Japan's Nuclear Future

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JEFF KINGSTON, APR 9 2012

Anyone paying attention to public opinion polls in Japan or the cascade of damning revelations about the ongoing Fukushima nuclear crisis might assume the nation is pulling the plug on nuclear energy. That is not the case. Prime Minister Noda Yoshihiko is eager to restart some of Japan's idled nuclear reactors as soon as possible despite significant safety concerns and he enjoys the powerful support of the so-called 'nuclear village' of pro-nuclear advocates, comprising, utilities, business federations, vendors, politicians, bureaucrats, media, and academics. Currently, only 1 of Japan's 54 reactors is operating, but by early May all will be offline for stress tests introduced by the government in July 2011 to assess operational safety. The government, however, is trying to bring at least two reactors back online before the summer by allowing utilities to postpone critical safety upgrades.

Japan is the most earthquake-prone nation in the world, experiencing more than 20% of the world's '>6' magnitude earthquakes. All of Japan's nuclear reactors are sited on the coastline, meaning they are also vulnerable to tsunami. Until 3/11, there had never been a serious nuclear accident at a commercial Japanese nuclear power plant, but this four-decade record of safety means little following the three meltdowns at Fukushima as investigations have revealed an institutionalized complacency regarding safety in Tokyo Electric Power Company (TEPCO), and among government regulators at the Nuclear and Industrial Safety Agency (NISA).

Safety Compromised

A private panel investigating the nuclear disaster concludes that TEPCO's systematic negligence contributed to the nuclear disaster, and criticized its 'make-believe' disaster emergency arrangements.[2] The myth that nuclear reactors could be operated with absolute 100% safety, embraced and promoted by the 'nuclear village', made it taboo to question safety standards, and militated against sober risk assessment, and robust disaster emergency preparedness. Those responsible for operating or regulating nuclear reactors bought into the myth of 100% safety, and this collective failure left them unprepared to deal with an accident or worst-case scenario. They justifed not practicing evacuations out of concern that the public might grow anxious about nuclear power.

The utilities, government, and associated scientists tout the high tech, fail-safe features of nuclear reactors, but as disaster expert Charles Perrow reminds us, accidents happen.[3] Immediately after the March 11 disaster, TEPCO was quick to claim that the tsunami and chain of multiple failures had been inconceivable, but the record suggests otherwise. In 1975, nuclear chemist, Takagi Jinzaburō, and others, established the Citizens Nuclear Information Center (CNIC). Fukushima was the nightmare scenario that CNIC had long predicted. In a 1995 interview, Jinzaburō spoke about the risks of a meltdown in the event of multiple, cascading failures. He raised the possibility of large radioactive releases from a meltdown, resulting from a breakdown in the emergency core cooling system, and the failure of back-up diesel generators – exactly what happened at Fukushima sixteen years later.[4]

The nuclear village did not heed a series of warnings, and actually rejected proposals to improve safety, since it would have undermined their quest for nuclear power under Japan's seismically fraught conditions. As Perrow argues, 'There is the problem that warnings are often seen as mere obstructionism. This was the view of a representative for a Japanese utility who brushed away the possibility that two backup electrical generators would fail simultaneously.'[5] This expert witness testified at the Shizuoka District Court in February 2007, on behalf of Chubu Electric Power Co., the utility that owns and operates the Hamaoka nuclear power plant.[6] Exasperated by

questioning from the plaintiff's lawyers, concerning what would happen in the event of a station blackout and loss of all backup electricity (as happened at Fukushima four years later), this witness blurted out, 'If we took all these possibilities into account, we could never build anything.' This witness was Madarame Haruki, who was subsequently named Chairman of the government's five-member Nuclear Safety Commission in April 2010.

In Japan, cozy and collusive ties between regulators and industry, embodied in the amakudari system and the nuclear village have compromised nuclear safety.[7] This situation has led to widespread regulatory capture, explaining the lack of a culture of safety at TEPCO, and the averted eyes approach to monitoring the nuclear industry evident at NISA. Workers at Fukushima report being routinely warned in advance of inspections, and inspectors did not seem eager to uncover violations.

