

# Nuclear power and energy policy in Japan: a foreign resident energy researcher`s perspective on recent progress

McLELLAN Benjamin Craig<sup>1</sup>

1. Graduate School of Energy Science, Kyoto University, Yoshida-honmachi, Sakyo-ku, Kyoto, 606-8501, Japan  
(b-mclellan@energy.kyoto-u.ac.jp)

**Abstract:** This article presents the perspectives of a foreign researcher and lecturer in Energy Science, based in Japan, on the perceptions and progress of nuclear power and energy more broadly in the period from just before the Great East Japan Earthquake disaster and subsequent nuclear accident, up until today (more than 6 years on). The article presents perspectives on a number of issues, namely: nuclear safety from societal perspectives (individual, foreigners, students and society more generally); soft safety systems and continuous improvement; politics, business and energy; consumer-side approaches to energy production and demand restriction.

**Keywords:** Fukushima Daiichi accident; societal perspectives; nuclear energy policy; soft safety system

## 1 Introduction

This article presents the perspectives of the author, a foreigner, researcher and lecturer in Energy Science, on the perceptions and progress of nuclear power and energy more broadly in the period from just before the Great East Japan Earthquake disaster and subsequent nuclear accident, up until today (more than 6 years on). The paper is not purely scientific in its approach, but attempts to reflect both objectively and subjectively on how energy policy and the technological, social and economic systems it engages with, have developed over this period. It reflects the origins (cultural and academic) and the ongoing social context of the author (work, family and life in general). As the author has been working in the field of Energy Science since prior to the Fukushima accident, and has continued to be engaged in both teaching and research in this field, it is hoped that at least some of the subjective and empirical discussions can be of use to the IJNS audience.

The article will cover a number of issues, namely: nuclear safety from a societal perspective; soft safety systems and continuous improvement; politics, business and energy; consumer-side approaches to energy production and demand restriction. The content will reflect some of the lessons apparent to the author, arising from extensive reading (academic and mass media), reviewing and teaching in the

energy field, but literature references will be scant (for which the author is apologetic but unrepentant).

## 2 Nuclear safety from a societal perspective

### 2.1 The author`s experience

I arrived in Japan in late July of 2010 with my family, settling in Kyoto to begin work as a lecturer and researcher at the Graduate School of Energy Science (Kyoto University). Coming from Australia, a country with ample energy resources in all forms – fossil, renewable and nuclear – but in which it is illegal to build a nuclear power plant, I was natively skeptical of nuclear power, in large part due to a lack of knowledge. In the first seven months in Japan, I became more familiar with, and more accepting-of nuclear power. Then the Great East Japan Earthquake disaster occurred. It was a surreal experience when based in Kyoto some 600km or so distant from the disaster, watching the terrifying tsunami and struggle for recovery of the coastal regions, then the nuclear plant and its gradual degradation into a full-blown meltdown. The fact that western Japan was effectively untouched perhaps enhanced the sense of helplessness – of not being able to contribute anything directly, despite having friends and relatives in affected areas (though mainly Tokyo and further westward). Like most foreigners living in Japan however, family from abroad would contact us on a regular basis – some checking on our situation, others hoping to encourage us to go home. It was an issue of perspective of course

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– from Kyoto, Fukushima seems far away, from Australia it seems like the two are neighbours.

Like most foreign residents, we were also torn as to what to do. Emotionally, perhaps, it seemed like returning home would be safer, but then it also seemed like it would be effectively deserting our Japanese friends and neighbours in their time of greatest need. Having just arrived in Japan, our roots to the community were still shallow – but for many longer term foreign residents there was no consideration of leaving. Scientifically, theoretically, we understood that radiation released from Fukushima would be highly unlikely to affect us in Kyoto – except through the food supply. The conflict of the emotional and logical responses was exacerbated by the influences of relatives and acquaintances abroad, and by the media. We stayed, because we were in Kyoto, if we had been living in Tokyo, we would likely have left.

