

TEPCO Country after Fukushima

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The series of major nuclear accidents at the Fukushima Number One Nuclear Power Plant that began with the earthquake and tsunami on the afternoon of March 11 this year, is, at the time of writing twelve weeks later, unending and uncontrolled. In mid-May the owner and operator of the plant, Tokyo Electric Power Company (TEPCO), finally admitted that the nuclear fuel cores of three of the six reactors at Fukushima No. 1 had indeed melted down.² This was followed by the resignation of the company's hapless president, an announcement of the largest corporate loss in Japanese history³, and the downgrading of TEPCO shares to junk status of international credit rating agencies.⁴ After months of confusion, prevarication, obfuscation, and provision of outright misinformation to both the public and government of Japan, TEPCO's most serious collision with the physics and engineering of reality came at the end of May, when the company conceded that its previous that it would achieve "cold shutdown" of the three reactors by the end of the year was not simply not possible.⁵ This amounted to a nuclear industry admission of the most fundamental fears of its critics – that a foreseeable and predicted sequence of accident at nuclear power plants could result in a threat to human security that approached the limits of effective control.

Prior to Fukushima, nuclear generation of electricity re-emerged onto the global public agenda after more than a quarter-century of post-Chernobyl decades of recession in the guise of a putative greenhouse gas emission mitigation strategy, heavily promoted by the nuclear industry and allies and admirers in government

¹ A version of this article without footnotes appeared in *Arena Magazine*, June 2011.

² TEPCO admits nuclear meltdown occurred at Fukushima reactor 16 hours after quake, Mainichi, 16 May 2011.

<http://mdn.mainichi.jp/mdnnews/news/20110516p2a00m0na028000c.html>; and TEPCO admits new reactor meltdowns, Mark Willacy and wires, ABC News, 24 May 2011.

<http://www.abc.net.au/news/stories/2011/05/24/3225645.htm>

³ Tepco Lurches To \$15bn Loss, Warns Of Doubts About Survival, NikkeiNet, 20 May 2011.

<http://e.nikkei.com/e/ac/TNKS/Nni20110520D20JF350.htm>

⁴ S&P Downgrades Tepco Debt Rating To Junk, NikkeiNet, 31 May 2011.

<http://e.nikkei.com/e/ac/TNKS/Nni20110530D30JFA23.htm>

⁵ TEPCO Believes Stabilizing Fukushima Reactors By Year-End Impossible, NikkeiNet, 30 May 2011.

<http://e.nikkei.com/e/ac/tnks/Nni20110530D30JF221.htm>

and academia.⁶ Even before Fukushima, the much touted “nuclear renaissance” was in doubt, principally because of nuclear economics and construction times, the closing financial gap from other new energy sources, a decline in likely availability of government subsidies, and the wholly implausible number of nuclear power plants required in a climate change salvation scenario.⁷

Nuclear pessimists see Fukushima as the final nail in the nuclear industry’s coffin. Industry optimists still see a climate change-driven future after a short pause for reflection. Both are wrong.

After Fukushima nuclear power in Japan will not die immediately, but it is mortally wounded and will never recover. A global secular rise in construction costs that will follow on from safety concerns will vitiate many of the cost-reduction benefits derived from incremental improvement and standardization of design and construction that have kept Japanese (and Korean) nuclear costs lower than other countries over the past two decades.⁸ The multiple official reviews of the causes and consequences of the Fukushima sequence of accidents will

⁶ For a first cut at the difficulties of substantiating the GH emissions claims for nuclear, see Benjamin K. Sovacool, “Valuing the greenhouse gas emissions from nuclear power: A critical survey”, *Energy Policy* 36 (2008) 2950– 2963.

⁷ See, for example, Trevor Findlay, *The Future of Nuclear Energy to 2030 and its Implications for Safety, Security and Nonproliferation*, Center for International Governance Innovation, February 2010, at <http://www.cigionline.org/publications/2010/2/future-nuclear-energy-2030>.