Whistleblower revelations of systematic falsification of repair and maintenance records in 2002, at all of TEPCO's nuclear plants, indicate that more robust inspections, transparency and accountability are crucial to nurture a culture of safety.[8] It is important to remember that in February 2011, shortly before the meltdowns, NISA extended the operating license of Fukushima Daiichi, despite expressing reservations about a dubious maintenance record, and eerily prescient concerns about stress cracks in the back-up diesel generators that left them vulnerable to inundation. At that time, the Federation of Electric Power Companies that represents the ten main utilities in Japan, also summarily rejected the NSC's recommendations to enhance preventative measures against nuclear accidents, citing costs and concerns that taking such steps might stoke public fears about nuclear energy.[9]

Crisis Assessment

TEPCO conducted an in-house investigation into the nuclear crisis, and issued a report in December 2011 that shirked all corporate responsibility for the accident, instead, blaming the massive tsunami, calling it a rare natural event that could not have been anticipated (sotegai), a claim that has been effectively refuted. A government panel issued an interim report at the end of 2011, which was harshly critical of TEPCO and the government, pointing out that the utility was ill-prepared for a crisis, and that its workers made critical errors in shutting off automated emergency cooling systems, and wrongly assumed that part of the cooling system was working when it was not.[10] Plant workers and their managers were inadequately trained to cope with an emergency situation, and according to the panel, lacked basic knowledge concerning the emergency reactor cooling system. Their mishandling of emergency procedures exacerbated the crisis.

At the end of February 2012, the non-government Rebuild Japan Initiative Foundation (RJIF) released a report based on its investigation of the nuclear accident.[11] It is a scathing indictment of Japan's nuclear risk management and crisis response. The report emphasizes the disarray, dysfunction, miscommunication, meddling, and vertical sectionalism that prevailed, and how these problems exacerbated poor disaster preparedness.[12] The crisis also exposed the vulnerabilities of the electrical and cooling systems, and lax security rules, raising concerns about a potential terrorist attack. In highlighting these sweeping problems, the report underscores the major risks associated with Japan's nuclear industry and raises serious doubts about whether it is possible to manage these risks.

The investigations reveal that TEPCO ignored several warnings, including internal research, about the possibility of a monster tsunami. It looked into building a larger tsunami seawall, but decided the cost was prohibitive and took no additional preventive measures. On March 7, 2011, only four days before the tsunami, TEPCO presented the Nuclear and Industrial Safety Agency (NISA), the government's nuclear watchdog authority, with results from simulations conducted in 2008 by its own researchers, showing that a tsunami as high as 15.7 meters could hit the area, a finding that was ignored.

Clearly, there is no basis to TEPCO's claim that the scale of the 3/11 tsunami was inconceivable; the utility chose to ignore centuries of geological evidence, and repeated 21st century warnings from modern scientists, including in-house researchers. TEPCO and two other utilities actually lobbied the government's Earthquake Research Committee in early 2011, to water down wording in a report, warning that a massive tsunami might devastate the Tohoku coast. Apparently, the committee agreed to modify the report in accord with concerns expressed by the utilities that a stark warning about the possibility of a colossal tsunami might cause 'misunderstanding' among the

public.[13]

Because the possibility of a tsunami inundating the plant was ignored, TEPCO made no preparations for simultaneous and multiple losses of power. The station blackout that halted cooling systems on 3/11 caused the meltdowns.

Whistleblower

In Diet testimony on February 15, 2012, NSC Chairman Madarame Haruki pulled back the curtain on the nuclear village, drawing attention to cozy and collusive relations between regulators and the utilities, and lax safety standards. He spoke of officials ignoring nuclear risks and new international safety protocols, stating, 'We ended up wasting our time looking for excuses that these measures are not needed in Japan.'[14] He asserted that Japan's safety monitoring technology is three decades out of date, while acknowledging that he and his colleagues had, '…succumbed to a blind belief in the country's technical prowess and failed to thoroughly assess the risks of building nuclear reactors in an earthquake-prone country.' [15] He said that regulators and the utilities missed many opportunities to improve operating safety, and warned that safety regulations are minimally enforced and fundamentally flawed. Furthermore, he asserted that regulators were toothless, and overly solicitous of utility interests. In Madarame's view, nuclear reactor safety is compromised because of institutional complacency, slipshod practices at the utilities, and perfunctory enforcement of safety regulations and guidelines.[16]

It is unnerving to have one of the nation's leading nuclear energy experts, the man in charge of the NSC, one who has long been a stalwart advocate of nuclear energy, suddenly voice many of the same objections that anti-nuclear activists have expressed over the years. In the one sector, where a culture of safety should have been foremost, the nuclear safety czar revealed a culture of deceit.

