Shadow of Fukushima: The Future of Nuclear Energy in Japan

I. Introduction

On March 11, 2011 a massive earthquake and tsunami hit the northeastern Tohoku region of Japan[1]. The 9.0 magnitude earthquake, one of largest ever recorded by modern technology, and the subsequent tsunami devastated the region and the country where thousands of people lost their lives, their homes and their livelihoods[2]. One of the casualties of the disaster was the Fukushima Daiichi nuclear power plant and, potentially, the future of nuclear power in Japan. In the wake of the natural disaster the nuclear reactors of the plant suffered multiple explosions and meltdowns precipitating the most serious nuclear disaster the since the Chernobyl incident in 1986. Thousands more have been displaced, the cleanup efforts at the plant continue, and the full extent of the damage on the environment and economy of the region is still unknown[3].

This incident has had a chilling effect on public opinion with regard to the use of nuclear energy. The kneejerk reaction to the disaster has been a large public outcry against the use of nuclear power due to safety concerns and distrust in the government and the power companies. Government officials have responded by suspending operations at a majority of the country's power plants and putting on hold all plans of expanding the country's nuclear energy program[4]. The future use of Atomic power in Japan is uncertain and there is the real possibility that Japan will eliminate the use of nuclear power all together.

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[1] *Japan Earthquake: Tsunami Hits Northeast*, British Broadcasting Corp. (BBC), Mar. 11, 2011, http://www.bbc.co.uk/news/world-asia-pacific-12709598

[2] Magnitude 9.0 - NEAR THE EAST COAST OF HONSHU, JAPAN, U.S. Geological Survey, Mar. 11, 2011, http://earthquake.usgs.gov/earthquakes/eqinthenews/2011/usc0001xgp/

[3] David Guttenfelder & Eric Talmadge, *Japan Fukushima Reactor: Eight Months After Nuclear Disaster, Plant Remains In Shambles*, Huffington Post, Nov. 12, 2011, http://www.huffingtonpost.com/2011/11/12/japan-fukushima-reactor-e_n_1089900.html

[4] Tsuyoshi Inajima & Yuji Okada, *Nuclear Promotion Dropped in Japan Energy Policy After Fukushima*, Bloomberg, Oct. 28, 2011, http://www.bloomberg.com/news/2011-10-28/nuclear-promotion-dropped-in-japan-energy-policy-after-fukushima.html

Although the current public sentiment has turned against nuclear energy, Japan is dependent on nuclear energy for nearly a third of its energy supply[5]. The country, with its lack of natural resources and struggling economy, cannot afford to abandon its nuclear energy program. The current situation was not caused because nuclear energy is unsafe. Human failures caused the disaster at Fukushima. Oversights and questionable practices by the Tokyo Electric Power Company (TEPCO) and governmental failures at every level are what caused this catastrophe. Furthermore, insufficient nuclear power regulations on the national and international levels exacerbated the situation. The more prudent solution for the country is not to abandon nuclear energy, but to address and correct the institutional and regulatory shortcomings. Indeed, a close examination of the history of nuclear energy in Japan and the events surrounding the Fukushima incident illustrate both the need for continued use of nuclear energy along with the need for substantial regulatory and administrative reforms within the government and the industry itself.

II. Nuclear Energy in Japan.

To fully understand the current situation, it is first necessary to examine the history of nuclear energy in Japan. Throughout the twentieth century and through the first decade of this century Japan has relied on fossil fuels for the majority of its energy needs[6]. Japan is an island national with scarce natural resources of its own and as of 2010 has had to rely on imports for 84% of its total energy requirements[7]. Japan first began researching the use of nuclear energy in the early 1950s[8]. The country's first nuclear reactor went into operation in 1966[9].

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[5] *Nuclear Power in Japan*, World Nuclear Association, http://www.world-nuclear.org/info/inf79.html, (last updated Nov. 30, 2011).
[6] *Id.*
[7] *Id.*
[8] *Id.*
[9] *Id.*

The foundation of the country's nuclear energy program begins with the Atomic Energy Basic Law of 1955[10]. The objective of this law is the research and development of nuclear energy for peaceful purposes. It aspires to promote international co-operation as well as three stated principles of transparency, independent management, and democratic means in the research and use of nuclear energy[11]. This law is essentially a statement of purpose for Japan's nuclear program, but it did set the foundation for the current regulatory scheme.

From this foundation a complex regulatory scheme emerged. The Atomic Energy Basic Law created the Nuclear Energy Agency and the Nuclear Safety Commission in the Prime Minister's Cabinet office to oversee nuclear regulations[12]. The current regulatory scheme further splits regulatory authority between a number of ministries with the aforementioned offices serving in advisory and oversight roles[13]. Safety regulation and inspection of nuclear power plants in Japan is left to the Nuclear and Industrial Safety Agency, which itself is part of the current Ministry of Economic Trade and Industry. Meanwhile, yet another ministry is responsible for the research and development of nuclear energy[14]. Along with its national regulations and oversight, Japan is a member of well-known IGOs such as the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA).

