SCMP article

Reflections on energy security and global safety

By Way Kuo

Over the past twelve months we have had time to reflect on the causes and consequences of the damage inflicted on the Fukushima No. 1 nuclear power plant triggered by the earthquake and the subsequent tsunami on 11 March 2011.

As we pause to remember the tens of thousands who died and others who were made homeless because of these two natural disasters, the psychological scars for those directly affected by this tragedy and for those living elsewhere on the planet are still fresh.

Understandably the debate surrounding the nuclear option as a viable and sustainable alternative to fossil fuels has intensified. Germany has announced it will shut down all its nuclear reactors by 2022 and redefine its energy strategies by using alternative renewable energy sources. Other countries are rethinking their own energy policies.

While the images of the disaster that unfolded in Japan in March last year remain vivid in our minds, it is important to maintain a rational view of the future development of energy, and to establish exactly what happened at the Fukushima No. 1 nuclear power plant and why.

It is worth knowing that the Fukushima nuclear plant was not the one nearest to the epicentre of the earthquake. The Onagawa nuclear plant, composed of three reactors set up in 1984, 1995 and 2002, respectively, is closer. But it suffered no operational problems or radiation leaks. The three reactors were safe from the 54-feet high waves from the tsunami as well because they are perched high upon a hill.

What does this tell us about reliability and nuclear power plants?

It is clear that the tragedy at the Fukushima nuclear plant had something to do with ageing: the plant was 40 years old, which was the designed age of the plant. Equipment will fail at times, as we saw when the nuclear plant in northern Illinois shut down at the end of January this year. Ageing means there is a shelf-life for everything, from aircraft carriers to space stations, bridges, your house, and nuclear plants. This means that, in due course, all nuclear plants have to be repaired, restructured, and then decommissioned when they reach their serviceable-life limit.

Safety for all energies, including nuclear, depends on hardware, human factors and management. In many cases, management and human factor are the problem, as shown in all three of the world’s major nuclear accidents: Three Mile Island (1979), Chernobyl (1986) and Fukushima (2011).

As a result of the Fukushima accident, nuclear safety codes have been reviewed and enhanced, reporting procedures have been revised, and the designs of nuclear reactors have been upgraded.

Nuclear power has always been subject to rigorous quality control across the world. What the flooding of the emergency generators at Fukushima has taught us is that we have to install future generators at a high elevation and in watertight chambers.

In addition, the use of sea water to cool the reactors, an unprecedented last-resort endeavour, has resulted in a number of cooling improvement procedures. These include keeping back-up power trucks nearby and keeping all parts operable manually if a cooling system is intended to operate without power.

While the Fukushima accident has called the world's attention to the future of nuclear energy security and global safety, we need to consider seriously the trade-off between energy consumption, reliability, cost-effectiveness and the sustainability of other sources of energy.

Take the worst drought for 60 years in the middle and lower reaches of the Yangtze River as an example. In April and May last year, the lack of water for generating hydroelectric power resulted in 40 per cent less electrical power generated in Hunan province compared with the same period two years ago. Then in early June, the same region was ravaged by storms and floods which killed hundreds of residents and caused tremendous loss of property. The capricious climate made it hard for the hydroelectric power plants to meet demand, not to mention the ecological consequences of damming rivers.

Another case involves ethanol, a biofuel produced from corn. Iowa, the largest corn-producing state in the US, started promoting ethanol as a substitute and additive for petroleum about 20 years ago. But since such large amounts of corn were used to produce the fuel, the price of corn for food and fodder rose sharply, aggravating the global food shortage problem. These strategies, which are not good for people's livelihood or welfare, cannot be regarded as convincing solutions.

Solar and wind power can generate energy but neither is reliable, and they shackle us to the fickle behaviour of the weather. And fossil fuels are powerful pollutants, highly dangerous to public health. Each year coal mining itself causes tens of thousands of casualties.

So far nuclear power is one of the most cost-effective energy sources in the full spectrum of available energies, a fact which may assume increasing significance in the future. According to a January 2012 survey in Germany, at least 20% of businesses are planning to move out of the country with one of the reasons cited being rising energy costs in the wake of the proposed elimination of nuclear power plants. Siemens estimates that phasing out nuclear power as planned will cost Germany US$2.17 trillion by 2030, as reported by Reuters on 17 January 2011.

Many people are haunted by a fear of a nuclear disaster when in reality nuclear energy has a strong safety record. Among the calls for improvement there are indeed some well-grounded concerns, but the social and psychological reactions are not always justified. The general public has to explore energy strategies rationally in terms of human welfare and sustainable economic

development on the basis of sound scientific knowledge. Otherwise, the debate will be chained to ideological biases and rhetoric, which, unfortunately, confound the real issue.

To cope with the energy crisis, we must address the issue's social and political dimensions by enhancing public engagement and public trust in energy decision-making. Government competence, information transparency, and the capacity of the regulatory authorities are critical to achieving effective energy governance.

New energy ideas require investment. There is no perfect solution to the challenges posed by the energy situation. Under the principle of collective responsibility, portions of electricity charges should be used for research into safety and professional training to boost reliability and raise standards.

The Fukushima incidence once again enlists the common saying that every crisis is an opportunity. A reliable energy source not only supports sustainable economic development, it enhances quality of life. In dealing with the energy issue, we should take a holistic view of energy development, prioritising the production and use of clean and reliable energy sources over that of polluting and volatile energy sources. At the same time, we should map out a policy that encourages and rewards the conservation of energy and efficiency in energy use.

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