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Post-Crisis Japanese Nuclear Policy: From Top-Down Directives to Bottom-Up Activism

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SUMMARY Over the past fifty years, Japan has developed one of the most advanced commercial nuclear power programs in the world. This is largely due to the government's broad repertoire of policy instruments that have helped further its nuclear power goals. These top-down directives have resulted in the construction of 54 plants and at least the appearance of widespread support for nuclear power. By the 1990s, however, this carefully cultivated public support was beginning to break apart. And following the earthquake and tsunami of March 2011 and resulting nuclear crisis in the Fukushima nuclear complex, the political and social landscape for energy in Japan has been dramatically altered. The crisis has raised and reinforced environmental concerns and health fears, as well as skepticism about information from government and corporate sources. A civil society that for decades has appeared weak and non-partcipatory has awakened and citizens are carrying out bottom-up responses to the accident, effecting change with grassroots science and activism.

In 1955, roughly one-third of the people of Japan supported a nuclear weapons ban—for many, nuclear power was equally unwanted

Using a mix of top-down directives and well-funded policy instruments, Japan successfully created one of the most advanced commercial nuclear power programs in the world. Government officials and local politicians actively supported the nuclear industry, along with its lucrative handouts to host sites, while Japanese citizens tacitly gave support by accepting both the benefits and the risks. But the compound disaster of 11 March 2011 has drastically altered the political and social landscape for energy in Japan and around the world. The Tohoku earthquake, tsunami, and ongoing nuclear crisis in the Fukushima nuclear complex raised environmental concerns and health fears both for well-established antinuclear groups and everyday citizens across the political spectrum. Local residents throughout Japan, along with nongovernmental organizations (NGOs), have seized the opportunity to carry out bottom-up responses to the accident, including radiation monitoring, challenges to bureaucrats' authority, and mass protest. This dramatic public response can be placed in context by reviewing the past five decades of Japan's nuclear power program, and by focusing on the interaction between state and civil society and the ways in which the system is being changed by grassroots science and activism after the disaster.

Japan's "Nuclear Allergy" and Top-Down Directives

Following the devastation at the end of World War II, the Japanese population developed a social condition known as *kaku arerugi* (nuclear allergy). The atomic bombings created a strong antinuclear weapons sentiment in Japan, as did the Lucky Dragon incident less than a decade later. In March 1954, 23 fishermen aboard the *Daigo Fukuryū Maru* (Lucky Dragon Number 5) passed through the fallout created by a Pacific Ocean test of the American hydrogen bomb. Soon after returning to Japan, Aikichi Kuboyama, the radio operator, succumbed to acute radiation contamination and became the first victim of the hydrogen bomb. Newspapers covered the incident and monitored his deteriorating health, detailing the all-too-familiar effects of radiation in front-page stories that captured the public's attention. Motivated by this tragedy, residents of the Suginami Ward in Tokyo began a petition drive to ban hydrogen bombs, and by August of 1955 they had secured more than 30 million signatures. Put another way, roughly one-third of the people of Japan expressed their support for a nuclear weapons ban. Many respondents envisioned nuclear power as equally unwanted. The two longest-standing antinuclear organizations in Japan, Gensuikyo and Gensuikin, emerged from these events and continue to hold rallies and disseminate information on nuclear issues.[1]

The widespread fear of radiation and distrust of nuclear power among Japanese civilians following the bombings at Hiroshima and Nagasaki have deterred Japan from pursuing nuclear weapons. Some explain it as a function of the nation's postwar pacifist norms, while others say it is the outcome of institutional design.[2] At the same time, however, Japan has built one of the most advanced commercial nuclear power frameworks in the world. While the United States and France abandoned experimental technologies such as fast breeder reactors, mixed oxide (MOX) fuel, and plans for a closed fuel cycle,[3] Japanese decision makers stuck with these schemes as crucial for achieving indigenous, self-contained energy production.[4] That goal remains in place today. Even the recent nuclear crisis and public protests have not elicited a dialogue on Japan's long-term energy production goals.

Some scholars have argued that Japan's nuclear power program is the outcome solely of market forces, a lack of access points for antinuclear groups, or a top-down hierarchical political culture. In reality, the government has carefully designed and refined a broad repertoire of policy instruments to further its nuclear power goals. In the same year as the Lucky Dragon incident, the young politician Yasuhiro Nakasone (who eventually became prime minister) proposed that the central government

allocate money to nuclear research. The Japanese legislature passed the Atomic Energy Basic Law and developed Japan's own Atomic Energy Commission to mirror institutional developments in the United States. Soon afterward, however, Japan departed from America's primarily market-based approach to energy policy (although the 1957 Price-Anderson Act remains a clear example of the US government amortizing the industry's risks). Rather than allowing private energy utilities throughout the nation to handle the issues of siting and public acceptance on their own, the Japanese government developed an extensive array of policy instruments and soft social control techniques designed to bring public opinion in line with national energy goals. Authorities and regulators overcame opposition and concerns among the broader population and in specific demographic groups, such as coastal fishermen and students, through focused policy instruments intent on manipulating public support.