Doubts about Stress Tests

Shortly after his Diet testimony, Madarame dropped another bombshell when he announced that he does not think that the first round of stress tests conducted on Japan's nuclear reactors are sufficient to ensure safe operation.[17] The stress tests were first announced by PM Kan in July 2011, stirring considerable controversy because he did not consult with his cabinet beforehand. [18] Speaking on behalf of the NSC, Madarame said, 'With only the first round (of stress tests), the level of safety confirmation that the commission seeks would not be met. Whether to reactivate (reactors) is the government's decision and we, as the safety commission, won't say anything about it.' This high profile indictment of the stress tests comes at an inconvenient time for the government because NISA has already endorsed first stage stress tests, conducted by Kansai Electric on its Oi power plant in Fukui Prefecture. In response to Madarame, the Chief Cabinet Secretary, Osamu Fujimura, stated that regardless of the NSC, the government will decide on whether or not to resume operations of nuclear reactors, based on the initial stress tests and local sentiments in nuclear plant hosting communities.

The Noda cabinet's desire to restore public confidence in nuclear energy through the stress tests, and restart idled reactors, has been undercut by Madarame's statement. The first stage stress tests are only computer simulations and have no hands-on component, and thus, cannot measure important issues such as metal fatigue in a nation where 19 reactors are over 30 years old. Public anxieties about nuclear energy are widespread and the stress tests have been dismissed all along as empty PR gestures by prominent politicians, experts, and citizens' groups. Nothing, however, could be quite as damning as the NSC chairman, one of the nuclear village's headmen, pointedly refusing to confirm that the first stage of stress tests are sufficient to evaluate operational safety.

On March 23, 2012 the NSC endorsed the Oi power plant stage one stress tests, but stage two tests have not commenced.[19] The government has taken this as a green-light and is bulldozing ahead on restarting idled reactors without conducting the second stage of stress tests, as originally planned, because doing so would postpone resumption of nuclear power operations until 2013 at the earliest. To this end it hastily cobbled together safety guidelines in early April that allow restarting reactors after minimal safety upgrades as long as the utilities promise to adopt further countermeasures such as higher seawalls over the next several years.

Overall, 57% of the Japanese public currently opposes restarting nuclear power plants, and 80% don't trust the government's nuclear safety measures.[20] These skeptical sentiments are shared in the communities that have benefitted most from hosting the reactors.[21] On March 8, 2012, NHK reported that in a poll conducted in 142 communities in the vicinity of Japan's nuclear power plants, only 14% of respondents favor restarting idled reactors now or in the near future, while 79% opposed or had strong reservations about doing so.[22] Clearly, the government faces a steep, uphill battle in gaining the understanding of Japanese living near nuclear reactors, to pursue plans for restarting reactors. Legally, however, it does not need local approval to restart the reactors.

Restart or Reset?

It is important to learn lessons from the poor risk management in the nuclear industry because Japan will probably continue to rely on nuclear energy for years to come, despite the Fukushima debacle. Energy Minister, Edano Yukio, predicts that Japan will not be relying on any nuclear energy this summer, and favors minimizing reliance on nuclear energy and replacing it with renewable energy.[23] Perhaps, but as we noted above there are ongoing determined efforts to restart some reactors based on stress tests that generate little confidence outside the nuclear village.[24] The utilities, with massive government subsidies, have invested vast sums in nuclear energy, and are not prepared to just walk away from their nuclear plants. Moreover, it will take considerable time and money to ramp up renewable energy generating capacity to offset the phasing out of nuclear power. While renewable energy may have a promising future in Japan, the nuclear lobby is powerful and working to undermine Japan's incipient green revolution.[25]

The Yomiuri argues that, 'The nation cannot afford to delay the reactivation of suspended reactors when there is no rational reason for doing so.'[26] But a majority of Japanese digesting the revelations about lax safety, systemic flaws in crisis preparedness, the bungling crisis response, and ongoing radiation leaks think there are many good, rational reasons to disagree, and wonder why there is such urgency to restart before the lessons have been learned, and safety measures vastly upgraded. Perhaps, there is a fear that a nuclear free summer might set a dangerous precedent.