In the event of a crisis in Japan, there exists a crisis management system modeled on that of the United States as well as a nationwide radiation detection system[15]. The crisis system in place would bring all of the various ministers and bureaucrats under the command of the prime minister to allow for fast and informed decision-making. All of the agencies are theoretically

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[10] *Nuclear Legislation in OECD Countries: Japan*, Nuclear Energy Agency (NEA), 3, www.oecd-nea.org/html/law/legislation/japan.pdf (last reviewed Apr. 8, 2011).
[11] *Nuclear Power in Japan*, *supra* note 5.
[12] *Nuclear Legislation in OECD Countries: Japan*, *supra* note 10.
[13] *Id.*
[14] *Id.* at 10.
[15] Norimitsu Onishi & Martin Fackler, *In Nuclear Crisis, Crippling Mistrust*, N.Y. Times, Jun. 13, 2011, at A1.

supposed to work together to ensure the safe and smooth operations of the nuclear industry. The government also works with the nation's utility companies to promote the use and expansion of the power source[16].

A. Public Opinion of Nuclear Energy in Japan.

The government of Japan officially promoted nuclear energy over the years not simply because it sought energy independence for the country, but also because the people of Japan have historically been divided regarding the use and safety of atomic energy. Japan's public opinion regarding nuclear energy throughout the decades since World War Two can best be summarized in the form of Godzilla. The famous movie monster provides an excellent metaphor in this case. The original 1954 film was a dark metaphor for the destructive power of nuclear weapons[17]. As the years went on the creature became more heroic and its popularity grew[18]. This is very much like the perception of nuclear energy in Japan itself. Since the 1980s, public support for nuclear energy has, for the most part, steadily increased[19]. Before the Fukushima incident, public support for the government's plans for expansion of the use nuclear energy was extremely high[20].

Although the public attitude toward nuclear power increased gradually over the years, public opinion has fluctuated as well. Historically support for nuclear power in Japan has been at its lowest following nuclear incidents. For example, in 1999 there was an uncontrolled nuclear reaction at Japan's first nuclear power plant that killed two people[21]. Following this incident, support for nuclear energy dropped 20% and the prevailing sentiment was that nuclear

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[16] *Nuclear Legislation in OECD Countries: Japan*, *supra* note 14
[17] GODZILLA (Toho Co., Ltd. 1954)
[18] Terrence Rafferty, *The Monster that Morphed into a Metaphor*, N.Y. Times, May 2, 2004
[19] *Public Attitudes to Nuclear Power*, NEA, 42 (2010) www.oecd-nea.org/ndd/reports/2010/nea6859-public-attitudes.pdf
[20] Ramana, *Nuclear Power and the Public*, BULL. of Atomic Scientists vol. 67 no. 4, 43 (July 2011)
[21] *Public Attitudes to Nuclear Power*, *supra* note 19 at 44

power was unsafe[22]. The public adopted this negative sentiment once again in 2002 during a scandal involving TEPCO's false reporting of safety tests on their reactors[23]. Despite further cover ups revealed in 2005 and an earthquake in 2007 shutting down a number of reactors at another TEPCO plant, support for nuclear power has generally increased in Japan over the past decade[24].

B. Development of Nuclear Energy prior to Fukushima

The development and usage of nuclear energy became a priority of the Japanese government in the 1970s after an international incident disrupted oil shipments and prices. In the years since its inception, Japan's nuclear energy program has grown significantly. Electricity derived from nuclear energy is produced and distributed by a limited number of local monopolies that serve different areas of the country[25]. The largest of these utilities is TEPCO and it is also one of the largest electric companies in the world[26]. In 1973 there were only five nuclear reactors in the entire country, but as of 2010 there were 54 reactors[27]. TEPCO owns one third of those reactors.

Until recently, nuclear energy accounted for producing almost 30% of Japan's electricity. The government of Japan planned to increase this amount to 40% within the next decade and to 50% within the next twenty years with the goal of increasing energy independence[28]. In 2007 Japan also signed the United States – Japan Joint Nuclear Energy Action Plan[29]. This plan was

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[22] *Id.*
[23] *Id.*
[24] *Id.* at 39
[25] Masahiko Aoki & Geoffrey Rothwell, *Coordination Under Uncertain Conditions: An Analysis of the Fukushima Catastrophe*, Tokyo Asia Development Bank Institute ADBI Working Paper 317, 9 (2011) available at http://www.adbi.org/working-paper/2011/10/28/4771.analysis.fukushima.catastrophe/
[26] Tokyo Electric Power Services Co., Ltd., http://www.tepsco.co.jp/oversea/about_tepco.html (last visited Dec. 14, 2011).
[27] Masahiko Aoki & Geoffrey Rothwell, *supra* note 25
[28] *Nuclear Power in Japan*, *supra* note 5
[29] United States-Japan Joint Nuclear Energy Action Plan, U.S.-Japan, Apr. 18, 2007

meant to further nuclear energy research with a focus on so-called fast-reactor technology. The technology would theoretically create longer lasting nuclear fuels and reduce nuclear waste.