The government provided a number of different types of support to Tokyo Electric Power Company (TEPCO) and other regional power monopolies in the early years of nuclear power. One form of help involved logistical and financial support in mapping out potential host communities throughout Japan. Government bureaucrats assisted the utilities both in the physical charting of potential locations—to ensure that they met certain technocratic criteria, such as having access to cooling water, proximity to existing power grid lines, support from relatively aseismic rock, and so forth—and in mapping the social characteristics of nearby communities. Internal documents from the Japan Atomic Industrial Forum (JAIF) industry group showed that planners of the late 1960s and early 1970s were very cognizant of the dangers posed by well-organized horizontal associations, especially fishermen's cooperatives (*gyogyō rōdō kumiai*). Analyses of the siting of nuclear power plants in Japan demonstrate that planners placed these projects in rural communities, which were less coordinated and more fragmented, and, hence, less likely to successfully mount anti-nuclear campaigns.[5] To overcome any remaining opposition in such localities, the government often offered jobs and assistance to fishermen to ensure that the nuclear power plant would not be seen as curtailing their livelihoods.

The high and unstable price of oil in the 1970s created pressure for Japanese planners to achieve energy security

Initially, the government agency known as MITI, the Ministry of International Trade and Industry, or Tsūshō Sangyō Shō (which became METI in 2001, the Ministry of Economy, Trade, and Industry) had only a handful of techniques to induce public support for nuclear energy.[6] Some communities rallied against planned nuclear complexes in their backyard—fishermen at the Tokaimura nuclear complex, for example, expressed their opposition through boat rallies and marches, and others stopped a planned teaching reactor at Kansai University, located in a densely populated urban area near Uji City—but large-scale opposition had not yet developed in the 1960s and early 1970s. (By the late 1970s, however, several national antinuclear umbrella organizations sprang up and began to organize protests across the country.) The oil shocks of the 1970s pushed Japan's energy bureaucracy into high gear, as the nominal price of oil skyrocketed and the market price quadrupled, from $3 a barrel to $12.

The high and unstable price of oil—critical for Japan's petrochemical industries, as well as a host of other fields, including automobiles and oil refining—created pressure for Japanese planners to achieve a new goal: energy security. The government hoped that between hydroelectric dams and nuclear power plants, Japan would be able to wean itself off oil from the Middle East. This would require the consent of the citizens of Japan on a large scale. As a result of this new push, the system that allocated benefits to actual and potential nuclear power plant host communities became so complex that the central government created a new agency, the ANRE (Agency for Natural Resources and Energy, or Shigen Enerugi Chō). Over the course of the next decade, more spin-offs were created, including the Japan Atomic Energy Relations Organization, the Japan Industrial Location Center (Nihon Ricchi

The Growth of Nuclear Power in Japan

1960-61: Construction of first reactors begin in Tokai-Mura area.

1965-66: First nuclear reactors begins commercial operation (JPDR-II, operated 1965-76; Tokai-1, operated 1966-1998).

1970s-80s: Reactor siting and construction goes into high gear when 1970s oil crisis creates pressure to reduce dependence on energy imports.

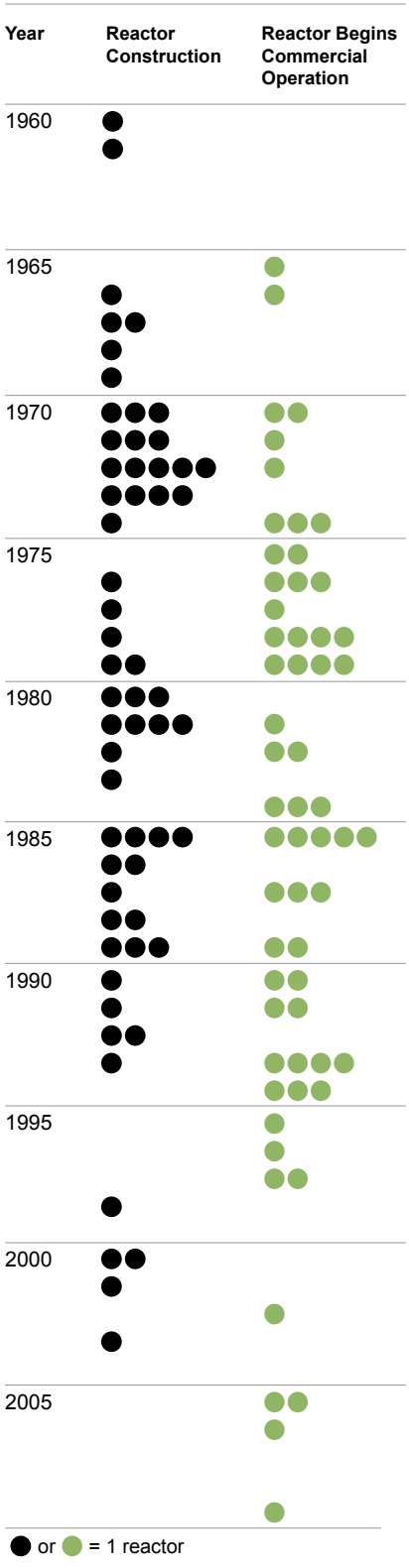
1986: Chernobyl disaster—the only atomic accident until Fukushima Dai-ichi complex disaster to be categorized as high as a 7 ("major accident") on the International Nuclear Event Scale (INES).

