Report of Field Research in France and the UK

(February 11, 2019: Copeland Brough Council)

March 29, 2019

Waseda Resilience Research Institute (WRRI)

Graduate School of Asia-Pacific Studies, Waseda University

Grants-in-Aid for Scientific Research (B):

Research on Social Acceptance of High-level Radioactive Waste (HLW)

Treatment and Disposal Facilities

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1. Introduction

1.1 Objective

The objective of this field research aimed at clarifying the factors of the consensus building process through communication and citizen participation on the HLW management policy, as well as approaches to the site selection of the HLW disposal facility in France and the UK.

The way of risk communication and public participation has been considered as the essential factors to achieve social acceptance on the issue. Meanwhile, the debate over reversibility and retrievability (R&R) has also been emphasized to deal with HLW management in many nuclear states.

Thus, the current field research aimed at deriving lessons for the future development of our research as well as policy implementation for the Japanese case through interviews with relevant persons in France and the UK.

1.2 Organizations (Alphabetical order)

No	Organization
France	
1	Committee of expertise and monitoring of the information and consultation process (COESDIC)
2	School of Advanced Studies in the Social Sciences (Ecole des hautes etudes en sciences sociales, EHESS)
3	National Committee for Public Debate (CNDP)
4	OECD/Nuclear Energy Agency
5	OECD/Centre for Entrepreneurship, SMEs, Regions and Cities
6	The French National Agency for Radioactive Waste Manamgement (ANDRA)
7	Wise-Paris
The United Kingdom	
1	Allerdale Borough Council
2	Copeland Borough Council
3	Committee on Radioactive Waste Management (CoRWM)
4	Cumbria County Council
5	Nuclear Decommissioning Authority (NDA)
6	Radioactive Waste Management (RWM)
7	University of Exeter

1.3 Schedule

Date	Time	Organization
France		
2019-02-01 (Fri)	11:40-16:25	Tokyo (Haneda) to Paris (CDG)
2019-02-02 (Sat)		Internal meeting and preparation for interviews
2019-02-03 (Sun)		
2019-02-04 (Mon)	20:00-22:00	1) Institute for Research and Innovation in Society (IFRIS) at Université Paris-Est
2019-02-05 (Tue)	14:30-16:30	2) OECD/NEA
	17:00-19:00	3) OECD/CFE (OECD Headquarters & Conference Centre)
	19:00-	Dinner with OECD/CFE
2019-02-06 (Wed)	09:30-12:00	4) Andra
2019-02-07 (Thu)	10:00-12:00	5) CNDP
	15:00-16:30	6) Ecole des hautes etudes en sciences sociales (EHESS)

2019-02-08 (Fri)	17:00-18:00	7) Wise-Paris
2019-02-09 (Sat)		Paris (CDG) to London (Heathrow)
The United Kingdom		
2019-02-10 (Sun)		London to Sellafield
2019-02-11 (Mon)	08:30-09:30	1) NDA/RWM
	10:00-12:30	2) Copeland Borough Council **Working lunch at 12:00**
	13:00-15:00	3) Allerdale Borough Council 4) Cumbria County Council
2019-02-12 (Tue)	12:00-15:00	5) RWM 6) The Committee on Radioactive Waste Management (CoRWM) **Working lunch at 13:00**
2019-02-13 (Wed)	13:00-15:20	7) University of Exeter
2019-02-14 (Thu)	17:00	Move to the airport
	19:00	Departure at Heathrow (London (Heathrow) to Tokyo (Haneda))
2019-02-15 (Fri)	15:50	Arrival at Haneda

1.4 Participants

Shunji MATSUOKA	Professor (Research Director), Graduate School of Asia-Pacific Studies, Waseda University Director, Waseda Resilience Research Institute, Waseda University Director, Waseda University Research Center for Future Planning in Hirono, Fukushima
KwangHo LEE	Research Associate (Ph.D.), Waseda Environmental Research Institute, Waseda University
Yunhee CHOI	Ph.D. Candidate, Graduate School of Asia-Pacific Studies, Waseda University Research Assistant, Waseda Resilience Research Institute, Waseda University

2. Summary record

2.1 France

2.1.1 President of the COESIC

Date & Time	February 4, 2019 20:00-22:00
Place	La Fresque
Participant	Dr. Pierre-Benoît Joly, Director,Institute for Research and Innovation in Society (IFRIS)

The function of the expertise and monitoring committee of the information and consultation process of Andra (COEDSIC)

- The COESDIC (since 2007), an assessment and follow-up committee, with expert scientific and operational skills in the field of the citizen, was established to advise Andra on social and information issues upon Andra CEO's decision.
- This special committee mainly dedicated to preparing for the public debate in 2013 and interaction between Andra and the society.
- Currently, the work of the committee was discharged as Andra established the Ethics and Society Committee (Le comité éthique et société, CES) in 2015, which some part of roles is overlapping with the COEDSIC.

· The Ethics and Society Committee: The Ethics and Society Committee was created by the decision of the Andra Board of Directors on December 17, 2015. By setting up a committee, the Agency responds to strong demand for greater involvement of society in the management of radioactive waste, which was notably expressed during the 2013 public debate on the Cigéo project (source: Andra).

- Participants of the COEDSIC

· Michel Callon, sociologist, a former member of the Scientific Council of Andra and professor at the Ecole des Mines de Paris;

· Anne Bergmans, sociologist and teacher-researcher at the University of Antwerp (Belgium);

· Pierre-Benoît Joly, economist, and sociologist, director of research at INRA, director of IFRIS;

· Saida Laârouchi-Engström, Vice President of SKB (Sweden).

- Two years ago, Michel Callon, president of the committee, retired and Dr. Pierre Joly became a president of the committee. Also, a new member joined the committee.

· Bernadette Bensaude-Vincent, philosopher and professor emeritus at the University of Paris 1 Panthéon Sorbonne.

- The participants met at least four times a year. There was a total of 40 meetings in the COESDIC. Besides public debate, many brainstorming on the issue, discussion on reversibility were carried out.

CNDP

- Including creating the 1991 Bataille law, the French Parliament played a critical role in nuclear waste management issue. Thus, Parliament, at first, did not welcome the CNDP to involve in the nuclear issue.
- The conclusion of public debate in 2005-2006 was in favor of sub-surface storage for the option. Although there was no such issue concerning legitimacy in the process to pass the bill back in 2006; still, the decision-making process after the debate in 2005 was criticized due to lack of in-depth consideration of the sub-surface storage for the option.
- If the debate organizes based on the traditional setting, it easily causes a significant loss. For example, the important debate on nanotechnology held in 2009 was not possible to proceed. In the same way, the 2nd CNDP on the nuclear waste management issue held in 2014 was not possible; and ended up discussing on

the internet. The citizen conference followed it as a supplement to the debate. It was interesting, yet the conclusion taken by the Andra was pilot phase among the other options discussed, which will be a phase to check technological parts of geological disposal while filling the URL with the real waste.
- Institutionalization of the public debate often used as a tool to manipulate the public. It has been observed on GMO issue as well as Nanotechnology issue. In practice, issues concerning nuclear energy and nuclear waste management themselves are a complicated and technical issue for public debate. Through debate, a specific concept such as reversibility has developed, yet the subject itself still not reversible in reality.

CNDP on PNGMDR
- The debate in 2013 started with criticism, in which originating from the lack of in-depth consideration of the conclusion from the 2005 public debate.
- The ongoing political turmoil in France, which has led to the Great national debate, can be seen as one of the reasons for the delay in the debate on PNGMDR. This situation is a considerable challenge for both the government as well as the public debate.
- The process of authorization for massive projects, including any energy-related projects and program, are obligated the consultation with the public by law. CNDP on PNGMDR is a part of this process.
- During the debate on PNGMDR, it is unlikely to discuss the option for radioactive waste management. Even during the 2013 debate, there was little discussion on the option since deep geological disposal was already decided as the option by the law in 2006. Although the chair of the citizen conference held in 2014, reopened the other options in the discussion, it ended up with the pilot phase, which is a phase to check the technical part of deep geological disposal.
- However, the economic evaluation could be a way leading possibility to change the option. In Europe, since 2000, there is an obligation to demonstrate the public investment is efficient. It has been transformed into the French law in 2013, which started obligating any more significant public investment to conduct the formal economic assessment.
- This economic assessment must follow a strict methodology, and it estimates possible costs not only now, but in the future including the possibility of any occurrence of Fukushima like an accident. Once the economic assessment finds that deep geological disposal is not economically efficient, economic logic is likely to have more power than the logic of engineers even in public debate.
- In this regard, if the option changes, unfortunately, it would be not because of the public debate, but because of the economy. If there are no changes in the power of relations, discussion through the public debate is unlikely to make changes in the choice which was determined by the existing power of relationships. And now, it could say that power relations are moving to economists.
- Currently, there is no exact information on the cost of the options. However, there is an ongoing project on the economic assessment of the options. It will allow comparing the costs of the options.
- The financial issue takes an important role. Especially, EDF, where provides funding to the Cigeo project, is an important actor in the decision-making process. If the estimated costs for deep geological storage much exceeds what the EDF is considering, and if the other options are likely to be less costly than deep geological disposal, there is a possibility in the future to reopen the debate for alternatives.

Technical democracy
- In terms of technical democracy, the point is the logic of the project. Although the series of events opened the place for citizen participation and deliberation, engineers still keep their logic concerning the schedule and direction of the issue.

Mobilization in Bure
- It is controversial. Due to the low population of Bure, local people are unlikely to mobilize. Also, the project has brought money to the community. However, there are external opponents against ZAD. Because of these opponents who have moved from outside Bure, there is a big battle in the territory, and the local

people are tired with opponents.
- The reaction of the local people has started blaming on the project, and it could be one of the difficulties to proceed with the project for Andra.

(From left) Dr. Kwangho Lee, Prof. Shunji Matuoka, Dr. Pierre-Benoît Joly, Ms. Yunhee Choi

2.1.2 OECD/Nuclear Energy Agency (NEA)

Date & Time	February 5, 2019 14:30-16:30
Place	OECD/Nuclear Energy Agency
Participant	Ms. Pascale Bourassa, Deputy Head for Human Aspects of Nuclear Safety, Division of Radiological Protection and Human Aspects of Nuclear Safety Ms. Kamishan Martin, Nuclear Safety Specialist, Division of Radiological Protection and Human Aspects of Nuclear Safety Mr. Tomoyuki Saito, Nuclear Safety Specialist, Division of Radiological Protection and Human Aspects of Nuclear Safety Dr. Edward Lazo, Deputy Head of the Division of Radiological Protection Dr. Gloria Kwong, Deputy Head of Radioactive Waste Management and Decommissioning Division Dr. Ichiro Otsuka, Division of Radioactive Waste Management and Decommissioning

The timescale for reversibility and retrievability

- Each country has its requirements during the operation phase. The closing period is not solely depending on the geology itself. Design of the facility is also crucial to decide the closing.

Intergenerational issue

- There is no clear cut off for the close and distant generation, and that is why they use intergenerational terms. The younger generation is not interested in the issue, and now one of the themes is to make the young generation get engaged. Unless the accident happens, no one is interested in such topics as emergency recovery.

Other options for HLW

- Different countries looked up all the alternatives. There are other options such as surface storage as long as the monitoring is provided. However, long-term monitoring is costly. And it is questioned whether the future generation would be willing to monitor.

How to overcome difficulties to proceed with the policy

- Interaction and engagement in the regulatory process are essential. For example, implementor in the Canadian case built a quite stable relationship with the community upon the adaptive phase approach (stepwise approach). Both local and national process is essential to proceed with the policy.

Public Communication

- The NEA supports its member countries in public communication, and especially under two very active working groups: Forum on Stakeholder Confidence and Working Group on Public Communication.
- A 3-day workshop will be held in the upcoming September on the topic of risk communication. (and further specific techniques in risk communication could be discussed?)
- Method applied in 2016 Workshop: Stakeholders attended the workshop and received feedback from the public participated in the workshop. Especially, during the post-session, in which invited young people (college students and educators), the spider strategy using the participant's SNS, was applied to spread information about the workshop.

Meeting with the OECD/NEA

Data collection

- Presentation material entitled *Integration Group for the Safety Case, Safety Case Communication*, by Dr. Ichiro Otsuoka, OECD/NEA.
- Copied pages of some part of *International understanding of Reversibility of decision and Retrievability of waste in geological disposal*, published in November 2011, OECD/NEA.
- A copied report entitled *Reflections on Flexibility, Reversibility, Retrievability and Recoverability* by Dr. Walter Blommaert of the Belgian nuclear safety authority.
- A report entitled *Radioactive waste management 2017, Communication on the Safety Case for a Deep Geological Repository*, OECD/NEA

2.1.3 OECD/Centre for Entrepreneurship, SMEs, Regions and Cities (CFE)

Date & Time	February 5, 2019 17:00-19:00
Place	OECD/Headquarters
Participant	**Centre for Entrepreneurship, SMEs, Regions and Cities (CFE)** Mr Jose Enrique GARCILAZO, Head of Regional and Rural Policy Unit, Regional Development and Tourism Division Mr Chris MCDONALD, Economist/Policy Analyst, Regional Development and Tourism Division

	Ms Mai SASAKI, Economist/Policy Analyst, Regional Development and Tourism Division Mr Tadashi MATSUMOTO, Coordinator, Cities, Urban Policies and Sustainable Development Division Mr Marco MARCHESE, Economist/Policy Analyst, SMEs and Entrepreneurship Division Ms Sandrine KERGROACH, Senior Economist, SMEs and Entrepreneurship Division (attended via Skype) **Nuclear Energy Agency (NEA)** Dr. Gloria KWONG, Deputy Head of Radioactive Waste Management and Decommissioning Division Mr Kentaro FUNAKI, Senior Nuclear Safety Technology Specialist, Nuclear Safety Technology and Regulation Division

The meeting started with Prof. Matsuoka's presentation on Waseda Resilience Research Institute (WRRI)'s Fukushima Project following the self-introduction of the participants to the meeting.

Further explanation of the fluctuation of the estimation made by WRRI. Why is the population expected declined again after some increase in population for some period?

- The area considered for estimation is the evacuation area. There are areas where evacuation order has not yet lifted. It is an expected increase in population considering the gradual lifting of evacuation orders in the future. However, considering the country's overall decrease in population, these areas will face the trend of decline in population after a certain period of population growth due to the return of the evacuees.

