

「OECD /NEA 主催HLW 処分に関する ワークショップ参加報告」

Authors

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Summary

本年度OECD/NEA 主催のワークショップに参加した中から、HLW処分に関する世界の動向と最近のドイツで変更されたHLW最終処分場の選定政策の概要が報告された。

2～16 ページは「Perspectives in Radioactive Waste Management」

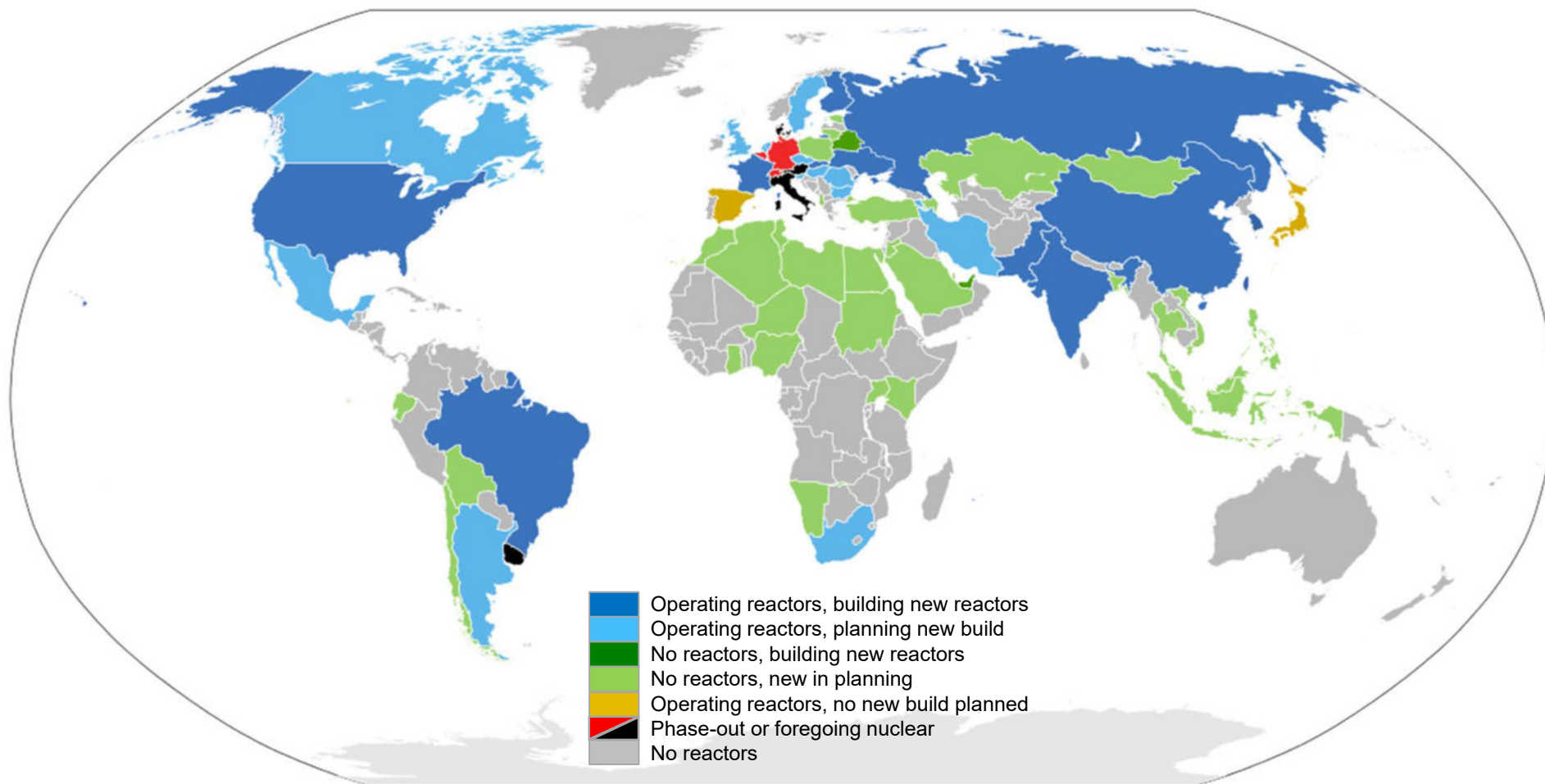
17～36 ページは「Case Study 6:Risk Communication in Long-term Waste
Management

Perspectives in Radioactive Waste Management

Donald Reed (LANL)

NEA TDB course on the thermodynamic data collection and assessment
14th of September, 2019 Kyoto, Japan

Global View of Nuclear Power Today



Source data: World Nuclear Association
Update 2015

Nuclear Power Plants

- ~ 430 operating worldwide
- ~66 under construction
- International Atomic Energy Agency (IAEA) information
- Many designs
- Issue of Aging