1990s-2000s: Reactor siting and construction slows dramatically due to citizen opposition to nuclear power because of potential health effects, the lack of a long-term storage facility for nuclear waste, and potential proliferation concerns.

Evidence of a history of accidents and coverups comes out in late 1990s and early 2000s.

2011: Fukushima Dai-ichi complex disaster following 11 March earthquake and tsunami.

As of December 2011, only 6 of Japan's 54 reactors are currently active (11.5 percent of total nuclear power capacity). Many are offline for routine maintenance, but are not restarting on schedule because of new stress test requirements.



Sources: World Nuclear Association, http://www.world-nuclear.org; Reuters, "Japan Nuclear Plant Ops (Genkai No.4 Enters Turnaround)," December 26, 2011.

Sentā), and the Center for the Development of Power Supply Regions. The personnel and budgets of these agencies were focused primarily on the placement of new nuclear power plants throughout the country. Policy instruments for improving nuclear power's image included pep talks from central government bureaucrats, the development of science curricula for school-aged children, Nuclear Power Day, and annual fairs where local fishermen and farmers could sell their products.

ANRE bureaucrats listened closely to the concerns of these demographic groups, who often feared "nuclear blight"—the inability to sell their fishing and agricultural products because of possible radioactivity—more than they feared health risks or environmental damage. In response, the various government agencies set up an annual, large-scale exhibition outside Tokyo called the "Electricity Hometown Fair," where fishermen and farmers from nuclear power plant host communities would be ensured a profit thanks to the hundreds of thousands of tourists and consumers who descended on the convention center, Makuhari Messe, outside Tokyo. Similarly, local government officials began to worry about recall elections, which had ended the political careers of several pronuclear mayors. To address their concerns, the central government organized workshops that educated local elected officials about what had worked—and what had failed— in past attempts to boost nuclear plants in various localities around the country. Mayors and governors who supported atomic reactors in their areas would find themselves invited to the prime minister's residence in Tokyo for a public recognition ceremony honoring their assistance with meeting national energy goals. These hortatory tools sought to create pronuclear agents at the local level who would help rally support for nuclear power plants and overcome any opposition.[7]

The government provided up to $20 million a year to acquiescent communities through the Three Power Source Development Laws (known by the abbreviation Dengen Sanpō). What had initially been a series of ad hoc measures designed to win

public support for nuclear power complexes became a tremendously well-funded policy instrument that funneled hidden taxes on electricity use into a pooled account. Bureaucrats then distributed these funds to host communities throughout rural, coastal Japan. Through this institutionalized redistributive system and a variety of other measures designed to convince local residents that nuclear power was both safe and necessary, the Japanese government created many host community volunteers among the depopulating towns and villages. For these small communities, such as Futaba in Fukushima and Tomari in Hokkaido, the promise of a nuclear power plant meant potential jobs, millions of dollars in grants and loans, new infrastructure, and the prospect of survival. Commentators have argued that the flow of money into often older, impoverished rural communities has created a "culture of dependence" and a "cycle of addiction."[8]

For small communities, a nuclear power plant meant potential jobs and millions of dollars in grants and loans

The breadth of policy instruments for manipulating public opinion, while effective, has not guaranteed success at siting. Research has shown that of the roughly 95 attempts to site nuclear power plants over the postwar period, only 54 were actually completed. With well-organized and informed opposition groups operating since the early 1980s, including the Citizens' Nuclear Information Center (CNIC, or Genshiryoku Shiryō Jōhō Shitsu) and the antinuclear newspaper *Hangenpatsu Shinbun,* many communities fought back in highly publicized battles. The accidents at Three Mile Island and Chernobyl worried many Japanese residents, but authorities reassured them that these would not be possible in Japan, given its strong engineering credentials, in-depth safety controls, and highly educated and motivated staff. The government also enlarged the range of projects to which the Dengen Sanpō funds could be applied, lengthened the period for which they would be available, and increased the pool of funding provided to local communities. Overall, despite ongoing opposition, the government and regional energy monopolies saw few reasons to worry about the future. One white paper envisioned the construction of an additional 17 nuclear power plants in Japan by 2024, which would increase the amount of electricity generated by nuclear power from one-third to roughly one-half. These optimistic visions of nuclear power's future, however, were not to be realized.