When do you expect to have one million visitors to the Hama-Dori?

- In this prediction, our target is foreign visitors to the area. It is only 24,000 as of 2015 to the whole Fukushima area. If Hama-Dori can realize social innovation, one million foreign visitors can be expected to visit the region by 2050.

The number of visitors to Fukushima even as of 2015 is half of the number of visitors to Kyoto. What is the specific attraction of Fukushima?

- There are several attractions, yet easy access from Tokyo might be one of the essential parts of the number of visitors.

Further explanation about social innovation plan and the role of the WRRI?

- The local government is the key to initiate social innovation. The central government subsidizes local government for now, yet the local government and people will need to expand their capability to invite local entrepreneurs and industries to join the approach. There are potentials to realize this approach, and the WRRI is searching for the possibility with local people.

What was the reason to choose Hirono town?

- Hirono is a small town with an original population of 5,000 even before the Fukushima accident. We see these small towns as an excellent player to make a region-wide collaboration. When the bigger-sized city with more power, like Iwaki city, initiates this kind of approach, neighboring towns and villages are likely to be cautious. Contrary, when a small town or village take initiatives, there are more chances to easily collaborate among the smaller size towns and villages in the region. Although Hirono is a center for our research institute, the project covers the whole Fukushima.

Can Hirono be seen as a hub for academic activities compare to the other communities? Are there any different opportunities in each town to create a specific cluster?

- For now, it might be challenging to make particular clusters in Hama-Dori. They are still relying on government subsidies, and the situation will be worse once the subsidize stops. That is why they need collaboration with each other. However, realizing cooperation in such towns will take time as the industry heavily relies on the nuclear industry. Also, their capacity to collaborate is still low compared to the other small cities in Japan. This tendency might be originated from their past behavior which has been quite path dependent.
- In this regard, culture for entrepreneurship in this region also is lacking compared to the other area in Japan. To support this part, the WRRI invites entrepreneurs from the different regions to share their knowledge and experiences with local people in Hama-Dori area. However, one of the key remaining questions is how to overcome existing dependency on previous activities and behaviors.
- Iwaki-Otento-Sun case can be one example. It is one of the NGOs in the area which producing organic cotton and spreading solar energy panels. One of the owners of this NGO is from the Western part of Japan and co-working with the other owners, who is originally from Fukushima. However, this case is not typical in the area. It is hard to make Fukushima people open their mind and express a real opinion in a short period.
- When we initiate a project or approach, we should keep in mind that the Fukushima accident is unique compared to the previous disasters. For example, social background and intuitions already built in Japan when the Fukushima accident occurred are different from the Chernobyl case. That is, there is no suitable lessons or examples that we could implement from the previous cases to the Fukushima case. Fukushima people will need to find their way to overcome the current situation. As one of the approaches, the WRRI is setting the platform in Hama-Dori area where local people gather together and discuss the issue with experts, scholars, and local people. Our project expects that this kind of platform enables local people to create and produce ideas to overcome the facing problems and to move forward.

About the OECD project in the region
- The OECD is still learning and trying to understand how OECD can contribute to the process. Decommissioning industry will be the OECD projects' main focus based on a request from the Ministry of Economy, Trade and Industry of Japan (METI), the client of the project.
- However, OECD's scope can be broader in the future. For this year, OECD will collect all the possible information and have policy dialogue. This dialogue does not mean providing answers or solutions. The outcome of this year will be a dialogue itself, and the approach will be qualitative analysis. OECD is not equipped yet to conduct any quantitative analysis, and it has not been requested either. By considering the current situation, OECD will try to find out an effective way for Fukushima.

Ms. Sasaki of OECD/CFE presented about the OECD project in Fukushima.

Further detailed discussion on the OECD project
- This first year, the OECD's project aims at having a dialogue on decommissioning industrial cluster with stakeholders (METI, the prefectural government, and innovation and cluster organization), but not a report. The OECD's project does not plan to carry out any particular analysis. In this process, the OECD will bring the cases what the OECD learned from the previous experiences and see how the OECD can contribute to the region.
- Stakeholder engagement is a part of a vital issue to discuss. At this stage, the prefectural government has not studied for decommissioning, yet the national government encourages the prefectural government to lead the discussion concerning decommissioning.
- The OECD will need to further precisely define decommissioning in Fukushima from the other normal decommissioning process.
- For now, the OECD focuses on decommissioning industrial cluster upon request of METI. However, a clear definition of decommissioning cluster has not decided yet. Once the prefectural government starts requesting more precisely, the decommissioning cluster should be in the form of Social Innovation as the

WRRI proposed. For now, however, the prefectural government mainly focuses on taking all the waste outside the prefectural territory. The OECD is also fully aware of the importance of the approach proposed by the WRRI and seeking the way to integrate that view within a scope of the project with technical issues.

Lastly, Prof. Matsuoka emphasizes the importance of the upcoming two years before the Olympic concerning effective Fukushima reconstruction. Many Japanese people have already had no interest in the issue, and after the Olympic, this tendency will be faster. Thus, the more practical approach to the Fukushima reconstruction should be implemented feasibly before the Olympic.

Meeting with OECD/CFE & OECD/NEA

Presentation by Prof. Matsuoka

2.1.4. French national radioactive waste management agency (ANDRA)

Date & Time	February 7, 2019 (Thursday) 09:30-12:00
Place	Andra
Participants	Mr. Richard Poisson, Business manager/International Division Mr. Matthieu Denis-Vienot, Directorate of Communication and Dialogue with Society/In charge of institutional relations Dr. Luis Aparicio, Research and Development Division, In charge of Social Sciences and Humanities

2.1.4.1 Meeting about the Parliamentary Office for Scientific and Technological Assessment (OPECST): with Mr. Richard Poisson and Mr. Matthieu Denis-Vienot

Delays in the debate on National Plan for the Management of Radioactive Materials and Waste (PNGMDR)

- Significant questioning regarding the government situation in France is one of the reasons for the delay in the debate on PNGMDR. The Government has decided to discuss the current situation through the Great National Debate (Le Grand Débat National; Started on January 15th for two months).
- Although the CNDP is not responsible for this grand debate, handling two debates at the same time is not good. Therefore, CNDP is waiting until the Great National debate finishes.
- The debate on PNGMDR should resume sometime before June this year.

· Note: CNDP was responsible for the Great Debate until December 2018, yet it was decided to be organized by various actors which include citizens, elected officials, and institutions, for-profit or not-for-profit

organizations as the Government wants the largest number to participate and organize debates (Source: Le Grand Débat National)
- The PNGMDR is a technical document which includes details of the technology. Mr. Poisson thinks that it might be a difficult subject to be discussed in a public debate.

The Parliamentary Office for Scientific and Technological Assessment (OPECST)
Establishing the OPECST
- The idea of having OPECST within the parliament was to have an independent scientific analysis capacity separated from the government so that the parliament has an independent view on science technology-related subjects to make the right decision.

The composition of the OPECST
- 1 President and 6 Vice-presidents are circulating every 3 to 5 years.
- Total of 36 members consist of 18 MPs, and 18 Senators have an equal political spectrum as the elected assembly.
- The OPECST has a scientific council composed of 24 members. Members of the scientific council can be both French and foreign. They cover all the scientific subject.
- The current president was a former Minister of Industry in 1993. He was active in the Cigeo siting process then.

Work of the OPECST
- The OPECST can produce documents on the specific subject by its own decision or by request of any chairperson of the political party or 18 MPs.
- Notably, the OPECST started involving in radioactive waste from the very early stage and produced a report.
- The OPECST produce text specifically concerning the three subjects: 1) radioactive waste, 2) bioethics research, and 3) any subject related to the energy transition.
- The OPECST has produced 200 reports; and since 2017, every one of two months, the OPECST come up with a specific note (a small report) to deal with the subject being relevant at the moment.
- These days, the OPECST more focuses on outer space work such as space exploration, traveling Mars, etc. These are 4-5 pages of brief notes (not a report).
- The OPECST was recognized with their significant role in evaluation on scientific research at the end of the previous period of parliament in 2017. Thus, the OPECST now become the body where can officially carry out evaluating scientific research in France outside the Parliament by law.
- There is a total of 10 reports on the waste management issue among 200 reports: three on PNGMDR, and seven directly linked to nuclear waste management.

The process of the study program
- When the subject is referred to the OPECST, the Office appoints one or two, sometimes more depending on the subject, rapporteurs, who always selected from among the members of the OPECST. Most study programs bring together an MP and a senator. OPECST also tries to include both the left and the right wings together; as well as gender. It is called ‘triple parity’ matching.

- Those appointed rapporteurs carry out a feasibility study before deciding whether to start a study program or not. It rarely happens when the Office chooses not to go for the study program.
- Once it is agreed to proceed with the study program, the rapporteurs take an extended period to collect information to draft a report.

- The rapporteurs use several methods to gather information. They hold hearings to gather all opinions from concerned people and organizations. They also travel in France or abroad for a better understanding of the situation at both the national and international level.

The rapporteurs' powers

- The OPECST rapporteurs have significant powers equivalent to the fiscal commission in France. It means that they have access to all available documents (except for those dealing with military matters or state security). It is similar to the prerogatives given to the judges. Particularly, for the nuclear installation, they can have unscheduled visits to the nuclear facilities and request documents. In this case, they have similar power to ASN. All documents should be provided to the OPECST members on request of them.
- Once all necessary information is gathered, rapporteurs draft a report. The report is not just an accumulation of the data and opinion collected. The rapporteurs add their analysis and opinion.
- At the end of their work, the rapporteurs submit their draft report and their conclusions to the members of the OPECST. The conclusions can be used directly for legislative work or budget discussions.

Relationship with the other agencies and academia

- The OPECST works with four agencies, which are ASN, Biomedicine, CSTB (dealing with the building construction), and CNE2 (Commission reviewing the Cigeo project). These four agencies present an annual report to the OPECST.
- The OPECST also have a system to match senators and MPs with specific scientific experts so that the member of the OPECST build knowledge on the scientific subject.
- Particularly for the Cigeo project, the OPECST designates senator and MP to be a part of a board of Andra. Since Andra is not a public body where the staffs are not government officers although it is under the Ministry, the OPECST tracks the work of the agency through this mechanism.

The way how the OPECST contributes to drafting a law on the specific subject

- It depends on the case. For example, the Bataille Law in 1991, Christian Bataille, carried out information collecting process as a mediator designated by the Government, not as a rapporteur of the OPECST. And the report was directly submitted to the government. The law, of course, drafted based on the report submitted by Mr. Bataille, yet there was no direct contribution to drafting law as a part of the OPECST.
- On the contrary, when the 2006 law was drafted, the OPECST was called on to look at the subject; therefore, there was a direct input to the law in 2006 from the OPECST.

The way of evaluation by the OPECST

- The members of the OPECST call on scientific experts who are working for senators and MPs. These scientific experts, who are not the members of the scientific council of the OPECST, produce the embryo of the reports from the scientific aspects.

Public hearings carried out by the OPECST VS. Public debate through the CNDP

- Public hearings through the OPECST does not allow the attended public to express their opinion. It is more about attending the hearings and listening to the panels invited by the OPECST, which is entirely closed. However, public debate is a space where attended people can express their position.

The relationship between Parliament and CNDP

- The decision made by the parliament after the 2005 debate was deep geological disposal although the conclusion of the debate preferred the long-term storage. Because parliament prefers to trust in geology than in society. Additionally, the Parliament could not respect the conclusion made by the debate as the parliament has the legislative power.
- In the public view, the decision made by the Parliament diluted the meaning of organizing such debate.

Thus, the public debate in 2013 was blocked by the NGOs, and the debate was held on the internet, which was controversial. In terms of the legitimacy of such a methodology using the internet, anybody interested in the subject could participate. However, it is challenging to provide information to the lay people who are not as proactive as the opponents and staying in the middle. For example, the citizen conference was held in 2014 to complement this legitimacy issue of the 2013 CNDP.
- The citizen conference was held for three weekends with a group of 20 people was selected by drawing lots. For the first weekend, experts explained the situation and contents of the subject, for the second weekend, the citizens discussed together on the issue, and for the third weekend, the group produced a report.

2.1.4.2 Meeting with Mr. Luis Aparicio

CNDP

- CNDP provides the platform to collect all the point of view on the issue. When it established in 1997, CNDP dealt with the issues only for infrastructure. However, parliament was not happy to have CNDP getting involved in the nuclear waste issue.
- When the CPDP decided to have citizen's conference during the 2nd CNDP in 2013, OPECST was critical for the citizens' conference parliamentarians seen is as a threat to representative democracy, although the aim of the citizen's conference was not making the decision.
- OPECST did not see the opinion from the citizen's conference as the national point of view as the participants cannot represent the whole nationally.

Citizen's conference

- Difference between consensus conference in Denmark and Citizen's conference in France: The citizen's conference tries to push people to come up with the statement while the consensus conference pushes people to have only one decision. In Belgium, such form of citizen's conference organized with a particular focus on reversibility five years ago.

Reversibility

- Reversibility has been usually presented as an ethical choice because of removing "the burden" on future generations (all of them). Nowadays, this ethical concern is the more and more understood in terms of "sharing of responsibilities" within present generations (some decades along the time).
- Collaborative work between Andra scientists and engineers and Social sciences and humanities researchers, as well as wider discussions within the Agency and beyond, have recently brought about a shared understanding of this notion as a governance principle (Aparicio 2010, Andra 2016).
- Therefore, three distinct yet complementary meanings have been historically developed and integrated into the 25th July 2016 Act:

a) A first strictly technical understanding of reversibility that incorporates the time-limited notion of retrievability, which entails constraints on the repository design.
b) A second meaning that refers to decision-making mechanisms (and implies technical reversibility): reversible decisions allow to either interrupting the implementation of the adopted options or going back to a previous step.
c) And third, reversibility in a wider political and moral sense, which includes the previous ones : as parents taking care of their children and grandchildren (instead of all future generations), this conception considers that the next generation should be provided with all the necessary resources and instruments to decide going forward or making a shift (the stake is to offer a similar range of options to our immediate descendants).