**Civaux (France) using
pressurized-water reactors**

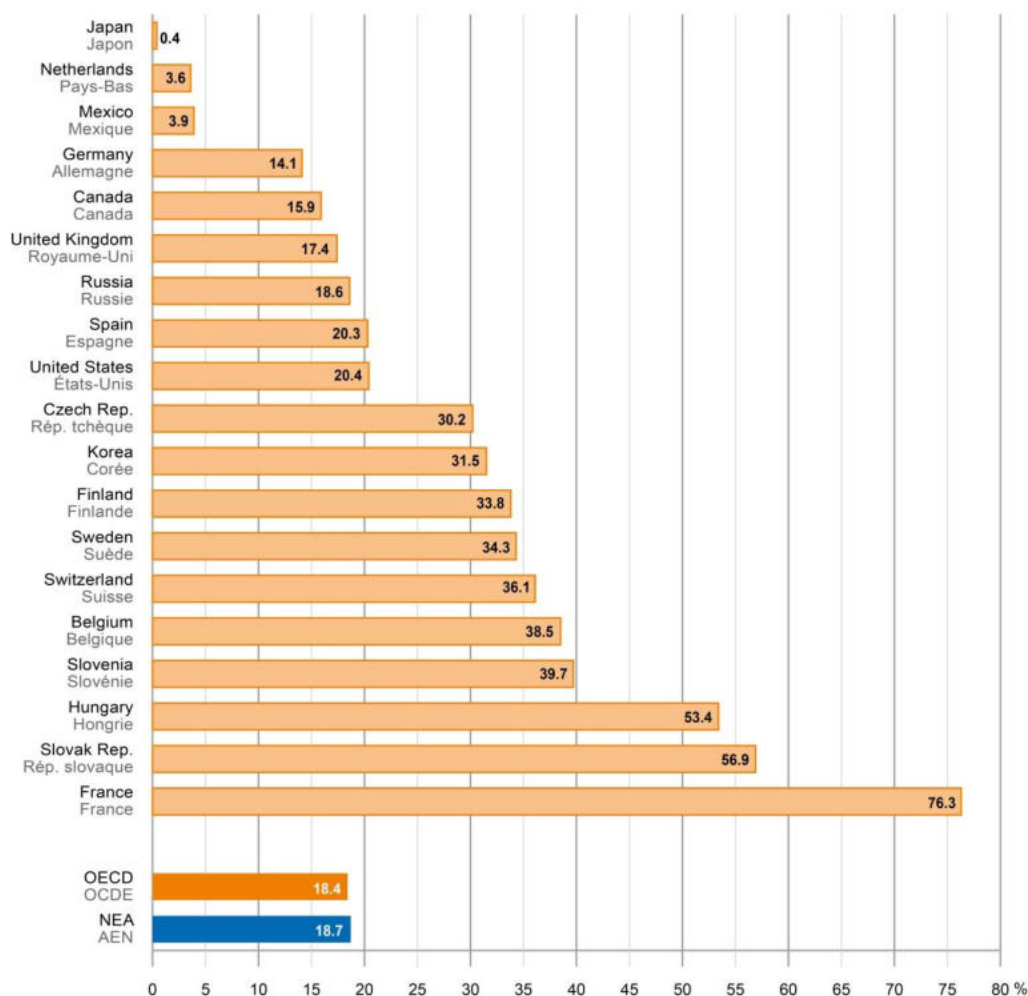


**Dungeness B (UK) uses
advanced gas-cooled reactor**



**Diablo Canyon(USA) 4-loop
pressurized water reactor**

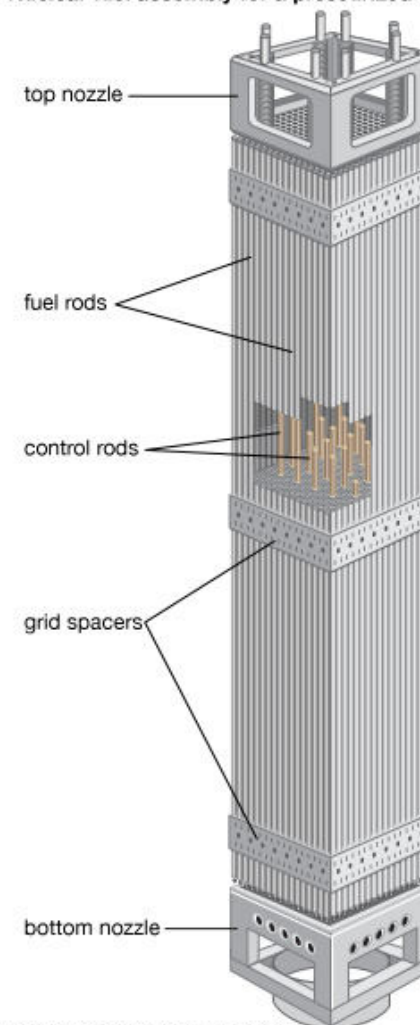
Nuclear power share of total electricity production (1 January 2016)