The Final Straw?

By the late 1990s, siting planners encountered serious bottlenecks in the system of constructing new nuclear power plants. The time between the proposal of the plant and its activation stretched from less than a decade in the early 1970s to more than three decades by the late 1990s.[9] Citizen opposition to nuclear power because of potential health effects, the lack of a long-term storage facility for nuclear waste, and potential proliferation concerns grew steadily. The CNIC and the *Hangenpatsu Shinbun* publicized ongoing fights against siting attempts and provided advice to would-be opposition groups. Across the industrialized democracies, residents began to demand more from their governments, moving beyond basic materialist concerns to focus on the environment, sustainability, and health.[10] In addition, a series of large- and small-scale accidents and cover-ups in the industry, including three fatalities at a nuclear facility in Tokaimura, chipped away at public support for the industry in the mid-1990s.

A history of cover-ups. On 8 December 1995, the experimental sodium-cooled fast breeder reactor known as the Monju experienced a huge sodium leak. The resulting fire was hot enough to melt various steel structures in the chamber. The Japanese agency in charge of the Monju, however, decided to suppress details of the accident and to doctor a publicly released videotape of the leak and its aftermath. Local residents successfully fought attempts to restart the experimental reactor until the summer of 2005, when the Supreme Court ruled in favor of restarting. Some four years after the Monju fire, Japan experienced its worst nuclear accident to date. On 30 September 1999, when three workers at the nuclear fuel cycle company JCO in Tokaimura were preparing

fuel for one of Japan's experimental fast breeder reactors, they set off a criticality (an increase in nuclear reactions in radioactive material) that exposed them to tremendously high levels of radiation. Two of the three died from extreme radiation exposure, and local residents in the nearby town were told to remain indoors to avoid contamination.

These were not the only events that began to break apart public support and faith in the industry. Revelations that TEPCO, the Tokyo Electric Power Company, had covered up numerous accidents, leaks, and cracks since the 1980s also came to light. Engineers came forward in the early 2000s to reveal that at least 30 serious incidents had been hidden by company management. In response, several upper management executives lost their jobs, and the central government ordered the shutdown of TEPCO's 17 nuclear reactors in 2002. These events further undermined the industry's credibility. The recent (and ongoing) accident at the Fukushima nuclear complex may be the straw that broke the camel's back.

The 3/11 disaster. On 11 March 2011, a 9.0 magnitude earthquake struck off Japan's northeastern coast, which caused much damage, but very few fatalities. Recent data show that fewer than 6 percent of deaths were caused by the collapse of buildings.[11] Far more destructive was the tsunami set off by the earthquake, which had waves as high as 50 feet in some places. The tsunami swamped existing seawalls and devastated communities, causing at least 20,000 deaths, primarily in Iwate, Miyagi, and Fukushima Prefectures. Estimates of the damage exceed $220 billion. The highly touted back-up systems at the Fukushima Dai-ichi nuclear complex operated by TEPCO—namely, the diesel generators and batteries—went offline soon after the earthquake and tsunami, although investigators have yet to pin down which event was primarily responsible for the failure.

Japanese parents are angry over reassurances that their children are safe, despite blood and urine tests showing high levels of exposure

As a result, though the reactors automatically shut down, residual heat caused fuel meltdowns in three of the six reactors at the site. Temperatures rose tremendously in the first day after the tsunami, soaring above 2,000 degrees Fahrenheit and melting the zircaloy (zirconium alloy) tubes containing the fuel pellets in the reactors. Engineers sought to reduce the growing pressure inside the containment units by deliberately venting the reactors to the atmosphere (thus releasing radioactive elements into the air), and they tried to cool the reactors and ensure that the spent fuel rods would remain underwater by pumping in hundreds of thousands of gallons of seawater. This procedure, which engineers refer to as a "feed and bleed," resulted in approximately 100,000 tons of contaminated water accumulating in the basements of the reactors, flowing into the ground and water table nearby, and being dumped into the ocean.[12] Adding to the chaos, hydrogen explosions blew the tops off three of the buildings containing the reactors, the result of zircaloy and water interacting.