Since the Fukushima disaster, however, these initial plans are in jeopardy. After the incident, the Japanese government froze plans to expand its nuclear energy program. In late October the Cabinet approved a White Paper that reviews the country's energy policy[30]. That report states that, "Japan's dependency on nuclear energy will be reduced as much as possible in the medium-range and long-range future[31]." This same report also stated that the country's energy policy would be redrawn from scratch in 2012. This is a drastic departure from prior plans and decades of promoting the use of nuclear energy to help Japan solve its energy needs.

III. The Fukushima Disaster and its Effects

It was the aftermath of the Fukushima incident and its aftermath that drastically changed and jeopardized the long-standing nuclear policy of Japan. The meltdowns and explosions at the nuclear plant were the immediate effect of the earthquake and tsunami that struck the country earlier in the year. A 15-meter tsunami surged through the entire plant and it disabled the power transmission capabilities of the plant, but also destroyed the back up generators that provided vital cooling for the plant's nuclear reactors. The result of this was uncontrolled overheating of the reactors, which in the days following the initial disaster led to numerous explosions, fires, and the full meltdown of three of the plant's reactors[32].

The effects of the destruction and meltdown of the reactors has been widespread. The explosions and fires that preceded the meltdown of the reactors released sizable amounts of

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[30] Tsuyoshi Inajima & Yuji Okada, *supra* note 4

[31] *Nuclear Power in Japan*, *supra* note 5

[32] *Timeline for the Fukushima Daiichi nuclear power plant accident*, NEA (Aug. 24, 2011) http://www.oecd-nea.org/press/2011/NEWS-04.html

radioactive material into the air and into the surrounding areas[33]. The exposed reactors in meltdown of course released further radiation. The structural damage caused by the natural disasters further compounded this problem. In the days following the disaster, information regarding the situation was very difficult to ascertain and reports from the Japanese government and the owners of the plant, TEPCO, were often contradictory[34].

In the weeks following, however, a 20-kilometer evacuation zone around the plant was put in place and remains in effect. There are many estimates that this exclusion zone will likely remain in effect for years and many of the displaced refugees may never be able to return to the homes and towns within the exclusion zone[35]. However, the full extent and degree of the damage remains uncertain. Reports and investigations relating to lasting environmental damage, especially with regard to potential health risks, are issued and conducted regularly. Among the ongoing investigations, perhaps those of most immediate concern are those relating to the agricultural products of Northern Japan. For instance, the government has had to prohibit sales of beef from a number of areas in the Tohoku region. In mid-November 2011, high levels of radiation have been detected in some rice crops[36]. Contaminated foods are removed from the market and the government is even considering banning shipments from areas where contaminated rice is found[37]. Many farmers lost their livelihoods in the wake of the dual disasters and continued investigations into the safety of agricultural products coupled with prohibitions on certain goods are further damaging the economy of the regional as well as the confidences of consumers in Japan and all over the world.

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[33] Richard Black, *Fukushima as bad as Chernobyl?*, BBC (Apr. 12, 2011) http://www.bbc.co.uk/news/science-environment-13048916
[34] Norimitsu Onishi & Martin Fackler, *supra* note 15
[35] David Guttenfelder & Eric Talmadge, *supra* note 3
[36] Roland Buerk, *Rice Containing Radioactive caesium found in Japan*, BBC (Nov. 17 2011) http://www.bbc.co.uk/news/world-asia-15769321
[37] *Id.*

The disaster has also, of course, had significant impact on the energy supply in the country. Along with the loss of the Fukushima Daiichi plant, the country has effectively lost the use of the majority of its nuclear reactors. For safety and maintenance concerns all but 10 of Japan's 54 nuclear reactors have had their operations suspended[38]. Many of these reactors, including those at Fukushima, provided power to the Tohoku region as well as to the highly populated Tokyo region[39]. Energy shortages and fears of rolling blackouts have been of grave concern and numerous power-saving measures have been employed in an attempt to cope with the problem. One look at the darkened skyline of Tokyo at night or a visit to an office building without central air conditioning is a foreboding testament to the desperate measures employed to ensure the lights stay on. TEPCO estimates that there will be enough power to last into the New Year, however the shortage of electricity production caused by the current crisis could become even more serious of a problem[40]. And it is all but certain that the energy crisis in the country will continue. The cleanup and decommissioning of the Fukushima plant is estimated to take years or even decades[41]. The remaining, functional, reactors in the country may also be shutdown for the foreseeable future. The current regulations state that the approval of local authorities is needed before a plant may turn on its reactors that are currently under maintenance, inspection, or whose operations have been suspended[42]. This go-ahead from local governments is unlikely given the current public attitude toward the country's nuclear program.