Spent Fuel – the source of nuclear waste

- ❑ Spent fuel is uranium oxide fuel that has completed its irradiation cycle in the reactor
- ❑ It is 95 to 96% uranium with a remaining enrichment level of U-235 that is approximately that of natural uranium
- ❑ It is 1% plutonium, and 0.1% other actinides
- ❑ It is 3-4% fission products (Sr, Cs, Tc, and many others)

Nuclear fuel assembly for a pressurized-water reactor

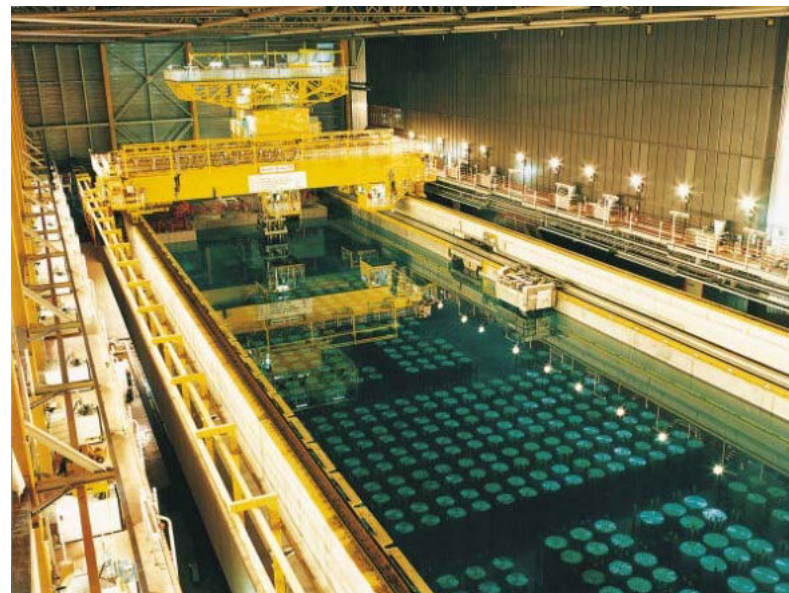


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Fate of Spent (Used) Fuel



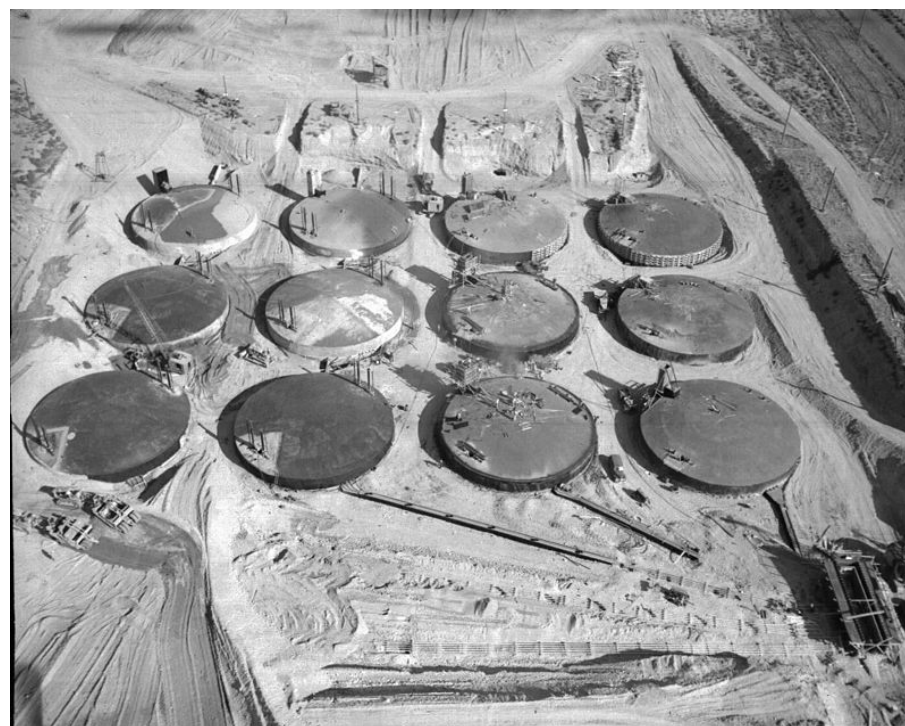
**Dry Storage Vaults at
Idaho National Laboratory
(USA)**



**Used Fuel Storage Pond at
Sellafield (UK)**

Liquid Nuclear Waste from Reprocessing

Store in Tanks or Seepage ponds (pre 1970 in the US)