Mr. Matthieu Denis-Vienot, Mr. Richard Poisson

Mr. Luis Aparicio (Left)

Data collection

- Presentation material entitled *PARLIAMENTARY OFFICE FOR SCIENTIFIC AND TECHNOLOGICAL ASSESSMENT (OPECST)*

2.1.5. National Commission for Public Debate (Commission nationale du débat public ; CNDP)

Date & Time	February 7, 2019 (Thursday) 10:00-12:00
Place	CNDP office
Participants	Dr. Floran Augagneur, Vice-president of the CNDP

Overview of the CNDP

- As a guarantor of the public debate, the CNDP works on two subjects which are project and program or plan in any matter. When having a debate on a project or program, the role of the CNDP is to ensure: 1) people's right to be informed, and 2) people's right to participate in the decision of the debate.
- Any project over 300 million euro and any program concerning energy matters including nuclear must come through the CNDP. For the projects under 300 million euro, depending on the characteristic of the subject the CNDP decides whether it will have a debate or not.
- The French CNDP is a unique system. Although the system in Quebec, Canada can be seen as a similar system, yet the Canadian system is more like the third phase (public inquiry) of the French system.

Principles of the CNDP

- CNDP is independent of the government. Although the French president names the president and two vice-presidents, they are not removable.
- CNDP is neutral. It does not support any opinion publicly.
- CNDP is transparent. Everything the CNDP members know open to the public without secret.
- CNDP tries to organize contentious debate while realizing deliberative democracy. It creates a place to exchange argument.
- CNDP offers equal treatment into the participatory democracy as CNDP works to ensure an equal opportunity to express among all participants in the debate.

The composition of the CPDP

- CNDP names 5 to 10 members of the CPDP including a chairperson of the CPDP. Sometimes a chairperson of the CPDP, who is named by CNDP at the first stage, propose the other members, yet it should be consulted

with the CNDP.
- Criteria to select the members of the CPDP is neutrality of the view on the issue, time available to dedicated to the debate, and someone who has the vision for participatory democracy.

The procedure of Public debate

- ⇨ Referral to the CNDP
- ⇨ Name the CPDP
- ⇨ Preparation (from a couple of months to one year)
- ⇨ Public debate (3 months)
- ⇨ Making the report (2 months)

- 1st phase
: Preparation of the dossier, which includes all the information on the project. It is open to the public, and a total of four documents are provided to the public. Usually, it takes one year to prepare the documents. In this phase, the role of CPDP is important working together with the responsible organization of the subject to ensure that all necessary information is included in the dossier.
: CPDP decides whether the documents can be submitted to the CNDP or not (they check whether all the required factual information, which include both benefits and risks, are in the document).
: When the CNDP, a body of 25 members, where the French president and other members designate one president and two vice-presidents, receives the dossier from the CPDP, all member of the CNDP vote whether the dossier can be open to the public or not. Usually, it is quite fast around one month until the member of the CNDP vote after receiving the dossier from the CPDP.
- 2nd Phase
: During the public debate, the CNDP receives contribution documents from all the concerned stakeholders, and there is deliberation of all the public. And before, during, and after the debate, public opinion could be tracked as it is recorded in the reports.
- 3rd phase
: Final reports (a report from CPDP + a short report from CNDP + a report with answers from the responsible organization on the subject)

- In all process, CNDP 's role is making sure that the dossier is not operators' OPINION! The dossier must be just information about all different options. Anytime when the CNDP finds the opinion of the project operator, CNDP requests to rewrite until it becomes real information.

The general process for projects and program to be authorized in France
1) Public debate through CNDP
: At the first stage, projects and programs should come through the CNDP. This stage is where all options are still possible.
: Once the project or program comes to the CNDP, CNDP firstly studies the matter and tries to understand the situation. This process allows the CNDP to clarify what things people need to know and on what topic people can discuss.
: For the next step, CNDP creates a special commission of public debate (Commission Particulière du Débat Public; CPDP), and CPDP handles the whole process of public debate on a particular subject.
: Once the public debate over, the government or responsible party of the matter have to answer within three months. All the public debate has to have an answer to the questions raised during the public debate.
- Important point: CNDP does not answer to the questions. CNDP does not need to do with the legitimacy to decide. However, CNDP makes sure that the public and all participants have an answer to the questions.

2) After the CNDP, it goes to the Environmental authority for the environmental impact study. This phase does not open to the public, and only experts involve.

3) Public inquiry: This phase is a sort of public hearing. In this phase, public participation is allowed. There is one last round of public hearing with judges and judges say yes or no based on all the studies conducted. This time judges see mainly whether the studies are reliable or not, all the studies are scientific or not.

4) Once the public inquiry judges it, the project or program can be started.

The CNDP on PNGMDR

- Background of having PNGMDR in public debate for the first time: Law in 2016 (ratified in 2018) expanded the role of CNDP. Before the ratification of the law, CNDP involved only in the projects. However, the 2016 law made CNDP dealing with the programs as well. It is the main reason for the CNDP on the PNGMDR.

- Background of delay: Before starting the debate on PNGMDR, political energy plan (PPE) have to come up as the treatment of nuclear waste depends on shut down of the nuclear plants, which will create new wastes. According to the decision made on the PPE, options should be open for PNGMDR. PPE was published in January, and the debate on PNGMDR is expected to start in April and in September.
The debate on PNGMDR is likely to be a debate between experts and NGOs as the content of the argument is technical. The CNDP will have to decide the suitable tool for this case.

Background of criticism on the 2nd CNDP

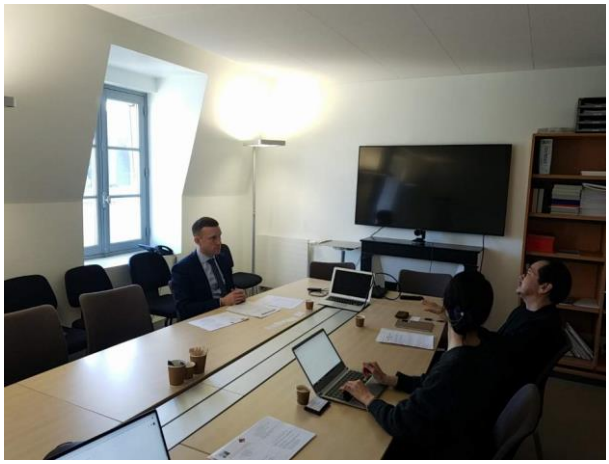
- Public debate conducted in 2005 was beneficial. It showed the alternatives. Nevertheless, the government ignored public opinion to investigate options further. For now, most of the actors are radicalized because of the government ignoring public opinion. It is not because of the quality of the public debate, and not because of the nuclear itself, but because of that, the government did not listen to the result of the debate.
- Additionally, there was one happening that the government requested the CNDP to remove one information which was in one of the contribution documents due to the defense matter.
- At least for now, CNDP never hides anything. For example, there was a big issue since the government recently requested the CNDP to do something and to say no on the other subject. The CNDP, of course, said no. From now on, the government would not ask for the CNDP to hide anything.

G400: A tool of public participation

- It is an American tool. CNDP provide information on the primary energy policy options to 400 citizens who were selected by drawing lots. In this process, CNDP tries to find the material of argumentation.

Participatory democracy vs. Representative democracy

- Participatory democracy through the CNDP does not try to replace representative democracy. However, there is some misunderstanding that participatory democracy will make the job of parliament more complicated.
- The interesting part is that, ever since the CNDP is created, its role has been developed. The CNDP tries to build social trust as the CNDP works to see what the decision-makers miss.

With a Vice-president of the CNDP
(A photo on the left) From left, Prof. Shunji Matsuoka, Mr. Floran Augagneur, Ms. Yunhee Choi

Data Collection

- Report entitled Public Debate Multi-Year Energy Programming (In French), 『Compte Rendu, Debat Public Programmation Pluriannuelle De L'energie』, 19 March to 30 June 2018, Published on 30 August 2018.

2.1.6 School of Advanced Studies in the Social Sciences (EHESS)

Date & Time	February 7, 2019 15:00-16:30
Place	EHESS
Participants	Dr. Yannick Barthe, Research Director, Interdisciplinary Laboratory of Studies on Reflexivities of EHESS

About the book entitled "Acting in an uncertain world."

- The notion of risk was everywhere when this book was published in 2001 in French. In many cases, society faces uncertainty rather than specific risks. Since these two notions, uncertainty and risk, are not the same, the notion of risk often misinterpreted.
- When society calculates risk, a decision should be made at the same time whether it will take risks or not. However, in the case of nuclear waste management, our society has to invent another process of decision; which is now called reversibility process. Reversibility is the term embracing not only the technical part but also the process of decision-making. To realize reversibility in decision-making, however, reversibility in the technological device should be preceded.
- This book was successful in France and led to an epidemic of fora everywhere. Sometimes we merely describe controversy itself. To deal with this type of issue, we need to design the procedure.

The public debate in France

- What Dr. Barthe experienced during the CNDP in 2005 where he participated, the idea of the CNDP is not to decide. It only provides various opinions on many other choices. In this process, there is a rivalry between the CNDP and the Parliament. Parliament did not understand the necessity of the CNDP because parliament thought the way carried out by parliament was enough. Indeed, Christian Bataille himself organized a lot of public hearings before the draft the Bataille law and his report included all the actors.
- In this regard, the conclusion derived from the debate was not welcomed by the parliamentarian as the Parliament did not see political legitimacy from the CNDP. However, this is a misunderstanding of the parliament. The parliament thought that CNDP would have the power to decide with the same type of debate

that used to have in the parliament. The idea of the CNDP debate is not to decide, and even no one says it is the best solution. The role of public debate is providing more ideas and choices to the parliament for the final decision-making. CNDP is a platform to enable this procedure to open the possibility of a deliberative process.

Options for HLW management

- Maybe the French parliament, government, and Andra genuinely believe that deep geological disposal is the best solution. Indeed, a massive amount of money has already been spent on this option.
- However, surface storage could be a real alternative in terms of reversibility. Although engineers of Andra insist that surface storage is not safe after an extended period, it could be rebuilt again after one century or a specified period. Also, this is the way not to forget about the waste.
- In France, not many engineers and scientists find surface storage interesting as much as deep geological disposal. The reason why they do not support the idea of surface storage is not solely based on a scientific point of view.

Reversibility

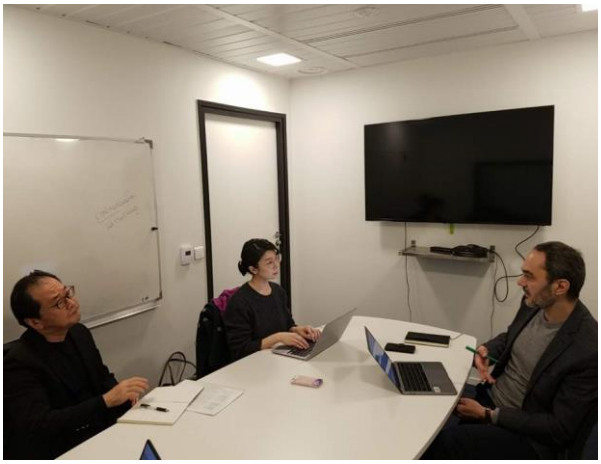
- The notion of reversibility originates from Christian Bataille or maybe local people who Mr. Bataille met during his study in preparation of the report. Mr. Christian Bataille collected information and opinion from all concerned-actors. According to him, people were not exactly afraid of either nuclear waste itself or geological disposal. People were worried about an irreversible approach which they cannot do anything in case any problem happens. It is the starting point of the idea of reversibility. This idea of reversibility was forgotten for a while in the 1980s, yet come back in 90s again, and become a condition to accept the option in 1998.
- Reversibility approach is a way of political compromise. Although reversibility is a condition for acceptance of the option, reversibility can be guaranteed only for 100-150 years due to the safety of the solution. If reversibility is genuinely important, sub-surface storage should be considered as a feasible solution.
- Reversibility approach is also a way to gain time from the beginning. There are many solutions when the decision is still open. In a democratic process, we test all the solutions. Some happenings can well explain how the reversibility approach used to gain time. When the Bataille law designated the three different options, CSR was indicated to study surface storage. Smart engineers at CSR researched the option with various ideas. However, the funding was stopped one day in 1998 when the government announced reversibility as a condition to accept the option.
- People all say that they are working on reversibility. However, the question now is how many times would it be reversible? Generally, this aspect of the debate is not really at the center of the solution at this time.

Background of government announcement in 1998

- There was a change in government. Some people in the government were close to the opponents of the deep geological disposal and environmental associations insisting that reversibility is essential. It could be considered as one of the factors of the government decision, although it is not apparent.

The future direction of the issue

- In France, we still have time to explore the other options to find a final solution, although money matters. Bure now is likely to be a new symbol of resistance to the government, bureaucracy, and technocracy. The situation is getting more complicated compared to 10 years ago. If Bure becomes a new symbol of environmentalists, gaining acceptance will take a very long time.




Meeting with Dr. Yannick Barthe
(A photo on the right) From left, Ms. Yunhee Choi, Dr. Yannick Barthe, Prof. Shunji Matsuoka

2.1.7 WISE-Paris

Date & Time	February 08, 2019 17:00-18:10
Place	Wise-Paris Office
Participants	Mr Yves Marignac, Director

Public debate in 2005-2006

- It was a big step in terms of the recognition of the role of 'non-institutional experts' who work professionally as experts outside the main institutions.
- Georges Mercadal, a chair of the CPDP of the 2005 public debate, emphasized the ethics of public debate.
- The purpose of the preparation meeting was to identify what should be the topics for discussion during the public meeting. Among 60 participants of the meeting, there were only five non-institutional experts who were from GSIEN, ECRO, Réseau Sortir du nucléaire, Greenpeace, and Wise-Paris. Rest of the participants were mostly from the Ministry.
- During this meeting, there was a tendency to respect the critical view, and this was a new approach.
- The idea of having a critical view from non-institutional experts, not from NGOs, was accepted during the preparation meeting, and B. Dessus, B. Laponche, and Y. Marignac from Global-chance and Wise-Paris were asked to provide this critical contribution by the CPDP.
- Starting this point, these three experts had a specific role in the public debate. In all public meetings, one of them presented on the stage as one of the discussants, and it enabled them to respond to the industry and government to say while answering the questions from the public.
- The way of these meetings worked was quite the same pattern each time; and it was a mix of auditions of the public meetings, thematic meetings, and synthesis meetings.
- Each meeting had an introduction by government providing info on the issue, plus one or two complementary presentations by EDF, CEA (it was about transmutation), and by the independent experts. The presentations kept quite short so that the meeting could provide more time to answer the questions.
- As one of the ways how the commission proceeded with the debate, they took the written questions and typed them in the computer, and from time to time showed the items to the audience during the meeting.
- The chair of the meetings (either Makerdal or another member of the CPDP) tried to pick the questions with a balance between the positive and negative ones. Depending on the type of question, the chairman asked for the panels to provide the answers.
- The principle of the debate was to give the public as much as possible the room for the questions.