## 2.2 Foreigners` perspectives

The opinions of foreign residents on the nuclear disaster at Fukushima, and importantly, on its implications for continued viability of their lives in Japan, was influenced by a number of key factors. Among these, availability of information through mass media or government sources, and the perception of TEPCO and the Japanese government`s responses to the accident were two of the most important. Of course, these were also major drivers in the opinions of Japanese natives as well. The modifying factor for foreigners was often their level of Japanese language ability (or ability to obtain trustworthy translation) and their relative trust or distrust of available media in Japanese and their own language.

With regards to available information, it was apparent that the general public was not satisfied with the timeliness and detail of information on the ongoing issues at Fukushima – this was also apparent in the dealings of the government with TEPCO. There was a growing sense of a company cover-up, and increasingly an erosion of trust that was reflected in opinions of TEPCO management as being incompetent. This attitude towards TEPCO flowed-over to feelings towards the Japanese government – particularly when assistance offered by

foreign governments and the IAEA were not seen to be immediately accepted. For foreign residents, much of this information was delayed or became available third-hand (through translation from domestic sources by colleagues, friends or foreign media). Lack of information, and lack of immediate, firm action and clear accountability on the part of TEPCO (or forced accountability by the government) made trust much more difficult to maintain. Many of the actions of TEPCO in particular were thereafter seen as trying to protect their own assets, rather than protecting the community. Particularly when conflicting data or opinions were expressed by the international media versus the Japanese media. Clear, timely and accountable information to the community from the start, with a precautionary approach to community safety as the first priority (as would be seen in natural disaster prevention) may have been a more effective strategy in instilling trust. Trust cannot be underestimated in its value politically.

At Kyoto University, we held a seminar called “Our Energy Future” (open to the public) in English, as one part of the engagement process, trying to fill the gap in knowledge for the local foreign community. But even this was a little too late (July 14, 2011), although it was perhaps useful for consideration of the mid-to-long-term issues of energy. As a member of the academic community working in the field of energy, the author was often asked by friends both foreign and Japanese to explain or give an opinion on the ongoing issues.

It was also apparent that there was commonly a difference in the explicit expression of trust in the Japanese government by Japanese and foreign residents. While Japanese may have also felt distrust (notably, environmental activists and mothers` groups were willing to express this) there was often a silence or reticence to criticize the government in open conversation. On the other hand, foreigners were perhaps more vocal about the perceived inadequacies of government actions.

## 2.3 Foreign students

In the context of University education, the Fukushima accident has also been interesting. From the perspective of incoming students, the 2011 intake

was certainly affected, as parents would not let their children move to a country that was under such a cloud of uncertainty, and some students left mid-semester. Japan has typically been seen by foreigners as a very safe location – despite the frequent earthquakes – but Fukushima changed that temporarily.

As a teacher of mainly foreign students, one of the author's classes is entitled "Sustainable Development and Energy Systems". In this class, one activity that is run annually is to assess the preference of students for different energy sources. The classes differ somewhat from year to year – typically dependent on the make-up of the class with regards to those who have experience with nuclear power, and those with a strong techno-economic background being empirically most likely to favour nuclear power. This assessment asks them to take into account all aspects of sustainability – economic, environmental and social at least. It has been apparent that there is a gradual shift in the anti-nuclear sentiment of each passing year's cohort. While students of Energy Science have been quicker than the general public to bring their consideration of nuclear power to being more positive than natural gas, it has still in most cases been considered less attractive than some forms of renewable energy (*e.g.* Table 1).

**Table 1 Power source preferences Kyoto students 2017**

Power source	Preference compared to Gas
Solar	5
Wind	2
Coal-CCS	2
Oil	-3
Gas	0
Nuclear	2
Geothermal	2
Wave	1
Hydro	3
Biomass	4

In Table 1, the numbers indicate the class's agreed preference for a technology compared to natural gas, on a scale from -9 (very much prefer gas) to +9 (very much prefer the alternative – *e.g.* solar is preferred to

gas, oil is somewhat not preferred. For this example class, the scores were quite condensed – earlier classes (and scoring with general community members) scored nuclear much lower, and had greater spread of the answers.