Hanford Waste Storage Tanks

Solid Radioactive Waste

Solids become low level or intermediate (TRU) waste



Low level waste Shallow land burial

- **Medicinal waste (a good thing)**
- **Nuclear research labs**



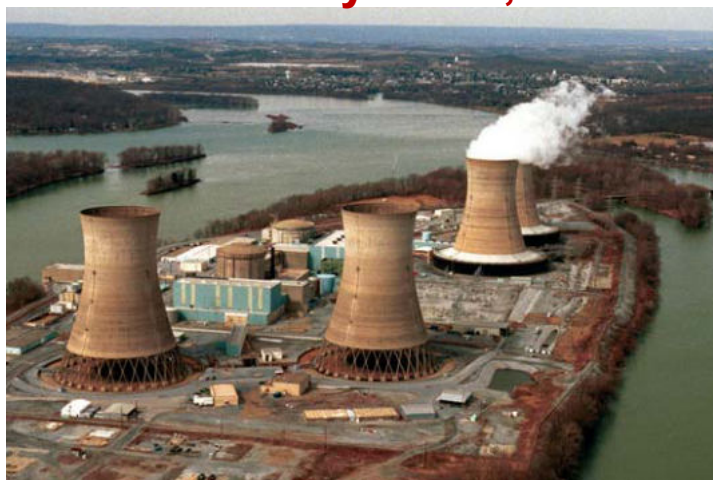
Transuranic Waste in the WIPP

**Example here is Mayak –
but there are many
throughout the nuclear
world where significant
reprocessing activities
took place**



Mistakes Happen

**Three Mile Island accident,
1979 Pennsylvania, USA**



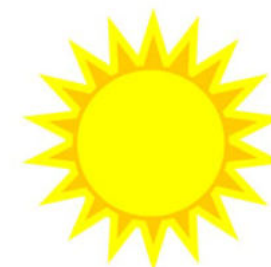
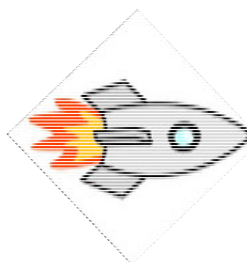
**Chernobyl, 1986.
Ukraine**



**Fukushima, 2011.
Japan**

Nuclear Repository/Remediation Concepts Many have been proposed over the years

- Deep seabed disposal (dilution is the solution)
- Ice cap meltdown
- Put in a rocket ship and send into the sun
- Transmutation
- Recycle actinides to burn up
- **Geologic isolation before/after Reprocessing**
- Deep borehole concept
- **What is missed?**



Repository Updates

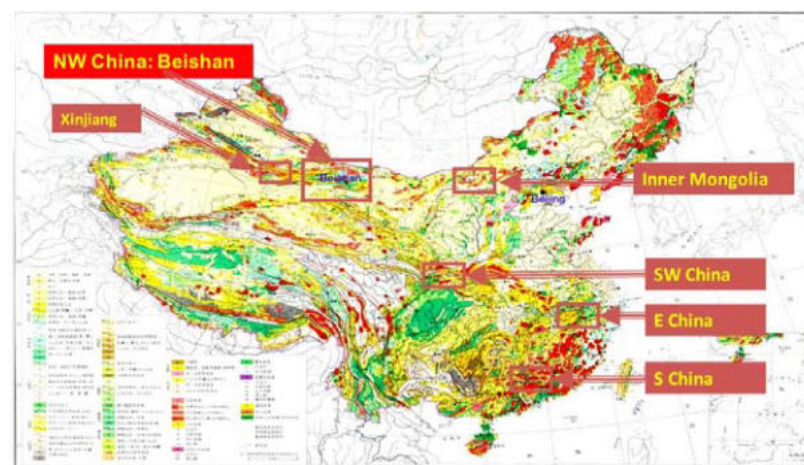
Europe and Canada

- **Repository projects in a few countries are advanced**
 - **Sweden: SKB**
 - application for a site licence at Forsmark (in granite) for a repository for spent fuel is in process
 - **Finland: Posiva**
 - application in 2012 for a construction license for a repository for spent fuel in Olkiluoto (approved by STUK)
 - expected to apply for an operating licence for the repository (also in granite) in 2020
 - **France: Andra**
 - has moved to an industrial phase and has submitted its license application (in Clay) in 2015
- **Other countries are in a step-wise siting process**
 - **Switzerland, Canada, and the UK**

Repository Updates – cont. China, Korea and Japan

China

- Beishan region selected in 2015 (granitic site) – down-selected from 6 sites
- 3 candidates evaluated to 1 repository (by 2050)

