Volume 11 | Issue 27 | Number 2 | Article ID 4146 | Jul 02, 2013

What Role for Nuclear Power in Japan's Future? 日本の未来、原発はいかなる役割を担うべき

Christopher Hobson

Japan is still struggling to deal with the hugely complex ramifications of the nuclear accident at Fukushima Dai-ichi. While there is often a hope that disasters may act as a major catalyst, following 3/11 it appears that there has been more continuity than change in Japanese politics.[1] Hymans has identified a similar state of affairs, noting that debate about nuclear power has 'gone around in circles' with Japan failing to reach 'a coherent long-term nuclear policy response.'[2] Yet the very serious political, economic and technical challenges that have emerged following the fateful events of 11 March 2011 are slowly forcing Japan to come to terms with the role nuclear energy might play in its future.

The considerable social impact of the nuclear accident has been widely reported.[3] Here the focus is on its consequences for energy policy in Japan. Whereas much of the debate concerning Japanese nuclear power has centred on the question of closure versus resumption, this article considers the changing character of the debate in light of changes in the nuclear industry and the new regulatory regime that could result in partial resumption of a number of nuclear power plants in the coming years.

The most immediate task, however, remains decommissioning the Fukushima Dai-ichi plant, which will be a lengthy, costly and extremely difficult process. Indeed, the full scope of what needs to be done remains unknown 'because nobody has yet examined many of the most important parts of the wreckage.'[4] The many problems that have beset TEPCO's efforts to manage the plant have been widely reported and do not need repeating here.[5] Yet progress is slowly being made. In particular, given the considerable concern with TEPCO's handling of the fuel rods in Unit 4, it is important to note that as of 30 June 2014, 1,188 of the 1533 fuel rods have been removed without incident.[6] Successfully removing all of the fuel from Unit 4 will be a significant step forward in the decommissioning process, but unfortunately may prove to be comparatively easy compared to what lies ahead in Units 1- 3.

As a result of the Fukushima accident the safety of nuclear power in hazard-prone Japan has been seriously called into question. The Nuclear Regulation Authority (NRA) has developed a tough new regulatory regime in order to minimise the risks of a similar accident reoccurring. If strictly enforced, these new standards are likely to significantly refashion the role of nuclear energy in this country. According to a recent study undertaken by Reuters, of Japan's 54 nuclear reactors, the 6 at Dai-ichi will be decommissioned, 14 will probably restart at some stage, the future of 17 is uncertain, and 17 others will likely never be used again.[7] Not only would such an outcome pose significant economic and technological problems for the nuclear industry, it raises doubts about whether nuclear energy can still play a major role in Japan's future. In this regard, Andrew Dewit recently surmised that, 'part of the reason nuclear appears not likely to recover its status as base-load power are the NRA's new safety rules, in tandem with maintenance schedules and other factors that make a very shrunken fleet unreliable. Another

https://doi.org/10.1017/S1557466013034359 Published online by Cambridge University Press

large reason for this likely outcome is, of course, the stubborn opposition to nuclear power.'[8]

Strengthening the safety culture of Japan's nuclear industry

When considering the changes required for reactors to be considered safe and eligible for being restarted, there has been a tendency to focus on the technical adjustments required: bigger seawalls, backup generators in higher locations, venting systems, renovated emergency control rooms and so on. Japan's utilities have already spent 2.2 trillion yen on adopting new nuclear safety measures in response to the accident at Fukushima Dai-ichi.[9] Without downplaying these investments, it was notable that at a recent forum with the NRA's international advisors, all stressed the importance of changes required in the *human dimensions* of nuclear power.[10] They strongly emphasized the necessity of further developing and prioritizing a safety culture within the Japanese nuclear industry. Dr Richard Meserve, former Chairman of the U.S. Nuclear Regulatory Commission, observed that all the different investigations into the Fukushima accident pointed to failures of safety culture as a central factor. It is much easier to spend money on technological solutions than to make fundamental changes in human systems, but this is ultimately what is needed in order for nuclear power to be safe in Japan. Indeed, there is a risk that relying excessively on technological fixes could give rise to a new 'nuclear safety myth'.