- At the same time, providing structured information before the public could raise the questions was important. At least, during the 2005 public debate, the chair of the CPDP tried to frame the information so that the public could reach faster the relevant questions.
- In this regard, the role of non-institutional experts was crucial in contributing both structured and balanced information.
- Also, inviting non-institutional experts enabled identifying the core of diverse view between experts which linked to different knowledge and understanding of the issue.
- Considering all this, the CNDP in 2005 attempted new approaches to structure the debate questions and to maximize room for public participation.
- Organizing structured information is related to interpersonal relations. Firstly, the attitude of participants is essential. However, the more important part is to clearly define the roles and put the responsibility to make experts or actors involved to prepare for the information to discuss and to come up with inputs.
- In sum, the way how CPDP handled the debate in 2005 was excellent from this perspective. Also, the debate itself was beneficial with a good result.

Public debate 2013-2014
- The strategy for the long-lived radioactive waste management has been a constant paradox in the history of French nuclear field. It has always been the forefront of democratizing the nuclear issue in terms of process. Each positive step, however, has been responded by closing doors by authority and government.
- 2005 public debate was another critical step in the democratic process of the country applying to the nuclear issue. The public debate was fair, transparent, and sound. However, the government again proposed the law, which was putting entirely aside from the positive and meaningful result of the debate.
- 2013 public debate started in bad condition. Anti-nuclear movement boycotted the meetings with attempts to stop the debate. The police force was mobilized, and it was not democratic and open at all. To solve this problem, the citizen's conference was held at the end of the debate in 2014.
- The citizens' conference was useful, and it could have prevented such a boycott situation if it had been held before the debate.

Citizen's conference in 2014
- CNDP commissioned a qualified person to chair this process. The citizen's conference was held for three consecutive weekends. For the first weekend, citizens were trained by listening to information provided by experts. The organizer was responsible for providing a balanced panel of experts. The second weekend, the citizens chose the experts based on their own opinion on the issue. Finally, on the third weekend, the citizens provided recommendations.
- The citizen group composed of 20 people was chosen for being representative enough of a diversity of the population. The criteria considered gender, professional positions, living area, and diverse view on the issue, etc.
- Some citizens who believe the goodness of nuclear industry trusted that nuclear waste could be handled without so many risks. On the contrary, some citizens were scared of radioactive waste. The group of citizens was a varied range of representations of real feelings of the population towards the issue.
- Mr. Marignac and the other non-institutional experts participated in the training session of the citizens' conference.
- The process enabled citizens to explain the situation with their words in their presentations how they understand the issue based on the information provided in the previous session.
- The citizen's conference drew some important points such as the emphasis on taking time to decide, reversibility, and concept of the pilot phase.
- However, the political outcomes went exactly against the positive outcome of the citizen's conference again. The government accelerated the licensing process. Ultimately, the currently facing difficulties are the result of all this situation.

The debate on PNGMDR

- PNGMDR is a process that was created by the 2006 law on radioactive waste management. It is a period of three annual processes. It is based on the work of the so-called PNGMDR working group. Mr. Marignac himself a member of the working group, yet he considers there is no joint constructive work on the issue among the members.
- ASN and DGEC run the process and listen to the opinion derived from the working group to draft the plan. However, the format of the process does not allow in-depth discussion. It is more about merely editing the report provided by the working group. The process itself is not very democratic.
- It is the first time to discuss PNGMDR through the CNDP. Newly ratified law in 2016 introduced the principle that the specific plans concerning environmental issues such as PNGMDR and PPE should come through the CNDP.
- The preparation started as early as April 2018. However, the government waited until the new president of the CNDP to be designated. The government did not want to start this further debate with the previous president who was chairing the CNDP in 2013 debate, as the general public did not trust him.
- Another reason for the delay in the debate on PNGMDR is the Great National Debate. For CNDP, it is much more difficult to proceed with the normal phase at the moment.
- One of the questions is how geological disposal and the other options will be discussed in the debate on PNGMDR. For now, it is not apparent what would be the political answer for the opponents who do not want to proceed with deep geological disposal.
- Another important topic should be in debate is spent fuel management for both storage and reprocessing option. At la Hague, there is roughly one-year stock of spent fuel storage, and EDF started the project for a new centralized spent fuel pool.
- There are growing questions about reprocessing as well. In the PPE, an energy plan which released two weeks ago, there is no implicit decision for reprocessing.
- In front of the debate, the government decides to close options and prevent a real discussion on some of the most framing issues again. Things are not clear, but the debate on PNGMDR does not start on the good ground again.


Meeting with Mr. Yves Marignac

2.2 The United Kingdom

2.2.1 NDA

Date & Time	February 11, 2019 08:30-09:35
Place	Nuclear Decommissioning Authority
Participant	Mr. Andrew Craze, Head of HSSEQ, RWM Ms. Kelly Anderson, Stakeholder Relations Manager (Cumbria), NDA

Historical overview of the UK program

- Flowers report in 1976 is the first report focusing on radioactive waste together with nuclear power and environment in the UK context. The content is similar to the current White paper concerning nuclear waste.
- Several attempts implemented in geological disposal in the late 70s and the Nirex was established as the nuclear waste executives in 1983. Nirex advanced the new approaches for site selection, but it carried out in the closed door. In the early 90s, Nirex applied to build an underground research laboratory for rock characterization. However, it was rejected by the state before the general election in 1997.
- In 2001, there was an open question at the national level to deal with the waste. As a result of the consultation, CoRWM was established, with a specific role in providing advice to the government concerning approaches to deal with the issue.
- CoRWM introduced Public Stakeholder Engagement (PSE) program, and based on the result from the PSE, CoRWM made 15 different recommendations in 2006. Key recommendations were: 1) geological disposal, 2) safe and robust interim storage with consideration of long-term time-scale of the project, 3) intensified research and development in terms of management, and 4) flexible and staged decision-making process which introduced voluntarist approach.
- In June 2008, White Paper published, provided a framework for the policy implementation. Geological disposal stated as a primary option to manage higher activity radioactive waste in the UK based on community voluntarism and working in partnership with local communities and governments.

- There are six stages in the MRWS Site Selection Process:
    1) Stage 1: Invitation issued and expressions of interest from communities
    2) Stage 2: Consistently applied ‘sub-surface unsuitability’ test (In case it is unsuitable, it cannot move forward to the next stage)
    3) Stage 3: Community consideration leading to Decision to participate
    4) Stage 4: Desk-based studies in participating areas
    5) Stage 5: Surface investigations on remaining candidates
    6) Stage 6: Underground operation

· Before Stage 6, the community can exercise its right of withdrawal.

- West Cumbria participation: Two Borough Councils (Allerdale and Copeland) and one County Council (Cumbria) formally expressed interest.
- In 2012, Shepway District Council in Kent took ‘soundings.’ They produced a web site, leaflets and held public meetings, gave presentations, and wrote to all businesses and residents. On 19 September 2012, Kent decided not to make a formal expression of interest as a result was negative (63% was negative among over 3,300 responses to soundings).
- Local authorities responded positively at the beginning, but they realized it necessary to have more information. In the summer of 2012, West Cumbria partnership made a recommendation, and local authorities were engaged in the process. However, local authority leaders did not feel comfortable to decide on the issue publicly. There were upcoming elections, and it could be a challenge for them. Since it was a local government process, the national government did not want to intervene in the politically sensitive issue locally.

- In January 2013, Cumbria decided on whether to move forward to Stage 4 of the process.
    - Copeland: 6-1 for moving to stage 4
    - Allerdale 5-2 for moving to stage 4
    - Cumbria 7-3 against moving to stage 4

- After the decision made in 2013, there was a consultation from September to December 2013. Following this consultation, the Government published a new White Paper in 2014.

It introduced many initial actions. It also adopted differently developed models for disposal based on community consent and communities interests to engage with the developer. It was much more fully prepared to promote and to lead the program.

- RWM was commissioned to take care of national geological screening exercise to look in England, Wales, and Northern Ireland. RWM collects existing geological information as well as public information and forms them in a usable way to the local authorities and communities so that they could decide whether or not to participate in the site selection process.
- The geological disposal infrastructure is a significant infrastructure, and it goes through a different national planning system, which is similar to as the Government does for major transport developments, and new nuclear power stations, etc.
- All the initial actions set out by the White Paper in 2014 is now completed. In December 2018, the Government published a new policy document which is replacing 2014 White Paper. In January 2019, Wales government also issued a similar paper. A new process has now launched.

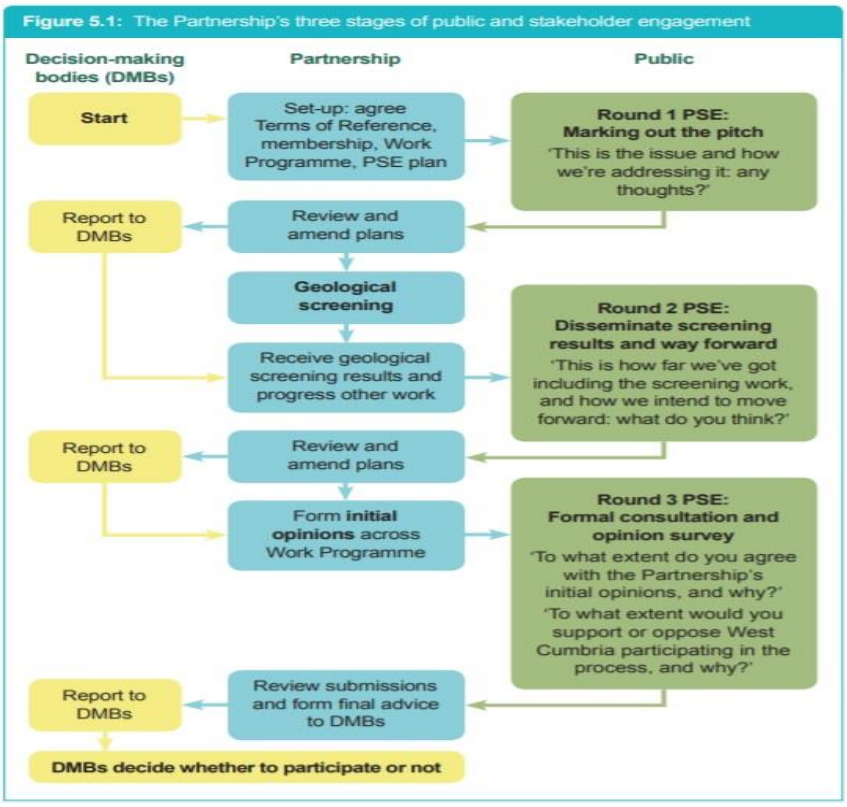


Figure 1: Process of PSE in the West Cumbria MRWS community partnership

Source: Presentation material entitled Geological disposal of radioactive waste in the UK and community engagement: Working with communities

Background of the result in 2013

- Cumbria is a new county formed in the 1970s from Cumberland and Westmorland. The County has Sellafield and the National Park with different interests and different economy, therefore, there has always been a tension in those communities. Making communities at a different level to get engaged in the challenges.
The lessons from the previous approach were around the level of engagement in different parts of the county. During the PSE, the level of engagement between the Western Cumbria Partnership and the local authorities' decision makers was different.
- Also, the political environment was an essential factor in the result in 2013. A lot of programs failed in the long-term history of the UK during the run-up to local and national elections. In May 2013, there were local elections in Cumbria. And there is a tendency not to make any moves before the election among the decision-makers.
- Since most of the waste is already in Copeland, there is a strong feeling among the local community that they cannot be treated the same as everybody else in the country. Regardless of whether the waste will be managed to be disposed of here or whether it is transported elsewhere in the country, the local community in this area will be affected.
- From a government perspective, which is treating everybody the same is an open and fair process. However, there has been strong feedback on this view from Copeland and Allerdale as they currently host waste.

Old vs. New processes
- The view from the government in the previous process, the process cannot move forward without an agreement of all participated body in the partnership.
- Also, during the last policy frame, two levels of local authorities (Borough and County) had to work together. That was the reason why the process had to stop in 2013 and took a step back.
In the new process, there is more flexibility in terms of community partnership. In the new process, there is a lot more possibilities for working together but no individual party having that right to veto over that.

Public engagement
- NDA has built a good relationship with Copeland and Allerdale, and NDA needs to maintain that relationship. However, NDA also needs to work on our relationship with Cumbria. However, County does not want to be known only for Sellafield, a nuclear community. County thinks that there is a lot of giving such as Lake District and National Park. For this reason, it is challenging to build a relationship with the county council as it sees the NDA to be here only to talk about the nuclear issue.
- In the process, NDA was not allowed to respond with advocates. However, not responding sometimes can be seen as there are some secret plans to develop. In this sense, NDA is in a difficult position.
- Local campaigns had an impact on people's views. However, it is challenging to reflect all opinions in decision making.
- The approach to the UK is different in France. There is not the same piece of legislation that sets the timescales for the program. Instead, there is a policy document that describes how the process should be implemented and what its objectives should be. It is a UK government policy, which sets engagement with communities in England. However, it does not set out any specific timeline for that approach leaving any sector to develop or to try to address the program in a way. For this reason, people generally say that the process of engagement taking to 10 to 15 years or so followed by 10 to 15 years of construction.
- One of the reasons for this depends on a wide range of uncertainty around the issue and a lot of our progress as a result based on assumptions at this stage. From our perspective as a developer, it would be helpful if we could develop site-specific programs for some community and use the data to come up with much further information on both the timescale and the cost of delivering the program. At the moment, everything is uncertain.

Reversibility and retrievability

- It was a discussion when CoRWM provided their original advice in 2006. Cumbria partnership also mentioned about it.
- From a community perspective, reversibility is attractive for 1) the ability to reverse the process if any unexpected problems occur, and 2) the possibility as a resource. However, there are disadvantages concerning the safety and operability of the repository.
- The policy position in the UK recognizes that there is some time over those decisions can be made. That reversibility and retrievability will be a debate. However, understanding the timescales and different issues in different geological settings, the view left open as a conversation between the developer and the local community.
- Sellafield's transition which is moved away from reprocessing is a significant change for the local community. There are still some people in the local community desire that some new technology will arise, or something will happen so that reprocessing can be restarted. That is one of the backgrounds of retrievability.