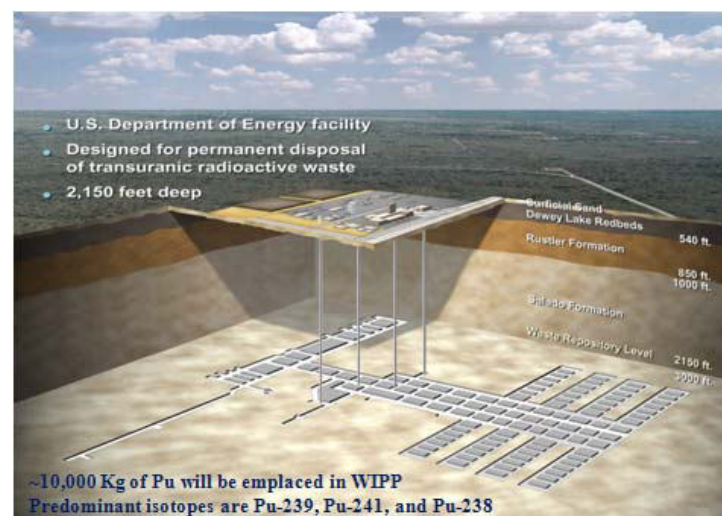


Stepwise siting process in Japan and Korea

Repository Updates – cont. United States

- **WIPP TRU repository continues to operate**
 - Defense waste focus
 - Possibly high level defense waste (reprocessed waste)
- **Spent fuel and HLW is yet undecided**

WIPP Existing TRU Repository Operating since 1999



Nuclear Waste is not a “choice” it is a “reality” and its solution will span several generations of scientists, regulators, and politicians.

- This means that we should/must evaluate paths forward today, but understand that they will evolve with time due to cultural change and scientific progress
- A sustained and managed effort is needed to provide a high-quality peer-reviewed thermodynamic database throughout this timeframe – primary mission of the NEA-TDB





Federal Office
for the Safety of
Nuclear Waste Management

Case Study 6: Risk Communication in Long-term Waste Management

Jochen Ahlswede

Federal Office for the Safety of Nuclear Waste Management (Germany)

OECD-NEA Workshop on Stakeholder Involvement: Risk Communication
Paris, September 24-26 2019

Background: Nuclear waste disposal in Germany



The decision for nuclear phase-out in 2011 was the condition for a new start regarding nuclear waste disposal in Germany after decades of confrontation and mistrust.