Japanese authorities eventually categorized the incident as a 7 ("major accident") on the International Nuclear Event Scale (INES) due to the amount of radiation released; the 1986 Chernobyl disaster is the only other atomic accident to date in this category. Then Prime Minister Naoto Kan initially set up a 12-mile evacuation zone around the Fukushima Dai-ichi plant, and moved to expand the radius of the evacuation over the next two weeks. As of October 2011, more than 75,000 residents of the area were unable to return to their homes in Fukushima Prefecture because of high levels of radioactivity. Foreign governments, including the United States, strongly encouraged their citizens in Japan to evacuate the immediate area (and, in some cases, the country) when details of the accident began to circulate. Since the accident began, a number of agricultural companies were forced to stop exporting food from the area due to radioactive contamination of tea, beef, rice, and citrus products. Many Japanese parents have shown increasing anger over reassurances from the central government that their children are safe, despite blood and urine tests showing high levels of exposure, even in areas far removed from the Fukushima area, such as northern Tokyo, Yokohama, and Saitama.

To add fuel to the fire, managers at the Kyūshu Electric Power Company were discovered tampering with a public opinion poll posted on 26 June 2011. The poll focused on the restart of the nearby

Saga nuclear power complex, and was initiated at the suggestion of the Saga prefectural governor, Yasushi Furukawa.[13] The scandal, known as the *yarase mairu* (staged mail) scandal, involved employees at the utility sending 140 supportive comments to the station, which were enough to tip the balance of opinion in favor of restarting.[14] When the media first reported the problem, the company denied doing anything wrong, but has since apologized for its actions.

Many corporations plan to relocate to offshore locations if Japan cannot ensure stability in the electricity supply

Public opinion polls done by the Roper Center for Public Opinion Research in early August 2011 of some 1,000 residents across Japan reported that nearly 60 percent of the respondents had either little or no confidence in the safety of Japan's nuclear power plants. Gaffes from government ministers have not improved matters. Yoshio Hachiro, who was at the time the new trade minister, called the village near the Fukushima Dai-ichi complex a "town of death," and then had to apologize after tremendous criticism. He soon stepped down from the post. Current Prime Minister Yoshihiko Noda has apologized to Fukushima Governor Yuhei Sato for the government's "inadequate response" to the disaster. After years of manipulation and incentives from the central government, the recent actions of the regional monopoly to alter public opinion has motivated many citizens to mobilize in the wake of the crisis.[15]

As the Japanese government struggled to deal with the rising death toll from the tsunami, the slow release of information about the accident from TEPCO, and rising citizen distrust, governments around the world have begun to reevaluate their own commitments to nuclear power. The event's political fallout has spread well beyond Japan's borders. Italy, Germany, and Switzerland, among other industrialized nations, have used the Fukushima nuclear crisis as a focal point for shifting policy away from nuclear power toward less potentially catastrophic sources.