Currently the public sentiment toward nuclear energy in Japan is at best hesitant and at its worst downright hostile. Prior to the March 2011 disasters, the Japanese government had plans to significantly expand its use of nuclear energy. Within 20 years half of the country's electricity

[38] Tsuyoshi Inajima & Yuji Okada, *supra* note 4
[39] David Guttenfelder & Eric Talmadge, *supra* note 3
[40] *Id.*
[41] *Id.*
[42] *Id.*

would come from nuclear power plants[43]. This was a plan with widespread public support as well. Some surveys even indicated public support for this initiative at somewhere between 70 and 80 percent. Most of this goodwill and optimism toward nuclear energy, however, was washed away in March by the tsunami.

Japan has always had a vocal anti-nuclear voice. This is understandable considering the country is in the unique if unenviable position of being the only nation to suffer the effects of a nuclear attack. One of the functions of the government nuclear agencies is actually to sell the proposition of nuclear power to the people[44]. No amount of government persuasion, however, could affect the prevailing anti-nuclear sentiment that arose following the Fukushima incident. A number of public opinion polls show that between 40 and 55 percent of Japanese citizens have unfavorable views of nuclear power and would support scaling back the country's use of nuclear power or even getting rid of it completely. Some polls even put this number as high as 70 percent[45].

Of course one of the major concerns is the perceived danger involved in using nuclear energy. After all, an entire 20-kilometer area if the country is uninhabitable and the extent of the lasting environmental damages are still unknown[46]. Furthermore, there is the fear that the food they eat and the water they rely on may, in fact, be deadly. Along with these practical reasons for concern, the people of Japan have simply lost faith in the system that they relied on. There is little trust in the government and the power company at the heart of the incident[47]. After receiving conflicting reports in the days and week subsequent to the tsunami and being subject to

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[43] *Nuclear Power in Japan*, *supra* note 5
[44] *Nuclear Legislation in OECD Countries: Japan*, *supra* note 14
[45] Eric Johnston, *Current nuclear debate to set nation's course for decades*, Japan Times (Sep. 22, 2011). Available at http://www.japantimes.co.jp/text/nn20110922x3.html
[46] David Guttenfelder & Eric Talmadge, *supra* note 3
[47] Eric Johnston, *supra* note 45

what is perceived as a lack of transparency, many people simply do not trust their leaders. Also, the people do not trust their government to adequately handle the situation[48]. Nine months after the event, thousands of refugees are still without homes or adequate necessities such as food and water[49]. When combined with the safety concerns along with the energy saving sacrifices they have had to make, among other things, the people's faith in the system to adequately handle the problem has been shaken. Nowhere was this more evident than late in the summer of 2011 when the Prime Minister and his entire cabinet were forced to resign and make way for a new administration[50]. Although Japan is notorious for short-lived leadership it is very telling that a leader was forced to quit during a crisis situation. The people's trust in their leaders and of nuclear power has plummeted. The evidence definitely seems to point to a general distrust of the government, its policies and the power company, however it is interesting that these institutional failings are often seen as shortcomings of nuclear power in general. Perhaps, rather than pure nuclear safety issues, the Japanese public's attention should be brought to the institutions and regulations that failed.

IV. The Human Causes of the Disaster

The direct cause of the disaster was the deadly earthquake and tsunami that caused the damage to the plant. However, TEPCO, the owners of the plant, and the government officials, whose duty it was to manage and mitigate the effects of the disaster, were also proximate causes of the subsequent and lasting effects of the incident. From the beginning ineffective communication, coordination, and information marginalized the disaster relief effort[51]. There was a lack of decision-making and communication during the entire ordeal. For example, the

[48] *Id.*
[49] David Guttenfelder & Eric Talmadge, *supra* note 3
[50] John Glionna, *Japan to get new leader after prime minister quits,* LA Times (Aug. 27, 2011)
[51] Norimitsu Onishi & Martin Fackler, *supra* note 15

Prime Minister of the country himself first learned of one of the reactor explosions at the plant at the same time the rest of the world witnessed it on television[52]. The Prime Minister did not even go to speak to the TEPCO executives in person until four days after the incident occurred and more explosions at the plant happened[53]. This was one of a series of instances where communication between the government and TEPCO and even within the government was almost nonexistent. No party involved seemed willing to disclose negative information out of fear for their reputations and livelihoods. Plus, many officials who could have assumed a leadership role simply had no experience in the field of nuclear energy or nuclear engineering, so accurate information and meaningful decisions were unlikely even if it was clear who had decision making power[54]. In this especially thick fog of war, officials guessed as to the intentions and wills of other parties. At one point TEPCO even made orders to the chief manager at the plant based on what they assumed the Prime Minister's intentions were. A company liaison to the Prime Minister's office reported that the "mood" of the Prime Minister seemed to be against continuing to cool the reactors with seawater. Based on this, the company ordered those operations to stop[55]. The plant manager, however, continued the operation because without the cooling, the reactors would likely precipitate a greater disaster. This organizational chaos is not debated either. The handling of the disaster eventually forced the Prime Minister to resign. The former Prime Minister himself admitted to the confusion and before leaving office he even set up an investigation committee to further examine the failings associated with the handling of the incident[56]. These organizational failings certainly exacerbated the problem,