For those advocating Japan's return to nuclear power, a more robust safety culture is important not only for reducing the possibility of any further major accidents, but also for helping to restore public trust. The 'nuclear safety myth' has been destroyed, along with people's confidence in the government, TEPCO and the so-called 'nuclear village'. For those seeking a return to nuclear, rebuilding this broken trust is one of the most immediate and difficult challenges following the Fukushima accident. But this is not simply about reactor restarts. It also has a serious impact on the recovery process. For example, regardless of actual radiation levels in decontaminated areas, many people do not believe what they are being told about safety, particularly for children. It is hard to argue that such a response is irrational, given the massive shortcomings with the way the evacuation, relocation, compensation and decontamination processes have been undertaken and communicated.

Dr Mike Weightman, former UK Chief Inspector of Nuclear Installations and Chief Executive of the Office for Nuclear Regulation, observed that trust could only be rebuilt in a slow and incremental fashion through the nuclear industry repeatedly and consistently prioritizing safety, behaving in an open manner and presenting information in ways easily understandable to the general public. In particular, he strongly argued for the need for all actors involved – the government, the regulator, the utilities – to be as transparent as possible. Dr Meserve concurred, noting that keeping things behind closed doors only stokes fears and concerns. This echoed the findings of the Kurokawa report, which argued that the lack of transparency was an important factor that led to the accident, identifying 'a cozy relationship between the operators, the regulators and academic scholars that can only be described as totally inappropriate'.[11] Making these changes may be easier said than done.

The Challenges of Change

There are significant challenges to successfully instituting the safety culture and transparency that has been identified as necessary for nuclear energy to operate in Japan in a way that the public can feel is safe. In particular, the NRA's international advisors strongly emphasized the need to create a workplace culture in which staff can provide critical, open

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feedback and air alternative opinions. Even if one does not completely accept Kiyoshi Kurokawa's conclusion that the 'fundamental causes' of the Fukushima accident 'are to be found in the ingrained conventions of Japanese culture',[12] one may still question how quickly such a direct approach could be developed in the context of a Japanese workplace. In this regard, Jeff Kingston has observed that, 'in Japan, promoting transparency is a work in progress because it challenges entrenched government practices and inclinations.'[13] The problem, of course, is not limited to Japan.



The Onagawa Nuclear Power Plant

Looking beyond Fukushima, there are signs that it is possible to build a more safety-conscious culture within the Japanese nuclear industry. In this regard, it is worth recalling the experience of the Onagawa nuclear plant, the proverbial dog that did not bark. As one study notes, Fukushima Dai-ichi and Onagawa 'shared similar disaster conditions, nuclear reactor types, dates of operation, and an identical regulatory regime. Yet their fates were very different. The Fukushima Dai-ichi plant experienced fatal meltdowns and radiation releases. … Onagawa managed to remain generally intact, despite its proximity to the epicenter of the enormous earthquake'.[14] A key factor identified in explaining these drastically different outcomes is that the Tohoku Electric Power Company had a stronger safety culture than TEPCO, especially when the plants were first being built.

The experience of the Onagawa plant suggests that there is nothing unique to Japanese society preventing development of a more robust safety culture. While the utilities may now be building higher sea walls and installing new ventilation systems, there is less evidence that these technological renovations are being matched by the necessary institutional changes. The Hatamura report criticised TEPCO for being insufficiently concerned with 'clarifying the causes behind the accident and thereby contributing to the prevention of the recurrence of a similar accident.'[15] This attitude has been further reflected in the rather grudging and incomplete manner in which the utilities have engaged in the screening process for reactor restarts. This has resulted in strong NRA criticisms of the quality of safety check applications, many of them incomplete and lacking important information.[16] Rather than accepting the need for more thorough applications, 'nuclear power plant operators and government officials have largely blamed NRA Commissioner Shimazaki Kunihiko for the delay in giving the green light for the resumption of reactor operations',[17] which appears to account for the recent end of his tenure at the NRA. More troubling evidence can be found in the lack of progress in developing realistic evacuation plans in areas where there are reactors applying for restarts, despite this clearly being identified as a major area in need of improvement after the Fukushima accident.[18] Certainly institutional change is something that occurs gradually, but given how central human failings were to the Fukushima accident, there are valid concerns that pushing ahead with reactor restarts while focusing mainly on instrumental and technological fixes will leave Japan vulnerable to future accidents.