(A photo on the right) From left, Prof. Shunji Matsuoka, Ms. Kelly Anderson, Mr. Andrew Craze, Ms. Yunhee Choi

Data Collection

- Presentation material entitled Geological disposal of radioactive waste in the UK and community engagement: Working with communities, by Andrew Craze

2.2.2 Copeland Borough Council

Date & Time	February 11, 2019 10:00-12:30
Place	Copeland Centre
Participant	**Copeland Borough Council** Mr. David Moore, Councillor, Portfolio Holder for Nuclear and Corporate Services Mr. Rob Ward, Nuclear Sector Development Manager, Nuclear & Energy Team Mr. Mitchell McCombe, Nuclear Sector Development Officer, Nuclear & Energy Team **Horton Smith, Consultants Limited** Mr. Steve Smith, Consultant

Process in the Nirex program

- West Cumbria was identified at the early stage when Nirex decided six areas for further research in the 1980s. However, massive resistance emerged among the residents in Cheshire once Nirex named it,

following that the Government failed to call the other four sites.
- In Cumbria, local authorities also opposed it as there was no mutual consent. It divided the community with many problems. The engagement started when people arrived to begin the research work.
- In the Nirex program, geology was the only criteria with the purpose of research work to build rock characterization facility (URL). However, there was massive resistance from the National Park side as there were a misunderstanding that the research work was for the waste facility on the national park side.
- A lengthy public inquiry took in Whitehaven. However, there was no such public engagement on the issue. Different level of governments had different views. The opinions raised from the public inquiry was given to the Government, and the State Secretary refused the decision to continue the research on the last day of its power in 1997.
- In the Nirex program, the view of the community seemed to be undervalued. Nirex work was purely based on a scientific and geological basis. The concerns raised by local people were not addressed in that process. The level of Nirex's public relations was also low. Nirex took a hierarchical position that they knew best while it thought that the questions from the community were irrelevant.
- Copeland is a knowledgeable community on the nuclear issue with over 60 percent of the people who work in the nuclear industry. Nirex approach was ill-prepared in this sense.

Process until the decision in 2013 after the Nirex program
- The government took the lessons from the mistakes made with the Nirex process, and the volunteerism process for local authorities was implemented, which was a significant change. Also, community benefit, which was missing during the Nirex program, was discussed.
- In the process after the Nirex experience, the Government spent almost two years trying to find the communities.
- Recognizing that Copeland was hosting nearly 80 percent of the waste of the country, it came forward early in the process. Allerdale also came forward and volunteered. Volunteering means to open for the Geological Survey to take place to see if it was even possible to build a facility within the area.
- The county council then put in an application but only for the west of the county not for the whole Cumbria.
- At each stage, the process had to have three green lights to take the next step.
- Decision made in 2013 was about participating in the next stage, not having a repository. Copeland was comfortable to take that next step forward to have further information before making a decision. Allerdale Council also agreed with moving to the next step forward. However, the County Council said no.
- Even though Copeland expressed to the government that we would be prepared to stay in the process, the government was clear about this process and it had to end. That was the way how stakeholder's engagement handled differently.
- Defining the host community is the most critical part of this process. However, the previous process failed in a way to explain who controls the process and who is the host community. Additionally, there was deep distrust from communities concerning benefits from the process.

The background of 2013 result
- West Cumbria is isolated compared to the other areas in Cumbria. Cumbria County Council recognizes that nuclear and nuclear waste issue is not popular in the rest of the Cumbria, as a County council, however, it could not lose the chances for the benefits from the partnership. It was a problematic issue politically for the county, so county council expressed its interest only in West Cumbria.
- Politics matter. There was about to be an election for the county council for reelection. Those councilors took its decision to operate a right of veto in January when elections were to be held in May. The benefits drove Their interest.

Partnership
- There were three principal authorities in the partnership, but it was a wide-reaching partnership. The

National Park borders were heavily involved in the partnership. Parish councils, the lowest level of local government where represent villages, were also included in the process. The National Farmers Union also involved because of agriculture. The partnership tried not to exclude anybody from that process as it needed to be open and transparent.

- There was a lot of challenges from NGOs with many scrutinies of the process. That was why the partnership had to make many communities involved.
- The partnership produced information based on the requests. It asked for independent geological surveys so it could have independent analysis separated from the one offered by the process.
- The process kept open while maintaining extensive community engagement. One of the challenges of this process is making people maintain their engagement over a long period. Other issues were keeping people interested.
- People were more interested in benefits rather than geology. It was difficult to answer as there is no best practice concerning this issue. One of the concerns raised by local people was continuity of benefits even after receiving the waste into the repository.

Public trust at the local level in the nuclear industry

- In the early days, most things about nuclear were national security. There was a lack of openness and transparency.
- However, a series of incidents challenged the local community, and the stakeholder engagement method started implemented.
- The industry has regained trust from the community, and now local people think that the whole process is open and transparent.
- The ongoing operation of the nuclear sector is available based on trust.

Copeland Borough Council on nuclear issue

- Having a specialized nuclear team is unique at this local government level. It underlines how important the nuclear agenda in Copeland where Sellafield is located.
- Council recognizes that it needs more capacity and capability to tackle the nuclear energy agenda.
- Council assesses and monitors the whole program by hiring independent researchers in terms of safety and contamination.
- The applicant covers the budget for this expertise, so it is not a burden on the local taxpayers.
- Six working groups look at all the issues around nuclear issues. There is a specialist who looks at environmental issues, community representatives, Professor Stephen Jones from the non-nuclear sector, who chairs the group. Also, the nuclear industry provides reports on the environment every quarter.
- The working groups work on the detail of things from all aspects of what is happening on the site. The meetings are held in public, and there are no behind-closed-door meetings. The press and the people are invited to every meeting and are encouraged to ask questions.
- There is also much expertise within the community who retired from the nuclear industry.
- All reports and evidence are still alive on the West Cumbria website. It will be maintained as a historical library of what went on that process.
- Copeland will always have to be involved in any process concerning the issue. Even if there is a safer way for it to be stored elsewhere, then Copeland will have to get engaged in the process.

Current position of the council on GDF

"The Council supports the Government's approach to the safe disposal of higher activity radioactive wastes through the provision of a Geological Disposal Facility (GDF) and, as host community for the vast majority of the wastes that would be disposed of to the GDF, we will continue to press the Government to progress the process, recognising the risk to the environment and local communities presented by the current interim storage of this waste and the continued delay in bringing forward a site for a GDF."

Changes in the new process

- The difference this time is that anybody who has an interest can start a conversation with the government through radioactive waste management limits. It could be a landowner, or parish council, literally anybody with interest.
- In the new process, the veto of one participant would not stop the process.

The benefits packages have laid out. At the early stages, a million pounds worth of Investment funding per year will be provided to any community, group partnership that was to be set up. When it develops to geological work like borehole, funding increases to two and a half million per year. This money is to fund projects in the local community. There will also be engagement funding, to be spent in supporting the partnership, paying for your independent experts for that engagement.

- Tourism and agriculture are a big part of the county. Due to the potential risks and the impacts on the community, the benefits packages should flow to the community at each stage. "People in the community trust that science will protect them. What they don't trust is how the funding comes."
- There is already an example concerning a community benefits package for the low-level waste repository.

Benefits Packages for the Low-level waste repository

After receiving 10 million pounds upfront to cover the waste and the communities gained a million and a half pounds a year. This corporate community fund as an independent fund can only be paid out the cooperated project with Copeland. The nuclear industry pays a million and a half each year, and Copeland distributes that for into the Copeland community fund.

Retrievability

- There was an intense debate on it within the MRWS partnership. But it will be decided in the future within the community partnership at that time.
- The community drove the concept of retrievability. In the early stage, geological disposal was about sealing up the waste eventually. There was reluctant to talk about any retrievability.
- However, the community had a strong view to have a monitoring system so that any unexpected happening could be tracked. Another point was a reluctance to see spent fuel as a waste which could be used as a fuel for the future generation.
- The MRWS processed still had this uncertainty over the plutonium. Today, most of the plutonium in the UK is stored on the surface site. This community believes that it is fuel. The government has not yet made that decision, but it certainly would not support, and some spent fuel into a repository and sealing away.
- In West Cumbria, retrievability is about two things: 1) what the community wanted to be understanding should something go wrong at a later stage, and they can go back to have the right to take it out, and 2) if fuels disposed in repository become useful in a later date, then recovering the fuel must be available.
- The issues concerning retrievability will be checked in the future partnership.
- In terms of the length for retrievability: it would be wrong to say anything like 300 years or something. If it is retrievable, it should be long term retrievability.

Discussion on the options

- The government's position is deep geological disposal, but there is a debate to look at the different options. They would look at the surface for interim, but there is a debate starting now about a near-surface.
- It is good to have that debate to look at the other options. However, people in Copeland do not want to see Sellafield continuing to build stores and to store waste in there.

Relationship with the stakeholders and engagement

- There is a different level of engagement with various stakeholders. As a responsible body for the local community, Copeland council engaged with the community and attempted to talk to as many as people to

explain the process.
- Copeland Council has a good dialogue with NDA, Ministries, and the Government.
- Copeland is the home of nuclear, and it could be a center of nuclear excellence. In that way, our view is well respected in the central government.

(A photo on the right) From left, Mr. Steve Smith, Mr. Rob Ward, Mr. Mike Starkie (Elected Mayor), Prof. Shunji Matsuoka, Ms. Yunhee Choi,
Mr. David Moore, Dr. Kwangho Lee, Mr. Mitchell McCombe

Data Collection
- The Final Report of the West Cumbria Managing Radioactive Waste Safely Partnership, West Cumbria Managing Radioactive Waste Safely Partnership, August 2012
- The Executive Summary of the Final Report of the West Cumbria Managing Radioactive Waste Safely Partnership, West Cumbria Managing Radioactive Waste Safely Partnership, August 2012

2.2.3 Allerdale Borough Council & Cumbria County Council

Date & Time	February 11, 2019 13 :00-15:00
Place	Allerdale House
Participant	Mr. Richard Griffin, Allerdale Borough Council Mr. David Southward, County Councillor for Egremont/Cabinet Member for Economic Development and Property

The decision made in 2013
- The partnership was formed among Copeland council, Allerdale council, and the Cumbria county council; then the county council represented the partnership.
- The idea of the partnership was to work together gathering all information necessary for decision-making to move towards the next stage.
- Within the greenlight system, it was required to have greenlighted at each level, which are the district, county, and the government.
- In January 2013, all three councils met and voted for whether it would further participate in the next stage for desk-studies or not. Copeland and Allerdale voted for the favor, and the county voted against for moving towards the next stage. Under the greenlight system, the process stopped.
- Since then, nobody has expressed interest, and the process has ended.

- The main background of the result comes down to trust. A councilor who voted for against did not believe the government would deliver on its promises. This mistrust was based on the perceived attitude of the Government up until the date. Even in the new process, there are no details around community benefits. For example, it was a stage to decide for the next study and the veto right to withdrawal was still given to the partnership. Nevertheless, some councilors were afraid of moving forward based on their mistrust in the Government.
- Indeed, there is a track record in the UK. There are already two significant projects carried out in our community. Each time, there were promises of social impact improvements and developments in both cases, but it ended up with some roadworks.
- Four years of discussion in the community during the MRST process, individuals brought a lot of views to the issue. However, the decision in 2013 was based on a personal perspective.
- Another contributing factor to the decision made by the county council was an election. County council election was planned to be in May 2013. Considering the unspoken rules in the United Kingdom, which are politicians are prevented from taking the stage and publicly talking about issues which might influence before an election, it is difficult to move forward in Cumbria. There are two tiers, and the six districts in the County. There is always an election somewhere, and the same problems repeat every year.

CoRWM's approach and Public Stakeholder Engagement

- In the Nirex program, Nirex was paternalistic the way to approach things. They did not consult too much, but they sponsored local events. Their approach was closed, yet the whole the plan was not bad. However, Nirex failed in the end as a conservative Minister, called Selwyn Gummer, put into stopping it.
- CoRWM's current approach was revolutionary for the UK. In terms of engagement for the process through consensus building approach has never been done in any major policy initiative way.
- During the process, the whole Cumbria was visited for the meetings in public, not a public meeting. However, only the same people repeatedly attended the meeting.
- There have been meetings in public, not a public meeting. During the meetings in public, there was an opportunity for the public to observe and to ask questions. However, it is questioned whether the industry learned by doing it.
- A lot of money has been spent on all those reports, the open meetings, the posters on the telephone boxes, flyers, and letters. However, people still did not feel like they have been engaged.
- Although the Government committed to doing a good job through the PSE, the result of PSE was not the main reason for expressing interest in 2008.
- The work of CoRWM and the partnership gave confidence to people in pursuing the process to some degree. However, the point of the public stakeholder engagement is the relationship. It's about putting that effort into building relationships with the communities and organizations whatever view they might have.
- Building trust with people is the key. It requires a considerable amount of effort to do in a way that makes everybody who engaged believe that their views been reflected.

The new process

- In the new process, the rest of the partnership still can discuss to proceed with the process even if one body of the partnership decides to leave the process,
- The new process is slightly different from the previous process in terms of opening discussion. Anybody can open a discussion. For example, RWM, which was an observer during the last process, could be a full member of the partnership.
- All members of the partnership would draw up a partnership agreement, and that would set out how to work together, and how to make decisions, and so on.
- However, at the same time, it is not much different from the previous process.
- Maybe neither the government nor RWM fully understands why it failed last time. They have made some assumptions as to why the previous process did not work. One of those assumptions is geology. They might

think this has been solved by producing the geological maps to the whole UK. The other issue is that community benefits. They have made these million pounds per year payment for entrance discussions, and up to two and a half million for boreholes. However, the benefits package is still unsophisticated. The amount of money announced, yet there are no details on it how it could be spent for the community. In the new process, for example, smaller parish council could receive money when it volunteers, yet it is questioned how it could spend money.
- In terms of flexibility, it makes sense when considering that the different communities operate in different ways. However, it is unclear whether this process will answer the challenges of the previous process.
- Around 75-80 % of waste is already in Cumbria. Whether it will be buried in here or moved to somewhere else, it will still affect our community. Considering this, Cumbria cannot be treated as equal to the other areas.
- In the new process, as long as it maintained membership, it can have its say. If you decide to opt out of the leave, then it no longer influences the decision. However, in case Copeland alone proceeds with the project, the question is how they would spend money. Because the road network is dealt with by the County Council or Government itself, the railways are dealt with by the government; the health service is a part of government part of the County Council. The Borough council controls minor services such as collecting bins or play parks planning permission. Those are essential functions but does not absorb a lot of capital. Thus, it is a dilemma. The government will be acutely aware of how it should be, but it would be easier for them if they are dealing with unity authority.