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[52] Masahiko Aoki & Geoffrey Rothwell, *supra* note 25.
[53] Norimitsu Onishi & Martin Fackler, *supra* note 15.
[54] *Id.*
[55] *Id.*
[56] THE PRIME MINISTER OF JAPAN AND HIS CABINET, INVESTIGATION COMMITTEE ON THE ACCIDENTS AT THE FUKUSHIMA NUCLEAR POWER STATION OF TEPCO (June 2011) available at http://www.kantei.go.jp/foreign/kan/actions/201106/07kenshou_e.html.

however, the internal failing of the government and TEPCO also contributed to the cause of the nuclear disaster.

A. TEPCO

TEPCO is the largest electric company in Japan as well as the fourth largest in the world[57]. Japanese energy suppliers consist of a number of regional monopolies[58]. TEPCO is one such monopoly and provides almost a third of the country's supply of electricity in servicing more than 26 million homes and businesses in the northeastern coastal areas as well as the Tokyo metropolitan area. The 60 year-old company owns 17 of the country's 54 nuclear reactors and, being one of the largest utility companies in the world, one would suspect that the company is capable of effectively managing its power plants in a safe and lawful manner[59]. There exists some evidence however, that suggest this might not be the case.

Despite its reputation for being one of the largest utilities in the world and for its relatively reliable distribution of electricity, TEPCO is known for its dishonesty. The company has a reputation for a lack of transparency. In the past, the company submitted fraudulent, falsified data and technical documents to government authorities. It also is very reluctant to disclose potential problems or incidents at its facilities. Only ten years ago the company admitted to over 200 incidents between 1977 and 2002 of data falsifications[60]. Further unreported instances would be disclosed a few years later in 2007. One such unreported incident was a 1978 accident at the Fukushima Daiichi plant[61].

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[57] Tokyo Electric Power Services Co., Ltd., *supra* note 26
[58] Masahiko Aoki & Geoffrey Rothwell, *supra* note 25.
[59] *Id.*
[60] Stephanie Cooke, *In Mortal Hands: A Cautionary History of the Nuclear Age*, Bloomsbury Publishing, 388 (2009).
[61] *Nuclear Power in Japan*, *supra* note 5.

The Fukushima Daichi plant itself is over 30 years old and is the oldest nuclear plant owned by TEPCO. The design of the power plant was criticized back in 1971 when it first became operational[62]. The backup generators for example - the ones that were supposed to cool the reactors in case of an emergency and the same ones that failed – were placed too close to sea level in the event of a tsunami[63]. Indeed, the entire plant complex could have been built on higher ground, however when constructing the plant a large amount of topsoil was removed resulting in an overall lower elevation[64]. TEPCO also ignored the warnings that the area could experience a large earthquake despite centuries old documents that pointed to the contrary[65]. Finally, in 2007 an earthquake damaged another nuclear plant owned by TEPCO, the Kashiwazaki-Kariwa plant. This plant is the biggest nuclear plant in the world and it sustained damage very similar to the damage sustained at the Fukushima Daiichi plant in March of 2011[66]. Although obviously not as severe, one of the reactors in the plant has been offline since 2007. This should have been adequate warning to TEPCO to investigate the decades old plant in Fukushima, but no such investigations ever took place. Even though it seems that TEPCO is to blame in many respects for allowing the present catastrophe to occur, a significant amount of blame still lies with the government in this situation as well.

B. The Japanese Government

It is the government's job to oversee and to regulate the conduct of those doing business in its territories. This holds especially true for utility companies because of the essential services they provide to the population of a country. The current nuclear regulatory system and energy

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[62] Norihiko Shirouzu & Rebecca Smith, *Plant's Design, Safety Record Are Under Scrutiny*, The Wall Street Journal (Mar. 16, 2011).
[63] *Id.*
[64] *Id.*
[65] Masahiko Aoki & Geoffrey Rothwell, *supra* note 25 at 14.
[66] *Nuclear Power in Japan*, *supra* note 5.

regulatory system in general has shown itself to be ineffective and likely contributed to the precipitation of this disaster.

A number of ministries and agencies within the Japanese Cabinet divide the regulation and oversight of nuclear energy and materials. There is no one independent nuclear regulatory agency or ministry in the Japanese government[67]. The Cabinet office of the Prime Minister contains the Japan Atomic Energy Agency and the Nuclear Safety Commission[68]. The Ministry of Economic Trade and Industry (METI) is supposed to govern safety and regulation of nuclear energy through its agencies the Nuclear and Industrial Safety Agency (NISA) and the Agency for Natural Resources and Energy (ANRE). The Ministry of Education, Sports, Science, and Technology (MEXT), meanwhile, is supposed to govern the development and research of new Nuclear Energy technologies[69]. There are a lot of acronyms at play here. The regulation of nuclear energy is divided up into no less than six different agencies and there are a number of others that handle such tasks as regulating the transport of nuclear energy. Such a system may actually allow for adequate management at some times, however in the context of an emergency situation its shortcomings become glaring.

