclear coalition used the press for public relations; and the government continued to support the nuclear program. In the Mihama accident, however, it seemed that all of these factors were present but to a more critical degree. Not only did the utility company not notify the local authorities, but it also tried to cover up its mistakes. Not only did the anti-nuclear coalition organize, but it also became more loud and outspoken against the utility companies. Not only did the pro-nuclear coalition use the same tactics as it did after the Tsuruga accident, but their tone now contained an edge of frustration in having to defend themselves and the nuclear power program. While the Mihama accident was very similar to the earlier one at Tsuruga, the similarities seemed to become amplified to a more urgent and confrontational level at Mihama.

Despite an upsurge in local opposition to nuclear power, however, the government and utility companies continued to support nuclear power. The Mihama accident was certainly a step back after their massive public relations campaign, prompting them to make concessions to win back public trust. People called the Mihama accident "Japan's worst nuclear accident," and indeed it was at the time.[115] Sadly, the frequency and severity of nuclear accidents only continued in the 1990s, bringing us to our third nuclear case: the Monju accident of 1995.

Monju (1995)

To appreciate both the wonderful potential and the alarming dangers of the Monju plant, it is necessary to understand the design of the fast-breeder reactor. If the technology would work, it would solve the problem of acquisition of fuel for nuclear reactors by creating more fuel than it consumes. The reactor uses an input of uranium-238, which is more abundant than uranium-235, to produce an output of weapons-grade plutonium-239. In essence, the reactor creates more plutonium than it consumes while generating electricity. It is a self-sustaining cycle that, if successful, would enable Japan to supply its nuclear plants with fuel.

However, the science behind this "solution" is extremely dangerous. The design makes it easier to have a runaway reaction since the neutrons in the reactor move at higher speeds and energy levels.[116] Furthermore, fast-breeder reactors use liquid sodium as a coolant instead of water. This is more dangerous, since liquid sodium reacts violently with water and can cause explosions that damage sensitive and expensive equipment. Fast-breeder reactors are so dangerous that the United States abandoned its two fast-breeder projects in 1972 and

1983, while Germany and Britain pulled out of their respective fast-breeder projects in 1991 and 1992, and France closed its fast-breeder project, called the Superphénix, in 1998.[117]

The Monju reactor, located about sixty miles outside Kyoto, is the result of Japan's 1956 commitment to a fast-breeder reactor that would enable the country to become self-sufficient in energy production.[118] It first began operation in May 1991 and has since then experienced a series of shutdowns and repairs. Legislation by pro-nuclear members of the "Iron Triangle" enabled the government to heavily subsidize the 600 billion yen reactor (equivalent to about more than $6 billion); the government paid for about 80 percent of the initial design and construction costs using taxpayer money.[119] By providing financial security, the Japanese government decreased the utility company's risk for developing such a complex, experimental, and dangerous reactor.

But on 8 December 1995, the Monju reactor experienced a sodium leak in the secondary cooling system.[120] The cause of the leak was a series of small mistakes; a design error in the thermocouple caused metal fatigue from sodium vibration in the pipes, which broke the thermocouple, causing the sodium leak.[121] The sodium reacted with oxygen to produce a fire that melted the steel structure of the room.[122] Fortunately, no one was hurt and no radiation escaped.

Anti-nuclear advocates rallied against the accident and publicized the company's blunders. Protestors were angry that plant operators waited about ninety minutes after the leak to shutdown the reactor and about three hours before attempting to stop the leak.[123] In the anti-nuclear newsletter *Nuke Info*, opponents of nuclear power argued that institutional rules enabled accidents like the 1995 Monju accident to occur: the rules governing the Monju reactor make it "virtually impossible" to check for design flaws and at times contradicted original safety protocols; designers of the reactor prioritized getting Monju operational as quickly as possible which could have led to mistakes; available reports lacked objectivity and provided little information to the public; and the official review processes was flawed since Monju's owner and operator conducted the inspections.[124]

An investigation revealed a series of events that caused the public to lose more faith in the government and utility companies. It first revealed that the utility company covered up evidence to downplay the severity of the accident. This plot did not occur at the local power plant but extended all the way to the company's headquarters in Tokyo.[125] Furthermore, the press discovered that the utility company provided the Japanese press an edited video to downplay the seriousness of the accident.[126] This showed that the pro-nuclear coalition continued to control the public's reaction by manipulating the press. This strategy backfired even more so than the Mihama case. The press and public were already distrustful after the 1991 Mihama accident, but the blatant

manipulation of information this time further distanced the public. Perhaps the most tragic event in this string of investigations was the suicide of one of the leading investigators. No one could determine if the Monju investigation influenced his actions, but it nonetheless added drama and anxiety about the Monju accident.

For many, it seemed that the public's distrust of the nuclear power program stemmed just as much from their distrust of the government and the utility companies as from the dangers of nuclear power itself. It also caused an alienation of possible nuclear power supporters. A Japanese nuclear chemistry professor said,

> I cannot wholeheartedly trust an investigation that is conducted by the operators of Monju. The government should have provided sufficient explanation and shown that it is doing its best to guarantee safety. Trying to play down the gravity of the issue only fans mistrust.[127]

The public's loss of faith was detrimental to the pro-nuclear coalition, who used their status as nuclear experts to heavily influence the news media. Despite this, Japanese bureaucrats maintained that "no matter what the findings, Japan will still have to depend on fast-breeder reactors for electric power in the future because of its lack of other energy resources."[128] As with the Tsuruga and Mihama accidents, the Monju accident only entrenched the government's commitment to nuclear power. A significant difference, however, was that the anti-nuclear coalition adopted new tactics that were extremely successful and prompted a big reaction from the pro-nuclear coalition. Perhaps the most powerful tactic was the referendum.

Less than a year after the Monju accident, residents of the town of Maki passed a non-binding referendum. The extraordinary aspect of the Maki referendum was that the local mayor honored the referendum and refused the proposed nuclear plant. After this success, communities across Japan wielded the referendum to pressure their local representatives to reject nuclear plants proposals.

The Maki referendum deserves special emphasis because it greatly altered the tactics and relationship between the anti-nuclear and pro-nuclear coalitions. Until 1996, the anti-nuclear coalition was at a severe disadvantage in monetary funds, legislation access, and networking. Their greatest successes were the result of fishermen's cooperatives refusing to give permission to the utility companies to use the local waters, or effective organizing in the earliest stages of the siting process of a proposed nuclear plant. The referendum was a successful type of NIMBY politics that leveraged local, anti-nuclear sentiment and put the pro-nuclear coalition on the defense. It was so effective that it forced the nuclear power advocates to develop new tactics, such as a renewal of public relations campaigns in the media, controlling information to the press, and training local government officials in how to sell nuclear power to their constituents. Despite this laundry list of tactics, it became more

expensive and difficult to site nuclear plants after the Monju accident due to successful referendums and a stronger anti-nuclear movement.

The Monju accident therefore continued and intensified the trend already set by the Tsuruga and Mihama accidents: the anti-nuclear coalition became increasingly critical and vocal against the utility companies; the press increasingly played a watchdog role rather than being the pro-nuclear coalition's public relations mouthpiece; the pro-nuclear coalition used their funds and remaining influence with the news media to downplay the severity of the accident; and the government remained committed to nuclear power. A key difference in the case of the Monju accident was the antinuclear coalition's use of referendums to stop the siting of new nuclear plants. This demonstrates the increasing influence of the anti-nuclear coalition and the eroding authority of the pro-nuclear coalition. I attribute much of this to the use of media-related technology, which allowed the anti-nuclear coalition to network with distant audiences, investigate scandals, acquire information from other sources, and unveil the schemes of the pro-nuclear coalition to manipulate or hide information. It is important not only to note the similarities in these accidents, but also to note the progression of severity among the nuclear accidents discussed thus far: the severity of the nuclear accidents increased from the radiation contamination in the Tsuruga case, to the massive radiation leak in the Mihama case, and then to the radiation leak and cover-up plot in the Monju case. The next accident involved Japan's first nuclear power fatalities.

Tokaimura (1999) [129]

In 1999, employee incompetence and a disregard for safety regulations caused an accident at the Tokaimura uranium reprocessing facility.[130] Three workers poured a uranium solution into a mixing bucket, causing a nuclear reaction. Safety regulations dictated that workers should have used a dissolution tower to process the uranium solution but, to save time and money, they used a mixing bucket instead. Radioactive residue accumulated on the surface of the bucket after each use, making it increasingly likely that a nuclear reaction would occur. On 30 September 1999, the residue on the bucket reacted to the uranium solution and reached criticality, an uncontrollable fission chain reaction that released high intensity neutron beams—the most powerful form of radioactive energy. The reaction emitted radiation into the atmosphere and surrounding area. Two of the workers handling the mixing bucket, Hisashi Ouchi and Masato Shinohara, died of radiation poisoning within a year.[131] This was rated a level four (out of seven) nuclear accident.

The Japanese press reported that the workers were ill-trained and lacked protective shields. One of the workers handling the uranium solution told reporters that he did not know the dangers of criticality or its risks.[132] The *Asahi Shimbun* and the *Yomiuri Shimbun* further reported that company management encouraged workers to skip safety precautions to increase efficiency. The *Asahi Shimbun* wrote that "there seemed to be a complication within the company that forced the employees to hasten the production of nuclear fuel" while the *Yomiuri Shimbun* wrote that one of the injured workers said that he routinely used an illegally produced manual that encouraged workers to speed up production by taking shortcuts.[133] Most of these ill-trained workers were temporary employees, who are less trained and face considerably higher exposures to radiation.[134] The workers carry monitoring devices to indicate the level of radiation exposure and are let go once they reach the maximum amount. To remain employed, however, some temporary workers place their monitoring devices under their clothes, still exposing themselves to high levels of radiation but nonetheless working longer. The press covered the news of the Tokaimura accident in a way that emphasized the poor working conditions and management ethics at the nuclear power plant.

The working conditions exposed the government's lack of oversight and made it a target for anti-nuclear criticism. A representative from Greenpeace International said, "The level of complacency throughout the bureaucratic safety apparatus is stunning… On top of that, you have an arrogance that says that their nuclear technology is Japanese… They actually believe that they cannot have accidents here."[135] The accident has turned some pro-nuclear sympathizers, such as scholars at Japan's elite schools where the "Iron Triangle" heavily recruits, against nuclear power.[136] One such engineering professor at the prestigious Tokyo University said, "In Japan there is a lack of responsibility and an arrogance on the part of engineers and industry. They've been telling us for thirty years that these technologies were completely safe, and we've just blindly accepted what they told us."[137] People who were passive or advocates of nuclear power began to question the government's message of nuclear power as clean, safe, and necessary for Japan's future. The twelve-hour delay in declaring a state of emergency further angered locals and led many people to question the government's ability to regulate utility companies and its competence in dealing with accidents. Although people mainly blamed the private utility companies for the Tsuruga and Mihama accidents, the public increasingly blamed the Japanese government for the Monju and Tokaimura accidents.

