



# 10 Years After Fukushima

What is the Future of  
Nuclear Power?

5 minute read - from V.E

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# 10 YEARS SINCE FUKUSHIMA

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March 2021 marks 10 years since the nuclear accident at the Fukushima Daichi Nuclear Power Plant. The accident at Fukushima can be seen as the moment when the “Nuclear Renaissance” slowed and when nuclear power-producing nations started to reassess their nuclear programmes. In the aftermath of Fukushima, Japan ceased operations at many of its reactors. Germany pledged to begin shutting down its reactor fleet by 2020<sup>1</sup>. Spain and Switzerland halted the construction of any new plants<sup>2</sup>; and, Italy voted to confirm the 1987 referendum phasing out nuclear power<sup>3</sup>. Since 2011, the number of active nuclear reactors has been stable, rising only from 434 to 441 in 2020<sup>4</sup>.

Whilst some countries have re-evaluated their use of nuclear power, others are bringing new projects onstream. In August 2020, operations began at the Barakah nuclear power plant in the UAE<sup>5</sup>, the first nuclear power plant in the Arab world, and construction is currently ongoing at the Akkuyu plant in Turkey<sup>6</sup> and the Roopur plant in Bangladesh<sup>7</sup>. The United States of America (96,553 MWe) and France (61,370 MWe)<sup>8</sup> have the largest installed operable net capacity but China has a substantial volume of capacity under construction (15,906 MWe).

In this 5 minute read we reflect on subsequent developments in the industry and question how the industry might develop in the future.

## A NUCLEAR RENAISSANCE?

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Operational safety remains the key consideration in relation to nuclear power development. Nuclear power generation requires stringent independent regulatory oversight to ensure the safe operation of plants and to protect human health and the environment. It also requires operators to design reactors with safety as the key element and implement robust safety mechanisms to reduce risks.

Nuclear waste storage is another key consideration. Nuclear waste remains radioactive and harmful to human health for hundreds of thousands of years and long-term storage solutions for high-level radioactive waste have yet to be fully developed. Deep geological storage is sometimes pitched as a solution, but in over half a century no significant deep storage projects have begun operations. In the US, Secretary of Energy, Jennifer Granholm, has signalled the Biden Administration’s opposition to the Yucca Mountain storage facility, which was the proposed site for the long-term storage of nuclear waste in the US, adding further uncertainty to the question of nuclear waste storage in the country<sup>9</sup>.

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<sup>1</sup> Germany shuts down atomic plant as nuclear phase-out enters final stretch, DW News, 31.12.2020

<sup>2</sup> Switzerland votes to phase out nuclear energy and switch to renewables, World Economic Forum, 01.06.2017

<sup>3</sup> Italians say no to nuclear energy in referendum, Reuters, 13.06.2013

<sup>4</sup> Nuclear Power in the World Today, World Nuclear Association, 01.02.2021

<sup>5</sup> Barakah: UAE starts up Arab world’s first nuclear plant, BBC News, 02.08.2020

<sup>6</sup> Akkuyu NPP Construction Project, Akkuyu NPP website, accessed 02.03.2021

<sup>7</sup> Roopur Nuclear Power Plant Ishwardi, Power Technology website, accessed 02.03.2021

<sup>8</sup> Nuclear Power in the World Today, World Nuclear Association, 01.02.2021

<sup>9</sup> Biden nominee confirms opposition to Yucca Mountain, World Nuclear News, 28.01.2021

Regulatory issues could also pose a threat to the development of nuclear power. The EU Taxonomy, which aims to label environmentally sustainable economic activities to better inform investors, does not consider nuclear power generation among green investments. The Taxonomy states that green activities must make a substantive positive contribution while respecting a 'do no harm' provision to its environmental targets.

In the US, the Biden administration has signalled an appetite to develop a greener economy and focus on climate change mitigation<sup>10</sup>. The new climate plan recognises the need to 'identify the future of nuclear' and it highlights Small Modular Reactors (SMRs) as a key technology to be explored by ARPA-E, the agency tasked with identifying and developing energy technologies. In Europe, the UK Government recently announced an investment of GBP 215 million in a project aimed at developing the SMR industry in the country. Small modular reactors have been touted as a potential source for growth in the industry, claiming that the modular nature of the reactors will help reduce manufacturing and construction costs.

Worldwide, 300 reactors have been in operation for 30 years or more. The average age of the US reactor fleet is 39 years old, having originally a proposed operational life of 40 years which will probably be extended. The age factor may cause producers and authorities to rethink whether to seek an extension if alternatives can deliver lower cost power or if the costs for upgrading plants are prohibitive.

The levelized cost of energy (LCOE) from renewable sources has been declining for several years now, while the LCOE for nuclear sources has increased during the same time frame<sup>11</sup>. This has enhanced the prospects for renewable technologies and diminished appetite for large-scale nuclear projects.

An increase in the price of coal and the requirement for deep decarbonisation of economies and energy systems to meet their Paris Climate targets may encourage further nuclear power development. As a low-carbon energy source, and provided the right market conditions exist, there is potential for further development of nuclear reactors. Energy generators' appetite to develop nuclear plants depends on the balance between upfront capital costs and the price of the electricity.

## CONCLUSION

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What we see is a mixed outlook when it comes to nuclear power generation. Some countries have decided that many of the risks associated with nuclear power are too great to consider pursuing nuclear policies and do not consider it a strategic long-term technology. On the other hand, we see countries such as China where the technology is viewed as a key tool to help them reduce their greenhouse gas emissions and provide a low-carbon baseload power alternative to coal and natural gas.

With electricity consumption set to increase in the coming decades, and an urgent need to cut carbon emissions, there are possibilities for development in this sector, but this is not a certainty. Given the need to cut emissions quickly, the long lead in times for planning, developing, and ultimately bringing new nuclear power online, may count against the technology in countries where significant baseload power alternatives are required. While nuclear power is here to stay in the short to medium term, longer term prospects are less certain.

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<sup>10</sup> Biden signs 'existential' executive orders on climate and environment, BBC News, 27.01.2021

<sup>11</sup> Levelized Cost of Energy and Levelized Cost of Storage – 2020, Lazard website, accessed 02.03.2021

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