For reviews of costs of nuclear power station construction prior to Fukushima see Gordon MacKerron, “Nuclear costs: Why do they keep rising?” *Energy Policy*, July 1992, pp. 641-652; Ioannis N.Kessides, “Nuclear power: Understanding the economic risks and uncertainties”, *Energy Policy* (2010), Volume 38, Issue 8, August 2010, 3849-3864; “Nuclear Power Economics”, in *The Future of Nuclear Power: An Interdisciplinary MIT Study*, Massachusetts Institute of Technology, 2003, at <http://web.mit.edu/nuclearpower/>; Update of the MIT 2003 Future of Nuclear Power: An Interdisciplinary MIT Study, Massachusetts Institute of Technology, 2009, at <http://web.mit.edu/nuclearpower/pdf/nuclearpower-update2009.pdf>; Stephen Thomas, Peter Bradford, Antony Froggatt and David Milborrow, *The economics of nuclear power*, Greenpeace, 2007; David Schlissel, Michael Mullett, and Robert Alvarez, *Nuclear Loan Guarantees - Another Taxpayer Bailout Ahead?* Union of Concerned Scientists, March 2009; Jonathan Koomey and Nathan E. Hultman, “A reactor-level analysis of busbar costs for US nuclear plants, 1970–2005”, *Energy Policy* 35 (2007) 5630–5642; Jim Harding, “Economics of Nuclear Power and Proliferation Risks in a Carbon-Constrained World”, *The Electricity Journal*, December 2007, Vol. 20, Issue 10, pp. 65-76.

⁸ MIT Future of Nuclear Power, *op.cit.*

undoubtedly lead to a great deal of retrofitting and redesign of existing reactors, as well as changes in future design requirements. While the Fukushima No. 1 reactors has already been written off (with massive costs far beyond normal expensive decommissioning costs), in total 34 of the country's remaining 54 commercial reactors are also offline for inspection and review.⁹ One measure of the likely complexity and duration of reviews some of these of apparently undamaged reactors is the experience at Japan's largest nuclear power station at Kashiwazaki-Kariwa, where the plant's six large reactors shut down automatically in September 2007 following the massive Chuetsu undersea earthquake off the coast of Niigata. Almost four years later, three of the reactors were still offline at the time of the Fukushima earthquake, pending further investigations.¹⁰ More importantly, in the wake of that earthquake, authorities repeated local seismic studies conducted almost three decades ago, and discovered a range of faults undetected by the state of seismological studies at the at the time of the plant's construction, leading to a comprehensive rewriting of Japan's nuclear seismic guidelines.¹¹ That process, writ large, will be now start again.

Nuclear power in Japan is a product of a particular version of Japan's *doken kokka*, or construction state¹², whereby the general model of a corporate-state alliance to build largely unjustifiable expensive infrastructure projects was fused with a vision of a plutonium economy that would free the resource-poor country from dependence on energy imports. At the heart of the vision of the plutonium economy were some of the largest of Japan's impressive white elephant population – the Monju and Jōyō breeder reactors, which were to generate an endless supply of fissile material to be then used as fuel for other reactors¹³, and

⁹ "TABLE-Japan nuclear plant operations (Chubu agrees to shut Hamaoka)", Reuters, 9 May 2011, at <http://www.reuters.com/article/2011/05/09/nuclear-japan-status-idUSL3E7G61IV20110509>

¹⁰ "Status of the Inspection and Restoration Works Performed after the Niigata-Chuetsu-Oki Earthquake" (as of March 10), Press Release , Tokyo Electric Power Company, 10 March 2011, at <http://www.tepco.co.jp/en/press/corp-com/release/11031001-e.html>

¹¹ *"The Niigataken Chuetsu-Oki Earthquake" - Mission Report: Engineering Safety Review Services, Seismic Safety Expert Mission, 2nd Follow-Up IAEA Mission in Relation to the Findings and Lessons Learned from the 16 July 2007 Earthquake at Kashiwazaki-Kariwa NPP, Japan*, Engineering Safety Review Services, Division Of Nuclear Installation Safety, Department Of Nuclear Safety And Security, International Atomic Energy Agency, 1-5 December 2008.

¹² See Gavan McCormack, *The emptiness of Japanese affluence*, M.E. Sharpe, 2001; and Jeff Kingston, *Japan's quiet transformation: social change and civil society in 21st Century Japan*, pp. 122-156.