Surface storage
- This issue is about dealing with long periods beyond ice ages millennia, and large numbers who are ambivalent about the nuclear industry have no particular view.
- When CoRWM made recommendations, many CoRWM members were favor in surface storage. However, surface storage is a lack of understanding of superhuman timescales. At present Sellafield has three or four buildings to put in the pacified waste. If there is no progress with the GDF project, they will build more of those building to store waste. In this sense, CoRWM had views surviving 15 years or so which was pretty good for government.

Reversibility and Retrievability
- R&R is a huge issue for the upcoming discussion.
- There was a debate on retrievability, reversibility, recoverability in the partnership but it was an ill-informed discussion. People mixed up the three terms or they used in the same sentence they would use.
- Regardless, the basic principle believed by the significant number of members of the partnership was that we had to allow room for further development of science, and what we considered to be a waste today could be an asset tomorrow.
- Pu has the potential for fuel in many forms of reactive in the future. Once it is treated as waste, it would make the capacity of the repository vastly bigger, and it needs to be guarded.

Situation in community
- There is undoubtedly a divided view between West Cumbria and the rest of Cumbria on nuclear issues.
- Tourism and agriculture are another big part of the industry in the rest of Cumbria. However, there was a massive negative impact on the tourism industry when tried to raise awareness on the issue.
- The result of a public survey is a little bit surprising. When looking at Cumbria as a whole, positivity from West Cumbria and the rest of Cumbria makes it nearly 50/50. Figure from Copeland and Allerdale was not so surprised, but Cumbria one was surprising.


(A photo on the left) From left, Ms. Yunhee Choi, Mr. Richard Griffin,
Mr. David Southward, Prof. Shunji Matsuoka

2.2.4 Radioactive Waste Management (RWM) & Committee on Radioactive Waste Management (CoRWM)

Date & Time	February 11, 2019 08:30-09:30
Place	BEIS
Participant	**RWM** Prof. Cherry Tweed, Chief Scientific Advisor Mr. Bruce Cairns, Chief Policy Advisor **CoRWM** Sir Nigel Thrift (Ph.D), Chair of CoRWM Dr. Mariana Ghosh, CoRWM Secretariat Ms. Kathryn Yates, CoRWM Secretariat

- In the UK, People, who currently work in the nuclear waste management field, used to work in the Nirex process as well.
- Back in the 1990s, developer and the community were not able to agree with the basic things. Also, the application was still premature, and the level of science was still not enough.
- Since 1997, the government has changed.
  : During 1986-1997, when the site selection process was held, the whole process operated in secrecy. During this time, nobody could see why the Sellafield was chosen.
  : Nirex, operator owned by the nuclear industry, did not share anything with the public and there was no role at all for the public.
  : There was no public confidence in the decision-making process back then.
- In 2003, CoRWM, independent committee sponsored by the government was established.
  : The composition of the committee members included no politicians, no scientists while it contains people who known to be skeptical on the issue. When it was established the spectrum of the member composition was quite extensive (around 10-20 people).
  : The way how CoRWM worked was very innovative. The way how they collected the evidence, now we could call it as public dialogue and focus group. With the small group of the public, the CoRWM provided the factual information and asked for their decision
  : The work carried out in Canada was the model of CoRWM. CoRWM mainly worked in the small size of the group. The group selected by independent social scientists.
  : Original CoRWM report emphasizes all the options and issues concerning intergenerational ethics. And

flexibility is the term somewhere between reversibility and retrievability in the UK.

: Once CoRWM disappeared and reconstructed with the different people, and it is entirely different from the early CoRWM.

: The primary role of CoRWM is to provide independent scientific and technical advice to the UK government, devolved administrations, the NDA, RWM, and other stakeholders. For now, the national government asks CoRWM for advice, yet in the future, maybe the local government will be able to ask for advice from the CoRWM. CoRWM also advised preparing for the new process.

: During the siting process, CoRWM will play the role to help the public to understand the siting process as well.

: However, compared to the previous CoRWM, the composition of the committee member is limited. In the past, some people are anti-nuclear as well as social scientists, that there is no more.

- PSE carried out between 2003 and 2005. However, there is no more such PSE like process.
- Rebuilding the nuclear power plant issue became more controversial in the UK. However, CoRWM is very clear that it is not talking about the new nuclear reactors.
- For R&R, the UK case has moved to the opposite direction to France and the German situation.

: Retrievability has been strengthened in the recent policy. Although retrievability is currently only at the national and theoretical level, yet it is the issue that will be discussed with the community.

: And the purpose of retrievability is to say that the deep geological disposal is the best option, not storage.

: Discussion on retrievability in public dialogue, at first, people thought that the idea of retrievability is interesting, yet the more they discuss people started realizing the difficulties in the retrievability.

- 2018 White Paper introduced the new approach to the process.

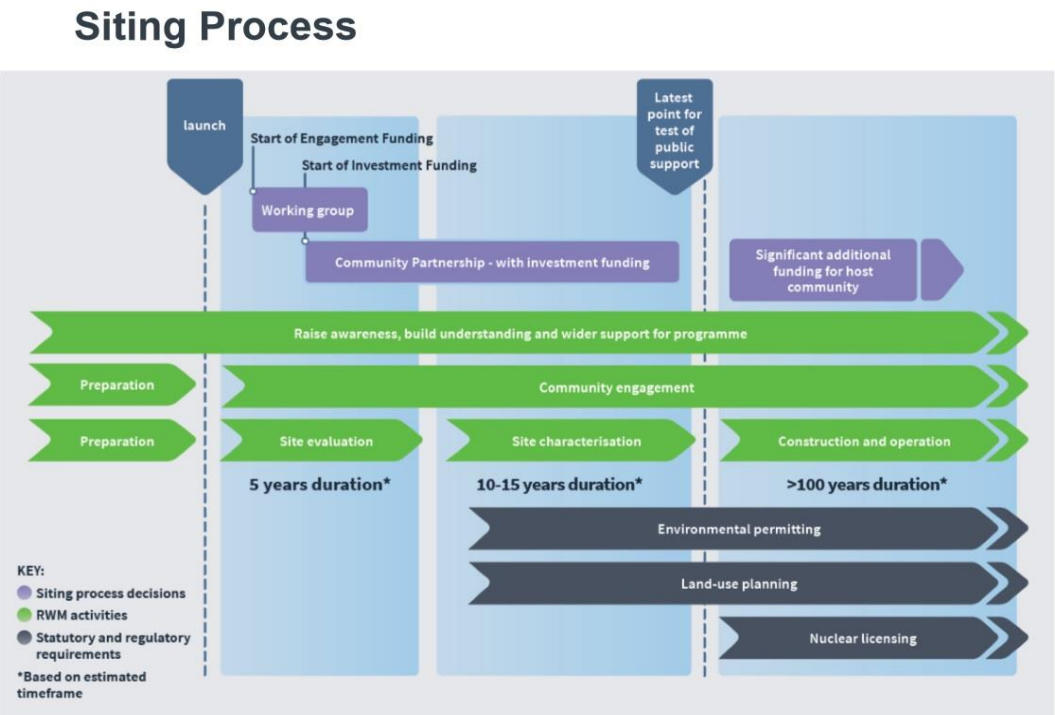


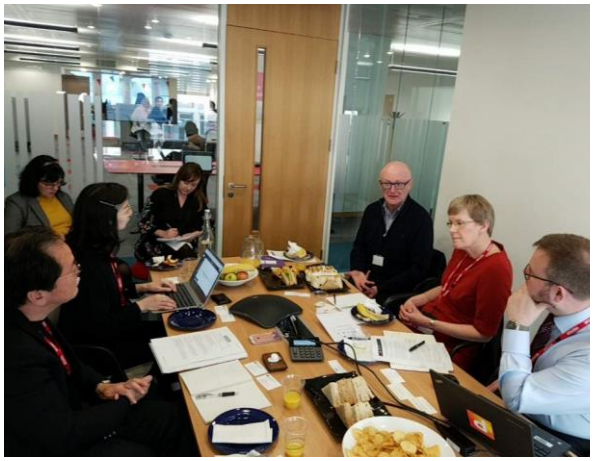
Figure 2: Siting process in the new process

Source: RWM presentation material

: The year of 2013 was the starting point of the new process, and in the new process, the community is not necessarily linked to the other community.

: In the previous process, the central government did not say which tiers of local government should make a decision.

: Also, there is no more six stages. It is a more flexible and smooth process.
: The critical difference is that the local government does not have to take their view at an early stage. They can take time to see while the scientists do their job.
: For now, 2040 is just an estimation, and there is no official statement on this timeline. There are no timescales set by the law in the UK.
In the UK, the white paper provides a legal basis for such a policy.

(A photo on the left) From left, Sir Nigel Thrift, Prof. Cherry Tweed, Mr. Bruce Cairns, Prof. Shunji Matsuoka, Ms. Yunhee Choi, Dr. Kwangho Lee, Dr. Mariana Ghosh

Data Collection

- Presentation material of RWM

2.2.5 University of Exeter

Date & Time	February 13, 2019 13:00-15:20
Place	Byrne House on Streatham Campus
Participant	Prof. Susan Molyneux Hodgson, Professor of Sociology Dr. Marika Hietala

Problems concerning nuclear issues

- The range of nuclear waste that needs to be managed in the UK is more complex since little attention paid to waste historically for both weapons and reactor. Additionally, it was never agreed in society to treat a mixture of military and civilian waste together. However, it is now treated as legacy waste in the UK, and it creates the issue among the people.
- Most of the waste comes from nuclear energy generation, but a significant amount of the waste comes from weapons generation.
- The current issue over the new nuclear power plant proposal also raises the question concerning new waste. CoRWM's recommendation for deep geological disposal referred only the legacy waste, and the waste from the new nuclear power plants was not considered in the recommendation.

· Legacy waste: Waste which was produced from the weapons programs and the old nuclear plants built for civil use. It is all the waste that the UK possesses for now.
· Also, the government has not categorized plutonium. In some report, plutonium (Pu) is still classified as a resource. The issue has been discussed over the past years, but policy decision has not been taken on Pu. Currently, Pu is stored in Sellafield in many different buildings or the sites of the current nuclear power stations.

Issues concerning nuclear waste management until today and public engagement

- Nirex failed to build the URL in 1997, and there is no URL in the UK.
- One of the problems is that people still remember the problem occurred during the Nirex program, which carried out with no public consultation.
- Since then, there have been several attempts for public engagement.
- For example, CoRWM, with its members with a diverse view, well carried out the public stakeholder engagement (PSE) between 2003 and 2006. The PSE process was well received and respected. At the local level, however, there are still many people in Cumbria who did not know what was happening in their community although MRWS Partnership carried out the PSE process between 2008 and 2012.
- In many ways, stakeholder engagement was very local, and it was not publicized widely. Leading participants in the process were mainly people related to the industry, policy process, and anti-groups. Some citizens involved, but many local people did not know about the process. Many citizens do not care about the issue, and their view is ambivalent. It presents difficulties in the policy process to make people engaged.
- When the geological disposal became an option for HLW following the CoRWM's recommendation in 2006, some people wanted to reopen the policy decision. However, the Government and RWM refused it as the policy decision was already taken based on the CoRWM's recommendation. CoRWM said that if waste from the new build is included in the waste inventory, then there should be a separate PSE process for that what, since new build waste, is morally and ethically different from legacy waste.
- Since 2013, there has been many consultations and more public involvement in the rewriting policy. Private consultancy carried out such processes, and the evaluation of these approaches is positive.
- People in Manchester and Swindon, which are not nuclear communities and a mixture of urban and rural areas, randomly participated in the government process. This public participation carried out by the Government, asked for the citizen's opinion concerning the way of public involvement and communication. The question included the compensation schemes as well.
- This process was open and transparent. However, the critical point is how to reflect it into policy. In this case, for example, the result of the consultation fit into the draft policy. Regardless, it took a long time to be published. Furthermore, it seems that it has not gotten noticed widely.

Difficulties of the policy process

- The interests of politicians, elections, different level of government, and a different timeline for elections always matters in the UK. It is a background of difficulties to think about long-term institutions.
- There are not many people or communities know about the new process.
  : The new report was released on December 19th, 2018 around the Christmas season. Therefore, many people have not noticed the changes in the new policy.
- Meanwhile, RWM has produced geological maps and videos.
  : On the RWM website, there is a video talking about the geology in Northern Ireland. Concerning this, RWM says that there are no plans to site the GDF in Northern Ireland. However, this video provoked community groups followed by online petitions and negative media reactions.
  : As the general public has not widely known the new process, the people did not have any context why the national geological survey has been done when the people saw the video talking about the suitability of the rocks.
  : It is a kind of deficit-model-like approach where the government officials want to communicate while they do not think about the context of how people feel about the issue and perceive it.

CoRWM

- There have been several changes in the CoRWM. The most recent change would be the character of the CoRMW. Compared to the past, it seems that the role of the CoRWM is less active than when it was established.
- There is a member who is dealing with risk communication but from the industry. The new chair, Sir Nigel

Thrift is a social scientist. However, there are no social scientists among the committee members for now.
- There is no independent office and staff at CoRWM. A secretariat is provided by the government, who is a civil servant.

New process
- The new process removed problems existed in the old process.
- In the previous process, three yeses required at the local, regional, and national level. The new process describes this 'three yeses' system as a problem which one participating body could veto for all processes. Therefore, there is no veto al all in the new process, which means one body cannot stop the whole process.
- It still requires a volunteer approach, but any interested people join the partnership. However, this process is unclear. It could be complicated in reality.

Community benefits packages
- There are some changes in the new process. The previous process also had the availability of money. However, the amount of money was not specified.
- In the new process, the amount is more clearly defined. The community can access money in the earlier stage of discussion. As a significant change, the policy is more explicit in terms of how much and at what point.
- The community will be able to use the money to hire technical experts to have independent analysis on the issue. However, there is still a restriction on it in terms of the method of use.
- For the local government, the initial one million pounds per year is significant. However, considering the money spent by NDA for its maintenance, it is not a substantial amount of money for the central government.