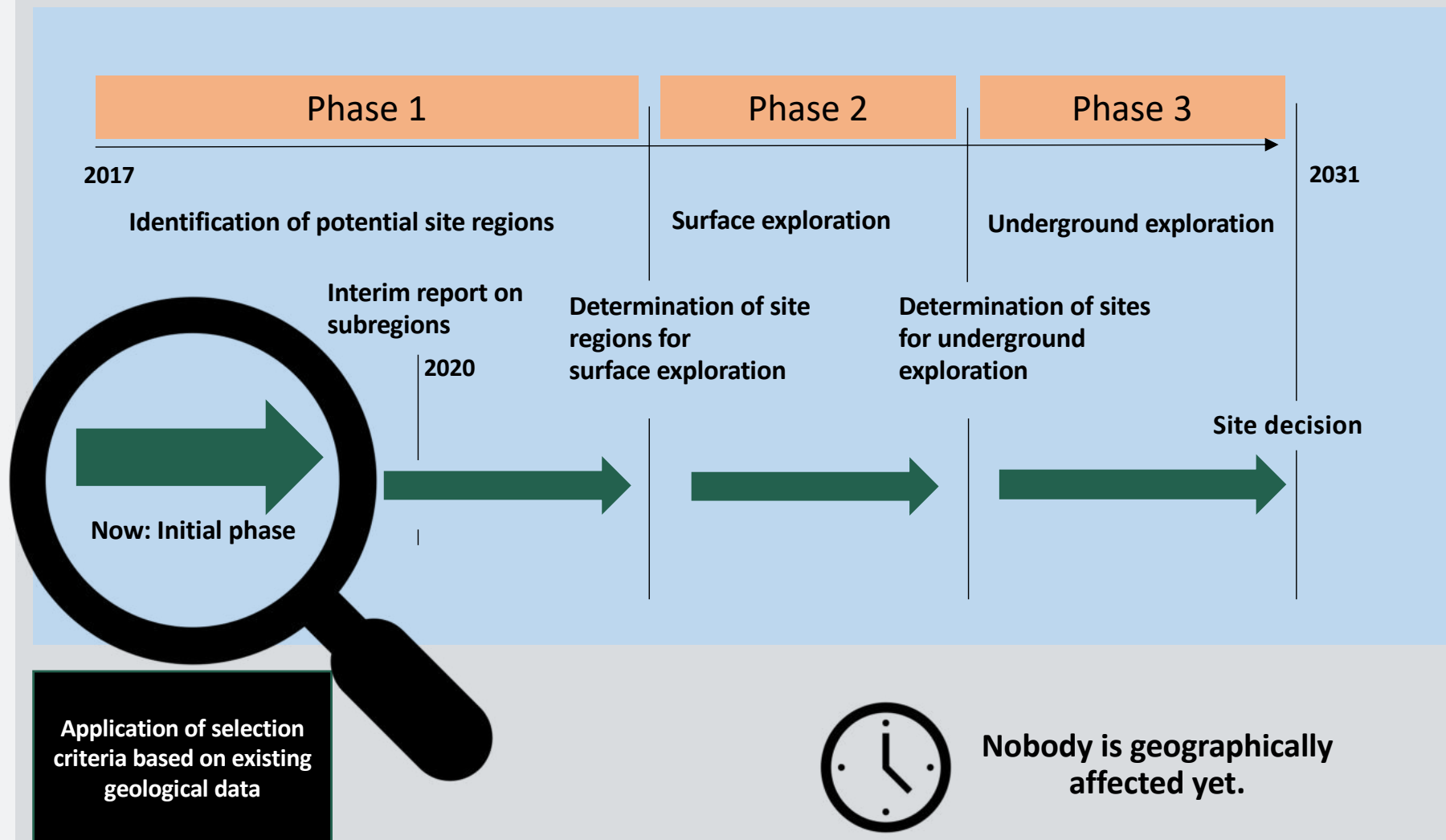


Background: The site selection procedure

- Start of new site selection procedure for a safe deep geological disposal of the high-level radioactive waste in 2017
- Main characteristics:
 - Starting from the “white map”
 - Stepwise process with decisions of parliament
 - Transparency
 - Public participation
- **Aim: Decision for a site with the best possible safety in 2031**



Background: The site selection procedure



Key actors



Federal Office for the Safety of Nuclear Waste Management (BfE)

- Regulator
- Responsible Body for public participation



Federal Company for Radioactive Waste Disposal (BGE)

- Implementer



National Advisory Body (NBG)

- Independent Advisor
- Mediator



Risk perception

Person

Values, knowledge, emotions, status, ...

Frame

Process, law, politics, information, resources, ...

Source

Damage potential, probability, control mechanisms, ...

Marti, 2016

Methods of information, dialogue and consultation



Dialogue with municipalities

Workshops with younger generation

Mobile nuclear waste management exposition



Conferences with stakeholders

Public information and dialogue events throughout Germany

Consultation of the public



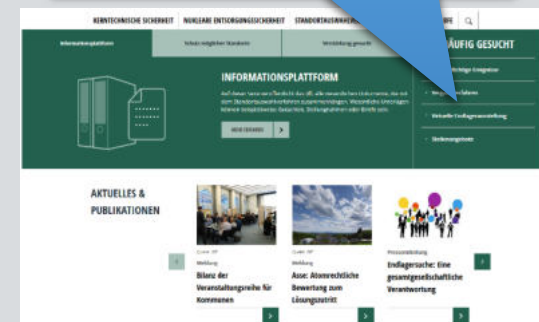
Information Material and animated videos



Web based information platform

Online consultation

App



Dialogue with municipalities

- Municipalities are often the first “address” for citizens with questions or critique
- In January 2019, BfE carried out four regional workshops for the municipalities across Germany.
- Preparation in cooperation with the umbrella organizations for municipalities on national level
- The events were held together with the implementer and civil society board



Dialogue with municipalities: Tools

- Mix of information, discussion and participation in order to explain the procedure and collect input and needs from municipalities
- Presentations BfE, BGE and NBG: Explaining the different roles of the main actors
- World Café discussions
 - What are your expectations regarding information and participation in the site selection procedure?
 - What do you think are the expectations of your citizens regarding information and participation?
 - What do you see as your responsibility in the procedure?
- Press briefings right before the workshops



Dialogue with municipalities: Key Messages

There are several opportunities for citizens, municipalities etc. to participate.

Safety is the priority.

The site procedure is designed as a « learning system » : checks and balances, the possibility of re-examinations, and a recovery option for the waste for 500 years.

Interim storage facilities are no suitable options for a safe long-term storage of high-active waste.

Only if all stakeholders take responsibility, there is the possibility for success.

Export is not an option due to the national responsibility that arises with the use of nuclear power in the past.

No burden shifting to future generations: A site for deep geological disposal has to be found within a justifiable time scale.