¹³ Monju's latest setback took place on in August 2010 in the process of restarting the reactor after a 14 year halt following a sodium fire. A three tonne

the \$91 billion Rokkasho Reprocessing Plant which, is planned to produce more than 8 tonnes of plutonium a year.¹⁴ A nuclear alliance made up of nuclear plant manufacturers, electricity utilities, the Ministry of Economy, Trade and Industry, and national and local politicians in the Liberal Democratic Party and Democratic Party of Japan has battled with a widespread and resilient grass-roots set of campaigns against nuclear power. Despite the massive imbalance of resources, including longstanding collusive and corrupt practices buttressing the elements of the nuclear alliance and intimidation and silencing of even senior conservative politicians, almost as many nuclear facilities were by these local campaigns stopped as were finally constructed.¹⁵

Fukushima will threaten the hold of the Japanese nuclear complex on decision-making in at least three particular ways. Firstly, considerable amounts of previously suppressed information is coming to light – not only from the electric power companies such as TEPCO, already a byword for a corporate culture of malfeasance and impunity. The regulatory agencies attached to the Ministry of Economy, Trade and Industry, especially the Nuclear and Industrial Safety Agency (NISA), have been shown to have been grossly delinquent, and possibly actually collusive with TEPCO, in earlier seismic safety assessments.¹⁶ On 3 June NISA admitted that it suppressed the fact that it had detected radioactive Tellurium (Te-132) six kilometres from the reactor site on the morning of March 12, the day after the earthquake, an indication that meltdown was already underway.¹⁷

part of a fuel exchange device fell into the reactor, together with part of its lid. “Agency gears up to retrieve device fallen inside Monju reactor”, Mainichi Japan, 24 May 2011, at

<http://mdn.mainichi.jp/mdnnews/news/20110524p2g00m0dm067000c.html>

¹⁴ Monju construction and decommissioning costs from Report of Study Group on Cost Estimate for Nuclear Fuel Cycle (METI, 2004), cited by Tadahiro Katsuta and Tatsujiro Suzuki, *Japan's Spent Fuel and Plutonium Management Challenges*, Carnegie Non-Proliferation Conference, 2007, p. 6; and Tatsujiro Suzuki, *Global Nuclear Future: A Japanese Perspective*, Nautilus Institute RMIT, Melbourne, September 2006, at

<http://www.nautilus.org/publications/essays/apsnet/reports/2006/0601t-suzuki/index.htm/>

¹⁵ See 原子力資料情報室(CNIC), “原子力市民年鑑2008年” [*Nuclear Power: Citizens Yearbook, 2008*], p. 67: 原発おことわりマップ [Map of Nuclear Power Rejected]; and Kingston, op.cit.

¹⁶ “Memo emblematic of disaster plan flaws: Regulators never questioned one-page document”, Associated Press, *Japan Times*, 29 May 2011, at <http://search.japantimes.co.jp/cgi-bin/nn20110528x1.html>

¹⁷ Hosokawa Komei, “Tellurium Detection in the Wake of the Quake Day, NISA Confession 3 Months After”, *Magpie News*, 5 June 2011, at <http://fukushima.greenaction-japan.org/2011/06/05/nisa-confesses-suppressing-crucial-information-at-early-stage-of-accident-magpie-news/>

Needless to say, public trust in nuclear power and its regulation has been shaken. More importantly, it is clear that the trust mainstream politicians had largely vested in the nuclear complex has been badly shaken. While his opponents in his own party and in the opposition LDP are eager to bring down Prime Minister Kan Naoto, very few would have wanted to swap places with him in the months after the earthquake as his administration was blindsided by TEPCO and NISA, and as a result, looking, as he actually was, virtually powerless to affect events significantly.

Secondly, even before Fukushima the strength of local opposition throughout the country was such that there was almost no likelihood of new nuclear facilities receiving local government planning permissions. This was a particular threat because onsite spent nuclear fuel storage has reached capacity at most Japanese nuclear plants, and the Mutsu Interim Spent Nuclear Fuel Storage Facility will not open until at least 2012.¹⁸ There is no prospect of a Japanese permanent spent nuclear fuel storage facility – nor elsewhere. Spent fuel was stored in eight different locations at Fukushima Number 1 NPP – in six reactors spent fuel storage ponds, an independent spent fuel pool, and an independent dry cask facility. With frequent substantial aftershocks continuing in the region, the greatest ongoing danger remains the possibility of a structural collapse of the earthquake-, blast- and fire-damaged spent fuel storage pond above Reactor No. 4, with complete loss of coolant to the large amount of spent fuel in the pond.