Information openness
- There is a government website where all reports are available to the public. Usually, the reports go to the national archives after some time.

Future generation & The sense ownership
- In the UK, the definition of the future generation keeps changing in the energy policy
- Also, the sense of ownership has not been considered thoroughly although the issue is a problem of every citizen as citizens' taxes pay it. There is a tendency that the public thinks the issue as the technical domain which should be solved by the Government.
- Especially military waste is not a public asset. The Government owns it.

Meetings in the public
- It was still one-way communication in a bizarre format watching experts talking to each other. Probably this format of public meeting happens only in the nuclear industry in the UK.
- Although there was a Q&A session, it was not genuine dialogue. It was a way to disseminate information to the public.


(A photo on the left) From left, Dr. Kwangho Lee, Prof. Shunji Matsuoka,
Prof. Susan Molyneux Hodgson, Ms. Yunhee Choi, Dr. Marika Hietala

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Attachments

Attachment 1: Research questions to France
Attachment 2: Research questions for the UK
Attachment 3: Research question for the OECD/NEA
Attachment 4: News Story uploaded on March 8, 2019, on the website of the CoRWM.
Attachment 5: Updates on Twitters
Attachment 6: Presentation material by Prof. Shunji Matsuoka

Attachment 1

Questions: France

1) Nuclear waste management in France

- What is the recent challenge in nuclear waste management in France?
- How should we understand the upcoming public debate on National Plan for the Management of Radioactive Materials and Waste (PNGMDR) through the CNDP?
  : What is the substantive background of organizing the public debate on nuclear waste management?
  : Can it be seen as a sign of the difficulty of policy implementation or an increased level of public opposition?
- How should we understand the environmental protest in Bure? Is this mainly based on the anti-nuclear movement? Or was there any lack of legitimacy in the decision-making process as well as in the process of public debate?

2**) Reversibility and retrievability (R&R)**

- Under the concept of R&R, France seems to put more emphasis on the 'future generations' rights to decide" than the other countries. Is there any specific background in the French context that we should consider in order to understand the French approach?
- One of the criticisms on the R&R debate is its feasibility concerning the duration of R&R. Nevertheless, the duration of R&R, which can be guaranteed by the current level of technology, lasts somewhere between 100 and 300 years. In this regard, how do stakeholders in France define a future generation: is this somewhat close future generation than a distant future generation? What is the stakeholder's standpoint on this debate?
- How has the role of reversibility debate changed recently? Are there any updates in the French reversibility debate?

3) Communication and Public Participation

- What are the differences between a public debate through the CNDP and the other forms of the public debate such as 'citizen conference' organized by the OPECST or citizen forum by the CLI?
- How do you see the nuclear waste management and its approach in the UK?

Attachment 2

Questions: The UK

1) Nuclear waste management in the UK

- How should we understand the approaches carried out in nuclear waste management between 1997 when Secretary of State for the Environment rejected the Nirex proposal and 2013 when the Cumbria County Council again decided to refuse the plan?

: How should we understand the difficulties faced by the UK government to find a site for the GDI even after implementing public and stakeholder engagement (PSE) strategies?

: Does nuclear perception problem matter concerning nuclear dread? Or are there any other reasons such as a lack of legitimacy in the decision-making process or issues concerning the design of public participation?

- What is the background that West Cumbria was again being suggested as a potential site for the GDI?

: What was the most critical factor in reconsidering West Cumbria as a potential site?

- Are Copeland Borough Council and Allerdale Borough Council still consider an underground storage facility in Cumbria?

: If so, what is the current situation and what would be the next step?

- Can we have an overall scheme of the community benefits package which is planned by the government?

2**) Reversibility and retrievability (R&R)**

- How should we understand the concept of reversibility and retrievability (R&R) in the UK context?

- The R&R debate embraces the rights of the future generation. In this regard, how do stakeholders in the UK define a future generation: is this somewhat close future generation than a distant future generation? What is the stakeholder's standpoint on this debate?

3) Communication and Public Participation

- Can we have overall information about PSE as well as the other platform implemented in the UK to encourage public participation and promote dialogue with the public?

- What is the modality of public involvement performed in the UK?

- What are the criteria to design public involvement?

- Is there any result of the public poll/survey regarding nuclear waste management that we could access?

Attachment 3

Questions to the OECD/NEA

1) Nuclear waste management
- What is the recent challenge in nuclear waste management in the member states?
- In which parts does the OECD/NEA focus on when the NEA collects information and reviews position on the nuclear waste management policy, challenges, and emerging issues in the member states in order to drive lessons from them?
- How should we understand the ongoing difficulties of increasing trust and acceptability of nuclear waste management approach taken by the member states even after implanting various participatory and deliberative approaches? Is this solely based on the characteristic of nuclear waste? Or are there remaining procedural issues regarding communication and participation? If so, are there any criteria taken by the OECD/NEA to assess whether it is deliberative or participatory enough or not?
- From which perspectives does the NEA see the third public debate in France on National Plan for the Management of Radioactive Materials and Waste (PNGMDR) through the CNDP?

2) Reversibility and retrievability (R&R)
- The R&R concept embraces the inter-generational equity concern from the sustainability perspective, aims to leave the options open for rights of future generation to decide as well as their potential opportunity to recycle the waste as a source of energy considering technology development.
From which perspective the OECD/NEA approaches to intergenerational equity issue? And are there any updates or new approaches emerged for intergenerational equity issues in the member states?
- One of the criticisms on the R&R debate is its feasibility concerning the duration of R&R. Nevertheless, duration of R&R, which can be guaranteed by the current level of technology, lasts somewhere between 100 and 300 years. In this regard, how does the OECD/NEA define a future generation: is this somewhat close future generation than a distant future generation? What is the OECD/NEA's standpoint on this debate?

3) Communication and Public Participation
- The OECD/NEA has conducted various workshops in cooperation with member states. What is the method or approaches taken by the OECD/NEA to improve quality dialogue in the workshops? Are there any specific management tool set up within the OECD/NEA?
- When evaluating the result of those workshops or forum from the consensus building and communication perspectives, what are the criteria to say whether consensus built or not, whether dialogue was fruitful or not?

Attachment 4

News Story uploaded on March 8, 2019, on the website of the CoRWM.

News Story

Committee on Radioactive Waste Management (CoRWM) and Radioactive Waste Management (RWM) Meeting with Waseda University

The Committee on Radioactive Waste Management (CoRWM) and Radioactive Waste Management (RWM) met with a research team headed by Prof. Shunji Matsuoka from Waseda Resilience Research Institute (WRRI) of Waseda University, Tokyo on 12 February 2019.

Waseda Resilience Research Institute has conducted research on the social acceptance of High-Level Waste (HLW) treatment and disposal activities since 2015. The purpose of the meeting with CoRWM and RWM was to discuss previous experience in the UK in engaging with the public and communities on these subjects and understand the emerging approach for future engagement and consensus building through communications and citizen participation in the site selection of a geological disposal facility in the UK.

RWM presented the history of higher activity waste management and siting process for a Geological Disposal Facility (GDF) including outreach events and outputs from the National Geological Screening exercise. The group discussed the importance of communication and challenges associated with public awareness and engagement around the GDF project.

Attachment 5

Updates on Twitters

Attachment 6

Presentation material by Prof. Shunji Matsuoka

Social Acceptance of High-Level Radioactive Waste (HLW) Treatment and Disposal Facilities

Shunji MATSUOKA
Professor and Ph.D
Graduate School of Asia-Pacific Studies,
Waseda University
smatsu@waseda.jp

February 13th, 2019

Table of Contents

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1. Nuclear Safety regulation & HLW Policy in Japan *Before and After Fukushima*

3

Changes in Japan's nuclear safety regulation and Institutionalism after the Fukushima Accident

First phase is from 1957 to 1977

Regulatory system in this period is a sort of mixed regulatory system based on Science and Technology Agency, MITI, and Atomic Energy Commission (AEC).

Second phase is from 1978 to 1999

MITI (now METI) and Nuclear Safety Committee becomes two main regulatory agencies in this period.

Third phase is from 2000 to 2011

Government took a measure of enforcement of Nuclear Safety Commission (NSC) and creation of Nuclear and Industry Safety Agency (NISA) under Ministry of Economy, Trade and Industry (METI).

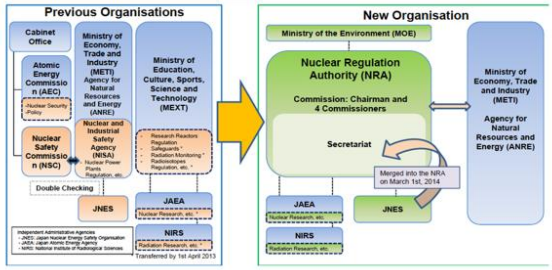
Institutional Futures of Nuclear Regulation in Japan

Dependency on Nuclear Development Institutions
Principal Institution: Development Institution
Complementary Institution: Regulatory Institution
→ 2012 New Regulatory Agency launched

4

Administrative Reform of Nuclear Regulatory Organizations

- **Independence**: Separate nuclear regulation function from nuclear promotion function and establish the Nuclear Regulation Authority (NRA) as an independent commission.
  Chairman and Commissioners are appointed by the Prime Minister after the approval of the National Diet.
  Introduce the so-called "no-return rule," forbidding NRA managing staff from being transferred to any government organization under the jurisdiction of promotion agencies (with a 5-year transitional period following the establishment).
- **Integration**: Integrate nuclear regulation functions, namely, nuclear safety, security, safeguards, radiation monitoring and radioisotope regulation, into the NRA.



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HLW Policy in Japan

Designated Radioactive Waste Final Disposal Act in 2000

Based upon Nuclear Fuel Cycle Policy, Solidified Glass Body; high-level liquid waste that arises from spent nuclear fuel reprocessing which is mixed with molten borosilicate glass, 400,000units

Supervisor: METI (Ministry of Economy, Trade, and Industry)

Implementation Agency: NUMO (Nuclear Waste Management Organization)
→ 9 regional power companies and other gov. related institutions

Regulator: NISA (Energy Agency, METI) and NSC (Cabinet Office)
→ After Fukushima Accident, NRA (Nuclear Regulatory Agency) in 2002

Research Institute: JAEA (Japan Atomic Energy Agency, MEXT)

Site Selection Process:

3 step process, public invitation for volunteer host municipalities
(Literature Survey: 2y + Preliminary Investigation Stage: 3y + Detailed Investigation Stage: 15y)

NUMO Invitation process started in 2002. Only one town (Toyo town in Shikoku Island) officially applied to NUMO in Jan. 2007, however the mayor was recalled by the town people. The town officially withdrew the application in April 2017.

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Policy Discussion after Fukushima Accident and New Government Policy

Science Council of Japan (2012) :

Provisional Storage around 100 years
Total HLW Amount Management,
Revision of Nuclear Fuel Cycle Policy
→ Official decision of Decommission of FBR (Fast-Breeder Reactor) Monju in Dec. 2016

Government of Japan decided a new policy based upon Scientific Based Area approach in May 2015

METI analysis the reason of difficulties of existing stepwise process

1. Enough public trust is not provided for safety of HLW disposal.
2. Application process requests heavy local government accountability.

New introductory step in which a set of site screening criteria based geoscientific knowledge, Opening to the public in July 2017

"potentially more suitable areas"
"potentially suitable areas"
"potentially less suitable areas"

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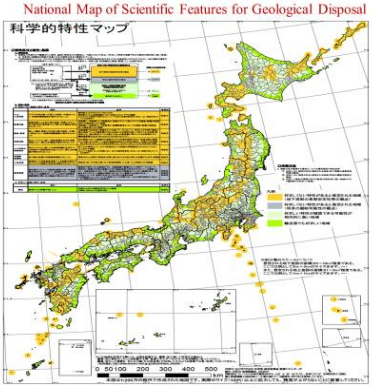
National Map of Scientific Features for Geological Disposal



Source: NUMO

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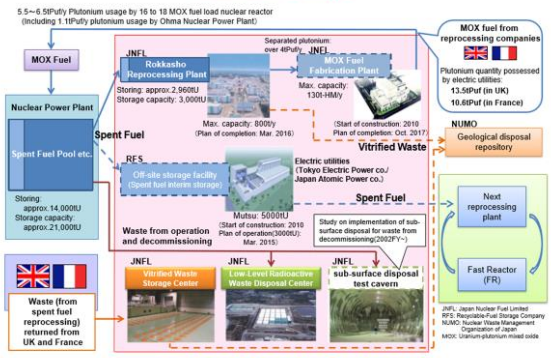
Nuclear Fuel Cycle in Japan



Source: Presentation material made by Hirobumi Kayama, Japan's current Nuclear Energy Policy, Agency for Natural Resources and Energy, METI, December 2014

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Stockpile of Spent Nuclear Fuel and Estimates

Stockpile of Spent Nuclear Fuel as of September 30, 2016						Estimates[12]		
Utility	Plant	1 core (tU)	1 refueling's worth (tU)	Control capacity (tU)[13]	Spent fuel stock (tU)	Control capacity (tU)	Spent fuel stock (tU)	Percentage of Storage Utilization (%)
Hokkaido	Tomari	170	50	1020	400	1020	600	59
Tohoku	Onagawa	260	60	790	420	790	660	84
	Higashidori	130	30	440	100	440	220	50
TEPCO	Fukushima-1	580	140	2,260	2,130	2,260	2,130	94
	Fukushima-2	520	120	1,360	1,120	1,360	1,120	82
	Kashiwazaki-Kariwa	960	230	2,910	2,370	2,920[14]	2,920	100
Chubu	Hamaoka	410	100	1,300	1,130	1,700[15]	1,530	90
Hokuriku	Shika	210	50	690	150	690	350	51
Kansai	Mihama	70	20	760	470	620[16]	550	89
	Takahama	290	100	1,730	1,220	1,730	1,620	94
	Ohi	360	110	2,020	1,420	2,020	1,860	92
Chugoku	Shimane	100	20	680	460	680	540	79
Shikoku	Ikata	120	40	1,020	640	1,020	800	78
Kyushu	Genkai	230	80	1,130	900	1,600[17]	1220	76
	Sendai	140	50	1,290	890	1,290	1090	84
JAPC	Tsuruga	90	30	920	630	920	750	82
	Tokai-2	130	30	440	370	510	490	96
Total		4,770	1,260	20,730	14,830	21,570	18,450	

Source: FEPC. https://www.fepc.or.jp/about_us/pr/oshirase/__icsFiles/afieldfile/2016/10/20/press_20161020_1.pdf

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Infrastructure at the Rokkasho reprocessing plant : Nuclear fuel cycle facilities in Aomori prefecture

(1)国及び電気事業者は、これまで30年にわたり、青森県の理解と協力の下、青森県内に核燃料サイクル施設の建設を進めてきた(六ヶ所再処理工場、むつ中間貯蔵施設等)。
(2)こうした青森県との関係を引き続き尊重し、十分な理解と協力を得て政策を進めることが必要。

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2. Research Framework

Social Acceptance Model

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Risk Communication: Deficit Model and Context Model

1. Main Social Characteristics of HLW
2. Social Consensus → Social Trust building
   → Risk Communication
   → Science Technology Communication
3. Deficit Model vs Context Model: Experts and People

Deficit Model: If experts can successfully input scientific information in people who don't have any accurate scientific risk knowledge, people will accept HLW facility.