The Tokaimura accident, more so than any earlier nuclear accident, put the pro-nuclear coalition on the defensive. The public and press were even more distrustful of the government and were distressed after the two

employees died of radiation. No longer was the Japanese bureaucracy seen as a guardian of the people's interests. In response, the pro-nuclear coalition took more authoritative measures. Prime Minister Keizo Obuchi ordered emergency inspections of all Japanese nuclear power plants and a full investigation of the events surrounding the Tokaimura accident.[138] The Japanese police also seized records from the utility company and revoked the company's license, forcing the plant to permanently shut down.[139] This was a radical response by the government in contrast to the wrist-slap they gave the utility company responsible for the 1981 Tsuruga accident, as well as the investigations in the 1991 Mihama and 1995 Monju accidents. By enforcing harsher consequences for the utility companies, the government's behavior changed yet did not change in that it continued to remind the people that, since Japan was a resource-poor nation, nuclear power was crucial to Japan's economy and "for energy security in the future."[140]

Additional Accidents in the 2000s

Moving to nuclear accidents of the 2000s, the same trends continued to be seen as in the earlier Tsuruga (1981), Mihama (1991), Monju (1995), and Tokaimura (1999) accidents. In the early 2000s, investigations prompted TEPCO to admit that they fabricated inspection records. The *New York Times* wrote,

> One alarming report after another, show a potentially catastrophic pattern of cost-cutting along with 16 years of cover-ups of serious flaws, apparently in an effort to preserve public trust. The pattern includes the systematic falsification of inspection and repair records at 13 reactors at the company, Tokyo Electric, the world's largest private electric utility.[141]

TEPCO had falsified inspection records to avoid costly repairs to their aging nuclear reactors, a new level of malfeasance in a progression whereby the utility companies repeatedly violated government regulations and the public's trust when addressing a nuclear accident (see Table IV on next page). The TEPCO scandal, however, was notable because TEPCO violated the public's trust even without a nuclear accident.

How deep was the utility company's malpractice if they falsified inspection records when there was no nuclear accident to cover up? Was this corruption embedded in the company's culture? Did it extend to the nuclear power industry as a whole? Some years later in 2010, the Chugoku Electric Power Company confirmed that it also failed to conduct its inspections properly. The company admitted that it failed to check 123 pieces of equipment on two of its nuclear reactors.[142] A month after its initial announcement, the unchecked equipment was revised to 506 pieces. It seems as if the TEPCO scandal did not prevent other utility companies from mismanaging their inspections, nor was TEPCO unique in its culture of data falsification.

Valuing efficiency over safety angered citizens, but the lack of government oversight brought an additional reason to worry about the Japanese nuclear power program. In response to the investigation, the government forced TEPCO to shut down all of its reactors temporarily. Local groups' outrage and NIMBY politics prevented the nuclear plants from returning online. TEPCO warned that there would be an electricity crisis if they did not continue operation of their nuclear plants.[143] By applying this pressure and with fading opposition, TEPCO was able to restart its reactors.

Date	Accident/ Scandal	Issue highlighted by press after the accident
1981	Tsuruga Accident	• Utility company failed to immediately notify the local authorities
1991	Mihama Accident	• Utility company failed to immediately notify the local authorities • Utility company withheld information
1995	Monju Accident	• Utility company edited a video of the accident before providing it to the press. • Afterwards, anti-nuclear groups started to successfully use referendums to prevent the siting of nuclear plants
1999	Tokaimura Accident	• Worker malpractice and poor ethics at utility company
2004	TEPCO Scandal	• Falsifying of inspection records during and not during nuclear accidents
2004	Mihama Accident	• Accidents continue despite new governmental regulations
2007	Kashiwazaki Accident	• Utility company failed to immediately notify the local authorities • Utility company statements misrepresented the accident • Earthquake proved that the design is susceptible to major damage despite the earlier approval of nuclear experts

Table IV. Nuclear accidents and the progression of issues that the press emphasized.

Later that year in 2004, there was an accident at the Mihama power plant where a pipe broke and the resulting steam explosion killed five workers and injured six others. Unlike the Mihama accident that occurred in 1991, no radiation was released. The accident nonetheless demonstrated that equipment in aging Japanese reactors was degrading and that the utility companies were unable to detect faulty equipment. In this case, inspections of the plant did not discover the pipe, which had eroded from half an inch to a few millimeters during the plant's twenty years of operation.[144]

In 2007, an earthquake caused a leak in a Kashiwazaki power plant and radioactive material leaked into the surrounding area as a result. A follow-up investigation determined that the company operators delayed contacting the local authorities and that contaminated water had fifty percent more radiation than the company initially reported.[145] The news media swarmed to the scene with helicopters and video cameras that recorded the

disaster, bringing the tragedy to distant viewers. The pro-nuclear coalition used the media as well, with television scenes that "showed Tokyo Electric's president, Tsunehisa Katsumata, bowing low in apology during a visit to the area."[146] The Japanese government reprimanded TEPCO, the utility company made an official apology and made repairs and improvements to its plants, compensation was given to local residents, and TEPCO continued operating its nuclear plants after the excitement of the accident calmed down. This is the same series of events that allowed the Tsuruga, Mihama, and Monju power plants to restart.

Throughout the 2000s, nuclear accidents continued to occur in Japan despite promised safety regulation changes, apologies from utility company officials, and the increased criticism of an anti-nuclear press. Not only were these trends cyclic in that they occurred after every accident, but they were also progressive. The public and press became increasingly distrustful and outspoken against the utility companies and the government; the press became more anti-nuclear and unveiled more flaws in the ethics, working conditions, and employee training of the utility companies; the pro-nuclear coalition lost more control over the press and thus their control over the narrative of the nuclear accidents. The three nuclear accidents/scandals in the 2000s and the four earlier ones discussed above were not the only ones that occurred in Japan since the 1980s. I have chosen these particular events as examples of trends and progressions that occurred in the anti-nuclear and pro-nuclear coalitions, the "Iron Triangle," and the press.

A remarkable consistency throughout all of the nuclear accidents was the government's steadfast commitment to nuclear power. While each nuclear accident caused strong opposition, which then faded only to be revived in the next accident, nuclear policy itself did not significantly change. However, the 2011 Fukushima Daiichi Incident came in the wake of a 9.0 earthquake and a monstrous tsunami that killed nearly 20,000 people. Unlike the previous nuclear accidents, the Fukushima Daiichi Incident occurred in an atmosphere of national panic, anxiety, and fear. It certainly repeated many of the previous trends, but it also introduced radical changes in the behavior of the anti-nuclear and pro-nuclear coalitions, the "Iron Triangle," and the news media.

Fukushima (2011)

In March 2011, the 9.0 magnitude Tohoku Earthquake caused a large tsunami, along the northeastern Pacific coast. Fourteen nuclear reactors were located there. Most were able to shut down: the Higashi nuclear power plant in Aomori prefecture was offline at the time, and the seven units at the Onagawa plant in Miyagi prefecture and Fukushima II (also called *Fukushima Daini*) plants that were operating all successfully shut down.

However, the tsunami damaged the Fukushima I (*Fukushima Daiichi*) plant's backup energy generators, which were unfortunately located in front of the reactors—e.g., directly facing the open ocean. The damage sustained from the tsunami caused the coolant system to lose power and prevented the reactor from cooling down. As temperatures and pressure increased inside the reactor, engineers created vents that released radioactive elements into the air. About 100,000 tons of contaminated water seeped into the ground and nearby water sources.[147] As these events unfolded, coolant water evaporated in holding tanks and exposed the spent fuel rods that were stored there. The hydrogen fuel rods, which reacted violently with oxygen, exploded and released radiation into the atmosphere. On 12 March 2011, about 10,000 times the normal background radiation level was released into the atmosphere from these explosions.[148] The Fukushima Crisis was rated a level seven nuclear disaster, the only nuclear accident in the world to be rated in the same category as the Chernobyl Incident.

Challenges for a Non-Nuclear Japan

Following the Tohoku earthquake, all nuclear power plants affected by the tsunami or earthquake were shut down. Since then, additional nuclear plants have shut down for annual maintenance. Local NIMBY politics have been remarkably successful in preventing those nuclear plants from restarting. The utility companies need the permission of regional authorities to restart the plants, but local residents promise a swift exit to any politician that allow the plants to restart. NIMBY politics have prevented over ninety percent of nuclear plants from restarting. Only three nuclear plants remained operating by the end of 2011, and only two were operating on 11 March 2012, or one year after the Tohoku Earthquake. These two plants have their regular shutdown and inspection in spring 2012, at which time all nuclear plants in Japan will be offline.

Japan faces a series of challenges after the Tohoku Earthquake, tsunami, and Fukushima Crisis: loss of human life, displaced populations, destruction of infrastructure and economic capital, and a crippled agricultural sector. The shutdown of nuclear plants has introduced additional challenges in finding energy to maintain the Japanese economy. Japan now imports coal to supplement its energy sources, but Japanese manufacturers, many of whom lost factories and capital in the tsunami, may consider moving overseas to find more stable sources of energy. The destruction of the tsunami and the shutdown of most nuclear plants have hurt Japan's international, national, and local economies in the short-term, and will likely cause long-term changes as well. A debate is raging in communities that host nuclear plants. Torn between economic incentives and safety concerns, they must choose whether to allow the operation of the plants or to forego the government and industry subsidies that inflate their

local budget. The national economy and industrial sector need the nuclear plants to resume operation, but local NIMBY politics have so far prevented this.

Criticisms for the Utility Companies

NIMBY politics has gained much momentum from two beliefs cemented by the Fukushima Crisis: nuclear power is unsafe and utility companies cannot be trusted. The Fukushima Crisis reopened old wounds, reminding the public of the utility companies' cover-ups and misleading information that became more and more apparent from the 1980s. TEPCO has repeated some of the actions that angered the public during the Mihama, Monju, and Tokaimura cases. Anti-nuclear activists cite poor ethics at the utility company, manipulation of information and the press, and poor transparency as major problems in Japan's nuclear program.

One of the recurring problems is company ethics at nuclear plants that value profits over safety. As the Fukushima Crisis unfolded, TEPCO considered using seawater to cool the reactor but, fearing that the salt would corrode the expensive equipment in the plant, they "decided not to do this immediately because, at this point, they still wanted to avoid decommissioning."[149] In other words, the priority of minimizing expenses delayed the workers from immediately cooling the reactor with seawater. TEPCO's delay may not have made a significant difference in the situation, but it nonetheless led people to question the company's ethics.