Thirdly, nuclear power in Japan is a product of a particular version of Japan's *doken kokka*, or construction state¹⁹, whereby the general model of a corporate-state alliance to build largely unjustifiable expensive infrastructure projects was fused with a vision of a plutonium economy that would free the resource-poor country from dependence on energy imports. At the heart of this vision of the plutonium economy were some of the largest of Japan's impressive white elephant population – the Monju and Jōyō breeder reactors, which were to generate an endless supply of fissile material to be then used as fuel for other reactors²⁰, and the \$91 billion Rokkasho Reprocessing Plant which, is planned to

¹⁸ On limits of onsite spent fuel storage capacities at specific plants, see Katsuta and Suzuki, op. cit., p.4.

¹⁹ See Gavan McCormack, *The emptiness of Japanese affluence*, M.E. Sharpe, 2001; and Jeff Kingston, *Japan's quiet transformation: social change and civil society in 21st Century Japan*, pp. 122-156.

²⁰ Monju's latest setback took place on in August 2010 in the process of restarting the reactor after a 14 year halt following a sodium fire. A three tonne part of a fuel exchange device fell into the reactor, together with part of its lid. "Agency gears up to retrieve device fallen inside Monju reactor", *Mainichi Japan*, 24 May 2011, at <http://mdn.mainichi.jp/mdnnews/news/20110524p2g00m0dm067000c.html>

produce more than 8 tonnes of plutonium a year.²¹ A nuclear alliance made up of nuclear plant manufacturers, electricity utilities, the Ministry of Economy, Trade and Industry, and national and local politicians in the Liberal Democratic Party and Democratic Party of Japan has battled with a widespread and resilient grassroots set of campaigns against nuclear power. Despite the massive imbalance of resources, including longstanding collusive and corrupt practices buttressing the elements of the nuclear alliance and intimidation and silencing of even senior conservative politicians, almost as many nuclear facilities were by these local campaigns stopped as were finally constructed.²² The vision of the plutonium economy, always a matter of fantasy, is now shattered: what is now at issue is how long the “once through” fall-back – sending the spent fuel from commercial reactors directly to storage, without reprocessing – will last politically.

Not surprisingly, the nuclear industry in Japan displays many of the characteristics of the wider social formation, now several decades into a state of disarray as the postwar social structure of accumulation summarised as Japan Incorporated continues to lose its *mojo*, while the outlines of a new order remain elusive. While the most obvious examples are the lack of political and bureaucratic effectiveness and coherence in decision-making, the dirty secret of Japanese labour is being played out once again at Fukushima, through the use of day-labourers. The great majority of workers recruited to work in the highly dangerous environment at Fukushima since the earthquake have contract employees (*hiseisha'in*), hired for about \$100 a day by a sub-contractor to work for TEPCO. Historically, much of Japan's postwar construction depended on the labour of men hired by labour-bosses, often with *yakuza* links, from highly depressed areas of big cities, such as Tokyo's *San'ya* and Osaka's *Kamigasaki*, from backgrounds of unemployment, mental and physical ill-health, family breakdown and social isolation. These days an SMS message on a mobile phone replaces the early morning labour call in the *yoseba*.²³

²¹ Monju construction and decommissioning costs from Report of Study Group on Cost Estimate for Nuclear Fuel Cycle (METI, 2004), cited by Tadahiro Katsuta and Tatsujiro Suzuki, *Japan's Spent Fuel and Plutonium Management Challenges*, Carnegie Non-Proliferation Conference, 2007, p. 6; and Tatsujiro Suzuki, *Global Nuclear Future: A Japanese Perspective*, Nautilus Institute RMIT, Melbourne, September 2006, at <http://www.nautilus.org/publications/essays/apsnet/reports/2006/0601t-suzuki/index.htm/>

²² See 原子力資料情報室(CNIC), “原子力市民年鑑2008年” [*Nuclear Power: Citizens Yearbook, 2008*], Tokyo: CNIC, 2008, p. 67: 原発おことわりマップ [Map of Nuclear Power Rejected]; and Kingston, *op.cit.*

²³ Paul Jobin, “Dying for TEPCO? Fukushima's Nuclear Contract Workers”, *Japan Focus*, 3253, at <http://www.japanfocus.org/-Paul-Jobin/3523>; Tanaka Yuji, “Nuclear Power Plant Gypsies in High-Tech Society”, *Bulletin of Concerned Asian Scholars*, Vol.; 18, No. 1, January-March 1986 (also available in Joe Moore (ed.), *The Other Japan: Conflict, Compromise, and Resistance*