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A further challenge to instituting a more robust safety culture is that the economics point in a different direction. The utilities are losing huge amounts of money while the reactors stay offline, retrofitting the reactors is proving to be very expensive, and this is not even considering all the costs that will come from decommissioning plants that do not meet the new standards. Given the way these companies are haemorrhaging money, it is not surprising that they are primarily concerned with getting the reactors operating again. They are very unlikely to go 'above and beyond' when it comes to safety. Furthermore, Ramseyer has argued that the government has created a perverse set of incentives for utilities *not* to invest extensively in safety, because if an accident of a similar or greater magnitude to Fukushima does happen, government intervention is unavoidable.[19] As Kenji Kushida notes, 'if nuclear operators are too big to fail—since nuclear problems tend to get worse with time if not properly managed—they may not undertake sufficient safety measures.'[20] Considering that TEPCO is primarily responsible for the second worst nuclear accident in history, it has actually gotten off very lightly, avoiding closure or any criminal prosecutions. Much like the 2008 financial crisis, the intervention of the government may have created a major moral hazard going forward.



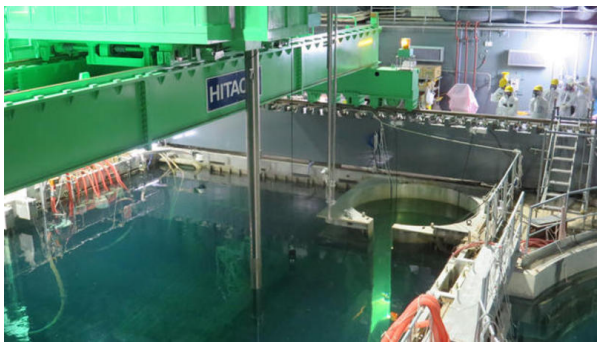
Tepco subcontract workers

A related issue lies in the deeply problematic sub-contracting system on which the Japanese nuclear industry depends. The vast majority of workers are employed by other organisations, sometimes at five or six removes from the actual plant operator. In 2010, 89 percent of Dai-ichi workers were contract workers, almost exactly the same as the industry as a whole, in which 88 percent of the approximately 83,000 nuclear workers in Japan were contractors.[21] This pattern has continued with the decommissioning of Fukushima Dai-ichi, which is now being undertaken by a workforce of about 900 TEPCO employees and a further 5,000 contractors.[22] Through this complex system of sub-contracting, workers receive lower wages and are deprived of important rights. There is a clear hierarchy, with employees of the energy companies undertaking the safest duties, while those at the bottom of the sub-contracting chain are little more than 'radiation fodder', generally taking up the most dangerous tasks and receiving the least training and protection.[23] The socio-economically weak positioning of these workers leaves them with few alternatives, hence the provocative description of the subcontracting system as effectively a form of 'nuclear servitude'.[24]

The nuclear industry in Japan is predicated on the subcontracting system.[25] In addition to the basic problems of relying on such exploitative labour relations, the sub-contracting system is simply not conducive to developing the safety culture that would be essential for the safe operation of nuclear reactors in Japan. Through this complex system of sub-contracting, accountability is diffused, while training and protection are limited. Such practices should be of considerable concern, especially in light of recent revelations that around 90% of the workers at Dai-ichi defied orders and fled the plant during a critical stage of the disaster.[26]