A second scandal occurred a few months later at another site. In June 2011, officials at Kyushu Electric Power Company, a utility company that operates the Genkai Saga plant complex, was found to have tampered with a public opinion poll.[150] The poll was a public survey to gauge whether the prefecture should allow the Saga nuclear plants to restart but, to skew the results, officials at Kyushu Electric mailed in 140 responses that supported restarting the nuclear plants. When exposed by the news media, the company denied the accusations but later made a public apology.[151]

In addition to scandals, the utility company also withheld information from the government. The *Asahi Shimbun* reported that TEPCO recognized signs of a possible hydrogen explosion at the Fukushima No.1 reactor, but they did not notify the central government.[152] Prime Minister Naoto Kan publically berated TEPCO officials, saying, "What in the world is going on?" in front of journalists. Unlike in past nuclear accidents, the Japanese government was much more public with its frustrations with TEPCO.

Since the Japanese central government is dependent on TEPCO for information about the nuclear crisis, it too has been criticized for its delayed response to the crisis and for its lack of transparency. People from within the

government like Seiki Soramoto, a lawmaker, nuclear engineer, and graduate of the elite Japanese school Tokyo University, blamed Prime Minister Kan for withholding information.[153] As in the Tokaimura case, individuals who would have supported nuclear power are more critical of the nuclear program because they distrust the government. Furthermore, the government made details of the accident public three months after the incident, just before an international conference. One source from the *New York Times* said, "It is extremely regrettable that this sort of important information was not released to the public until three months after the fact, and only then in materials for a conference overseas."[154] Anti-nuclear groups criticized the Japanese government for not being transparent and for giving up information only when confronted by international scrutiny.

A Case of How Government Inaction Harmed Survivors

On 12 March 2012, thousands of residents from the town of Namie evacuated. The central government did not give them guidance as to where they should go, so the local officials took the residents north to a district called Tsushima, thinking that the winds would be blowing any radiation south. Thinking they were out of danger, the evacuees did not take proper precautions: parents allowed their children to play outside, people used water from a stream to wash and cook rice, and people dug pits in the soil to serve as toilets.

In fact, the winds were blowing north and made Tsuhima one of the worst hotspots for radiation. The central government's computer system indicated that the radiation was directed in that area, yet officials did not notify the people. The Namie evacuees only discovered this two months later (Onishi and Fackler 2011).

Like most Japanese citizens, the Namie evacuees are mostly concerned about their children. This concern has brought a stronger member base to the anti-nuclear coalition.

It is important to humanize this account by clarifying that the workers at TEPCO did not withhold information out of spite nor did they immediately benefit from the disaster. Officials may have withheld information because they did not want to appear inept during a nuclear accident or they wanted to prevent a panic. It is important to remember that the workers at the Fukushima plant were themselves perhaps the people most affected by the nuclear incident. They are residents of the local town and not only were their jobs and health in jeopardy but so were their families, friends, and communities. Many of the workers stayed at the plant despite high radiation in order to contain the nuclear accident.

Furthermore, the crisis occurred in the midst of a much larger disaster that unfolded in a concentrated period. Under these stressful conditions, it is likely that there were communication mistakes from both TEPCO and the Japanese government. It is also understandable that TEPCO and the government wanted to verify information before they published it to the public. Inaccurate information could create wide-scale panic or not enough caution, or it could hurt TEPCO's credibility and hamper its ability to gain control of the nuclear accident. Months after the accident, when confronted by the press' accusations for withholding information, government representatives asserted that they did have the information but that it was often inaccurate and incomplete. TEPCO and the

government were busy trying to recover from two large-scale disasters and contain a third calamity; they did not have the resources to replace damaged radiation detectors in remote regions or to investigate most of the hundreds of questions demanded by the press and international governments. Nonetheless, the anti-nuclear news media and the public criticized TEPCO and the government for not immediately sharing information that they had at their disposal.

The Fukushima Crisis saw a recurrence of earlier trends, whereby utility companies disregard safety regulations to increase productivity, withhold information from the government and public, and try to manipulate public opinion. When the media uncovers the plots, the utility companies first deny the charges but then publicly apologize and admit their misdemeanors. As with the Monju case in 1995, the Fukushima Crisis also incited the creation of an independent organization to conduct research and development on nuclear power safety measures.[155] The effectiveness of these measures, however, has yet to be seen.

Concern for Children and Women's Activism

A major concern following the Fukushima accident is whether children were exposed to radiation. The Namie evacuees interviewed by *New York Times* correspondents returned to this concern, reiterating in horror that they allowed children to play outside (Onishi and Fackler 2011). Parents from Koriyama, a city about forty miles west of the Fukushima plants, sued the government to relocate their children to a safer area. The Koriyama residents also removed all topsoil from school grounds.

As discussed earlier, housewives and mother's movements have effectively organized anti-nuclear protests throughout Japan. In the wake of Fukushima, scholars often credit women organizers with the success of the sit-in protest at METI as well as the September 19th protest in Tokyo, which drew over 60,000 people (Slater 2011).

Technology and News Media in the Nuclear Power Debate

The 2011 Fukushima Crisis exemplifies how the pro-nuclear coalition uses science and new technology to promote its agenda. Despite being designed to withstand only lesser earthquakes, Japanese nuclear plants in fact sustained little damage from the 9.0 Tohoku Earthquake and nearly all the power plants were able to shut down. The situation at Fukushima Daiichi went out of control primarily because of faulty design where the backup generators were located directly in the path of the tsunami. Looking at the statistics, only 6 out of 54 (or about 11%) reactors were seriously compromised due to the earthquake and subsequent catastrophic tsunami. In other words, the technology held up remarkably well despite not being designed to withstand a 9.0 earthquake. Some argue that it was human error, specifically the location of the backup generators, that caused the accident.

Since Fukushima, United Nations engineers have conducted stress tests on nuclear reactors to evaluate if they are safe. The results showed that two reactors at the Ohi Nuclear Power Plant would be able to handle another 9.0 earthquake.[156] Those eager to restart nuclear plants use the stress tests to promote the idea that nuclear power is safe as long as officials take proper measures. Whereas the pro-nuclear coalition uses

engineering and technology arguments to promote the idea that nuclear power could be safe in the future, however, anti-nuclear groups disagree, saying that nuclear power is inherently dangerous and makes the possibility of catastrophe ever-present. They use the press to voice their opposition. It is true that during the crisis the press sometimes exaggerated the situation and caused more panic. One Japanese man commented, saying that the government and TEPCO "try to disclose only what they think is necessary, while the media, which has an antinuclear tendency, acts hysterically, which leads the government and TEPCO to not offer more information."[157] The Fukushima Crisis repeated the pattern seen in previous nuclear accidents where the pro-nuclear coalition continues to rely on science and technology to present nuclear power as basically safe, while the anti-nuclear coalition disagrees, using the press to criticize nuclear power.

Following Earlier Trends, Continuing the Progression of Crises

Although the events surrounding it have followed the same pattern seen in earlier accidents, the Fukushima Crisis has profoundly changed the membership and tactics of the two coalitions. The anti-nuclear coalition has become broader in terms of active members and their tactics are more resilient to the pro-nuclear coalition's placation. Japanese citizens are taking a more active role in confronting bureaucrats over the Fukushima Crisis. Whereas community members would hold protests over a local nuclear issue or accept the government's information, people now swarm to national anti-nuclear rallies and question the government's information. For example, about 5,500 people attended a January 2012 rally in Yokohama, and about 40,000 people attended a September 2011 rally in Tokyo.[158] These movements encompass demographics like urban workers and youth who are often underrepresented in protest movements.[159]

Technology and media are also playing larger roles in organizing and accessing these movements. More activists are using social media sites, such as Twitter and Facebook, to connect to other activists and organize protests or rallies. Advanced camera and information networks made it increasingly difficult for utility companies to cover up scandals. While TEPCO's opaque and slow information about the nuclear crisis may have bought it sufficient time during the Monju crisis to edit film footage and bury paperwork, but the instant news environment and presence of international press organizations seized press control away from TEPCO in the Fukushima Crisis. The relatively calm and uninformative NHK news coverage of the Fukushima Crisis contrasted sharply with the more sensationalist news coverage of it in Europe, the United States, and other parts of Asia. The international attention and use of technology differed more sharply in the Fukushima case than in any of the earlier nuclear

accidents partly because of new technology and also because the region was already the focus of attention after the tsunami.

Despite signs of recovery, scientists and policy makers are still assessing economic, environmental, demographic, and radiation effects from the triple crisis that commenced on 11 March 2011. NIMBY politics continue to prevent nuclear plants from restarting, even as the last two operating nuclear plants plan to shutdown in April 2012 for their annual inspections. Fukushima differed from all prior nuclear accidents in igniting widespread and effective local politics that have now shackled Japan's nuclear power program. It remains to be seen whether NIMBY politics have truly beaten Japan's nuclear power program, or if nuclear power will creep back into use once the memories of Fukushima become more distant.

CONCLUSION: COALITIONS AND JAPAN'S NUCLEAR FUTURE

In this thesis I have analyzed the two coalitions that influence nuclear power policy, giving in-depth attention to the "Iron Triangle," as well as the news media's role in delivering information to the public. The Japanese nuclear accidents since 1980 are real-world cases that exemplify these topics and themes. The main questions that guide this thesis are: what elements in society allow a pro-nuclear agenda; how has the news media and technology affected the nuclear power debate; and will Japan continue to use nuclear power? I have been able to answer all of these questions in the course of my thesis.

There are various elements in society and the government that allow a pro-nuclear agenda: the interdependent relationships in the "Iron Triangle," legislation that decreases the risks of funding nuclear power plant construction, and the press' dependence on pro-nuclear experts for information. The membership, goals, and tactics of the two coalitions further show how the pro-nuclear coalition use their monetary funding, legislative access, and organizational structure to dominate national nuclear power policy and influence local debates. There exist structures that influence the nuclear power debate that transcend national, prefectural, and municipal levels. These structures and the interactions between the two coalitions often allow, rather than prevent, nuclear power development.

The news media has played both pro-nuclear and anti-nuclear roles in the debate, first as a mouthpiece for the pro-nuclear coalition and then as a watchdog and whistleblower for the anti-nuclear coalition. Since the 1980s, the press has adopted a progressively more critical tone towards the utility companies and the central Japanese government. The press has expanded its power and independence by seeking information from various sources, instead of relying on pro-nuclear experts, and by adopting new technologies to reach and target audiences cheaply and swiftly. These changes allowed the press to hold the government and utility companies accountable for nuclear accidents and mismanagement as well as to encourage national, anti-nuclear movements.

The final question relates to the future use of nuclear power in Japan. It is unlikely that the Japanese nuclear power industry will end with the Fukushima Crisis. The Japanese nuclear power program is the culmination of decades of large investment and it is difficult to imagine the government abandoning nuclear power as a means of energy independence. The pro-nuclear coalition's argument continues to be that Japan's position as a resource-poor nation leaves it with limited options. Many alternatives, such as solar and wind power, cannot sustain Japan's energy appetite by themselves. The most realistic solution to replace nuclear power would be to

invest in multiple types of energy. This will take time and vast amounts of resources. In the meantime, it is argued that it would be much simpler to continue the nuclear power program while Japan develops these energy alternatives. This plan would not only provide a lifeline for the nuclear power program, but it would also allow the public time to distance itself from the memories of the Fukushima Crisis and provide the pro-nuclear coalition time to influence consumers to support nuclear power once again.