Example: Risk Awareness



„No use in yelling.“

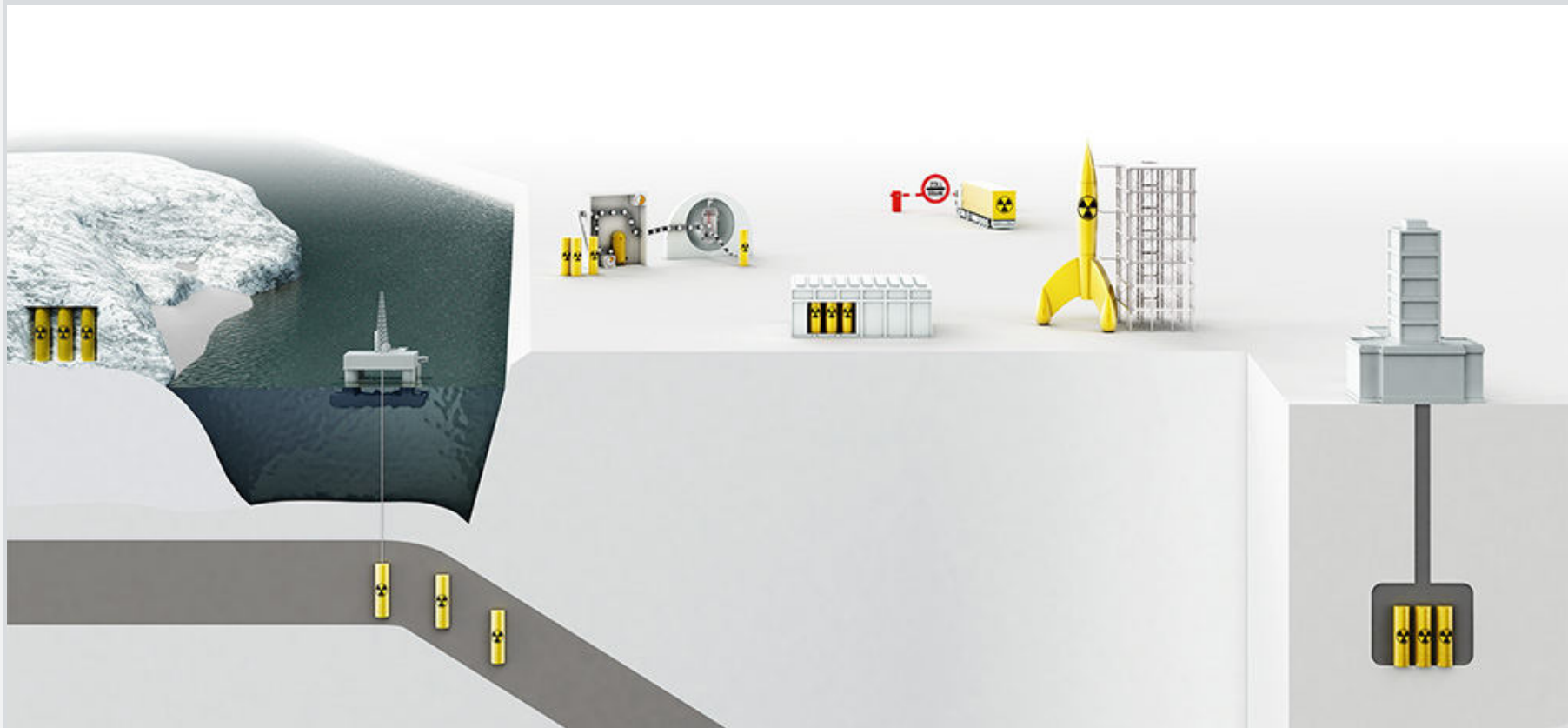


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Example: Graphical Comparisons



Example: Animations



Addressing risks of other nuclear waste management options than deep geological disposal proactively.

Dialogue with municipalities: Implementation challenges

- At the moment, the awareness for the problem of nuclear waste disposal is generally low.
- It was a logistic challenge to properly reach and invite several thousand municipalities in Germany.
- Some representative assumed that the region where a workshop was carried out is already on the 'shortlist' of potential regions (subareas).
- There was a dispute if the workshops shall be public or not. BfE followed the wish of the municipalities to held it non-public, which caused questions and critique of NGOs

Dialogue with municipalities: Ressources

- BfE was on site with 5-10 people (president/vice-president, head of unit site selection procedure, press officer, participation team).
- A certain amount of work can be outsourced, but an intensive steering is needed.
- Skills and capabilities for (Risk-)Communication and public participation belong to the core of BfE's work and is considered as important as any other technical or scientific know-how.
- Professional moderation, transparent documentation (publicly available) and evaluation is necessary.
- New technology for participation (real time voting etc.) will be used in the future.