Molding the Future

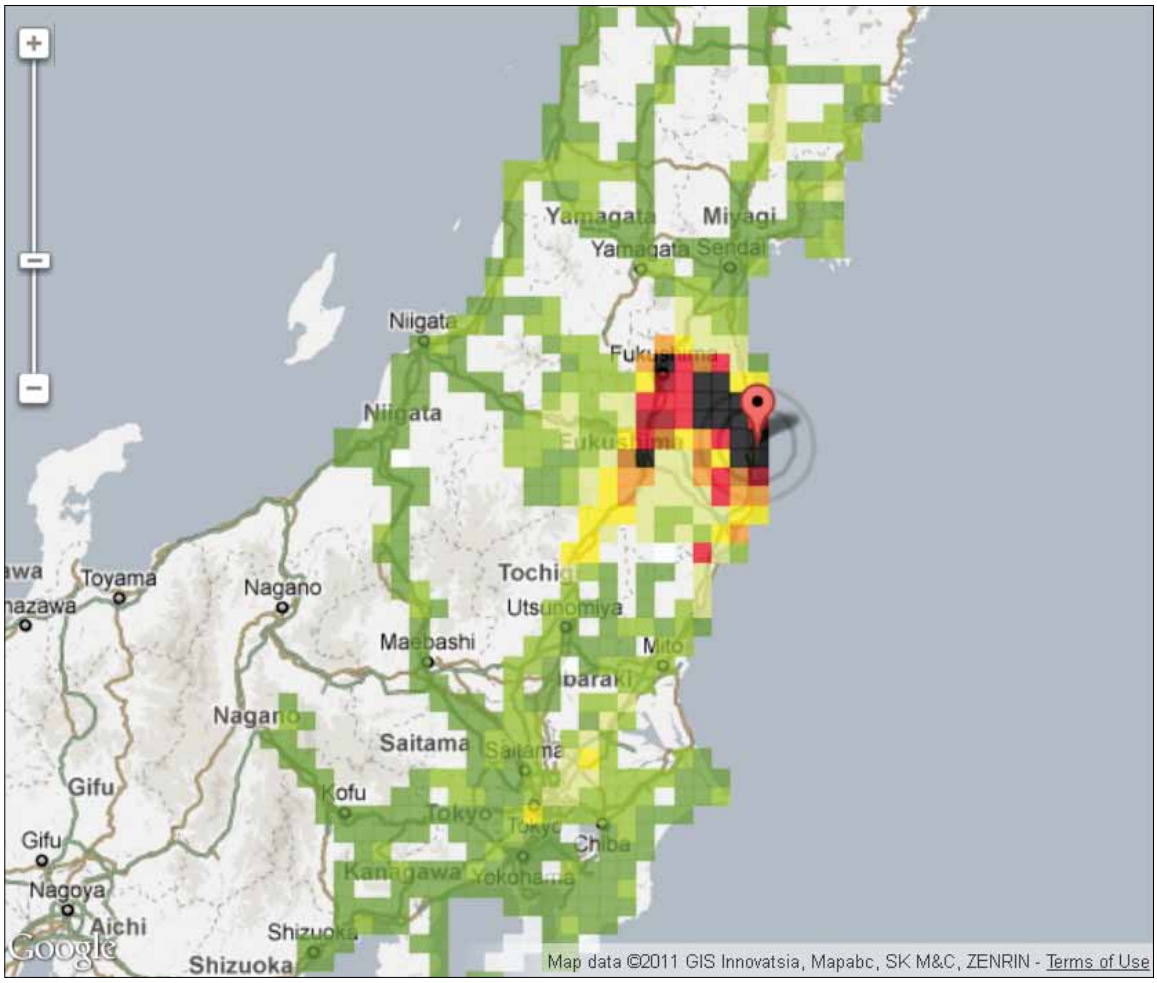
Along with altering the decision-making calculus on nuclear power for Japan and other nations, the events of 11 March opened a window for bottom-up initiatives and bold actions, and provide hope that the "business as usual" mentality will be upended. Only 6 of Japan's 54 reactors were in use as of December 2011, and restarting and reintegrating them into the national power supply will require tremendous public relations work. Japan's major financial newspaper, the *Nikkei Shinbun*, published a series of surveys showing that many corporations plan to relocate their manufacturing to offshore locations—including India, China, and Malaysia—if the Japanese government cannot create a plan to ensure stability in the electricity supply over the next three years. One Japanese business analyst argued that "if we completely abandon nuclear power generation . . . I think most industries would lose competitiveness and go out of Japan."[16] Many observers have underscored the fact that that corporations dislike uncertainty, and uncertainty about disruptions in Japan's power supply (or a spike in costs for electricity) have made many Japanese firms deeply anxious. Given the economic difficulties the nation has faced over the past two decades, these new economic threats are being taken very seriously. Some private firms, such as the energy utility KEPCO (Kansai Electric Power Company), have stepped forward with new plans for safer alternative energy sources, including a new 10,000-kilowatt solar facility in Osaka Prefecture. Tohoku Electric Power Company has stated its intent to dramatically increase the capacity of its wind farms by 2020.[17] Popular entrepreneur Masayoshi Son, creator of SoftBank, pledged an investment of a billion yen in the new Japan Renewable Energy Foundation, which is centered on solar energy.

Citizen science. Beyond economic concerns from the business community, several new initiatives show how Japan's civil society has been energized by this tremendous tragedy. The Safecast project (see map on following page) embodies a new focus on "citizen science"—that is, the participation of everyday residents as volunteers in data collection, technical measurement, and analysis in fields such as ecology, biodiversity, and astronomy.[18] Participants in such collaborative projects work together, often using web-based platforms and affordable instrumentation, to achieve results that lone

researchers in highly funded laboratories would not be able to accomplish.

Data such as that provided by Safecast trumps the data released by the government and TEPCO, whose collection methodology has been opaque and whose release has been slow. At a time when many survivors of the tsunami have fled their homes in Fukushima seeking what they see as safer shelter in Tokyo, this kind of data sheds light in an otherwise dark time. Japanese bureaucrats have taken notice of the surge in citizen science. Minister of Education and Science Masaharu Nakagawa told reporters, "Citizen's groups have played a very important role in examining their neighbors closely. I really

Map of radiation levels in the Fukushima area, courtesy of "citizen science"



Source: Screen shot from http://blog.safecast.org/maps/, December 27, 2011.