A deficit of energy already provides reason to restart the nuclear plants. TEPCO and other members of the Federation of Electric Power Companies of Japan (FEPC) plan to raise electricity rates "due to an increase in fuel costs as well as other extenuating circumstances brought about by the shutdown of the nuclear power stations."[160] Most importantly, the Japanese economy is also at stake. Electricity prices will increase for both suppliers and consumers. If the situation in Japan does not improve, companies may move their factories outside of Japan. Although many people wish to switch to an alternative source of energy, the change may not happen soon enough to prevent businesses from moving overseas. Nuclear power, in other words, could supply the energy bridge needed in the short run.

Some hope that the shutdown of nuclear plants will cause the utility companies to lose enough money that they will switch to a more acceptable energy source. Although the utility companies lose profits while the nuclear plants are offline, they still have a source of revenue from international contracts.[161] As long as India, Kazakhstan, South Korea, Taiwan, Vietnam and other countries make nuclear power contracts with Mitsubishi and Japanese companies, the nuclear power industry still maintains a substantial source of income. Short-term, domestic economic pressure on the nuclear power industry may not be enough to pressure utility companies to switch to an alternative energy source.

Although the Fukushima Crisis stands apart from previous nuclear accidents, it nonetheless continues earlier patterns and could potentially result in the same outcome where the current nuclear power policy continues. The pro-nuclear coalition may make concessions while memories of Fukushima are strong, but they have the resources and incentives to wait and then slowly restart the power plants. The pro-nuclear coalition has long-term goals, as emphasized by their tactics that rely on legislation and soft power, instead of the largely reactive tactics that the anti-nuclear coalition uses for their individual opposition movements. It is therefore necessary to account for long-term goals and tactics when projecting the outcome of Japanese nuclear power policy. For example, the "Iron Triangle" has established networks and relationships that drive a pro-nuclear power agenda over the long-term. These relationships, along with pro-nuclear legislation like the *Dengen Sanpō* laws and

the Land Expropriation Law, are institutional structures that support nuclear power over a long timeframe. As long as these structures are in place and still function to promote nuclear power, it is unlikely that Japan will abandon it.

Despite the increase in opposition to nuclear power, the pro-nuclear coalition still trumps the anti-nuclear coalition in legislative access, monetary funds, structured networks, and collective action. The pro-nuclear coalition continues to have a profound influence on policy, judging from its organization, membership, and tactics. A successful strategy of the pro-nuclear coalition in the past has been its ability to customize its tactics to fit the circumstances of the time. For example, the pro-nuclear coalition developed tactics to tie nuclear power to the environmental movement as well as the recovery from the oil shocks in the 1970s and the economic downturn in the 1980s and 1990s. It is possible that the pro-nuclear coalition will similarly develop strategies that will counter the anti-nuclear coalition's current momentum.

Therefore, it is unlikely that Japan will abandon nuclear power. The Japanese government has already invested a considerable amount of resources into its nuclear power program and has few choices that could realistically replace the nuclear plants. Alternative sources of energy would require time and investment, an unlikely scenario given current economic pressures and Japan's costly recovery efforts. While the Japanese government deliberates its energy problem, the public's anxiety and memories of Fukushima may dissipate and the anti-nuclear coalition may lose momentum. Far from defeated, the pro-nuclear coalition maintains powerful networks and influence and has the time to develop tactics. Pro-nuclear institutional and legislative structures remain active in the Japanese government and society. As long as these structures continue to function as their pro-nuclear bureaucrat creators intended, then it is unlikely Japan will change its pro-nuclear agenda.

The possibility remains, however, of an opposite outcome. One key area in which the anti-nuclear coalition consistently surpasses the pro-nuclear coalition is in local politics. The anti-nuclear coalition is most effective at preventing nuclear plant siting when it organizes swiftly and at the local level. The Fukushima Crisis is different from previous accidents by the effectiveness of NIMBY ("Not in my back yard") politics. In contrast to previous accidents, the Fukushima Crisis demonstrates how NIMBY politics can effectively shut down the nuclear power grid. If the Japanese nuclear power program is abandoned rather than resuscitated, then it will most likely be due to NIMBY and local politics, not due to national politics.

APPENDIX A: Japanese Nuclear History Timeline

Decade	Date	Event	Details
1940	August, 1945	Hiroshima and Nagasaki Bombings	United States dropped nuclear bombs on Hiroshima and Nagasaki
1950	1952	San Francisco Peace Treaty	Japanese allowed to research nuclear power
		Private Nuclear Power Utility Companies	Central Government gave private nuclear utility companies monopolies in nine regions
	March 1, 1954	Lucky Dragon Incident	A US hydrogen bomb test contaminates the Japanese tuna boat *Daigo Fukuryu-maru.* Of all the 23 crewmembers who were exposed, only the chief radioman died of radiation sickness
	March 1954	Government Funds Nuclear Power Research	National Diet approved Nakasone Yasuhiro's request to fund nuclear power research (¥ 235 million)
	October 26, 1954	Nuclear Power Day	Government created a holiday to recognize the importance of nuclear power
	3 November 1954	*Gojira* (*Godzilla*) film released in Japan	Anti-nuclear weapon film
	January 1956	Japan Atomic Energy Commission Established	Formed the commission that plans and decides basic policies for promoting nuclear power research, development, and utilization
1960	Mid 1960s	Local Community rejects proposed nuclear plant	Ashiyama in Mie prefecture rejects a proposal for a nuclear power station
	1966	First Japanese Commercial Nuclear Reactor	Japan Atomic Power Company opened the first commercial nuclear reactor in Tokaimura, a town northeast of Tokyo
	1969	Tokaimura Protest	Over 1,000 fishermen protested against plant to build a fuel recycling at Tokaimura
1970	1973	Japan Scientist Congress Symposium	Anti-nuclear power scientists gathered to hold an open symposium on the dangers of nuclear power and sent a joint objection to the Prime Minister
	1973	OPEC Oil Shocks	Expands the role of the central government in promoting nuclear power
	1974	Three Power Source Development Laws (*Dengen Sanpō* laws)	Government passed invisible taxes on electricity use to fund pro-nuclear agendas, such as spending money on improving communities that host nuclear power plants
	1975	National Liaison Conference of the Anti-Nuclear Movement	National, umbrella organization for Anti Nuclear groups formed

	1977	1977 Protest	For the first time, 23 anti-nuclear organizations gathered for a large, joint protest
	1978	"Important Electric Power Resources" Title Implemented	22 thermal and nuclear power plants labeled an "Important Electric Power Resources" that allowed host communities to receive additional funding under the *Dengen Sanpō* laws
	1979	Committee for the Promotion of Power Sources	Committee under the Prime Minister formed. It centralizes many of the government groups that promote a pro-nuclear power agenda
	March 28, 1979	Three Mile Island Incident (USA)	Nuclear accident in Pennsylvania, United States. Rated a Level 4 (out of 7) nuclear accident on the INES scale
1980	1986	Chernobyl Incident	High profile nuclear incident in USSR during the Cold War. Convinced many nations that nuclear energy was not safe. Rated a Level 7 (out of 7) nuclear accident on the INES scale
1990	1991	Mihama Incident	Nuclear accident in Mihama, in Fukui Prefecture. A small amount of radiation escaped into the atmosphere. Rated a Level 2 (out of 7) nuclear accident on the INES scale
	1994	MITI spends more on nuclear power plants	MITI started to eliminate the maximum restrictions on how much utility companies could spend on siting nuclear power plants
	1995	Monju Incident	Nuclear accident in Monju, in Fukui Prefecture. A malfunction caused a fire and explosions, and leaked radiation
	1996	First Successful Referendum to stop a Nuclear Power Plant	Of the Maki residents who voted, 60.86% voted against a nuclear power plant. Mayor Takaai Sasaguchi respected the referendum and refused to allow the siting of nuclear power plants in Maki
	1997	Tokaimura Incident	Nuclear accident in Tokaimura, in Ibaraki Prefecture. A fuel-reprocessing plant malfunctioned and caused a fire and explosions that released radiation into the atmosphere. Rated a Level 3 (out of 7) nuclear accident on the INES scale
	11 December, 1997	Kyoto Protocol	An international agreement that committed Japan (and other nations) to reducing greenhouse gas emission to 6% less than 1990 levels. They must do this by 2012
	1999	Tokaimura Incident	Nuclear accident in Tokaimura, in Ibaraki Prefecture. Three workers poured a uranium solution into a mixing tank and reached criticality. Radiation leaked into the atmosphere. Of the three workers who were blasted by radiation, two died within a year. Rated a Level 4 (out of 7) nuclear accident on the INES scale
2000	2001	Land Expropriation Law	Made it easier and faster to seize land for nuclear power plant construction, easier for bureaucrats to overcome *hito-tsubo* strategy, allowed bureaucrats to reject compensation offers, and shortened the compensation time period from four years to two years
	2004	Mihama Incident	A pipe ruptured, exposing workers to steam. Five workers died and six were injured
2010	March 2011	Fukushima Daiichi Incident	The Tohoku Earthquake caused a tsunami off the coast of Japan. The tsunami knocked out the Fukushima Daiichi power plant's backup generators, making it difficult to cool the reactors and reactor rods. Explosions released radiation into the atmosphere. Rated a Level 7 (out of 7) nuclear accident on the INES scale

APPENDIX B: Nuclear Incidents in Perspective

Nuclear incidents are rated on the International Nuclear and Radiological Event Scale (INES). The scale goes from one to seven, with one being a minor incident and seven being a major incident. To put it in perspective, there have only been two level seven incidents: Chernobyl Incident (1968) and the Fukushima Incident (2011). Three Mile Island Incident (1979) was a level five, the Tokaimura incident (1999) was a level four, and the earlier Tokaimura incident (1997) was a level three incident.

