

A Decision to Make

Hong Kong's Fukushima Lesson: Increase Nuclear Literacy

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Christine Loh



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The China-Hong Kong Context

A nuclear renaissance just prior to Fukushima

The events at Fukushima took place at a time of global revival in nuclear power development, with an estimated 360 GW of additional generating capacity projected to be developed by 2035 on top of the 390 GW already in use.¹ The renewed interest arose mainly due to technological advances in nuclear power, and its potential as a low carbon energy source that would also provide energy security as energy demand and competition for fossil fuels increase across the world.

Hong Kong has been a nuclear city since 1994

Of particular relevance to Hong Kong on 11 March 2011 – the day of the Fukushima accident in Japan – was that China already had a substantial nuclear expansion programme in place with half the committed reactors planned for Guangdong Province. Moreover, Hong Kong has been buying nuclear power from the Daya Bay nuclear plant across the border since 1994, which represents approximately 23% of the city's electricity source. Daya Bay is China's first commercial scale nuclear plant. A private Hong Kong electric utility listed on the Hong Kong stock exchange owns 25% of that investment.²

Government proposed using more nuclear and natural gas

The HKSAR Government had also proposed in 2010 to change Hong Kong's fuel mix to increase its nuclear component by means of increasing electricity import from Guangdong to 50% by 2020. By also increasing natural gas to power local electricity plants, Hong Kong could decrease its coal use to well below 10%, thereby enabling the city to meet its proposed carbon intensity reduction target.³

Chinese government remains committed to nuclear power

Immediately post-Fukushima, the Chinese Government announced on 16 March 2011 a full safety review of its existing plants,⁴ although its continuing commitment to nuclear energy was not in doubt. In May 2011, a series of supplementary measures to improve safety at nuclear plants were announced,⁵ and the full safety checks were completed in October 2011.⁶ In December 2011, the National Energy Administration said that China would make nuclear energy the foundation of its power-generation system in the next 10 to 20 years, adding as much as 300 GW of nuclear capacity over that period.⁷ As to questions about whether staffing capabilities could keep pace with China's rapid expansion of nuclear energy,⁸ these and other questions related to safety and governance are expected to be covered in reports soon to be released, after which nuclear plant construction would resume.

The HKSAR Government will obviously not push ahead until the national government's position is clarified, particularly as public acceptance of nuclear power may well have been shaken by what happened at Fukushima.⁹

Hong Kong has a decision to make about nuclear power

With the Chinese Government about to formally announce its future plans for the expansion of nuclear energy, and with a new administration to take power in Hong Kong on 1 July 2012, Hong Kong has a decision to make about its position on nuclear energy. This paper discusses whether Hong Kong should simply view itself as a passive importer of nuclear electricity from Guangdong, or whether it has a role to play in terms of nuclear safety and nuclear governance as an importer of nuclear electricity, an investor in one of China's nuclear plants, and most importantly as Guangdong's neighbour since any major accident could affect a large number of people in the Pearl River Delta Region, including Hong Kong.

Varying Post-Fukushima Perspectives

- Four perspectives post-Fukushima** What happened at Fukushima has raised questions about the future of nuclear energy worldwide. The 9.0 magnitude earthquake and tsunami that struck Japan on 11 March 2011 created several sets of reactions around the world.
- Nuclear power is unsafe** The first was that nuclear energy is unsafe. Although all nuclear reactors shut down as designed, the subsequent power outage caused by the tsunami resulted in a failure of the cooling systems, eventually leading to a major release of radioactive materials across four units.
- Nuclear power may be safe but there are high residual risks** The second was that while nuclear energy itself may be safe, the residual risks are just too high when something goes wrong. While the reactors did shut down as designed, other circumstances nevertheless created conditions that led to lethal levels of radiation being released causing land contamination and public health damage.
- Nuclear power can be safe but can't trust industry and regulators** The third was that nuclear energy can be safe but the nuclear industry, governments and regulators cannot be trusted to manage risks responsibly. Japan is a developed economy and yet its management and regulatory systems failed at critical moments.
- Nuclear power is safe and plants can be well-managed** The fourth was that nuclear energy is safe and systems and institutions operating and regulating it can be well-managed.
- Governments of countries relying on nuclear energy made safety assessments of their own reactors and regulatory systems to see what lessons could be learned from Fukushima. It can be seen from these gradations of concerns that while the post-Fukushima debate has been dominated by technical and safety considerations, there are important socio-economic dimensions to consider as well.

Arising Themes

There are THREE recurrent themes arising from the nuclear expansion debate particularly for places that already have nuclear energy:

3.1 Reversal vs. Advance

Fukushima had both a reversal and a ratcheting-up effect on nuclear development

The current nuclear debate has two key strands for countries that use nuclear energy: (a) emphasize risks and withdrawal of policy support for nuclear energy; and (b) conduct safety review, then articulate steps to decrease risks, followed by continued support of nuclear energy.