This map, compiled and published by Safecast, provides an example of the new citizen activism and citizen science that has emerged amidst the atmosphere of mistrust among the Japanese people towards both TEPCO and the central government itself. The data for this map is collected by trained Safecast volunteers using radiation sensors.

The full map (available on the website Safecast.org) is made up of more than 600,000 data points collected by volunteers—not TEPCO engineers, central government bureaucrats, or subcontractors from the nuclear industry. Instead, Japanese citizens and foreign residents who own Geiger counters have traveled throughout Japan (including areas in Fukushima), measured radiation levels, and electronically uploaded the collected data to the Safecast project's central website. Volunteers have turned the data into a map that illustrates the amount of detected radiation in each spot. In doing so, Safecast has created a public repository of data generated through transparent methodology in real time.

appreciate their contribution, as it's most important to eliminate as many hot spots as possible."[19]

Increasing activism. Citizen activism became increasingly visible at recent public meetings hosted by officials from the central government. These meetings have typically been "rituals of assent,"[20] where bureaucrats make statements and the audience says little in response. Many people in nuclear plant host communities reported that government-sponsored attendees have regularly lectured them on the necessity and safety of nuclear power plants since the 1990s. Following Fukushima, many citizens have been unwilling to accept statements from the government or industry at face value. A new video of Fukushima citizens challenging grim-faced bureaucrats has garnered over a quarter of a million views so far.[21] The video shows a number of clearly angry citizens facing down bureaucrats with statements such as, "People in Fukushima have a right to avoid radiation exposure and live healthy lives, don't they?" Residents forced from their homes in Fukushima have similarly shouted down government representatives as they attempted to justify laborious, 60-page applications for government assistance. Some yelled, "We don't know who we can trust! Can we actually go back home? And, if not, can you guarantee our livelihoods?"[22] In the past, polls such as the World Values Survey have shown that Japanese residents are not likely to participate in large-scale demonstrations; the Fukushima disaster has brought out a new type of activism.

Public pressure is altering decades of business-as-usual politics

A recent *Wall Street Journal* article quoted Tokyo resident Taichi Hirano, who said that while he used to shy away from protest rallies, his feelings had changed: "I wanted to go somewhere where I could say loudly that I was scared and not be ashamed."[23] He now uses social media platforms such as Twitter to seek out other participants for marches in the capital. Organizers across the country carried out a Sayonara Nuclear Power Rally in Tokyo's Meiji Park in mid-September, which drew roughly 40,000 participants. Holding placards and chanting "end nuclear power," the large crowd listened to talks from celebrities such as popular author Kenzaburo Oe and musician Ryuichi Sakamoto.[24] These coordinated antinuclear protests are significant not only because they are relatively rare and indicate new levels of activism, but also because the very act of participation in public protest deepens Japan's democracy and enhances the presence of often unrepresented demographics, such as urban workers and youth, in the public sphere.[25]

A new direction. The government's decision to move away from top-down, technocratic decision-making processes demonstrates that public pressure is altering decades of business-as-usual politics. While the pre-Fukushima strategy for national energy involved siting up to 15 more nuclear power plants over the next few decades, with the goal of increasing nuclear power's share of production to 50 percent, plans have clearly taken a new direction. The government has taken an important step in promising to separate nuclear regulators from nuclear promoters. Previously, MITI (now METI) was charged with the unsustainable task of both ensuring that the industry cut no corners and encouraging firms to create new plants with government subsidies to host communities. A new institution will take over the Nuclear and Industrial Safety Agency (NISA) and will absorb radiation monitoring activities carried out by bureaucrats within the Ministry for Education, Culture, Sports, Science, and Technology (often known as MEXT). To avoid criticism that the same bureaucrats will simply be reshuffled into the new agency, the government has claimed it will draw on the Ministry of Environment to staff it.

Former Prime Minister Naoto Kan spoke of moving Japan away from nuclear power, and while many companies may be skeptical of the government's ability to fill in the gap with renewable energy sources, the public is convinced that Japan needs a new nuclear energy policy. Local mayors and governors, who in the past could be counted on to support restarts of nuclear power in their communities, seem unwilling to move forward even nine months after the accident. Prime Minister Noda has

Only time will tell if this large-scale catastrophe will break the cycle

called plans for building new reactors "unrealistic," though he also recognizes the tremendous financial costs it will entail.[26] Further, Noda and the Democratic Party of Japan (DPJ) have sought alternative cost estimates for maintaining Japan's extensive nuclear program, beyond those provided by the "iron triangle" of firms, bureaucrats, and politicians deeply committed to the industry. Initial reports indicate that these alternative estimates are far higher than the costs typically stated, which might strengthen government support of solar, geothermal, and wind power.[27] However, while there are now political and social challenges to the iron triangle of the nuclear industry, no public discussion has taken place on the subject of changing the elaborate Dengen Sanpō system or eliminating subsidies to rural host communities. Only time will tell if this large-scale catastrophe will break the cycle of addiction created by more than thirty years of redistribution to the periphery of Japan.