Year	Incident	Nation	Rating
1979	Three Mile Island	USA	5
1969	Chernobyl	USSR	7
1991	Mihama	Japan	2
1995	Monju	Japan	X*
1997	Tokaimura	Japan	3
1999	Tokaimura	Japan	3
2011	Fukushima	Japan	7

* Information not available

Table V. Major nuclear accidents in Japan and aboard that affected Japanese nuclear power policy

	People and Environment	Radiological Barriers and Control	Defence-in-Depth
7	*Chernobyl, 1986* — Widespread health and environmental effects. External release of a significant fraction of reactor core inventory.		
6	*Kyshtym, Russia, 1957* — Significant release of radioactive material to the environment from explosion of a high activity waste tank.		
5	*Windscale Pile, UK, 1957* — Release of radioactive material to the environment following a fire in a reactor core.	*Three Mile Island, USA, 1979* — Severe damage to the reactor core.	
4	*Tokaimura, Japan, 1999* — Fatal overexposures of workers following a criticality event at a nuclear facility.	*Saint Laurent des Eaux, France, 1980* — Melting of one channel of fuel in the reactor with no release outside the site.	
3	*No example available*	*Sellafield, UK, 2005* — Release of large quantity of radioactive material, contained within the installation.	*Vandellos, Spain, 1989* — Near accident caused by fire resulting in loss of safety systems at the nuclear power station.
2	*Atucha, Argentina, 2005* — Overexposure of a worker at a power reactor exceeding the annual limit.	*Cadarache, France, 1993* — Spread of contamination to an area not expected by design.	*Forsmark, Sweden, 2006* — Degraded safety functions for common cause failure in the emergency power supply system at nuclear power plant.
1			Breach of operating limits at a nuclear facility.

Figure VI. INES Scale and related Incidents, taken from the International Atomic Energy Agency website

APPENDIX C: The Nuclear Power Plant Siting Process

Siting a nuclear power plant is a long process, and has only become longer as opposition groups have become better organized. Only about half of all siting attempts by utility companies have succeeded.[162] Of the criteria to site a nuclear power plant, the main factors are strong bedrock foundation, close proximity to the sea, a small local community population, and proximity to the electrical power grid. They are large, expensive projects, and a strong bedrock foundation is necessary for the investment. It is also important that the power plant can withstand earthquakes. The nuclear power plant near Kashiwazaki was built on a fault that was deemed safe, but a 2007 earthquake caused fires and damage. This is not only dangerous but also very expensive to fix.

In addition having a strong bedrock foundation, power plants must also be located near a large body of water for its cooling system. Nuclear reactors draw in seawater and use it to absorb excess heat from the reactors. The water is then dumped into the bay. The seawater is isolated in its own cooling system to prevent contaminated material from flowing into the sea. The cooling system requires vast amounts of water, which is why most Japanese power plants are located on coasts.

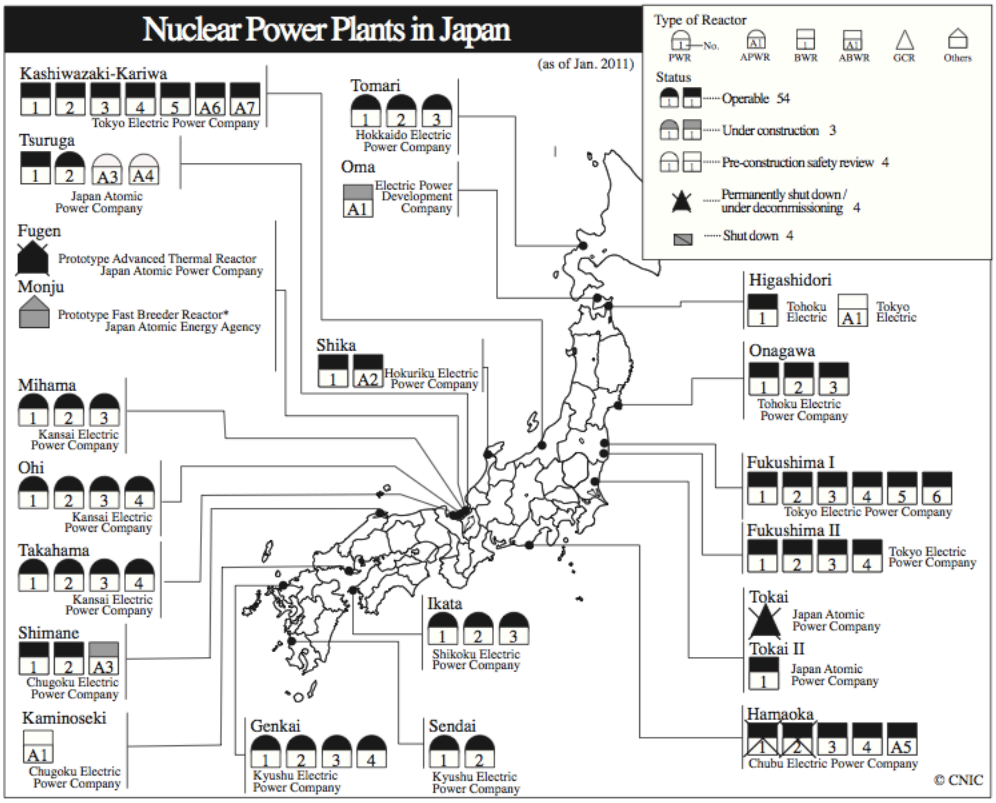

Figure VII. Map of nuclear plants in Japan, taken from the Jan/Feb 2010 no.134 issue of *Nuke Info*, published by the CNIC

Nuclear power plants must also be located near small populations. This is to ensure a successful evacuation in case of an accident. The last factor is distance to the electrical grid; power plants must be close enough to connect with the electrical power grid. A power plant that is distant from the network will be more expensive. Once the utility company chooses a location that fulfills these requirements, the utility company must gain approval from the local government and METI. A chart showing the application process is available below.

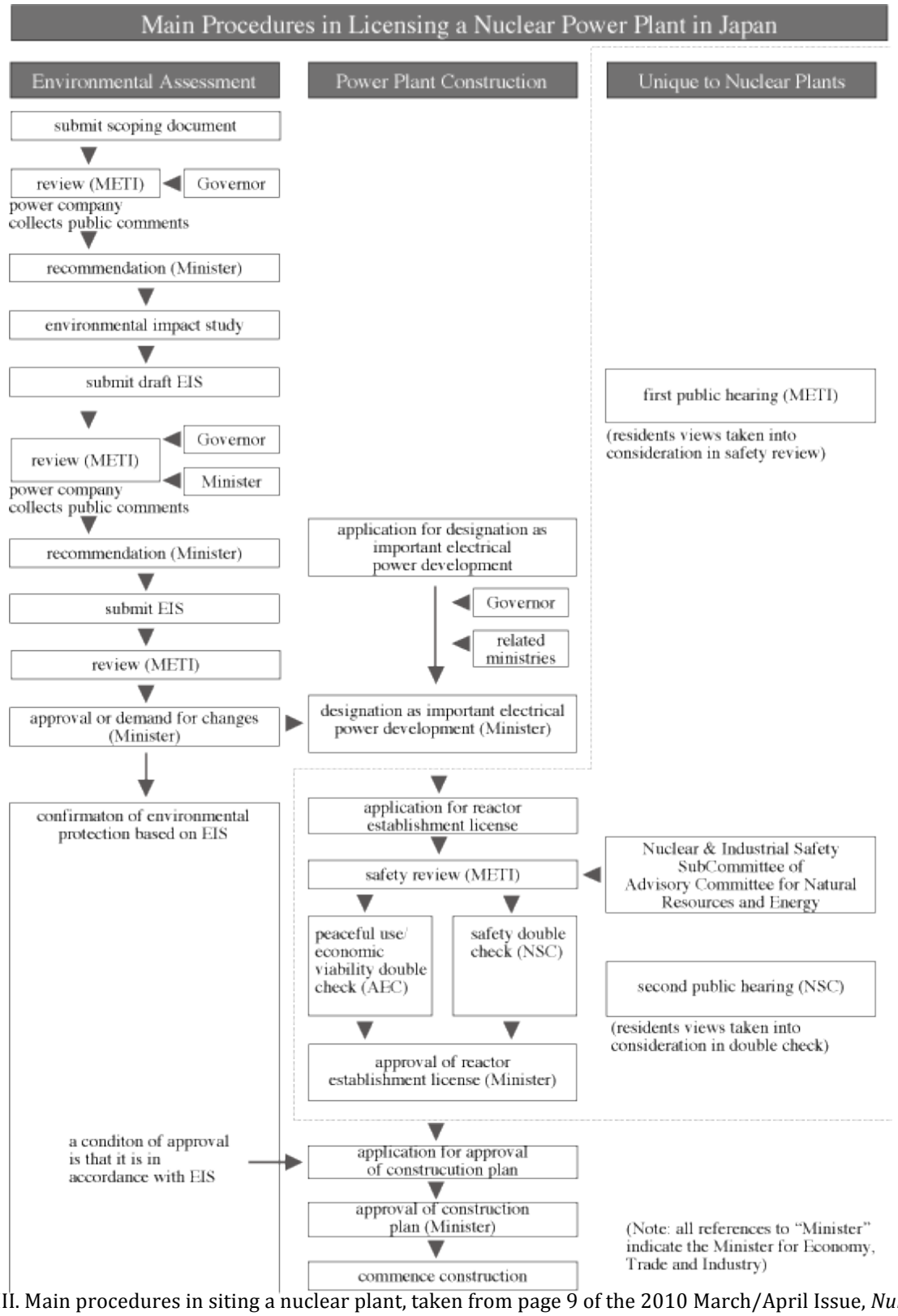

Figure VIII. Main procedures in siting a nuclear plant, taken from page 9 of the 2010 March/April Issue, *Nuke Info Tokyo* No.135 (published by CNIC)

Table 6. Japanese nuclear power plants, data taken from World Nuclear Association website

Reactor	Type	Net capacity	Utility	Commercial Operation (month-yr)
Fukushima I-5	Boiled Water	760 MWe	TEPCO	Apr-78
Fukushima I-6	Boiled Water	1067 MWe	TEPCO	Oct-79
Fukushima II-1	Boiled Water	1067 MWe	TEPCO	Apr-82
Fukushima II-2	Boiled Water	1067 MWe	TEPCO	Feb-84
Fukushima II-3	Boiled Water	1067 MWe	TEPCO	Jun-85
Fukushima II-4	Boiled Water	1067 MWe	TEPCO	Aug-87
Genkai-1	Pressurized Water	529 MWe	Kyushu	Oct-75
Genkai-2	Pressurized Water	529 MWe	Kyushu	Mar-81
Genkai-3	Pressurized Water	1127 MWe	Kyushu	Mar-94
Genkai-4	Pressurized Water	1127 MWe	Kyushu	Jul-97
Hamaoka-3	Boiled Water	1056 MWe	Chubu	Aug-87
Hamaoka-4	Boiled Water	1092 MWe	Chubu	Sep-93
Hamaoka-5	Advanced Boiled Water	1325 MWe	Chubu	Jan-05
Higashidori-1 Tohoku	Boiled Water	1067 MWe	Tohoku	Dec-05
Ikata-1	Pressurized Water	538 MWe	Shikoku	Sep-77
Ikata-2	Pressurized Water	538 MWe	Shikoku	Mar-82
Ikata-3	Pressurized Water	846 MWe	Shikoku	Dec-94
Kashiwazaki-Kariwa-1	Boiled Water	1067 MWe	TEPCO	Sep-85
Kashiwazaki-Kariwa-2	Boiled Water	1067 MWe	TEPCO	Sep-90
Kashiwazaki-Kariwa-3	Boiled Water	1067 MWe	TEPCO	Aug-93
Kashiwazaki-Kariwa-4	Boiled Water	1067 MWe	TEPCO	Aug-94
Kashiwazaki-Kariwa-5	Boiled Water	1067 MWe	TEPCO	Apr-90
Kashiwazaki-Kariwa-6	Advanced Boiled Water	1315 MWe	TEPCO	Nov-96
Kashiwazaki-Kariwa-7	Advanced Boiled Water	1315 MWe	TEPCO	Jul-97
Mihama-1	Pressurized Water	320 MWe	Kansai	Nov-70
Mihama-2	Pressurized Water	470 MWe	Kansai	Jul-72
Mihama-3	Pressurized Water	780 MWe	Kansai	Dec-76
Ohi-1	Pressurized Water	1120 MWe	Kansai	Mar-79
Ohi-2	Pressurized Water	1120 MWe	Kansai	Dec-79
Ohi-3	Pressurized Water	1127 MWe	Kansai	Dec-91
Ohi-4	Pressurized Water	1127 MWe	Kansai	Feb-93
Onagawa-1	Boiled Water	498 MWe	Tohoku	Jun-84
Onagawa-2	Boiled Water	796 MWe	Tohoku	Jul-95
Onagawa-3	Boiled Water	796 MWe	Tohoku	Jan-02
Sendai-1	Pressurized Water	846 MWe	Kyushu	Jul-84