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Problems at the plant have continued well after the crisis ended. There have been persistent reports of serious problems with working conditions, with complaints about 'working in the stifling protective gear, the relatively low pay, loneliness - and stress'.[27] These issues are significant not only because the wellbeing of these people matters, but also because they are engaged in vital work. Exhaustion or stress could lead to human error, misconduct or even sabotage. There have been instances of contaminated water leaking due to mistakes made by workers, leading one former employee to warn that similar problems may reoccur 'unless the working environment and working conditions improve'.[28] In this regard, it is a matter of concern that a government official involved in the management of the contaminated water at Dai-ichi has recently observed that working conditions at the plant are 'no better'.[29] The on-going problems at Dai-ichi do not inspire much confidence that TEPCO or any of the other utilities will foster the kind of workplace in which safety culture is prioritized.



Fuel roads at Fukushima Dai-ichi No. 4 plant

While there has been limited evidence of institutional change in the nuclear industry, there have been more positive developments on the regulatory side. It appears that the NRA has genuinely been trying to assert its neutrality and institute a 'safety first' culture. It has been given a particularly difficult mandate: on the one hand, it must convince the nuclear industry of the need to drastically upgrade safety standards, and on the other, it has to persuade a sceptical public that they are genuinely independent. This is made more challenging by the limited resources available. The NRA currently has only approximately 1,000 staff, which has led Jeff Kingston to question whether it has sufficient human resources 'to oversee strict enforcement of new safety guidelines and institutionalize a culture of safety'.[30] To date, there are indications that the NRA has maintained its independence and withstood increasing political pressure for fast-tracking nuclear restarts. The recent appointment of Professor Tanaka Satoru as a new NRA commissioner, however, has caused considerable apprehension due to his strong ties to the 'nuclear village'.[31] There are also concerns that this may portend further political intervention in nuclear regulation by Abe and his administration. Tanaka and his colleagues at the NRA will have to try to dispel these doubts by clearly prioritizing the public interest and withstanding political pressure.

Improving transparency is another area where there is considerable work to be done. The government's reticence to release the 772 interviews undertaken as part of the Investigation Committee on the Accident at the Fukushima Nuclear Power Station is the latest in a long list of cases in which the authorities have sought to withhold information related to the accident.[32] More generally, the Abe administration has tried to stifle debate and the airing of alternative opinions. Late last year the LDP rammed the 'Specially Designated Secrets Protection Law' through the Diet with little discussion, raising fears about its impact on freedom of the press and the right to free speech. Reflecting on problems with the law, Lawrence Repeta notes that, 'many Japanese critics say that Japan's most pressing need is more transparency, not greater secrecy power.'[33] The Abe's cabinet's reinterpretation

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of Article 9 of the constitution on 1 July 2014 proceeded in a similar fashion, with little debate or regard for public opinion. Not only do such developments pose serious threats to Japanese democracy, they are the exact opposite of what is necessary for promoting the safe use of nuclear energy.

A related challenge for the NRA, as well as the government and the nuclear industry, is to improve communication with the public. This is not only about improving disclosure, but also concerns how this information is shared with the public. There is still a tendency for TEPCO to release raw data or information in an overly technical format that is difficult for non-experts to decode. Such an approach attempts to reinforce 'a hierarchy of information authority that delegitimizes citizens' knowledge, opinions, and concerns, and instead legitimizes the voices of "insiders" in state agencies, scientific and technological institutions, and industry.'[34] Yet with the discrediting of nuclear experts following the Fukushima Dai-ichi accident, many people do not know who or what to trust. The result is problems with misinformation, rumours, confusion and difficulty in differentiating among levels of risk. The resulting situation is taking its toll, with people suffering from 'fear and depression, resulting from both well-intentioned and politically motivated ignorance on radiation doses and effects following the accident.'[35] These feelings are reinforced by the lack of good will shown by TEPCO, which has constantly sought to shift responsibility and limit its liability for the consequences of the disaster. The most recent example of such behaviour is TEPCO's rejection of a proposal by the Nuclear Damage Compensation Dispute Resolution Centre to increase compensation payments for psychological damage suffered by people from Namie. TEPCO and the rest of the nuclear industry need to significantly improve the way they interact and communicate with the public, and especially with those directly impacted by the Fukushima accident.