Although certain agencies are assigned specific regulatory tasks, these agencies report to a minister. Many of the authority figures within the agencies know very little about nuclear power or engineering[70]. They are career executives, bureaucrats, and political hopefuls. Furthermore, many of the authority figures often have ties to the corporations they regulate[71]. This potential conflict of interest can also serve to dull the regulatory blade that these public servants are expected to wield. This has to some extent even been recognized because in August

[67] *Nuclear Legislation in OECD Countries: Japan*, *supra* note 10.
[68] *Id*.
[69] *Id.* at 13
[70] Masahiko Aoki & Geoffrey Rothwell, *supra* note 25 at 14.
[71] *Id.*

2011 a number of energy officials were fired from METI[72]. Furthermore, METI is also the government agency responsible for promoting nuclear energy and before the Fukushima incident was working alongside TEPCO to establish plans for new nuclear power plants and to secure business deals abroad. This is an awkward relationship seeing as though the NISA, a part of METI, is supposed to be regulating TEPCO. Given this type of situation it becomes easier to understand how TEPCO may have been able to falsify data for a period of almost thirty years. The lack of an independent nuclear regulatory body is evident here. Although the government has discussed implementing such an administration in the near future, the annual energy report issued by the legislature does not mention any such plans[73].

These issues speak also to one of the core problems of the Japanese government and that is a lack of effectual leadership. As of September 2011 Japan has seen six Prime Minister sworn into office in almost as many years[74]. Most have not even managed to stay in office for a year. Japanese leaders and lawmakers at the national level are prone to losing favor with voters quickly and therefore are do not make difficult decisions. Fear of falling out of favor with their constituents is also a driving factor for local authorities keep the temporarily suspended reactors offline. Given the recent history of leaders in the country, the confused, haphazard response to the disaster that forced the former Prime Minister out of office was almost inevitable.

The Prime Minister did not trust many of the bureaucrats within his own agencies nor did he trust the company, TEPCO, either[75]. As a result, he attempted to keep his advisory team small and personal. In doing so he bypassed the established crisis management system

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[72] *Top METI Officials to be fired over N-Crisis*, Daily Yomiuri (Aug. 5, 2011) available at http://www.yomiuri.co.jp
[73] Tsuyoshi Inajima & Yuji Okada, *supra* note 4
[74] Roland Buerk, *Japan's Revolving Door*, BBC (Aug. 26, 2011) http://www.bbc.co.uk/news/world-asia-pacific-14045098
[75] Norimitsu Onishi & Martin Fackler, *supra* note 15

completely and proceeded with incomplete information. He was not even aware that there was a national system for measuring radiation throughout the country existed[76].

A severe lack of communication and understanding of the situation caused this disaster. Absent an independent regulatory organization, with real authority, the government was unprepared to deal with such a crisis.

V. Analysis of the Issues and Solutions

The evidence points toward the human shortcomings of TEPCO and the Japanese as the reason for the excessive devastation caused by the nuclear disaster at the Fukushima Daiichi plant rather than the safety issues inherent in the use of nuclear energy. Perhaps it would be for the best if, rather than risk further damage in the future, Japan leaves nuclear power behind. This is, however, unnecessary. There are available solutions to these problems and these solutions are practicable. Furthermore these solutions are paramount because nuclear energy is necessary in Japan.

A. The Need for Nuclear Energy in Japan

Japan is the third largest producer of nuclear energy in the world and nearly a third of the country's electricity is produced by nuclear power[77]. Many people are currently worried about the dangers of nuclear energy, however there is more fear than there is adequate reason for fear. Japan cannot afford to simply abandon nuclear energy. Even scaling back on the use of nuclear energy isn't very feasible economically for the country.

Before the Fukushima disaster the citizens of Japan were already paying 50% more for their electricity than their counterparts in the United States[78]. Japan is an island nation with limited resources. The majority of the country's remaining electricity is produced by fossil fuels

[76] *Id.*
[77] *Nuclear Power in Japan*, *supra* note 5.
[78] Masahiko Aoki & Geoffrey Rothwell, *supra* note 25 at 13

and coal. To abandon nuclear energy would mean that the final third of the country's power supply would have to be imported. The burden on the nation's economy to import this fuel would be around 1.4% of the annual GDP[79]. That is no insignificant number especially considering that the country is currently trying to clean up two disasters and will likely also have to import even more of their food supply then normal. Also, the country was in a recession before the disasters struck. Japan's public debt is currently almost 200% of its GDP[80]. A proposed solution to essentially import 30% of their energy needs is unfeasible.