The nuclear village has been battered over the past year because there are fundamental questions about safely operating nuclear reactors in such a seismically disadvantaged nation. Kitazawa Koichi, former Chairman of the Japan Science and Technology Agency, stresses that Japan, given the incompetent nuclear crisis response, was very lucky that the disaster was not significantly worse.[27] It is equally alarming to know that the scientific community did little to challenge, and in the end perpetuated, the absolute safety myth that enshrouded nuclear energy.

Decontamination, decommissioning, and disposing of contaminated waste over the coming decades, will keep nuclear energy under sustained, critical scrutiny. Japan's spent fuel rods are mostly stored at cooling pools adjacent to reactors, a dangerous situation that amplifies the risks from an accident. The problem is that existing 'temporary' cooling pools are almost full, and the reprocessing complex at Rokkasho is not functioning due to a series of glitches and delays.[28] At the end of February 2012, the Japan Atomic Energy Agency, now revising Japan's basic nuclear energy policy, suggested the option of direct fuel disposal by burial. This signals a possible move away from the nuclear fuel cycle and reprocessing, but currently there is no disposal site.[29]

TEPCO continues to downplay the role of the earthquake in damaging cooling system piping.[30] If the quake is implicated in the meltdowns, the implications would be enormous, requiring extensive and expensive retrofitting at all of Japan's remaining nuclear reactors because they are all vulnerable to such seismic events. This is not the sort of risk management that instills confidence in a company that seeks permission to restart its idled reactors.

The public is voicing overwhelming opposition to restarting reactors in a series of polls that are upping the political stakes. Hashimoto Toru, the mayor of Osaka, is launching a nationwide political movement, and he has been one of the most outspoken critics of nuclear power. People are also conserving electricity; in the summer of 2011, household consumption fell 20%. As electricity rates climb, conservation is becoming the new commonsense norm. In addition, prominent business leaders and politicians are backing renewable energy, and see enormous potential for jobs, investment and exports.

Conclusion

The Dream That Failed, '…they allowed their enthusiasm for nuclear power to shelter weak regulation, safety systems that failed to work and a culpable ignorance of the tectonic risks the reactors faced, all the while blithely promulgating a myth of nuclear safety.' – Economist, March 8, 2012

The battle lines are drawn between nuclear advocates, who cling to this failed dream, and opponents, who favor a shift towards renewable energy. The nuclear village enjoys many advantages in this battle, as it is easier to maintain or modestly tweak the national energy status quo than to promote a green revolution. The trump card of the nuclear village is the need to maintain stable electricity supply and its advocates maintain that nuclear energy cannot be replaced by renewable energy, and note that shifting to carbon fuels is costly in terms of the trade deficit and global warming. The strategy is to transform this politicized debate into a 'pragmatic' decision, dictated by a dispassionate assessment of energy, economic and environmental realities. But the realities that spewed from Fukushima, and a cascade of damning revelations about TEPCO and regulators, lead other actors to draw different conclusions about the safety, reliability and cost of nuclear energy. The Economist abandoned its longstanding support for nuclear energy because it is not economically viable. The pragmatic reassessment by nuclear critics also draws on the fact that nuclear energy developed because of significant government subsidies over several decades, and they argue that similar investments in renewable energy would yield less toxic and more cost effective dividends.

It does seem likely that Japan will continue to rely to some degree on nuclear energy, at least for the medium term before sufficient renewable energy can be ramped up. However, if it does so, it is critically important to minimize risk by enacting much more stringent safety measures. It is worrying that the Noda Cabinet, in its haste to restart reactors, is not according safety the priority it should be given based on the lessons of Fukushima. By July, the government will unveil its new national energy strategy and is expected to set a 20% medium-term goal for renewable energy, up from a current level of 1% while scaling back nuclear energy from 29% of electricity generating capacity pre-3/11, to some as yet undetermined level.

Until the utilities improve safety and emergency measures much more extensively, there should be no rush to resume nuclear operations, and until renewable energy becomes a viable option, greater reliance on relatively clean LNG seems a less risky bet. The great risk in Japan today and well into the future is that the lessons of Fukushima are being skewed, ignored or marginalized in a nation where nuclear energy represents a significant and abiding risk.