The 'nuclear village' still has much work to do in responding to people's valid concerns about the potential political, economic, social and environmental costs of nuclear power after the Fukushima accident. I have argued elsewhere that TEPCO being more open about the problems they are encountering in decommissioning Fukushima Dai-ichi is perhaps the only way that it *might* rebuild some degree of trust with the public.[36] This observation is relevant to the whole nuclear industry in Japan. To date there has been limited evidence that the utilities have undertaken the kind of institutional learning necessary for rebuilding trust and developing a stronger safety culture.

Breaking the Impasse

'The nuclear village's pre-3.11 paradigm appears to be history',[37] but it remains unclear what exactly will replace it. Despite polls consistently showing that a clear majority in Japan opposes nuclear power, this sentiment has not greatly influenced political outcomes: the pro-nuclear LDP is now firmly back in control of Japanese politics, with anti-nuclear candidates failing to perform strongly in recent elections. As such, it is hard to determine exactly what role anti-nuclear sentiment will play in shaping the future of Japan's energy policies. It is unlikely to be sufficiently strong to prevent a series of restarts in the near to medium future. Abe may be hoping that these initial restarts will create momentum back towards nuclear power,[38] but it is more difficult to determine the fate of the many reactors that remain a long way from matching the NRA's regulatory standards.

The lack of public support is certainly not a deterrent against Abe continuing to advance his pro-nuclear agenda. Abe and his supporters have repeatedly indicated that they are not particularly interested in debating policy choices, as long as they maintain a ruling majority. They have been pushing Japan back to

https://doi.org/10.1017/S1557466013034359 Published online by Cambridge University Press

nuclear power, while doing little to respond to the understandable concerns of a sceptical majority.[39] Yet there are limits on how much this approach can achieve, especially once the easier restarts have been accomplished. In this regard, Aldrich has argued that local politics will be more determinative in shaping the future of nuclear power in Japan. In particular he observes a sharp division between different communities near nuclear plants:

> The perspectives of direct and neighboring host community leaders on this issue are strongly polarized; those representatives from communities which have benefited most strongly continue to support nuclear power and have yet to speak out against it. Those hailing from communities which face externalities but have fewer benefits have rallied against the technology.[40]

One example of this is Hakodate city government's lawsuit to halt the construction of the Oma nuclear power plant, which is located less than 30 kilometres away across the Tsugaru Strait.[41] In another recent case, the Fukui District Court ruled to prohibit the restart of two reactors at Oi nuclear power plant due to safety concerns.[42] These actions and rulings will make it more difficult for Abe to repeat the kind of strong-arm tactics that he has used to force through the new secrecy law and reinterpretation of the constitution. Attempting to significantly interfere in the independence of the NRA or undermine the new regulatory regime may be sufficient for anti-nuclear sentiment to become politically relevant.

Given the on-going impacts of the Fukushima accident, it is understandable that supporters of nuclear energy emphasize the considerable safety upgrades and the tough new regulatory regime, which are meant to prevent another disaster. But as Japan painfully discovered when the 'nuclear safety myth' was shattered, it is impossible for nuclear power – or indeed any energy source – to be 100% risk free. This is still the case and one should not downplay the huge social costs of the Fukushima disaster, which has left more than 130,000 people in limbo unsure when – if ever – they will be able to return to their homes. If nuclear power is to be used again in Japan, there will be risks. Yet there are risks that come with all energy sources. Indeed, prominent climate scientist James Hansen has recently co-authored a paper that argued 'global nuclear power has prevented about 1.84 million air pollution-related deaths and 64 gigatonnes (Gt) CO2-equivalent greenhouse gas (GHG) emissions that would have resulted from fossil fuel burning'.[43]

Such arguments are relevant, given that in fiscal 2013 88% of Japan's energy consumption depended on fossil fuels, which had a significant impact on the country's trade deficit and its carbon emissions.[44] Considering these difficult realities, it is important to be open about the real and potential dangers of nuclear power, and also to consider them in comparison to the costs and benefits that come from other energy sources.