Opponents of the continued use of nuclear energy may argue that Japan needs to focus more on renewable energy resources. However, the technology just does not exist in a way that can be effectively implemented. The technology must first exist before the nuclear reactors can be shut down. In the mean time, continued use of nuclear energy will help facilitate the development of renewable energy. Perhaps it will not facilitate the development of new energy resources on its own, however it is possible if combined with a feasible regulatory scheme that promotes such advancements.

B. Solutions

1. An Independent Regulatory Agency

The Atomic Energy Basic Law calls for independence and transparency with regard to the research and use of nuclear energy[81]. However, transparency and independence are both foreign concepts in Japan's nuclear industry. The Fukushima incident was caused by this lack of transparency in the industry and by the lack of an independent decision making authority. Over the years, TEPCO has been less than forthcoming with information regarding the operations of

[79] David Guttenfelder & Eric Talmadge, supra note 3
[80] How will Japan Pay for Reconstruction, The Economist (Mar. 14, 2011) http://www.economist.com/blogs/freeexchange/2011/03/sovereign_debt
[81] *Nuclear Power in Japan*, *supra* note 5.

its plants. It has covered up safety issues and accidents and has even falsified reports to regulatory officials. These misdeeds went on for over three decades before being made public[82]. This company has also been accused of "stacking" public meetings and hearings to voice support for nuclear power plants[83]. All of this demonstrates a lack of transparency within the industry that allows for questionable practices.

Power companies such as TEPCO also work with government agencies to promote the use and expansion of nuclear power. Government authorities even help these companies secure business deals domestically and abroad[84]. This collusive arrangement breeds distrust that can hinder proper regulation and oversight. This can be seen during the disaster when the Prime Minister acted on a long-standing distrust of the bureaucrats and TEPCO officials. Years of cover-ups and shady practices were the reason for this distrust. More so than that, however, the current regulatory structure is also a failure because decision-making authority and oversight is spread out among too many different government ministries. This system creates a bureaucratic nightmare that is unprepared to effectively regulate, especially in times of crisis.

Japan needs a truly independent nuclear regulatory agency. This idea is not a new one. There have been numerous calls for an independent agency in the wake of the disaster. It is widely expected that the government will submit bills to the legislature early in 2012 with the intent on creating such an organization. The proposed organization is tentatively called the Nuclear Safety Agency[85]. However, despite the call for such an agency, there was no mention in

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[82] Daniel Kaufman, *Japan's Triple Disaster: Governance and the Earthquake, Tsunami, and Nuclear Crises*, Brookings (Mar. 16, 2011) http://www.brookings.edu/opinions/2011/0316_japan_disaster_kaufmann.aspx
[83] Mark Willacy, *Japan nuke companies stacked public meetings*, Australian Broadcasting Corporation (Oct. 3, 2011) available at http://www.abc.net.au
[84] Daniel Kaufman, *supra* note 82
[85] *Nuclear Power in Japan*, *supra* note 5.

the recently released energy White Paper about the creation of such an authority[86]. Also, there are few details regarding a proposed independent regulatory agency.

For any reform in this area to be effective, any new regulatory agency must be truly independent. It should not exist as a sub-agency of an existing ministry nor should it share regulatory authority with any other ministry or agency. It should only have the duty to report to the Prime Minister or to the Diet. Also, while most Cabinet ministries change leadership when an administration changes leadership, this should not be the case with the leadership in this new agency. Perhaps an appointment for a set amount of time would be more appropriate. This would prevent the agency heads from being swayed by the temporary political climate. Stability and predictability is needed within an agency such as this. An independent regulatory agency cannot afford to worry about constantly shifting public opinion and must be able to avoid making any knee-jerk reactions based on such. The effectiveness of such an agency would be limited if subjected to the constant political shuffling that takes place in the Japanese government.

The heads of the agency and the employees should also be independent, to whatever extent possible, from the power companies as well. Of course it would be foolish to expect those employed by the agency to be completely independent from both the government bureaucracy and the energy industry, however, a situation like the current system where both the corporations and the government work together in concert to promote nuclear energy is unacceptable and should be avoided. One solution might also be to incorporate some members and goals of Japan's Nuclear Safety Network (NSnet). This organization was established after the accident in 1999 and is an industry peer review group of sorts[87]. The members of this group are a part of the nuclear industry, but if they could be recruited into a regulatory agency then their expertise could

[86] Tsuyoshi Inajima & Yuji Okada, *supra* note 4
[87] *Nuclear Power in Japan*, *supra* note 5.

be put to good use. The workers and management at the Fukushima plant proved that there are many capable people working in the industry.

Another staffing and policy solution, although likely more controversial, is to look outside Japan for help and regulatory authority. Although nuclear energy is a sensitive area in terms of national security, reaching out to foreign experts in the field might help the autonomy of the agency. Some third party, objective viewpoints might help keep the agency's decision making truly independent. This idea is not especially radical. The country relies on the United States for its military needs, for example. It is in a close relationship with the US and may be able to utilize some of America's information and experts in the field of nuclear energy. Japan is also a member of the IAEA and the OECD's NEA. Both international organizations are meant to assist member nations in the development and regulation of nuclear energy for peaceful purposes. By getting the IAEA involved, for example, and perhaps even adopting suggested regulations and strategies from the organization, this would assist in the creation and implementation of a truly independent regulatory scheme. It could also serve the secondary purpose of legitimizing the work and authority of the IAEA.