Japan under the Naoto Kan government¹⁰ and Germany under the Angela Merkel government¹¹ have adopted (a)¹² while Britain, France, the US, and China have adopted (b). Those who adopted (a) must find alternative energy sources. The question remains as to whether they may have to switch back to using more fossil fuels to some extent.¹³ Those who adopted (b) emphasized the urgent need to decarbonize electricity in order to fight climate change, and increase energy independence. Britain has solidified its support for eight new nuclear plants in July 2011,¹⁴ while the US has approved two new reactors in February 2012.¹⁵ In the case of France, which relies heavily on nuclear energy (74%), its regulator recommended improved protection for nuclear plants and the Nicolas Sarkozy government pledged further investment in nuclear power.¹⁶

This suggests that Fukushima has had both a reversal as well as a ratcheting-up effect on nuclear energy development in various countries.

3.2 Economics of Nuclear Power

Irrespective of who finances nuclear power, public resources will be involved in case of serious accident

Who finances nuclear development? In Britain, development of new facilities is expected to be financed with private sector investments without government subsidy,¹⁷ while the US administration has offered conditional loan guarantees.¹⁸ In China, the development, expansion and financing of nuclear energy is tightly controlled by the authorities but minority ownership of nuclear plants is possible, such as with Daya Bay. Irrespective of who owns the investment, in the event of a serious accident, Fukushima serves as a reminder that compensations could be enormous and governments have to be involved one way or another.¹⁹ In other words, public resources will be needed.

Degree of acceptance differs, and where plants are sited also matters

Public opposition to nuclear energy will make it harder for both governments and private investors but the degree of public acceptance of nuclear power differs from country to country. Where reactors are sited also make a difference – when proposed sites are on or near to existing reactors, they may be more acceptable.

3.3 Safety and Ethics

Many post-Fukushima official reports

Fukushima led various governments to review nuclear energy governance and safety procedures. For example, the US Nuclear Regulatory Commission's inspection looked at US operating plants to deal with power losses or damage to large areas of a reactor site following extreme events and concluded that "all the reactors would be kept safe even in the event their regular safety systems were affected by these events, although a few plants have to do a better job maintaining the necessary resources and procedures".²⁰ The UK's report from the Office for Nuclear Regulation stressed nuclear power was safer than it has ever been, there was no reason for curtailing the operation of nuclear plants in Britain, and made wide-ranging recommendations of lessons learned from Fukushima.²¹

Those who are withdrawing from nuclear power accepts "trade-off"

The German government's decision to withdraw from nuclear power was framed in terms of ruling out future devastating risks, and that a non-nuclear future was possible because there were less risky energy alternatives, in particular developing renewable power such as wind and solar, plus promoting energy efficiency²² and reverting to using more fossil fuels.²³ The decision was not without controversy; opponents argued nuclear energy was necessary to mitigate climate change and deliver a secure energy system.²⁴ Thus, the German decision is a trade-off between potential devastating risks in case of an accident vs. mitigating climate change and increasing energy security.

Hong Kong to Increase Nuclear Literacy

Survey shows Hong Kong public unaware of their reliance on nuclear power

Hong Kong cannot avoid taking a position on nuclear energy because it is already a major nuclear user although this fact is not appreciated by many people, as could be seen from a survey carried out in November 2010.²⁵

There is decision to be made; deliberation requires basic energy literacy

The HKSAR Government and the public must take a view and play a positive role because the outcome affects the city's energy future. To participate in that deliberation requires some understanding of energy and basic literacy in nuclear issues.

Hong Kong needs to look at the bigger picture

In view of the fact that Hong Kong's neighbour, Guangdong Province, already has several nuclear reactors and is building more, Hong Kong should take an active interest in nuclear safety and nuclear governance issues irrespective of whether it imports or how much nuclear power it imports from its neighbour.²⁶

Hong Kong can play a constructive role

At a minimum, Hong Kong should increase its understanding of not only the basic features of nuclear power operation and its many mandatory safety systems, but also the significant safety issues such as accidents prevention, mitigation, and evacuation procedures. At the same time, Hong Kong should consider exploring how it may be able to play a positive and constructive role vis-à-vis China's oversight and development of nuclear power.