Japan's tragedy has taken lives, destroyed homes and communities, and slowed an already underperforming economy. But it has also awakened a civil society that for decades has been seen as weak and nonparticipatory. Citizens have stepped forward to engage in community-based science, challenge the information and explanations given to them by government officials and other authorities, and protest existing policies. At the crossroads of energy and politics, Japanese citizens have the chance to take the path they make themselves and to determine their own future.

Notes

[1] For details on the split between the two, see Hitoshi Yoshioka, *Genshiryoku no Shakaishi* [The social history of nuclear power] (Tokyo: Asahi Shinbunsha, 1999).

[2] University of Southern California professor Jacques Hymans has written extensively about the long-term institutional stability in Japan's nuclear power regime, which has kept that nation from pursuing nuclear weapons. Some of his writings are available at http://www-rcf.usc.edu/~hymans.

[3] See Gabrielle Hecht, *The Radiance of France: Nuclear Power and National Identity after World War II* (Cambridge, MA: MIT Press, 1998) and John L. Campbell, *Collapse of an Industry* (Ithaca, NY: Cornell University Press, 1988) for a discussion of national-level energy plans in France and the United States.

[4] Susan Pickett, "Japan's Nuclear Energy Policy," *Energy Policy* 30 (2002): 1337–55.

[5] Daniel P. Aldrich, "Location, Location, Location: Selecting Sites for Controversial Facilities," *Singapore Economic Review* 53, no. 1 (2008): 145–72.

[6] MITI was popularized in the West in Chalmers Johnson, *MITI and the Japanese Miracle* (Palo Alto, CA: Stanford University Press, 1982).

[7] See Daniel P. Aldrich, *Site Fights: Divisive Facilities and Civil Society in Japan and the West* (Ithaca, NY: Cornell University Press, 2008 and 2010) for details on these programs.

[8] These are quotes from Martin Fackler and Norimitsu Onishi, "Utility Reform Eluding Japan After Nuclear Plant Disaster," *New York Times*, May 31, 2011; and from Kōichi Hasegawa, *Constructing Civil Society in Japan: Voices of Environmental Movements* (Melbourne, Australia: TransPacific Press, 2004), 26.

[9] See S. Hayden Lesbirel, *NIMBY Politics in Japan: Energy Siting and the Management of Environmental Conflict* (Ithaca, NY: Cornell University Press, 1998) for more information.

[10] Ronald Inglehart is well-known for his work on post-materialist consciousness; see his article "Changing Values among Western Publics from 1970 to 2006," *West European Politics* 31, no.1 (2008): 130–46.

[11] Social scientists under the sponsorship of the Earthquake Engineering Research Institute (EERI) provided a detailed report of their field visit to the Tohoku region, which is available online at http://www.eqclearinghouse.org/2011-03-11-sendai/files/2011/03/Japan-SocSci-Rpt-hirez-rev.pdf.

[12] New studies by researchers such as Takuya Kobayashi have shown that the amount of radiation in the sea is at least three times higher than initial estimates released by TEPCO. See the *Yomiuri Shinbun* report on this topic at http://www.yomiuri.co.jp/dy/national/T110909005415.htm.

[13] "Worker Exposed Deception/Whistleblower Informed JCP of Kyushu Electric's Plans," *Yomiuri Shinbun*, July 9, 2011.

[14] Chester Dawson, "Scandal Taints Japan Nuclear Sector," *Wall Street Journal*, August 13, 2011.

[15] The government's attempts to solve difficult social problems with financial incentives is quite parallel to its use of money as a panacea in the ongoing struggle over the United States military base (re)location in the Okinawan island chain. See Alex Cooley and K. Marten, "Base Motives: The Political Economy of Okinawa's Antimilitarism," *Armed Forces and Society* 32, no. 4 (2006): 566–83; see also Hayashi Kiminori, Ōshima Ken'ichi, and Yokemoto Masafumi, "Overcoming American Military Base Pollution in Asia," *The Asia-Pacific Journal* 28-2-09 (July 13, 2009) [a translation by Christopher Nelson from article published in *Gunshuku Mondai Shiryo* (Disarmament), October 2008].

[16] Linda Sieg, "Energy: Can Japan Afford Not to Be Nuclear?" *Business Day*, July 27, 2011.

[17] Risa Maeda, "Tohoku Electric Aims to Triple Wind Power by 2020," Reuters, September 30, 2011.

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