While radiation levels inside the reactor and turbine buildings of Units 1, 2 and 3 are extremely high, and a fifteen minute exposure, even a completely sealed suit, is equivalent to the maximum exposure for a US nuclear worker over five years. In other places on the site while radiation levels remain high, they are probably not lethal if proper procedures are followed and repeat exposures restricted. The problem is that in recruiting day-labourers the nuclear industry is repeating its earlier history of hiring “nuclear gypsies”, whose exposure levels are not properly monitored as they move from job to job, and whose work situation is such that they may rapidly accumulate dangerous levels of radiation exposure. Even before Fukushima, nuclear contract workers routinely had the highest monitored levels of exposure. SMS and Twitter messages calling for Fukushima day labourers after the earthquake were offering 10,000 yen a day. One 48 year-old worker living nearby declined an offer which went: “We are looking for people over fifty who could intervene in the reactor; the pay is much higher than usual.” As the sociologist Paul Jobin remarked, “The wording ‘over fifty’ suggests that in order to come work on the site, you must be ready to die ...”²⁴

Five nuclear questions for Japan

The answers to five questions will indicate just how long the mortally wounded Japanese nuclear industry will take to finally die.

1. Will the liberalisation of Japanese energy markets be extended to the nuclear industry, allowing the market realities of nuclear power generation without subsidy to shape decision-making?

2. Will the electric utilities, now so reliant upon nuclear power generation, remain committed to it? After the German electricity sector’s sudden conversion to a non-nuclear future following the lead from Chancellor Angela Merkel, questions may begin to be asked in Tokyo boardrooms.

3. Can an elected politicians form a Japanese government that will take control of nuclear policy? Here the nuclear sector is a canary in the coalmine for the wider key issue of politicians wresting control of policy from unelected bureaucracies, and hence, being capable of taking responsibility for policy.

4. Can an elected government admit the failure of the chimera of the plutonium economy? Minimally, this is simply the reconstruction of a system-rational mode of Japanese capitalist democracy that does not waste billions of tax-payers

Since 1945, M.E.Sharpe, 1996); and Edward Fowler, *San’ya Blues: Laboring Life in Contemporary Tokyo*, Cornell University Press, 1998.

²⁴ “To Work at Fukushima, You Have to Be Ready to Die”: Anne Roy interviews Paul Jobin’, *Japan Focus*, 3253, at <http://www.japanfocus.org/-Paul-Jobin/3523>

dollars on white elephant infrastructure. Beyond that is the darkest side of the plutonium economy, the other chimera of nuclear power, the not-so-hidden fantasy of indigenous nuclear weapons development.

5. Can a Japanese government breakthrough encrusted vested interests to direct a new energy policy? Ideally, this should be based on a mix of high energy efficiency, renewable energy sources, and a mix of centralised and distributed power generation.²⁵ In late May, Prime Minister Kan announced a target of 20% of electricity generation by 2020, a decade ahead of pre-Fukushima plans.²⁶

Five questions for the rest of us

1. Will Australia resist the temptations of high-level nuclear waste disposal and uranium enrichment, the pathway to the bomb?

2. Can the push-back by the Australian nuclear power boosters in government, business and academia be resisted?

3. Will the Fukushima be more than just another round of cost increases, or a more fundamental informed critique?

4. Will social movements be able to generate adequate pressure to erode the hidden financial protections that sustain the nuclear state-corporate complex?

5. Contra the current trajectory for planetary disaster, will the collapse of the illusion of the nuclear option as a fallback generate sufficient psychic and political pressure for potentially viable climate change action?

²⁵ See David Von Hippel et al, *After the Deluge: Short and Medium-term Impacts of the Reactor Damage Caused by the Japan Earthquake and Tsunami*, Special Report, Nautilus Institute for Security and Sustainability, March 17, 2011, at <http://www.nautilus.org/publications/essays/napsnet/reports/SRJapanReactors.pdf>;

and David Von Hippel et al, *The Path from Fukushima: Short and Medium-term Impacts of the Reactor Damage Caused by the Japan Earthquake and Tsunami on Japan's Electricity System*, Nautilus Institute for Security and Sustainability, April 11, 2011, at <http://www.nautilus.org/publications/essays/napsnet/reports/SRJapanEnergy.pdf>.

²⁶ Kan says 20% of Japan's energy to be from natural resources in 2020s, Kyodo News, 25 May 2011, at <http://english.kyodonews.jp/news/2011/05/93368.html>