Sendai-2	Pressurized Water	846 MWe	Kyushu	Nov-85
Shika-1	Boiled Water	505 MWe	Hokuriku	Jul-93
Shika-2	Boiled Water	1304 MWe	Hokuriku	Mar-06
Shimane-1	Boiled Water	439 MWe	Chugoku	Mar-74
Shimane-2	Boiled Water	791 MWe	Chugoku	Feb-89
Takahama-1	Pressurized Water	780 MWe	Kansai	Nov-74
Takahama-2	Pressurized Water	780 MWe	Kansai	Nov-75
Takahama-3	Pressurized Water	830 MWe	Kansai	Jan-85
Takahama-4	Pressurized Water	830 MWe	Kansai	Jun-85
Tokai-2	Boiled Water	1060 MWe	JAPC	Nov-78
Tomari-1	Pressurized Water	550 MWe	Hokkaido	Jun-89
Tomari-2	Pressurized Water	550 MWe	Hokkaido	Apr-91
Tomari-3	Pressurized Water	866 MWe	Hokkaido	Dec-09
Tsuruga-1	Boiled Water	341 MWe	JAPC	Mar-70
Tsuruga-2	Pressurized Water	1110 MWe	JAPC	Feb-87
Monju	Prototype fast-breeder	246 MWe	JAEA	operated 1994-95, then May-Aug 2010

APPENDIX D: Key Terms

Agency for National Resources and Energy. *Shigen Enerugi cho* in Japanese, established in 1973. Handles the promotion of commercial nuclear power through the Three Laws (*Dengen Sanpō* laws) and other incentives.

Amakudari. Literally means "heavenly descent." It is a common practice in Japan where bureaucrats of the central government retire to work in the business sector

Citizens' Nuclear Information Center. *Genshiryoku Shiryo Johoshitsu* in Japanese. Founded by Gensuikyo, an anti-nuclear umbrella organization. Prints newsletters and articles on nuclear power in both Japanese and English. Coordinates anti-nuclear protests.

Dengen Sanpō Laws. Laws passed in 1974 that allowed the government to placed an invisible tax on electricity consumption, which the government used to create incentives for local communities to allow the construction of a nuclear power plant (also called Three Power Source Development Laws)

Fast-Breeder Reactors. Reactors that take in uranium-238 and produce plutonium-239. The Japanese Monju plant in Fukui Prefecture and the French Superphénix reactor are examples of fast-breeder reactors.

Gensuikyo. Called the Japan Council against Atomic and Hydrogen Bombs in English. Established in 1950s after the Lucky Dragon incident. Later founds the anti-nuclear umbrella group, the Citizens; Nuclear Information Center. Coordinates anti-nuclear protests.

International Nuclear and Radiological Event Scale (INES). A scale created by the International Atomic Energy Agency. It rates nuclear incidents on a scale of one to seven, where one is a minor nuclear incident and seven is a major nuclear disaster.

Japan Atomic Energy Agency. Established 1 October, 2005 to promote long-term environmental policies, nuclear safety research, and technology for nuclear power. The head office is in Tokaimura, the site of two nuclear accidents in the 1990s.

Japanese Atomic Energy Relations Organization. Established in 1970 to promote pro-nuclear power through local and national events. Set up an annual high school essay contest that looks at positive aspects of nuclear power.

Japan Atomic Energy Research Institute. *Genshiryoku Iinkai* in Japanese, established in 1 January, 1956. The commission has five Commissioners, one of whom is the Chairman. The Prime Minister appoints each Commissioner with the Diet's consent. They serve for three-year terms. The commission plans and decides basic policies for promoting nuclear power research, development, and utilization. The commission annually publishes a report called "The White Paper," which is a report to inform the public about nuclear energy.

Japan Atomic Energy Research Institute. *Nihon Genshityoku Kenkyujo* in Japanese, established in June 1956. The institute's purpose is to research, develop, and establish nuclear technology.

Japan Atomic Industry Forum (JAIF). *Nihon Genshiryoku Sangyo Kaigi* in Japanese, established on 1 March, 1956. It is a non-profit organization to promote peaceful use of nuclear energy. It publishes various journals, reports, and papers on nuclear issues.

Kisha Kurabu. *Kisha kurabu*, or "reporter clubs" in Japanese, were places journalists would go to meet with individuals to acquire information. Major news agencies had memberships to these clubs, but had to abide by the club's rules when interviewing sources.

Kyoto Protocol. Adopted in Kyoto, Japan on 11 December 1997 and enacted on 16 February 2005. It is an international commitment where 37 nations, including Japan, agree to reduce CO_2 emissions to less than 6% less than 1990 levels. The deadline for this is 2012. The Kyoto Protocol is an important first step towards a global emission reduction regime that will stabilize greenhouse gas emissions.

Lucky Dragon Incident. In 1954 near Bakini Atoll, the United States conducted a hydrogen bomb test, which contaminated twenty-three crewmembers of a nearby Japanese fishermen boat, the Daigo Fukuryu-maru. Sparked anti-nuclear sentiment in Japan

Maki Referendum. A referendum on 4 August 1996. Of the Maki residents who voted, 60.86% voted against a nuclear power plant. Mayor Takaai Sasaguchi respected the referendum and refused to allow the siting of nuclear power plants in Maki. Sparked referendums nationwide as a way to oppose nuclear power plants.

Mihama Facilities. Incidents in 1991 and 2004

Ministry of Economy, Trade and Industry (METI). The ministry of the central bureaucracy that is in charge of promoting nuclear power, regulating utility companies, and research and development of energy. In 2001, MITI (Ministry of International Trade and Industry) was reorganized to METI.

Ministry of International Trade and Industry (MITI). The ministry of the central bureaucracy that was in charge of promoting nuclear power, regulating utility companies, and research and development of energy until 2001 when it was reorganized to METI (Ministry of Economy, Trade and Industry).

Monju Facilities. Incident in 1995. Contains a fast-breeder reactor, which takes in uranium solutions and produces energy and plutonium.

Nakasone Yasuhiro. Convinced the Lower House to pass a budget for scientific research, ¥ 235 million of which went to nuclear power research. Later serves three terms as Japan's prime minister, from 1982-1987.

National Liaison Conference of the Anti-Nuclear Movement. Established in 1975, monitors important pro-nuclear agencies and has monthly publication of the Hangenpatsu Shimbun newspaper

Three Power Source Development Laws. See *Dengen Sanpō* laws

Three Mile Island. On 28 March, 1979, the reactor at Three Mile Island in Pennsylvania, United States failed to cool down, causing part of the core to melt.

Tokaimura Facilities. A fuel-reprocessing center where there were accidents in 1997 and 1999.

Turnkey Contracts. Contracts where the manufacturer delivers an operational reactor at a set price

NOTES

[1]Paul A. Sabatier and Hank C. Jenkins-Smith, *Policy Change and Learning: an Advocacy Coalition Approach* (Westview: Boulder, 1993).

[2] Sabatier and Jenkins-Smith refer to "policy subsystems" as groups that strive to influence policy. Policy subsystems encompass interest groups, journalists, government officials, technicians and engineers, politicians and political parties, etc.

[3] A report on the US propaganda in Japan showed that in 1956, 70 percent of Japanese associated "atom" with "harmful." By 1958, the number dropped to 30 percent (Kuznick 2011).

[4] The number 235 came from the element uranium-235, which nuclear reactors use as fuel.

[5] Daniel P. Aldrich, "Post-Crisis Japanese Nuclear Policy: From Top-down Directives to Bottom-up Activism," *AsiaPacific Issues*, no. 103 (2012): 2.

[6] Yasushi Haka, "Three Mile Island Accident Leaves Japan Extra Jittery," *Los Angeles Times*, June 28, 1979, F7.

[7] Henry Scott-Stokes, "Japanese Renewing A-Plant Resistance," *New York Times*, May 9, 1979, A9.; *NYT,* "Japan Finds Need for Nuclear Growth," *New York Times*, Dec, 28, 1979, D4.

[8] Daniel P. Aldrich, *Site Fights: Divisive Facilities and Civil Society in Japan and the West* (Ithaca: Cornell UP, 2008).

[9] Fishermen's cooperatives whose membership increased by 50% had a 70% chance to stop a nuclear project; Fishermen's cooperatives whose membership decrease by 75% had only a 5% chance to stop a project.

[10] Aldrich, *Site Fights*, 145.

[11] Aldrich, *Site Fights*, 146.

[12] David H. Slater, "Fukushima Women Against Nuclear Power: Finding a Voice from Tohoku," *The Asia-Pacific Journal: Japan Focus* (2011).

[13] Merry White, "The Virtue of Japanese Mothers: Cultural definitions of Women's Lives," *Daedalus* Vol. 116 no.3 (1987): 149-163.

[14] Hasegawa, Kōichi. *Constructing Civil Society in Japan: Voices of Environmental Movements* (Australia: TransPacific Press, 2004).

[15] Scott-Stokes, "Japanese Renewing A-Plant Resistance."

[16] Haka, "Three Mile Island Accident Leaves Japan Extra Jittery."

[17] Haka, "Three Mile Island Accident Leaves Japan Extra Jittery."

[18] Koichi Hasegawa and Yuko Takubo, *JCO Criticality Accident and Local Residents: Damages, Symptoms and Changing Attitudes* (Tokyo: Citizens' Nuclear Information Center, 2001), 6.

[19] Hasegawa and Takubo, *JCO Criticality Accident,* 11.

[20] The power plants pump out water that is about six degrees warmer than the surrounding seawater (Aldrich *Site Fights*, 2008).