Endnotes

1. International Energy Agency, *IEA Annual Energy Outlook 2010*, 2011.
2. Hong Kong Nuclear Investment Company (HKNIC) is an investor in the Guangdong Nuclear Power Joint Venture Company (GNPJVC), which owns the Guangdong Daya Bay Nuclear Power Station. The station is managed and operated by the Daya Bay Nuclear Power Operation and Management Company (DNMC). CLP Holdings, a company listed on the Hong Kong stock exchange owns HKNIC and is an investor in DNMC. The Daya Bay plant is considered by the nuclear industry to be among the world's best managed plants.
3. HKSAR Government, *Public Consultation on Hong Kong's Climate Change Strategy and Action Plan*, 2010.
4. China suspended approval of new nuclear projects and announced full safety checks of all existing plants, World Nuclear Association, "Nuclear Power in China", updated January 2012, <http://www.world-nuclear.org/info/inf36.html>.
5. Chinese nuclear power plant operators would work on ways to respond to multiple accidents that might occur at the same time, strengthen flood control plans, reinforce external walls at reactors and make sure the national electricity grid could provide power even in an emergency, see "China to Improve Nuclear Safety", *New York Times*, 8 May 2011.
6. World Nuclear Association, "Nuclear Power in China", updated January 2012, www.world-nuclear.org/info/inf36.html.
7. Ibid.
8. An International Atomic Energy Agency team completed a review of China's regulatory programme at the Chinese Government's request in 2010 and concluded that China needed more funds and staff to keep pace with its rapidly expanding nuclear industry, World Nuclear News, "IAEA team reviews Chinese regulatory system", 2 August 2010.
9. Civic Exchange's November 2010 survey showed public acceptance of nuclear power was evenly split just prior to Fukushima, *Expanding Hong Kong's Nuclear Power Base: A Public Opinion Survey*, <http://www.civic-exchange.org/wp/wp-content/uploads/2010/12/101217NuclearSurvey.pdf>.
10. Former Prime Minister, Naota Kan, said that, considering the scale of the risks involved for Japan, "we should aim to achieve a society that is not dependent on nuclear power. In other words, we should reduce our dependence on nuclear power in a planned and gradual manner and aim to realize a society in the future where we can do without nuclear power stations", 13 July 2011, press conference.
11. In autumn 2010, the German Federal Government adopted a policy concept for renewable energy. Nuclear power was seen as having "a bridging role" until renewable energy could play their part reliably and the necessary energy infrastructure has been established. Post-Fukushima, the Merkel government reconsidered the role of nuclear energy because of its "residual risks": "In a step-by-step approach, we will completely phase out electricity production in German nuclear power plants by the end of 2022 at the latest", Federal Ministry for the Environment, Nature Conservation and Nuclear Safety website, June 2011.
12. Other governments that adopted similar approaches to Germany are Italy and Switzerland.
13. Germany has ramped up spare capacity at existing coal-fired plants and started to import electricity from France, most of which is generated by nuclear plants, "The knock-on effects of Germany's nuclear phase out", *Nature*, 3 June 2011, <http://www.nature.com/news/2011/110603/full/news.2011.348.html>.
14. UK Department for Energy and Climate Change, *National Policy Statement for Nuclear Power Generation Volume 1 (EN-6)*, Crown Copyright, July 2011.
15. In February 2012, the US Nuclear Regulatory Commission approved construction and licensing of 2 new nuclear reactors at Plant Vogtle, the first such approval in the US since 1978.
16. "Nicolas Sarkozy makes Euro 1 billion commitment to nuclear power", *The Guardian*, 27 June 2011.
17. Charles Hendry, UK Minister for Energy, *The Road to Final Investment Decisions*, 6 July 2011, http://www.decc.gov.uk/en/content/cms/news/ch_speech_nia/ch_speech_nia.aspx.
18. The White House's *Blueprint for a secured Energy Future*, 30 March 2011, p. 34 noted: "To help restart the domestic nuclear industry, the [Obama] Administration issued a conditional loan guarantee for a nuclear plant in Vogtle site in Georgia in 2010". See note 14.
19. The compensation for Fukushima is in the region of US\$125 billion, the cost of which will be covered in the first instance by special government issued bonds that the privately-owned power plant (Tokyo Electric Power Company) will be expected to repay over an unspecified number of years.
20. US Nuclear Regulatory Commission's press release 11-081, "Inspections at US Nuclear Plants Prompt Corrective Actions", 13 May 2011. The Commission's website contains details of the inspections, <http://www.nrc.gov>.

21. The UK's Chief Nuclear Inspector of the Office for Nuclear Regulation is Mike Weightman, and thus the report is also referred to as the Weightman Report. An interim report was issued in July 2011 and the final report in October 2011.
22. Ethics Commission for Safe Energy Supply, *Germany's Energy Transition: A Collective Project for the Future*, 30 May 2011.
23. See "A reliable energy supply without nuclear power", *Spiegel On-line*, 12 May 2011, <http://www.spiegel.de/international/germany/0,1518,762150,00.html>.
24. See note 22.
25. Civic Exchange's November 2010 survey showed 90% of the Hong Kong public did not know the extent to which Hong Kong relied on nuclear power, *Expanding Hong Kong's Nuclear Power Base: A Public Opinion Survey*, www.civic-exchange.org/wp/wp-content/uploads/2010/12/101217NuclearSurvey.pdf.
26. Collaboration to improve nuclear governance is possible. For example, Hong Kong-Guangdong collaboration prior to Fukushima in January 2011 led to the Daya Bay plant enhancing transparency via publishing information on non-emergency Licensing Operational Events (LOE) through its website within two working days after plant management has identified an LOE. LOEs are events that do not require emergency response and do not carry safety consequences. With LOEs, the UK makes quarterly disclosure and France have no specific timing requirement.

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