海外情報連絡会セッション

“The UK Nuclear Industry, Past, Present and Future”
From Decommissioning the Original Fleet of Nuclear Power Stations, To Nuclear New Build

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The UK has a long history in the nuclear industry. From the opening of the world’s first nuclear power station at Calder Hall in 1956, to the current plans for nuclear to provide 18GW, of the UK’s electricity by the 2030s (Figure 1). The UK believes that safe, reliable and affordable nuclear power can provide a large amount of secure, low carbon electricity, and that it should remain part of the energy mix. Of the first 3 new projects in the UK, one is French, and two are Japanese, involving Hitachi and Toshiba.

Figure 1: New Nuclear Build Sites in the UK

A method called “Contract for Difference” has been developed in the UK to ensure that all low carbon electricity generation methods are considered on an equal basis. This applies not only to nuclear, but to other low carbon forms of generation. This allows for the setting of ‘strike price’ for electricity, so that developers can be confident of the return on their investment over an extended time period.

The UK currently has reactors at all stages of their lives. In addition to the new build plans, there are a fleet of operating Advanced Gas Cooled reactors (Table 1) and one PWR (Sizewell B, opened in 1995).

Table 1: Start and Closure Dates of the UK's Advanced Gas-Cooled Power Stations

Dungeness B	1983	2018→
Hartlepool	1983	2019→
Heysham 1	1983	2019→
Heysham 2	1988	2023→
Hinkley Point B	1976	2016→
Hunterston B	1976	2016→
Torness	1988	2023→

[N.B. Life extensions are being pursued on these plants]

In decommissioning, the UK is in a unique position, with complex clean-up challenges at sites such as Sellafield and Dounreay, but also experience of decommissioning an entire reactor fleet, the iconic Magnox Reactors (Table 2). This decommissioning experience is also very relevant to water cooled, as well as gas cooled reactors.

Table 2: Start and Closure Dates of the UK's Magnox Power Stations

Wylfa (part-closed)	1971	2015 (44 years)
Bradwell	1962	2002 (40 years)
Chapelcross	1959	2004 (45 years)
Dungeness A	1965	2006 (41 years)
Hunterston A	1964	1989 (25 years)
Hinkley Point A	1965	2000 (35 years)
Calder Hall (First nuclear power station)	1956	2003 (47 years)
Trawsfynndd	1965	1991 (26 years)
Berkeley (now entered SafeStore)	1962	1989 (27 years)
Oldbury	1967	2012 (45 years)
Sizewell A	1966	2006 (40 years)

[N.B. All exceeded original 25 year planned lifetime]

The skills and experience gained from Sellafield and Dounreay have provided useful insight into solutions for the challenges at Fukushima Dai-ichi, with knowledge of how to retrieve difficult radioactive material from a building, and then packaging it safely for disposal, finding particular parallels with the situation at Dai-ichi.

UK's Nuclear Decommissioning Authority (NDA) is in charge of the strategy, and this allows for the sharing of expertise across all decommissioning sites (Figure 2). The NDA is a government body, but the actual delivery of decommissioning is carried out by individual Site Licence Companies, who utilise the extensive UK supply chain to carry out the work on their sites.

Figure 2: Nuclear Decommissioning Authority (NDA) Sites in the UK

There are many lessons to be learned in decommissioning, in particular the need to not only focus on the technical aspects. The social aspects of decommissioning should not be ignored, and in many cases are more important. The nuclear industry has many stakeholders, and they need to be allowed to engage in the process at their speed not yours. A lot of decommissioning can take place inside buildings, where progress is not obvious, sometimes it is also necessary to be seen to be making visible progress, as with the demolition of the Calder Hall cooling towers (Figure 3).

Decommissioning requires a different mindset, with many changes needed from operations. A lot is said about decommissioning culture, and the UK has gained valuable experience in moving from an operational to a decommissioning culture. It isn't just a technical shift in behaviour, the importance of a strategy, setting interim end states, site management on a constantly changing site, and contracting arrangements are some of the aspects which need to be considered.

Figure 3: The Demolition of the Calder Hall Cooling Towers

The UK's nuclear industry has been operating in a deregulated, liberalised market for over 20 years. Japan is now starting this process, and may be able to benefit from the UK's experience in delivering decommissioning projects, at low cost, in full market conditions. One of benefits of being the first country to commission a fleet of nuclear reactors means that the UK were one of the first to undertake large scale decommissioning, and plans are in place for a special tour of UK decommissioning sites for interested participants from the Japanese Nuclear Industry early in 2017.

The UK and Japanese nuclear industries have world class and complementary skills. Japanese New Build and UK decommissioning and waste management have the potential to be a strong alliance. Organisations in both countries should consider the advantages of such strategic partnerships for the future of the industry, in the UK, Japan and around the world.