#### 2.4 Shift in sentiment on safety

It is apparent from various streams of social research, that people can get accustomed to many different standards of living conditions – and find them satisfactory. It is often only when they are exposed to better options, or when the current conditions cause them direct discomfort, inconvenience, or threat to their lives, that they become dissatisfied to the point of making efforts to change social systems. The same might be said with the perspectives on nuclear power – as exemplified pre- and post-Fukushima.

For a long time nuclear acceptance in Japan has been somewhat neutral (accepting its need, although not certain of its safety), punctuated by occasional dissatisfaction when nuclear accidents at home or abroad have occurred. Fukushima has potentially changed that permanently. Even now, 6 years after the disaster, the opposition to nuclear power is still strong – despite the effective measures that have been imposed in the meantime, and the economic burden, which will be discussed later. The "myth of nuclear safety" has been broken – and such a level of trust will be very difficult to rebuild. For a number of foreign countries which had been considering building nuclear plants, the fact that "even Japan" could have such a disaster was enough to make them rethink or cancel. Japan has long had a reputation for high levels of technology and attention to detail – but Fukushima caused a loss of this aura both domestically and abroad.

Importantly, trust in nuclear safety has been undermined with regards to both the direct potential radiative fallout and the impacts on the food chain. Trust varies with experience – those who live near and work in or around nuclear facilities have remained largely in favour of their restart, while those less directly affected have tended to be more reticent.

### 3 Soft safety systems and continuous improvement

One of the apparent failings of the Fukushima accident was the failure to have sufficient equipment installed, and the failure of systems to enable more rapid response under duress. The potential failings due to conflicting directions from onsite and offsite management and third-party players such as the government may also have impacted the outcomes. If one point became apparent from the Fukushima accident, it was that there was perhaps too much complacency in the nuclear community in the period leading-up to the accident. Old plants need to be upgraded, old facilities need to be renewed and supplemented – but so do old systems. This is something that is taught and acknowledged in the operation and design of industrial facilities globally – but it does not appear to have been effective in the case of the nuclear plants of Japan up to 2011. Just as the community at large had somewhat forgotten the presence of nuclear power facilities, the trust in technology, the failure to have a strict independent regulator, and the general continuity of safe operation seem to have combined to give a false sense of security to the operators of nuclear plants – specifically Fukushima in this case. One of the largest assets of a company is its people – in this case, the engineers and other workers who operate and maintain the plant from day-to-day. But the lack of, or failure to implement effectively, continuous improvement processes that could have highlighted flaws in the existing infrastructure or operating procedures is something that needs to be reflected on. Further questions were raised as to whether Japanese operators had effectively engaged with best international practice.

### 4 Politics, business and energy

As has been reported in a series of reports given by Shibutani, S.<sup>1-4</sup>, the regulatory structure for nuclear power in Japan had undergone a dramatic shake-up since all power plants went offline after Fukushima Daiichi accident. As has been also described by Shibutani recently<sup>5</sup>, there are many plants that are yet to apply for restart, and some that are confirmed that they will not. This reflects (hopefully) that the new regulatory regime is more effective.

Questions in the aftermath of Fukushima were immediately raised regarding the apparent (and apparently well-known) interrelationships of the regulators and the power companies running nuclear power stations. Ex-regulatory officials going on to work for the companies and vice versa. While this is in many cases probably benign – and in some cases necessary with a limited pool of skilled individuals available domestically – it does raise issues of conflict of interest and whether the regulator can effectively regulate with total independence. From the perspective of many foreign residents from Western societies in particular, it further undermines trust in the capability of the system to be effectively monitored and regulated. It is the same question that is raised with President Trump and his family business affairs – but in the case of nuclear power plants it might be argued to be even more important to have independent oversight.