An independent nuclear regulatory agency must also have the final word on implementing regulations and should only be checked by the Diet or Prime Minister's office. This power would include disaster management plans and safety regulations and inspections of plants. In the wake of the earthquake and tsunami, the primary goal of any regulatory agency should be to ensure that all plants are built to withstand seismic activity and ensure public safety in the event of natural disasters. The plants that pass safety tests would then, of course be opened to resume operations. This would not be a large deviation from current practice. Indeed, most of the nuclear plants directly affected by the earthquake initiated emergency shut down

procedures and were shut down safely as intended. However, the greater power and scrutiny of the agency would be able to prevent and address problems such as those with the Fukushima Daiichi plant. This would pave the way for the growth of nuclear energy in Japan in a much safer environment.

Furthermore, any disaster management plans regarding potential nuclear crises should be subject to the approval of this new nuclear regulatory agency. Even if the Prime Minister would ultimately be in charge during a crisis, it should be the specialists appointed to regulate the industry that should formulate the strategy. This would actually work well with the crisis management scheme that was supposed to be in place before the disaster, but that the Prime Minister ignored. Perhaps a trusted, truly independent agency would be in a better position to influence the Prime Minister and help ensure that proper procedure is followed.

A nuclear regulatory agency not susceptible to rapid political change, corporate influence and with true independent decision making power is necessary for the future of Japan's nuclear industry. The lack of transparency and the lack of an independent regulatory body resulted in a system that allowed large utility corporations to maximize their profits while simultaneously compromising national security and public safety.

2. TEPCO should not be bailed out.

Although an independent nuclear regulatory agency is the solution for the continued safe use of nuclear power in Japan, the immediate effects of the Fukushima disaster must also be dealt with. Cleanup and victim compensation stands to financially cripple TEPCO and if this happens, the future of energy in Japan is uncertain. TEPCO is the largest provider of electricity in the country. Indeed, the government has already approved the use of 900 billion yen in public

money to assist TEPCO with compensation of the victims of the tragedy[88]. There is also speculation - although the government rebuffs these - that TEPCO will need a government bailout to survive.

TEPCO should not be bailed out. Effectively nationalizing the country's biggest energy provider would do nothing to help the situation in the long term. Rather, the better solution would be for the government to purchase TEPCO's transmission grid[89]. TEPCO and the other regional energy monopolies in Japan control both the distribution and transmission of electricity. By purchasing TEPCO's transmission grid, the government could avoid a bailout scenario. Also, the government should aim to not only purchase TEPCO's transmission grid, but also seek to gain control of the transmission grids of the other energy companies and create a national grid. One of the oddities of Japan's electrical grid is that the western portion of the main island of Honshu operates on a different frequency than that of the eastern portion8. This made it impossible for the southwestern portion of Japan to alleviate any of the energy shortage caused by the earthquake, tsunami, and nuclear disaster.

Such a plan would avoid an expensive bailout and would put those public funds to better use. This would not interfere with the energy industry significantly. It would still be a privatized industry and the production of electricity would not significantly change. Such a system would be similar to the systems in many European countries that have a publicly owned transmission system. Theoretically this system would also allow for other, new energy companies to emerge. This could fuel competition and perhaps even encourage the development of cheaper, cleaner energy[90].

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[88] *Japan's Yukio Edano Rebuffs TEPCO Bailout Claim,* BBC (Dec. 8, 2011) http://www.bbc.co.uk/news/business-16082349
[89] Masahiko Aoki & Geoffrey Rothwell, *supra* note 25 at 11
[90] *Id*.

Although the idea that this may promote the development of cheaper, greener energy is speculative, it would be in the country's best interest to create one national transmission system. Also, the aforementioned nuclear regulatory energy could perhaps have its powers expanded to allow for one agency to oversee the transmission of the country's electricity.

VI. Conclusion

The earthquake and Tsunami that struck Japan in March 2011 was a devastating natural disaster. The nuclear disaster at the Fukushima Daiichi plant was a devastating man-made disaster. A proper response and independent regulatory and safety scheme could have prevented and mitigated the disaster at the Fukushima power plant. For Japan, the solution going forward is not to abandon its nuclear program. The country must institute a reform within the government and create a new, independent regulatory agency for the nuclear industry. This will regain the public's confidence and ensure the continued, safe use of nuclear energy. The past shows that public opinion is fickle especially where the use of nuclear energy is concerned. Although the Fukushima disaster is much more serious than past incidents, the past also shows that it is possible to win the back the public's trust through proper action. By continuing the use of nuclear energy under a capable regulatory regime, the country will put itself back on the road toward energy independence and ensure it remains a global economic power.