The Fukushima nuclear disaster and the impact on the global nuclear industry

February 2013

The Fukushima nuclear disaster not only devastated the lives of hundreds of thousands of people, ruined local economies, and contaminated vast areas of land. It also blew up whatever was left of what the industry called a “nuclear renaissance”.

Now, nearly two years after the disaster at Fukushima, the industry's hopes of building hundreds of new reactors during this decade have faded away. The industry is now facing a much tougher economic, political and regulatory environment. Long gone is the nuclear industry’s bold boast, made quickly after the 11 March 2011 disaster, that the accident would not change its ambition to greatly expand nuclear power globally.

Snapshot of nuclear developments

Only a handful of countries are officially sticking to their pre-Fukushima plans for building new reactors. Of those, only Russia and the UAE are actually moving ahead. However, rising costs, delays and technical complications are dampening the plans even in these two countries.

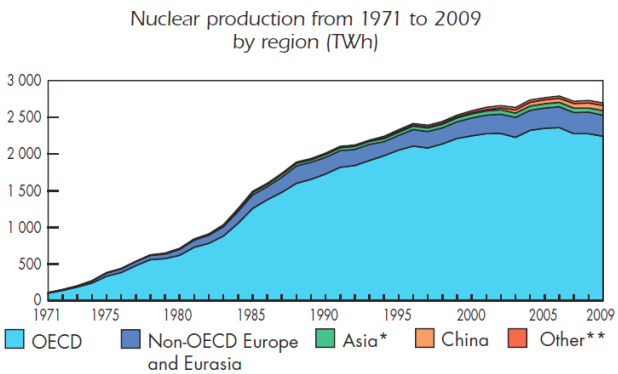
In most of the other countries hoping to expand their nuclear sector – such as China, the UK, India, South Korea, the US, Canada, South Africa, and many in Europe – nuclear projects are being revised, postponed, and downscaled. National targets for nuclear new built are being pushed back or revised downwards.

In addition, a broad and influential group of countries – including Germany, France, Japan, Italy, Belgium and Switzerland – have announced plans to either phase out nuclear energy entirely, or at least to significantly decrease the nuclear share in their electricity supply.

Market snapshot

This graph from the International Energy Agency (IEA) shows that the total electricity production from nuclear plants was already in decline well before March 2011.

In addition, these statistics show that the share of nuclear energy in the final global energy demand was a mere 2.3 %[1]. Since the Fukushima disaster, the speed of the decline of nuclear power has only increased.



During the past 24 months, only nine reactors (with a total installed capacity of 6.7GWe[2]) were started up in China, Pakistan, Russia, Iran, and South Korea. But 20 reactors (15GWe combined capacity) were shutdown permanently during the same period of time in Germany, Japan, the UK, the US, Spain and Canada[3].

The new Japanese government has said it is committed to restarting the 48 reactors currently idle in the country. But tighter regulations and detailed safety checks may delay those restarts by up to three years. It is also very likely that many reactors in Japan will not be restarted but instead will be closed for good.

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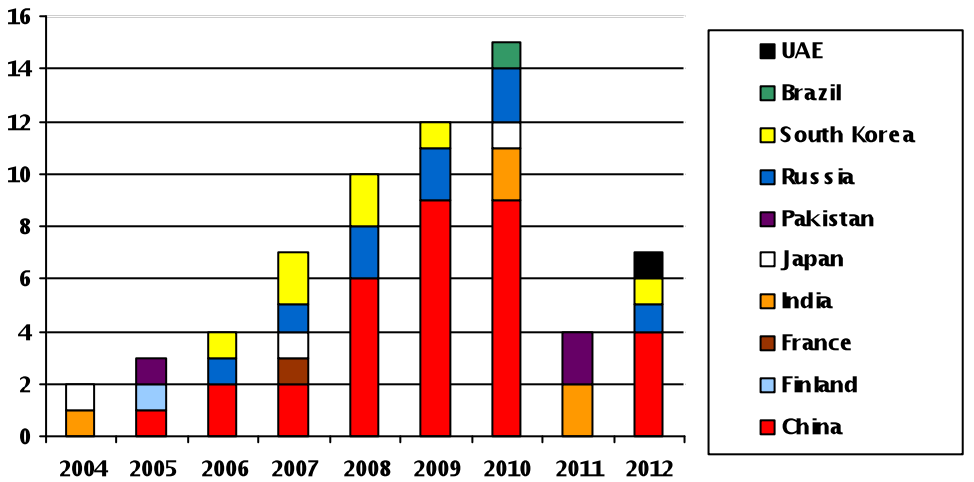
For example, the newly proposed seismic requirements by the new Japanese regulator, the Nuclear Regulation Authority (NRA), already seem to rule out future operation of 16 reactors (16GWe combined)[4].

Dozens of other reactors in other countries are slated for closure during this decade either because they will reach the end of their design life, or because governments are committed to shutting them. France says it will close Fessenheim. Germany will close its remaining operating reactors by 2022. The average age of operational reactors in the world exceeds 27 years[5].