Dialogue with municipalities: Feedback and Outcome

- Overall **positive feedback** from municipalities
- Intense discussions about **justice, responsibility as a society, risks for future generations and the opportunities and boundaries** for public participation in a representative democracy
- Start of a **two-way communication** and **mutual understanding** with a crucial stakeholder group
- substantial agreement on **leading values** and a **better understanding of the frame** (site selection procedure, responsibilities, decision making)
- A **list of recommendations and wishes** was documented which influenced BfE`s concept for information and participation

Dialogue with municipalities: Lessons learnt

- ✓ **Show a face as early as possible:** Institutions need a face for building trust in an abstract procedure
- ✓ **Clear management of expectations:** Talk about possibilities as well as boundaries of decision processes at the beginning, although it could trigger uncomfortable discussions
- ✓ **Confidential spaces may be helpful:** It was good to have a confidential atmosphere (and it was appreciated by most of the representatives)
- ✓ **Inform together:** It was helpful, that all key actors informed together about the procedure in order to clarify responsibilities
- ✓ **Address regional compensation:** Although it is a highly sensitive matter, concepts for regional compensation play a key role also in the early stage of the site selection procedure



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Thank you for your attention.

Contact

Jochen Ahlswede

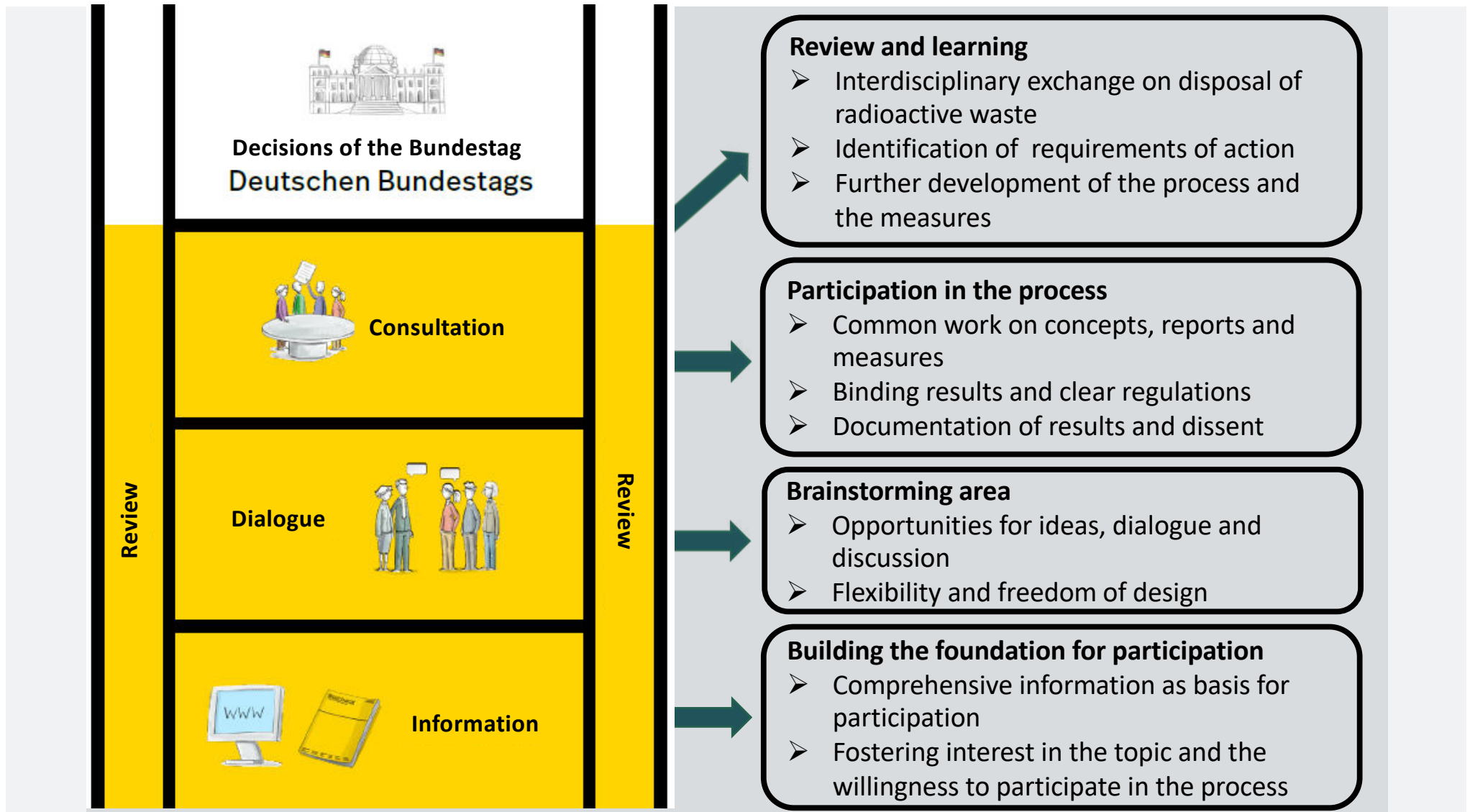
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Levels of participation



Participation in the Site Selection Process