[21] Philip White and Masako Sawai, "High-Level Radioactive Waste Shipped from UK," *Nuke Info* no. 135 (Mar/April 2010): 2.

[22] In 2010, Japan also owned 37 tons of plutonium that was stored and processed in the United Kingdom and France (White and Ban 2010, 7).

[23] Philip White, "Nuclear Power and Nuclear Weapons: the Unbreakable Connection," *Nuke Info* no.138 (Sep/Oct 2010): 8-9.

[24] LAT, "Safety Violations in Japan, Nuclear Plants Charged," *Los Angeles Times*, Sep 21, 1980, 2.

[25] Daniel Aldrich, conversation with author, February 2012, Oberlin, Ohio.

[26] A town with a single nuclear plant has a 20% higher chance of receiving another nuclear reactor than if it had no initial nuclear plant (Aldrich *Site Fights* 2008, 46).

[27]About 37.1% of residents were unaware of the plant whereas 28.1% knew it was a facility related to nuclear power. Another 12.9% of residents responded that they were aware of the facility, but did not know what it was; another 18.5% knew "it was some sort of manufacturing facility" (Hasegawa and Takubo 2001, 28).

[28] David E. Sanger, "A Crisis of Confidence for Japan's Nuclear Power Strategy," *New York Times*, July 1, 1991, D1.

[29] Aldrich, *Site Fights*, 130.

[30] Howard W. French, "Safety Problem at Japanese Reactor Begin to Erode Public's Faith in Nuclear Power," *New York Times*, Sept. 16, 2002, A10.

[31] Hokkaido Electric, Tohoku Electric, Tokyo Electric, Chubu Electric, Shikoku Electric, Hokuriku Power, Kansai Electric, Chugoku Electric, Kyushu Electric, and Okinawa Electric power companies.

[32] The Ministry of International Trade and Industry (MITI) reorganized to form Ministry of Economy, Trade and Industry (METI) in 2001. At their respective periods of operation, they had the most influence over promoting energy and regulating nuclear power plants.

[33] Aldrich, "Post-Crisis Japanese Nuclear Policy," 5.

[34] "Japan: The World Factbook," Central Intelligence Agency, https://www.cia.gov/library/publications/the-world-factbook/geos/ja.html.

[35] Cohen, Linda, and Matthew D. McCubbins, and Frances Rosenbluth. "The Politics of Nuclear Power in Japan and the United States." (Paper funded by the U.S. Agency for International Development, submitted to the University of Maryland at College Park, May 1995); Peter F. Cowhey and Mathew D. McCubbins. *Structure and Policy in Japan and the United States* (Cambridge: Cambridge UP, 1995).

[36] Ryūkichi Imai and Henry S. Rowen, *Nuclear Energy and Nuclear Proliferation: Japanese and American Views* (Boulder, CO: Westview, 1980).

[37] NYT, "Japan Finds Need for Nuclear Growth," *New York Times*, Dec, 28, 1979, D4.

[38] French, "Safety Problem at Japanese Reactor…"
[39] Howard W. French, "Tokyo is Told: Go Nuclear or Go Dark," *New York Times*, April 13, 2003, A23.
[40] Sam Jameson, "Japanese Criticizes U.S. Nuclear Strings," *Los Angeles Times*, May 21, 1977, A21.
[41] Norimitsu Onishi and Hiroko Tabuchi and Ken Belson, "Dearth of Candor From Japan's Leadership," *New York Times*, 2011, http://www.nytimes.com/2011/03/17/world/asia/17tokyo.html?pagewanted=all
[42] Eric Johnston, "Japan's Nuclear Nightmare." *The Asia-Pacific Journal: Japan Focus* (2009).
[43] Philip White, "Nuclear Power and Nuclear Weapons, the Unbreakable Connection," *Nuke Info Tokyo* 138 (Sept/Oct 2010): 6-9.
[44] "Kyoto Protocol," United Nations Framework Convention on Climate Change.
[45] Aldrich, *Site Fights*, 52.
[46] Imai and S. Rowen, *Nuclear Energy and Nuclear Proliferation.*
[47] Suzuki Atsuyuki. 1996. Why Plutonium is a 'Must' for Japan. In *Japan's Nuclear Future: The Plutonium Debate and East Asian Security*, ed. Selig S. Harrison. Washington D.C.: Carnegie Endowment for International Peace.
[48] Aldrich, *Site Fights*.
[49] Aldrich, *Site Fights*, 129.
[50] Aldrich, "Post-Crisis Japanese Nuclear Policy," 5.
[51] Aldrich, *Site Fights*, 148.
[52] Aldrich, *Site Fights*, 147.
[53] David E. Sanger, "A Crack in Japan's Nuclear Sangfroid," *New York Times*, Feb 17, 1991, E4.
[54] In 1980, the Tokyo Electric Company (TEPCO) organized a public hearing regarding its proposal for power plants in Kashiwazaki. Over 6,000 members from national anti-nuclear groups arrived, hoping to attend. Despite the great turnout, only eleven of the twenty confirmed questioners and 77 of 250 confirmed observers were allowed to attend the meeting (Aldrich *Site Fights,* 2008, 131). The proposed power plants were approved and completed five years later.
[55] Eric Johnston, "Covering Nuclear Power in Japan – Notes from the Front Lines," *The Foreign Correspondents' Club of Japan* (2007).
[56] Aldrich, *Site Fights*, 60.
[57] Aldrich, *Site Fights*, 46.
[58] Aldrich, *Site Fights*, 148.
[59] According to Professor Daniel Aldrich's book *Site Fights*, communities with a 75% decrease in fishermen's cooperative membership had a 5% chance to stop the project. In contrast, cooperatives with a 50% *increase* in fishermen's cooperative membership had a 70% chance to stop a project. In Tomari, a community in Hokkaido, fishermen's cooperative membership dropped from 33% of the workers to 5% by 1995. Tomari became a target community for not one but *three* nuclear plants. In contrast, in Taisei village (also in northern Hokkaido), the fishermen's cooperatives maintained a membership of about 25% of the workers and, because of this, were not considered as a potential host for a nuclear plant. Communities with significantly decreasing, increasing, or diverse populations also signify a weaker civil society. Communities with decreasing populations need infrastructure or jobs that will draw young workers. Current power plants in Japan are located in areas with less than one third the average national population density (Aldrich *Site Fights,* 30). Such places will more readily approve a nuclear power plant if the utility company promises large compensation packages to improve the community. Utility companies will also target communities with population booms or of population growths of 80% or more since rapid increases in population lead to diversity and fragmentation. Like communities of a "boomtown," diverse populations are more susceptible because it will be more difficult for the community to organize a unified, strong resistance. The population of Omiya, a town in Saitama, doubled in over twenty years, making it more challenging for new and old residents to unite against a proposed nuclear plant. Likewise, the population of Kumatori (near Osaka) tripled. Utility companies have attempted to site nuclear plants in both Omiya and Kumatori (Aldrich *Site Fights*, 40-41).
[60] Aldrich, *Site Fights*, 42.
[61] Aldrich, *Site Fights*, 129.
[62] S. Hayden Lesbirel, *NIMBY Politics in Japan: Energy Siting and the Management of Environmental Conflict* (Ithaca, NY: Cornell UP, 1998), 85-95.
[63] More than 54 nuclear plants have been completed in Japan, but many have been decommissioned over the years. As of the end of February 2011, there were 54 active nuclear power plants.
[64] Cowhey and McCubbins. *Structure and Policy in Japan and the United States*, 59.
[65] Cowhey and McCubbins. *Structure and Policy in Japan and the United States*, 118.
[66] Aldrich, *Site Fights*, 62.
[67] Cohen, McCubbins, and Rosenbluth, "The Politics of Nuclear Power in Japan and the United States."
[68] Cowhey and McCubbins. *Structure and Policy in Japan and the United States*, 181.; Cohen, McCubbins, and Rosenbluth, "The Politics of Nuclear Power in Japan and the United States," 4-6.
[69] In Japan, fishermen's cooperatives, local politicians, and members of the national Diet hold most of these licenses. The utility companies developed various tactics to influence the local license holders, and have little problem getting approval from the national Diet since the ruling party in the Diet also has top positions in the bureaucracy. Therefore, the license holders at the locality, like fishermen's cooperatives, have the most influence over the siting process.
[70] Daniel P. Aldrich, "Future Fission: Why Japan Won't Abandon Nuclear Power," *Global Asia* Summer 6.2 (2011): 63-67.
[71] Chalmers A. Johnson, *MITI and the Japanese Miracle: the Growth of Industrial Policy, 1925-1975* (Stanford: Stanford University Press, 1982, 72.