The ongoing progress and plans for the future of nuclear power are also a concern. As mentioned, most power plants have not been allowed to restart, but it is also apparent that community mistrust has not yet been effectively addressed by either the government or companies. The Democratic Party of Japan (DPJ) was in power during the Fukushima crisis – and in the author's opinion, was scapegoat for many problems brought on by the decisions of former governments (predominately the Liberal Democratic Party (LDP), who have regained the government that they have held for most of the post-war period). Towards the end of their tenure, the DPJ ran a nationwide “deliberative polling” exercise, to elicit community opinion from 1000 representatives on alternative plans for nuclear power in the future. The results (with Fukushima still very raw in the minds of the masses) was a preference for a no-nuclear future. The DPJ stated initially that they would accept this, then reneged when business groups indicated their displeasure. Eventually, the DPJ were voted out and the LDP regained government, with Prime Minister Abe indicating his preference for a full restart of nuclear power. Given the results of the polling exercise, this would appear to have been an opportunity lost with regards to democratic engagement in Japan – the verdict of the people being effectively ignored for the benefit of businesses (some of whom brought about the nuclear problem in the first

place). Following a populist idea is not always the best solution – examples in the West such as Brexit or Germany's reduction in nuclear power may turn out to be non-ideal solutions – but it is always dangerous (politically) for a government to directly reject community sentiment on such issues without sufficient explanation of the reasoning and the benefits of the alternatives.

Japan is notably a country that relies on imports of fossil fuels, and has very minimal installed domestic energy capacity. This makes the country vulnerable to changes in market conditions and supply restrictions in the global market. Industrial competitiveness on the global market also relies on the reduction of input prices (*e.g.* energy, raw materials and labor) and the maximizing of prices obtained for the product. Prime Minister Abe has made the economy a prime component of his government policy platform, with energy playing a significant part. Fuel imports to power the country have increased significantly since the shutdown of the nuclear plants – and electricity prices to households and industry have increased. This could potentially impact the economy significantly – particularly when the Yen was devalued, making imports effectively more expensive and exports cheaper. However, when the cost of rehabilitation and accident prevention is taken into account, and (if a location is ever decided upon) the final permanent storage of spent nuclear fuel is included, the cost competitiveness of nuclear has certainly decreased in recent years. One risk to the government in focusing on the economy as its major argument for nuclear power (although this is important to society of course), is that it is seen to under-emphasize safety, or to rush the reopening of nuclear plants. In a sense, society in Japan has seen over the past 6 years that nuclear power has not been necessary for their daily lives without excessively impacting them – so that its elimination is definitely possible. Again, this begs the question – is the government ignoring the will of the people at its own peril, or will they accept its explanations?

## **5 Consumer-side approaches to energy production and demand restriction**

Having undertaken some research on the policy of the Japanese government over the past 50 years or so with regards to energy, there are a few notable trends. Successive Japanese governments have sought to fund research and development, and commercial / industrial developers of technology. Technology has been considered as a solution to the problems, and the consumer side has not been very prominent in considerations. Further to this, the tendency has been to support larger businesses - this has been apparent with the choice of nuclear power as an avenue for achieving pseudo-domestic energy production, and with the support for manufacturers and developers of solar photovoltaics, but not the installers (consumers) until recently.

This seeming neglect of the general consumers (small businesses and households) has only been rectified to some extent in the post-Fukushima era. In the immediate aftermath of the disaster around 15% reduction in electricity demand was achieved across the country by engaging the consumers (who were willing to do something to support the country and those who were hardest hit). Some of this saving has been retained over the following years. The feed-in-tariff for solar and other renewable technologies then showed dramatic increase in solar energy uptake. The final steps to liberalise the market and gradually dismantle the power company monopolies are also underway, and though little movement has yet been made (incumbency of providers is hard to break) there is good potential for change, and the governance restructuring should enable more transparency across the energy system.

## **6 Conclusions**

This paper is perhaps a collection of thoughts that deserves only little attention in terms of

conclusions. However, if there is one note that the author would like to finish with, it is that perhaps the energy crises of Japan have been moving it gradually towards a democratization of energy production and consumption. Technology is of course a key enabling aspect, but society and its aims and preferences can shape the future if allowed or enabled. From the foreign perspective, it is good to see the opaque and stale systems of governance and regulation being broken down in Japan. Predictions are notably fraught with error, but the direction at least appears positive for the moment.

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