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Thinking about Nuclear Cultural Heritage
: Lessons from Dounreay in the United Kingdom
&
Hanford in the United States

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International discussion of nuclear cultural heritage

- **OECD/NEA's 'Initiative on the Preservation of Record, Knowledge, and Memory (RK&M) across Generations**

- **Summary of nuclear cultural heritage discussion in the previous studies**

	Deep geological disposal facilities for HLW	Nuclear power plants decommissioning
Purpose	◆ Securing safety of future generation ◆ Preserving the rights of future generations by leaving information and knowledge ◆ Preserving potential for spent fuel or HLW being used as resources	◆ Providing education on the history of the nation to the currently living generation and the future generation ◆ Sharing periodic communal values of the past and the current generations to the younger generations of within currently living generations and the future generations ◆ Economic sustainability by creating new local industry
Target	◆ Future generations (close and distant generations) * No clear definition of close and distant generations in terms of length	◆Current (intra-generational aspect: residents of the host community, other localities, and younger generations) ◆ Future generations (inter-generational aspect: close and distant generations)
Major obstacles	◆ Uncertainty	◆ Safety (Depending of the level of pollution in site) ◆ Economic factors ((Balance between maintenance fee and benefits/values to the local people as well as taxpayers)

Nuclear Cultural Heritage discussion in the UK

Source: Nuclear Cultural Heritage, Position statement

Nuclear cultural heritage

- Position statement prepared by the various experts in the museum sector, academia, nuclear sector, and international organization.

- Nuclear Cultural Heritage

: "Anything that has been related to nuclear science and technology.“

- Emphasizes the importance of cooperation and communication between various experts with the diversified background

- An interdisciplinary approach is necessary to clarify the "culture" of nuclear cultural heritage discussion.

: Experts in cultural research such as history, museum, and heritage sectors Experts in nuclear science and technologyExperts in nuclearity (People holding the local knowledge)

Analytical framework: Network governance

▪ Growing emphasis on the governance: Interaction between actors to deal with comp lexity and uncertainty (see Rosenau, 1992; Kooiman, 1993; Rhodes, 1997; Stoker, 1998).

▪ UNDP (1997)

- "The exercise of economic, political, and administrative authority to manage a cou ntry's affairs at all levels. It comprises the mechanisms, processes, and institutions through which citizens and groups articulate their interests, exercise their legal righ ts, meet their obligations, and mediate their differences."

▪ Kooiman (1993)

- The governance is the interaction between 'states, markets and civil society'
- A process of networking

▪ Rhodes (1997)

- Networks in governing

Case study: Dounreay and Hanford

- By focusing on the network of governance, this research compares two cases: Dounreay in the UK and Hanford in the US.

: The governance developed for heritage strategy concerning the decommissioning project of the facilities.

- The Dounreay Fast Reactor (DFR) and Hanford B Reactor were deemed to hold significant nuclear cultural heritage values.

- The Dounreay site opted to dismantle the whole NPP site's facilities, including the DFR, and eventually turn the site to greenfield.

- The Hanford B Reactor has been decided to preserve the reactor physically and use it as a museum. (Although the earlier decision was the reactor's dismantlement, the result was reversed).

The timeline of the Dounreay NPP in the UK

Milestone: Dounreay Nucear Power Plant	
1955	Started construction of the Dounreay Fast Reactor (DFR)
1958	Completion of construction of the DFR
1962	The world's first commercial power generation as a fast reactor
1977	Shutdown of the DFR
2000	Announced the Dounreay Site Restoration Plan (Estimated £4 billion (about 548 billion yen) over 60years)
2005	Established Nuclear Decommissioning Authority (NDA)
2007	NDA became the owner of the Dounreay NPP (Estimated decommissioning budget increased to be about £3.6 billion until 2032)
2007	Nuclear cultural heritage discussion initiated
2008	Dounreay Site Restoration Ltd (DSRL) obtained a license to carry out decommissioning and cleanup program instead of the NDA
2008	Plan for the site closure rescheduled to 2025 (shortened from the previous plan)
2025	The Dounreay site planned to be closed
2078	Planned to end the site monitoring and management
until 2300	Residual radioactive decay will be continued on the site

Source: Author's compilation

The heritage significance of the Dounreay NPP

Source: Gunn & Croft (2010)

- The evidential value: The preserved reports, documents, design drawings, and photographs that allow providing information on the process of science and technology development in the field of the nuclear industry.

- The historical value: The innovative development of science and technology in the nuclear industry.

- The aesthetic value: The DRF's sphere dome (Figure) that simultaneously embodies the technologies of architectural and engineering requirements and harmonization with the natural scenery in the community was highly appreciated.

- The communal value: The UK's collective memory in economic development and modernization that includes the memories of success in science and technology and negative aspects such as contamination and secrecy in the history of the industrialization process.