[72] Aldrich, "Future Fission."
[73] "Organization Chart," Ministry of Economy, Trade and Industry, http://www.meti.go.jp/english/aboutmeti/data/aOrganizatione/pdf/chart2009.pdf.
[74] Morris F. Low, "Scientists and the State," in *Japan: The Political Economy of Japanese Science: Nakasone, Physicists, and the State*, ed. Etel Solingen (Ann Arbor: The University of Michigan Press, 1994).
[75] Daniel P. Aldrich and Martin Dusinberre, "Hatoko Comes Home: Civil Society and Nuclear Power in Japan," *Journal of Asian Studies* 70.3 (2011): 1-23.
[76] Ellis S. Krauss, *Broadcasting Politics in Japan: NHK and Television News* (Ithaca: Cornell UP, 2000).
[77] Anti-nuclear power media certainly existed prior to the 1980s and often directly criticized the Japanese government, nuclear power utility companies, and other pro-nuclear advocate groups. There was a substantial increase of anti-nuclear power news coverage after Three Mile Island and Chernobyl, and even more so since the 1980s. In the 1960s and 1970s, however, there was a general agreement in the media, government, and general public that nuclear power was a necessity (Dauvergne 1993, 578). I focus this section of my paper providing a brief argument as to why the anti-nuclear coalition had such an increase in influence and presence in the news media since the late 1980s, namely that it was due to the public sentiment, new broadcasting techniques, and an increase of use of media-related technologies.
[78] Krauss, *Broadcasting Politics in Japan*, 29.
[79] Krauss, *Broadcasting Politics in Japan.*
[80] Martin Fackler, "Japan Shuts Nuclear Plant After Leak," *New York Times*, July 18, 2007, A10.
[81] Krauss, *Broadcasting Politics in Japan.*
[82] Krauss, *Broadcasting Politics in Japan, 38.*
[83] Krauss, *Broadcasting Politics in Japan, 75.*
[84] Ikuo Kabashima and Gill Steel, *Changing Politics in Japan* (Ithaca N.Y.: Cornell University Press, 2010), 64.
[85] Kabashima and Steel, *Changing Politics in Japan*.
[86] Haka, "Three Mile Island Accident Leaves Japan Extra Jittery."
[87] Kabashima and Steel, *Changing Politics in Japan*, 63.
[88] Fackler, "Japan Shuts Nuclear Plant After Leak."; Martin Fackler, "Japan's Quake-Prone Atomic Plant Prompts Wider Worry," *New York Times*, July 25, 2007, A3.
[89] *Japan Times*, "Protesting nuclear power," *Japan Times Online*, 2012, http://www.japantimes.co.jp/text/ed20120122a2.html.
[90] The pro-nuclear coalition also does this and have published pro-nuclear textbooks and manga comic books that stress the importance of nuclear power.
[91] It is important to note that although media and technology promote investigations and publication of the truth, they also enable the circulation of biased or false information. For example, in 1996, it was discovered that TEPCO officials edited a video of the Monju accident before releasing it to the public. Similarly, sensationalized or subjective foreign news coverage of the Fukushima Crisis could scare both Japanese and foreign citizens. These examples demonstrate the potential for misinforming the public by both the pro-nuclear and anti-nuclear coalitions.
[92] James Brooke, "Rust and Neglect Cited at Japan Atom Plant," *New York Times*, Aug 11, 2004, A6.
[93] French, "Safety Problem at Japanese Reactor…"
[94] Aldrich, "Post-Crisis Japanese Nuclear Policy," 6-7.
[95] Sanger, "Crack in Japan's Nuclear Sangfroid."
[96] Associated Press, " Poll: Most Japanese Favor Break With Nuclear Power," *Mercury News*, March 18, 2012. http://www.mercurynews.com/news/ci_20201162/poll-most-japanese-favor-break-nuclear-power.
[97] Arvind Kumar, *A Textbook of Environmental Science* (New Delhi: APH Publishing Corporation 2011), 254.
[98] *NYT*, "Around the World: Japanese Concede Errors In Nuclear Plant Mishap," *New York Times*, April 24, 1981, A6.
[99] *NYT*, "45 Japanese Workers Are Reported Exposed To Nuclear Radiation," *New York Times*, April 26, 1981, A6.
[100] *NYT*, "Around the World: Japanese Concede Errors In Nuclear Plant Mishap."
[101] *NYT* "Around the World: Nuclear Executives in Japan Resign Over Recent Mishaps," *New York Times*, May 14, 1981, A11.
[102] Peter Dauvergne, "Nuclear Power Development in Japan: 'Outside Forces' and the Politics of Reciprocal Consent," *Asian Survey*. Vol. 33. no. 6 (1993): 581.
[103] Sanger, "A Crack in Japan's Nuclear Sangfroid."
[104] Sanger, "A Crisis of Confidence for Japan's Nuclear Power Strategy."
[105] Sanger, "A Crisis of Confidence for Japan's Nuclear Power Strategy."
[106] David E. Sanger, "Japanese Are Hardly Reassured on Nuclear Peril," *New York Times*, March 5, 1991, A6.
[107] David E. Sanger, "Japan Nuclear Accident May Impede Push for Plant," *New York Times*, February 11, 1991, A3.
[108] Sanger, "Japan Nuclear Accident May Impede Push for Plant."
[109] Sanger, "A Crack in Japan's Nuclear Sangfroid."
[110] Sanger, "Japanese Are Hardly Reassured on Nuclear Peril."
[111] Dauvergne, "Nuclear Power Development in Japan," 583.
[112] Sanger, "A Crack in Japan's Nuclear Sangfroid."
[113] Dauvergne, "Nuclear Power Development in Japan," 583.
[114] Dauvergne, "Nuclear Power Development in Japan," 583.
[115] Sanger, "Japanese Are Hardly Reassured on Nuclear Peril."

[116] The goal of the fast-breeder reactor is to keep the neutrons at fast speeds and energy levels so that the uranium will undergo fission but the plutonium created in the reactor will not undergo fission. This leaves a larger stockpile of plutonium, thus earning the name "breeder." In a thermal nuclear reactor, the most common type of reactor, water serves as a coolant or "modulator" to slow down the neutrons that bombard uranium-235. This is because slower neutrons cause fission more efficiently. A fast-breeder reactor uses liquid sodium, which does *not* slow down the neutrons as much as water, and hence the neutrons remain fast and the reactor earns the name "fast-breeder." The fast neutrons make it more difficult for elements to undergo fission. But uranium-238, which is more common than uranium-235, can more easily catch the fast neutrons and undergo fission to create plutonium-239. While the uranium (input) can undergo fission, plutonium (output) cannot easily catch the fast neutrons and does not undergo fission as easily. This entire process converts uranium into energy and plutonium, and prevents the plutonium from further breaking down into another element, as it would in a thermal reactor (Karam 2006).

[117] Hiroko Tabuchi, "Atomic Agency Backs Safety Tests for Japan's Reactors," *New York Times* [Tokyo], 2012, http://mdn.mainichi.jp/mdnnews/news/20120317p2g00m0dm012000c.html. ; Andrew Karam, "How do Fast Breeder Reactors Differ from Regular Nuclear Power Plants?," Scientific American.

[118] Dauvergne, "Nuclear Power Development in Japan," 585.

[119] Dauvergne, "Nuclear Power Development in Japan," 583.

[120] The primary cooling system is the coolant that flows out of the reactor and contains radioactive material. It flows near the secondary cooling system, a series of pipes that is clean from contamination and where the heat can transfer from the primary cooling system to the secondary cooling system. It is much more dangerous for a leak to occur in the primary cooling system since it contains radioactive material and a leak could also decrease the ability to transfer heat away from the reactor. The leak in the 1991 Mihama accident occurred in the primary cooling system and released radiation; the leak in the 1995 Monju accident occurred in the secondary cooling system and did not release radiation (refer to Figure V on page 46).

[121] White and Ban, "Restarting Monju: Like Russian Roulette," 1.

[122] Thomas B. Cochran and Harold A. Feiveson and others, "Fast Breeder Reactor Programs: History and Status," *International Panel on Fissile Materials* no. 8 (2010): 54.

[123] White and Ban, "Restarting Monju: Like Russian Roulette," 1.

[124] White and Ban, "Restarting Monju: Like Russian Roulette," 2.

[125] "Japanese Suicide Linked to Nuclear Plant Leak," *New York Times*, Jan. 14, 1996, 6.

[126] White and Ban, "Restarting Monju: Like Russian Roulette," 2.

[127] Sheryl WuDunn, "Accident At A-Plant Leads Japan To Debate," *New York Times*, 1995, 4.

[128] "Japanese Seek Inquiry Into Leak at Reactor," *New York Times*, December 12, 1995, A9.

[129] Japan's first nuclear reactor was built in Tokaimura and started operating commercially in 1966. This nuclear reactor, called Tokai Unit 1, operated until it was decommissioned in 1998. A second nuclear plant, called Tokai Unit 2, started operating commercially in the 1970s.

[130] There also was a nuclear accident in 1997, where a fire caused an explosion and released radiation into the atmosphere. The accident rated a three out of seven on the International Nuclear and Radiological Event Scale.

[131] Hisashi Ouchi received about 2.5 times the level of radiation that guarantees death, and about 400 times the maximum amount of radiation a worker should receive over an entire year. He died three months after the accident in late December 1999 (NHK-TV Tokaimura Criticality Accident Crew 2008; French 1999, "Death Stirs Up Opposition Of Japanese To Atom Use.").

[132] Howard W. French, "Urgent Inspections Ordered For Japan's Nuclear Plant." *New York Times*, October 5, 1999, A10.

[133] Howard W. French, "Atom Plant Cut Corners On Safety, Japan Is Told," *New York Times*, October 4, 1999, A8.

[134] Temporary workers account for 96% of the total radiation dosage that occurs in Japan (White "Nuclear Power and Nuclear Weapons.").

[135] French, "Urgent Inspections Ordered For Japan's Nuclear Plant."

[136] It is interesting to note that the "Iron Triangle," a staunch supporter of nuclear power, recruits much of its workforce from the elite Japanese schools and that professors at these schools became increasingly cautious and outspoken of nuclear power through the 1990s. Perhaps this trend could turn future employers of the "Iron Triangle" against nuclear power, but it is unlikely given the strict hierarchy and job training that condition employers to adapt to the company's set goals. It is nonetheless an aspect of the pro-nuclear coalition that should be monitored.

[137] Calvin Sims, "Angst at Japan Inc.: A Nation Frets Over a String of Technological Accidents Angst in Japan," *New York Times*, 1999, C1.

[138] French, "Urgent Inspections Ordered For Japan's Nuclear Plant."

[139] Howard W. French, "Japan Seizes Nuclear Fuel Company's Record," *New York Times*, October 7, 1999, A15.

[140] French, "Urgent Inspections Ordered For Japan's Nuclear Plant."

[141] French, "Safety Problem at Japanese Reactor…"

[142] CNIC, "Statement of Protest Against Recommencement of Monju Test Operation," *Nuke Info* no.136 (May/June 2010): 2-3.

[143] French, "Tokyo is Told: Go Nuclear or Go Dark."

[144] Brooke, "Rust and Neglect Cited at Japan Atom Plant."

[145] Martin Fackler, "Japan Nuclear-Site Damage Worse than Reported," *New York Times*, July 19, 2007, A8.

[146] Fackler, "Japan Nuclear-Site Damage Worse than Reported."

[147] Aldrich, "Post-Crisis Japanese Nuclear Policy," 6.

[148] CNIC, "Statement by Group of Concerned Scientists and Engineers Calling for the Closure of the Kashiwazaki-Kariwa Nuclear Power Plant," *Nuke Info* no. 141 (March/ April 2011).
[149] CNIC, ""Statement by Group of Concerned Scientists and Engineers," 4.
[150] Aldrich, "Post-Crisis Japanese Nuclear Policy," 6-7.
[151] Aldrich, "Post-Crisis Japanese Nuclear Policy."
[152] Takashi Sugimoto, "TEPCO Delayed Disclosing Rising Radiation Levels at Plant," *Asahi Shimbun*, 2011.
[153] Norimitsu Onishi and Martin Fackler,"Japan Held Nuclear Data, Leaving Evacuees in Peril." *New York Times*, 2011.
[154] Onishi and Fackler,"Japan Held Nuclear Data…"
[155] "Utility industry to Establish Independent Nuclear Safety Organization," *Denki Shimbun* [Tokyo], http://www.shimbun.denki.or.jp/en/news/20120124_02.html
[156] Tabuchi, "Atomic Agency Backs Safety Tests for Japan's Reactors."
[157] Onishi and Tabuchi Belson, "Dearth of Candor From Japan's Leadership."
[158] *Japan Times,* "Protesting Nuclear Power."
[159] Aldrich, "Post-Crisis Japanese Nuclear Policy," 9.
[160] "Home Page," Tokyo Electric Power Company accessed in January 2012, http://www.tepco.co.jp/en/index-e.html.
[161] Daniel Aldrich, conversation with author, February 2012, Oberlin, Ohio.
[162] Aldrich, *Site Fights*.

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