In terms of future markets, the shrinking potential for new contracts is very clear from the following chart that displays the number of new reactors that started construction in a given year[6]:



Two things are noteworthy here: First, in 2011 the Fukushima accident clearly interrupted the growing trend of new nuclear projects. Second, China alone has been driving the growth of new reactors. The same applies for most projects initiated in 2012. But China is also one of the countries that apparently took the Fukushima lesson seriously: almost immediately after the disaster it announced a suspension on construction and new approvals. This was lifted 18 months later, in October 2012, with a revised policy and strengthened conditions for any new projects.

From now on, only third generation reactors can be approved, and only in coastline locations[7]. This inevitably leads to increased costs, and reduced ambition is already reflected in revised nuclear targets for the country. By the end of 2015, China aims to have 40GW of nuclear power and an additional 17GW under construction (compared to 26GW under construction today). China's 2020 target is now expected to be reduced from an earlier range of 80GW to 120GW down to 60GW.

At the same time as China is reducing nuclear ambitions, it is simultaneously ramping up its ambitions and targets for renewable energy. By 2015, it aims to have an installed capacity of over 400GW of renewable energy, including 100GW of wind and 21GW of solar PV.

The increasing gap between the fast growth of renewable energy installations, and the shrinking markets of nuclear reactor technologies, is a global phenomenon. In 2011, for example, $302bn US dollars was invested in new renewable capacities[8] – in contrast, only about $5bn was invested in new nuclear.

In terms of delivering new generating capacity in 2011, less than 3GW of new nuclear was added to the grid but 32GW of solar PV and 45GW of wind power plants were added[9]. Together, those solar PV and wind farms, finished in a single year, are capable of generating 130TWh of electricity a year – the equivalent of 20 large (1GW) nuclear reactors. For comparison, only three such reactors were finished in 2011.

This discrepancy between the market dynamics of nuclear and renewable energy technologies will only increase, given the reduced and postponed plans for nuclear new build and the clear determination of world's leading economies – Germany, Japan, the US and China – to further upscale their renewable energy installations.

Industry snapshot

Shrinking markets and growing competition from cheaper energy technologies are not all that undermine the prospects of nuclear industry. In addition, the nuclear industry is struggling with:

- Additional costs due to new regulatory requirements. For example, the measures resulting from the post-Fukushima stress tests in Europe are expected to cost €33bn across Europe. France alone will have to spend €10bn to €15bn.
- Escalating costs of the new build reactors. Construction budgets are going through the roof in Finland, France, Bulgaria and the US; a single new reactor now costs between $7bn and $12bn.
- Increased decommissioning payments, a shorter span for lifetime extensions of aging plants, and longer service outages are all a result of increasing regulatory demands and further undermine the bad economics of nuclear energy. In addition, investors are facing uncertainty and potentially huge additional financial risks from the much-needed revision of liability regimes and related legislation.
- The inability or unwillingness of governments, because of austerity or popular rejection of nuclear power, to keep the industry on life support through various subsidies and incentives.

The impact of the Fukushima disaster, and the bleak outlook for the nuclear industry, are also clear from the performance of leading nuclear companies and the way influential investors and analysts view this sector. For example:

- The market value of shares of Areva – the core French nuclear company – halved from €30 in February 2011 to €14.75 in February 2013.[10]
- The Economist labeled nuclear technology as “a dream that failed” and concluded that “Nuclear power will not go away, but its role may never be more than marginal”.[11]
- Moody’s analysis of 48 historical examples shows that when power utilities announced new nuclear projects, their credit rating was subsequently downgraded, on average by 3.5 notches.[12]
- The CEO of General Electric was quoted in July 2012, saying: “It's just hard to justify nuclear. Gas is so cheap and at some point, economics rule.”[13]

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1 Electricity represented 17.7% of the world’s final energy demand in 2010, and nuclear power generated 12.9 % of all electricity that year; data Key Energy Statistics 2012, International Energy Agency, OECD. http://www.iea.org/publications/freepublications/publication/name,31287,en.html

2 GWe = gigawatt of net electric capacity, 1GW = 1000MW.

3 International Atomic Energy Agency’s database PRIS (IAEA PRIS). http://www.iaea.org/PRIS/home.aspx

4 Nuclear Intelligence Weekly, 2 February 2013.

5 IAEA PRIS, op cit.

6 Ibid.

7 Nucleonics Week. 16 November 2012, Platts.

8 Bloomberg New Energy Finance. 14 January 2013. http://about.bnef.com/2013/01/14/new-investment-in-clean-energy-fell-11-in-2012-2

9 Nuclear data from IAEA PRIS op cit; global wind data for 2012 were published by GWEC on 12 February 2013 (http://gwec.net); global solar PV data for 2012 were published by EPIA on 12 February 2013 (http://www.epia.org)

10 http://quotes.wsj.com/FR/AREVA/interactive-chart

11 http://www.economist.com/node/21549098

12 New Nuclear Generation: Ratings Pressure Increasing, Moody’s, June 2009.

13 http://www.reuters.com/article/2012/07/30/us-energy-power-nuclear-shale-idUSBRE86T0AX20120730