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[1] This essay is adopted from "Mismanaging Risk and the Fukushima Nuclear Crisis"

[2] The Rebuild Japan Initiative Foundation investigated the nuclear accident and conducted over 300 interviews of those involved. Asahi 2/28/2012. For a brief synopsis see Yoichi Funabashi and Kay Kitazawa, "Fukushima in Review: A complex disaster, a disastrous response", Bulletin of the Atomic Scientists, 68(2), (March) 2012, 9-21.

[3] Charles Perrow (2011) " Fukushima and the Inevitability of Accidents" Bulletin of the Atomic Scientists 67(6) 44-52.

[4] Takagi Jinzaburō, "Kakushisetsu to Hijōjitai: Jishin Taisaku no Kenshō o chūshin ni," *Nihonbutsuri Gakkaishi* 50 (1995): 821.

[5] Charles Perrow (2011) " Fukushima and the Inevitability of Accidents", Bulletin of the Atomic Scientists 67(6) 44-52.

[6] Repeta, op.cit., p. 191

[7] NYT, 4/26/2011. Amakudari literally refers to descent from heaven, but in practice means officials securing post-retirement sinecures in the industry they previously supervised in their official capacity. This system, creates a government-wide conflict of interest; officials are loathe to alienate potential future employers by zealous enforcement of regulations and standards.

[8] On the nuclear reactor whistleblower scandal see Jeff Kingston, *Contemporary Japan: History, Politics and Social Change Since the 1980s*. Wiley 2011, pp. 151-152.

[9] Mainichi Daily News 3/ 27/2012.

[10] Asahi Shimbun 12/27/2011

[11] Japan Times, 2/28/2012; Wall Street Journal (Asia) 2/29/2012

[12] Funabashi, op.cit

[13] Japan Times, 2/27/2012

[14] AP 2/15/12

[15] NYT 2/15/2012; AP 2/16/2012, Bloomberg 2/16/2012

[16] Japan Times 2/16/2012

[17] Mainichi 2/21/2012

[18] Jeff Kingston, "The Politics of Disaster, Nuclear Crisis and Recovery", in Jeff Kingston (ed.),*Natural Disaster and Nuclear Crisis in Japan: Response and Recovery after Japan's 3/11*. Routledge 2012, pp. 194-96.

[19] NHK News 3/23/2012.

[20] Asahi 3/13/2012. 27% are in favor of restarting.

[21] These hosting communities receive large subsides and the plants generates jobs and tax revenues. See Daniel Aldrich, Site Fights: Divisive Facilities and Civil Society in Japan and the West, Cornell University Press: Ithaca, NY, 2008. Also *Hiroshi ONITSUKA, 'Hooked on Nuclear Power: Japanese State-Local Relations and the Vicious Cycle of Nuclear Dependence,'* The Asia-Pacific Journal *Vol 10, Issue 3 No 1, January 16, 2012.*

[22] NHK News 3/8/12

[23] NHK News 9 Interview 3/8/2012.

[24] Pre-Fukushima the media was generally pro-nuclear energy but since revelations about the meltdowns coverage has been more mixed. The conservative newspapers Yomiuri and Sankei remain supportive.

[25] See Andrew Dewit, "Japan Power Switch Put to Test", Asia Times 3/23/2012. http://www.atimes.com/atimes/Japan/NC23Dh01.html

[26] Yomiuri 3/24/2012.

[27] Kitazawa remarks drawing on RJIF non-government investigation report on the Fukushima accident at the Foreign Correspondents' Club Japan, 3/1/2012.

[28] Masa Takubo, "Nuclear or Not? The Complex and Uncertain Politics of Japan's Post-Fukushima Energy Policy", *Bulletin of the Atomic Scientists*, 67(5) 2011, 19-26. For recent further details on Rokkasho see Reuters 2/ 24,/2012.

[29] Mainichi 2/29/2012

[30] Earthquake damage is reported by Jake Adelstein and David McNeill, "Meltdown: What Really Happened at Fukushima?" Atlantic Wire, July 2, 2011. Accessed Dec. 12, 2011. http://www.theatlanticwire.com/global/2011/07/meltdown-what-really-happened-fukushima/39541/