The timeline of the Hanford B reactor in the US

Milestone: Hanford Nucear Power Plant	
1942	The Hanford site became a part of the Manhattan Project for plutonium production
1943	Began construction of the Hanford site
1944	Startup of the B Reactor
1946	Hanford NPP turned to civilian operation (Manhattan Project ends/Atomic Energy Act passed)
1946	General Electric became a primary site contractor at Hanford
1947	Truman Doctrine and the Cold War ($350 million site expansion at Hanford follows)
1968	The shutdown of the B Reactor
1976	The B Reactor was named a National Historic Mechanical Engineering Landmark by the American Society of Mechanical Engineers
1989	Tri-Party Agreement
1989	Shut down of all nine reactors at the Hanford site
1991	Organized the B Reactor Museum Association (BRMA)
1992	The B Reactor was listed in the National Register of Historic Places
1994	Hanford's cleanup budget reaches $2 billion (18,760 employees)
1999	DOE published the final land use plan for Hanford
2008	The U.S. Department of the Interior designated the B Reactor as a National Historic Landmark
2014	Congressman Doc Hastings, with support from Washington's U.S. Senators, obtained congressional authorization for the new Manhattan Project National Historical Park
2090	Aiming at the completion of cleanup (estimated cost for the next 50 years is $100 billion)

Source: Author’s compilation

The heritage significance of the B reactor

Source: B Reactor Museum Association https://b-reactor.org/)

- The historical value: A part of the Manhattan Project. Its value is not confined only the American history, but also expands to the world history where ideology and hegemony conflicted and competed for the nation to nation. The innovative process of science and technology contributed to the development of the nuclear industry (Potter, 2010).

- The aesthetical value: The architectural value of the era related to its symbolic "Alphabet" houses in the community near the NPP site.

- The communal value: The process of preserving and interpreting the Manhattan Project. It is a memory and record of how individuals, particularly scientists, had contributed to the peace of the nation in the age of upheaval, where different ideologies and systems had clashed. It also includes lessons for the peaceful use of nuclear energy (Rhodes, 2015; Kelly, 2015).

Narrowed network vs. Expanded network governance (1)

Dounreay: Narrowed network governance between the relevant actors

▪ The owner of the Dounreay NPP site is the Nuclear Decommissioning Authority (NDA), yet th e Dounreay Site Restoration Ltd. (DSRL) carries out the decommissioning operations in place of NDA.

▪ Historic Scotland, the Dounreay Stakeholder Group (DSG), National Museums Scotland, Caithness Horizons Museum and Art Gallery, Royal Commission on the Ancient and Historical Monuments of Scotland, the Highland Council, English Heritage, Cadw (Welsh Heritage), Dundee University, North Highland Tourism, Caithness Chamber of Commerce, Caithness & North Sutherland Regeneration Partnership

▪ Local and narrow network

- The main driving force of the heritage strategy is the nuclear industry and the relevant actors associated with the museum industry

- It was confined at the local level

Narrowed network vs. Expanded network governance (2)

Hanford B Reactor: Expanded network governance

- The grassroots movement emerged in 1990 to preserve the B Reactor based on the various actors
  - It includes local and state elected officials, the Tri-Citi Development Council, Visit Tri-Cities, and the Washington state congressional delegation

- B Reactor Museum Association (BRMA) organized to support the B reactor's preservation from the cultural heritage perspective in 1991
  - It consists of the members who used to work at the Hanford site, employed various forms of activities, which include informal lobbying activities with politicians, information distribution to promote public awareness, and escorting the DOE officials as well as the approved public by the DOE for the tour of the facility

- The DOE, a responsible body for the decommissioning process, consulted with the Advisory Council on Historic Preservation (ACHP) concerning the heritage significance of the Manhattan project sites.

- The Atomic Heritage Foundation (AHF), a Washington DC-based nonprofit organization founded by a former DOE official in 2002
  - Stimulated public interest and awareness of the physical preservation of the Manhattan Project sites at the national level by using the press

Conclusion (1)

- The different forms of networks were structured within nuclear heritage governance in the two cases.

- Further in-depth research is required to clarify the effect of the type of network within the governance on the decision-making process in nuclear heritage discussion.

- The activities of the various actors at the multiple tiers can contribute to drawing the public interest at both national and local levels and stimulate the government's motivation to review the heritage plan.

- Prioritizing safety dealing with the contaminated facilities and the land is indispensable when considering the nuclear heritage strategy in decommissioning operation.

- Nevertheless, this paper suggests the importance of establishing network-based governance, which involves experts from various fields, including the affected local people from the outset of the decommissioning process.

Conclusion (2)

- The purpose of this presentation was not to argue that the same approach should be implemented for the Fukushima case. However, it questions whether local people's various views and opinions have been broadly considered in the decommissioning of the Fukushima NPP site.

- Due to the remaining wounds of the Fukushima accident, the concept of "heritage" or "value" could be perceived as a negative connotation by the local people in the case of Fukushima.

- Nevertheless, in terms of deriving lessons for the current and future generation of Japan and the world, such nuclear cultural heritage discussion can be one aspect that should be discussed with local people among various approaches in the process of decommissioning.

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The Calder Hall NPP (Source of the photo: Wikipedia)