Looking towards the future, compromise and dialogue on all sides is needed. Amongst those seeking an end to nuclear power in Japan, there is sometimes an unhelpful tendency to revert to emotional hyperbole, such as warning that a further accident at Fukushima 'would destroy the world environment and our civilization'.[45] The more persuasive arguments against nuclear energy are the ones that avoid caricaturing it as some kind of nefarious evil. Those seeking a different energy future for Japan have raised important and valid questions about the storage of nuclear waste, the hidden costs involved with nuclear power, and the very real dangers posed by future

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natural disasters. Scholars such as Andrew DeWit, and entrepreneurs such as Son Masayoshi, have provided compelling arguments that Japan could benefit greatly by investing more heavily in renewables and energy efficiency.[46] In this regard, Abe's limited interest in renewable energies is rather shortsighted.[47] Even supporters of nuclear power should recognize the value of enhancing Japan's under-developed renewable energies sector, thereby creating a more well-rounded energy portfolio for the country.

What Japan needs is a more sophisticated discussion about what kind of risks the country is willing to tolerate, and what role nuclear power should play – if any – given the disastrous consequences of the Fukushima Dai-ichi nuclear accident. On this point, Japan can learn from the German decision to embark on an 'energy revolution' (*Energiewende*). Chancellor Angela Merkel created an Ethics Commission on Safe Energy Supply, composed of a cross section of German society with representatives from politics, industry, academia and religion. They collectively reflected on what was best for the country and its future, and then reached a unanimous set of recommendations. This process built on a public debate dating back to the Chernobyl accident, and ultimately helped to generate a strong societal consensus behind the decision to abandon nuclear power and prioritize investment and policies to promote renewable energy. Public backing for *Energiewende* is especially important as it now faces significant challenges, most notably the increase of energy costs.[48]

The issues that Japan must consider are different, but no less difficult, and are connected to its history, its economic situation, its lack of resources, its vulnerability to natural hazards, the experience of Fukushima, and the demands of a changing climate. There is no easy solution to Japan's energy dilemma, so different options should be openly and responsibly debated. Collectively the country must assess the pros and cons not only of nuclear power, but all other relevant energy sources. In doing so, it is important to remember that risk-free energy is not possible, and that cost considerations—in financial terms, in safety terms, and in terms of greenhouse gas emissions—are important.

The approach Abe is presently pursuing is setting Japan on course for an unproductive and suboptimal middle ground, in which it is exposed to the potential risks that follow from operating nuclear reactors in a country vulnerable to multiple natural hazards (earthquakes, tsunamis, volcanoes, typhoons), while receiving limited benefit, given that it is predicted that nuclear power may constitute less than 10% of Japan's energy supply.[49] In light of this situation, Hymans has predicted that 'the coming nuclear restarts... can be expected to be highly inconsistent and politicized, and to routinely violate economic and technical rationality.'[50]

The direction Japan is headed – essentially cutting the baby in half – will solve neither the economic nor environmental challenges Japan faces in securing its energy supply, nor will it satisfy the anti-nuclear majority or pro-nuclear business groups. Rather than continuing his troubling moves to supress debate, Abe needs to use his position of strength to foster an open and inclusive discussion about Japan's future and what role nuclear energy should play in it. Unfortunately there are few signs that Abe is willing to do so.

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https://doi.org/10.1017/S1557466013034359 Published online by Cambridge University Press

*at an event at the United Nations University on 29 July 2014.*You can follow him on Twitter at @hobson_c

Recommended citation: *Christopher Hobson,* "*What Role for Nuclear Power in Japan's Future?*", The Asia-Pacific Journal*, Vol. 11, Issue 27, No. 2, July 7, 2014.*

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this meeting will be available soon. For a summary, see here.

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