Bryan Wynne (1991),"Knowledge in Context", *Science, Technology & Human Values*, 16(1), pp. 111-21.

Context Model: People have local knowledge (situation-specific and/or contextualized information). For building trust, mutual communication between local knowledge and experts knowledge.
→ Lay-Expert Model; Cancer Patients Association

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Social Characteristics of HLW Problem

1. Difficulty of adaptation of Lay-Expert model in HLW
2. Trans-Science Problem or Uncertainty of Geoscience

Alvin M. Weinberg (1972), "Science and Trans-Science", *Minerva*, 10(2), pp. 209-222

Trans-Science problem; Scientist can study the HLM problem, however scientist can not decide the solution of the problem. Society have to decide the problem.

Uncertainty of Geoscience
→ Scientific Super-long-range predict

3. Sublation Deficit Model and Context Model
   → Social Acceptance Model

Wüstenhagen, R., M. Wolsink, and M. J. Burer (2007), "Social Acceptance of renewable energy innovation: An introduction to the concept", *Energy Policy*, 35, pp. 2683-2691

4. Social Acceptance Model and Theory of Ba, Place (Framing)

National (Macro level) acceptance and Local (Micro level) Acceptance

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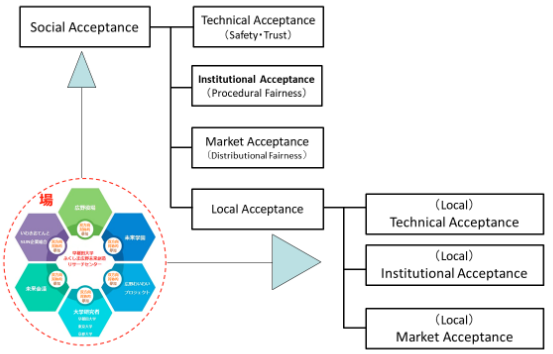
Ba, Place（Collaborative Governance）and Social Acceptance（3+3）



「場 (Ba) means Place」(Collaborative Governance)

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Research Scheme: Interdisciplinary Research

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Methodology of the research

Deficit Model	Three experts in different positions (Promotion of geological disposal, opposition, reversibility) provide professional and scientific knowledge on geological disposal to the citizen participants in one-way. The selection method and criteria of citizens: Total of 12 participants in the 3 generation group (around 20 years old, 30 - 50 years old, 60 years old or over, male / female, central and rural areas, nuclear disaster area (Tokyo - Fukushima) Before and after the conference, questionnaire survey is carried out on geological disposal. Additionally, after the questionnaire at the end of the meeting, an individual interview is conducted to oberserve any changes made in the questionnaire before and after the meeting。				
Contect Model	An interactive communication meeting between three experts in a different positions on geological disposal and the citizen groups. Before and after the conference, questionnaire survey is carried out on geological disposal. Additionally, after the questionnaire at the end of the meeting, an individual interview is conducted to oberserve any changes made in the questionnaire before and after the meeting。				
Social Acceptance Model	Based on the social learning process based on collaborative governance by diverse citizens, the social acceptance model conference is base on cooperative and mutually active communication bewteen the citizen group. Experts provide expertise and knowledge according to citizen's request. Before and after the conference, questionnaire survey is carried out on geological disposal. Additionally, after the questionnaire at the end of the meeting, an individual interview is conducted to oberserve any changes made in the questionnaire before and after the meeting。				
Factor analysis on changes in perception	Factor analysis on changes in perception	Technology Acceptance	Institutional Acceptance	Market Acceptance	Local Acceptance
		Safety Technical Alternatives	Procedural Legitimacy Policy Consistency	Economic Rationality Distributive Legitimacy	Fairness on Risk and Burden Techology / institutional / market acceptance

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3. Fukushima Hirono Research Center for Sustainable Region (FHRC)

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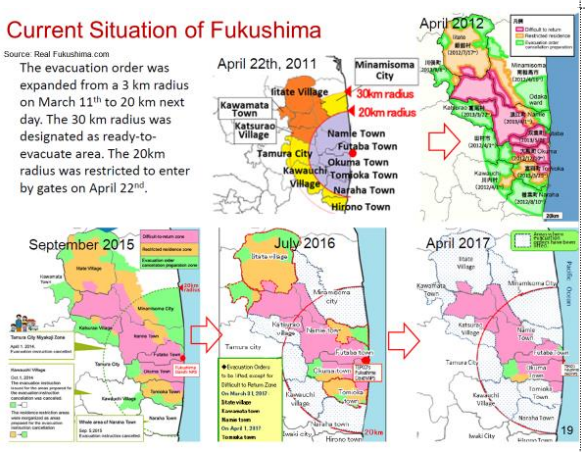
Current Situation of Fukushima

Source: Real Fukushima.com

The evacuation order was expanded from a 3 km radius on March 11th to 20 km next day. The 30 km radius was designated as ready-to-evacuate area. The 20km radius was restricted to enter by gates on April 22nd.



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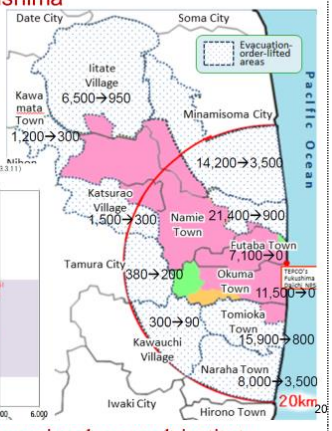
Current Situation of Fukushima

Source: Real Fukushima.com

88,000 before the accident

11,000 at December 2018

Most already settled their life out of this area, where is more convenient, better for education, lower radiation.



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About FHRC

- **Fukushima Hirono Research Center for Sustainable Region (FHRC)** has opened in May 25th, 2017 in cooperation with local people in Fukushima as well as the researchers both inside and outside Waseda University. This regional research center, as a part of the Waseda Environmental Reasearch Institute(WERI), aims at conducting researches on environment and energy issues as well as sustainability of the area. It also aims at creating a good practice of sustainable development.
- Hirono, which used in the name of the research center, is the name of a town located in Fukushima Prefecture. The scope of research of FHRC, however, embraces whole communities and the organizations in the affected areas in Fukushima. Thus, it functions as an academic research base on Fukushima reconstruction to consider the sustainable future of the community together with the municipalities and various organizations.

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The new form of the regional research institute & Approach to the research

Co-designing dialogue with various actors & multi-generation
→ Activate diversity of thoughts

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Academy and Fun Society of Fukushima Studies

- 1st Academy and Fun Society of Fukushima Studies (28th Jan, 2018)
- 2nd Academy and Fun Society of Fukushima Studies (4th Aug, 2018)
- 3rd Academy and Fun Society of Fukushima Studies (27th Jan, 2019)

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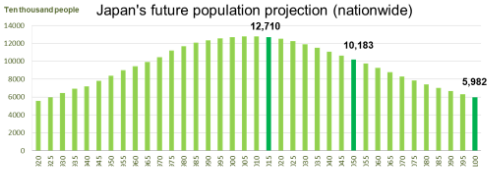
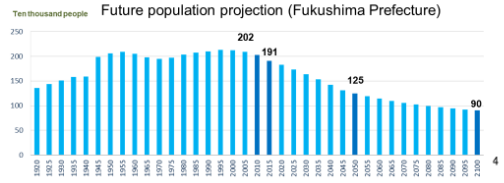
Prediction of the population change in the Hama-Dori area of Fukushima Prefecture in 2050 and 2100

-In case the current situation continues (BAU scenario) -





4

Prediction of the population change in the Hama-Dori area of Fukushima Prefecture in 2050 and 2100

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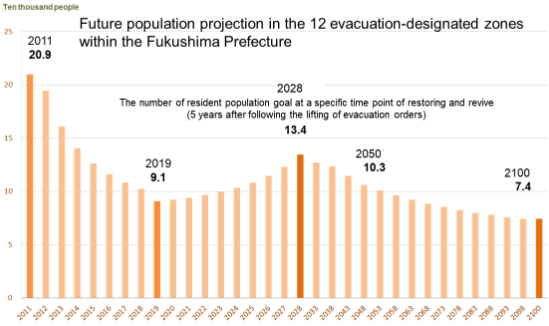

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Prediction of the changes in the Hama-Dori area of Fukushima Prefecture in 2050 and 2100

-In case of creating social innovation (SI scenario) -

The Social Innovation Scenario (SI) is based on various existing industrial and cultural facilities in Fukushima,

Joban Coal Mine (Iwaki), Hirono Thermal power station (Hirono), Fukushima Daini Nuclear Power Plant (2F) (Naraha·Tomioka), Fukushima Daiichi Nuclear Power Plant (1F) (Okuma·Futaba), Archive base facility (Futaba), revival memorial park (Futaba, Namie), Haramachi Thermal Power Station (Minamisoma)

together with the plan for innovation:

① "The legacy of energy industry・The legacy of nuclear accident・Network for earthquake revival Facilities" on the premise of 1F preservation

② "Fukushima Hama-Dori Art Festival" based on 1F & Energy industry

③"Region-wide DMO" based on the combination of the Machitsukuri (Community building) experience and the energy・agricultural・forestry・fishing experience through the homestay program

* More than one million visitors (both domestic and foreign) are expected to the Hama-Dori area if the social innovation is created within the framework based on the three pillars of the plan for innovation.

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Prediction of the changes in the Hama-Dori area of Fukushima Prefecture in 2050 and 2100

-In case of creating social innovation (SI scenario) -

National tourist statistics in 2015 (Source: Japanese tourism organization, 2016)

当道府県	A	B	C	D	当道府県	A	B	C	D
01 北海道	3,592	78,424	1,776	150,780	24 三重県	4,191	24,209	132	30,948
02 青森県	1,275	30,719	51	35,923	25 滋賀県	2,080	21,144	211	52,291
03 岩手県	1,578	31,077	58	43,250	26 京都府	6,281	32,441	1,830	28,826
04 宮城県	2,507	26,251	57	42,052	28 兵庫県	4,703	42,116	450	20,067
05 秋田県	1,099	41,112	27	43,455	29 奈良県	1,351	28,887	193	13,973
06 山形県	1,857	28,632	35	48,572	30 和歌山	2,789	17,175	252	34,600
07 Fukushima	3,007	29,347	24	42,113	31 鳥取県	1,390	22,278	47	47,797
08 茨城県	1,322	20,459	36	94,185	32 島根県	1,196	25,952	31	42,237
09 栃木県	5,942	24,632	84	41,311	33 岡山県	1,376	21,491	51	42,859
10 群馬県	4,858	21,941	111	103,567	34 広島県	1,940	21,879	191	57,249
11 埼玉県	846	14,396	26	99,590	35 山口県	1,181	26,245	36	45,378
12 千葉県	10,644	35,837	1,406	29,442	36 徳島県	1,048	27,791	22	41,754
13 東京都	8,776	34,044	3,940	100,476	37 香川県	1,468	27,338	113	42,518
14 神奈川県	6,914	19,759	1,719	72,009	38 愛媛県	1,409	25,054	42	32,782
15 新潟県	3,708	20,055	81	26,820	39 高知県	1,068	30,033	27	42,578
16 富山県	1,270	24,447	61	14,843	40 福岡県	2,001	43,282	344	48,536
19 山梨県	4,719	26,663	1,054	10,573	41 佐賀県	1,195	24,462	217	42,523
20 長野県	8,880	30,137	510	26,524	43 熊本県	2,477	36,432	454	10,228
21 岐阜県	2,495	32,486	561	19,306	44 大分県	2,709	26,169	509	12,748
22 静岡県	10,661	21,585	933	15,548	45 宮崎県	869	24,266	90	52,191
23 愛知県	2,641	25,317	658	35,250	46 鹿児島	2,267	46,852	215	103,939

A : Number of tourists(unit:1,000) (Japanese・sightseeing purpose : Accommodation outside the prefecture)
B : The tourism consumption unit price (yen) (Japanese・ sightseeing purpose : Accommodation outside the prefecture)
C : Number of foreign tourists (unit: 1000) (Foreign visitors in Japan: Accommodation in Fukushima)
D : The tourism consumption by foreign visitors unit price (yen) (Foreign visitors in Japan: Accommodation in Fukushima)

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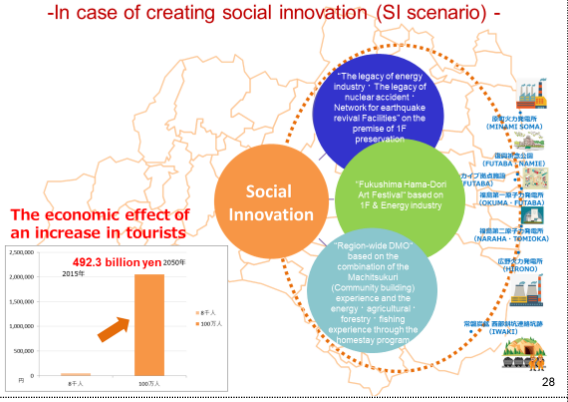
Prediction of the changes in the Hama-Dori area of Fukushima Prefecture in 2050 and 2100

-In case of creating social innovation (SI scenario) -



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Waseda Resilience Research Institute

http://www.waseda.jp/prj-matsuoka311/index.html

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