Prospects for the fuel cycle issues in Japan

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Major subjects of discussion addressed in basic policy subcommittee

1. Strengthening of accident prevention scheme
2. Reinforcement of the safety assurance culture of utility companies
3. Fostering of human resources
4. Recovery of the public's trust to the nuclear policy
5. Future support to local municipalities that have contributed to nuclear power generation
6. **Solutions to the issues of accumulating spent nuclear fuels and high level wastes, as well as delay in the implementation of deep geological disposal**
7. **Revision of the nuclear fuel cycle policy, which is suffering a serious delay, as seen in Rokkasho Reprocessing Plant and FBR Monju**
8. Contribution to the world, in terms of safety, non-proliferation, and security
9. Contribution to the world's peaceful nuclear utilization, in view of the growing nuclear capacity
10. Definition of nuclear business operation, in the context of enhanced safety regulation and ongoing electricity reform

Advantage of the Closed Fuel Cycle in Japan

Generally

Not recognize the spent LWR fuels as wastes, but put importance on its potential as fuel, to enhance the sustainability of nuclear power.
Keep the potential technology for the future uncertainty in terms of resource security and waste management

Specifically

Save ca. 15 to 20 % of U-235 demand (MOX recycling to LWR)
To facilitate deep geological disposal
- Reduce the volume of HLW
- Reduce the heat generation of HLW
- More stabilized form of HLW

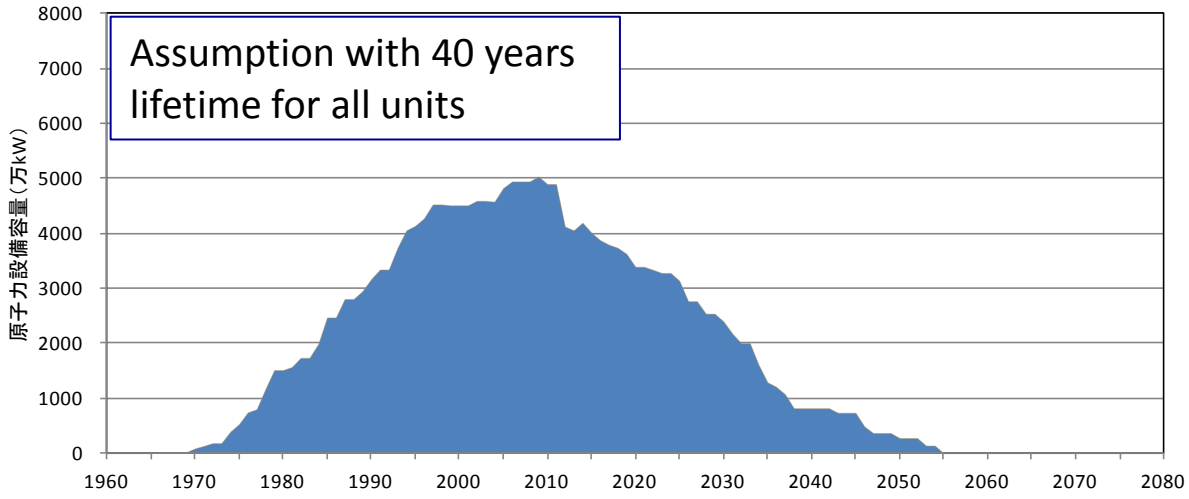
Reduce the number of the stored spent fuels (to 1/8 or 1/7 by MOX recycling)
More flexibility in Plutonium management
Reduce the long-lived radiological toxicity by recycling it to the Gen-IV reactor

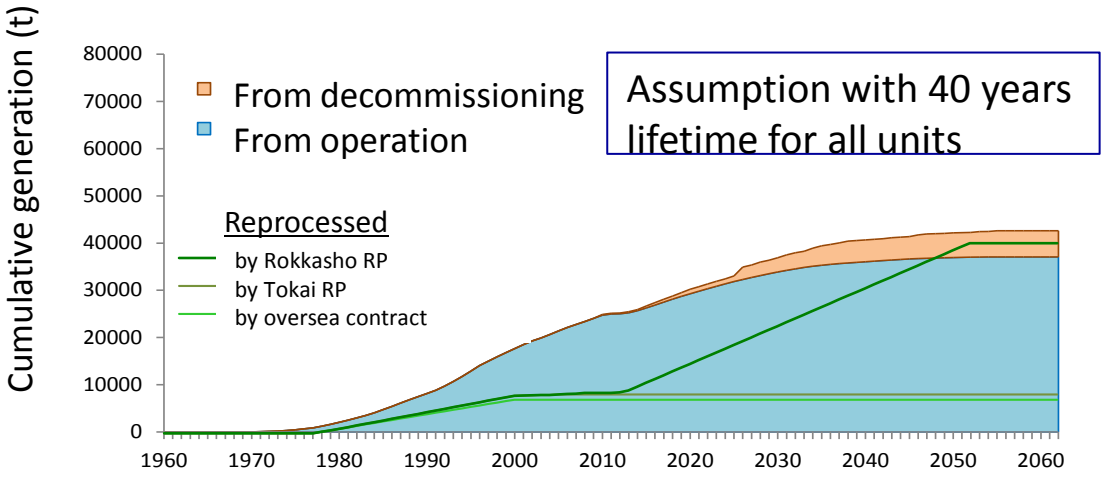
Cooperation by municipalities

Place a higher premium on the understanding and acceptance on the fuel cycle facility (Rokkasho complex) by Aomori Prefecture

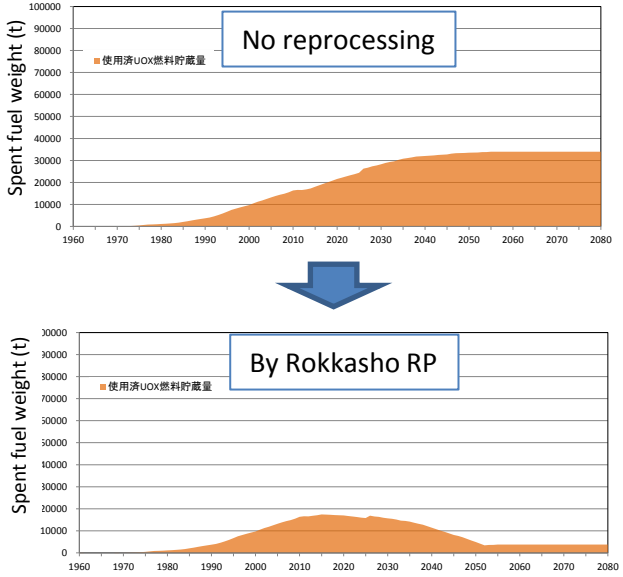
Future nuclear power capacity in Japan (being discussed)

If the limitation of reactor lifetime to 40 years is entirely adopted



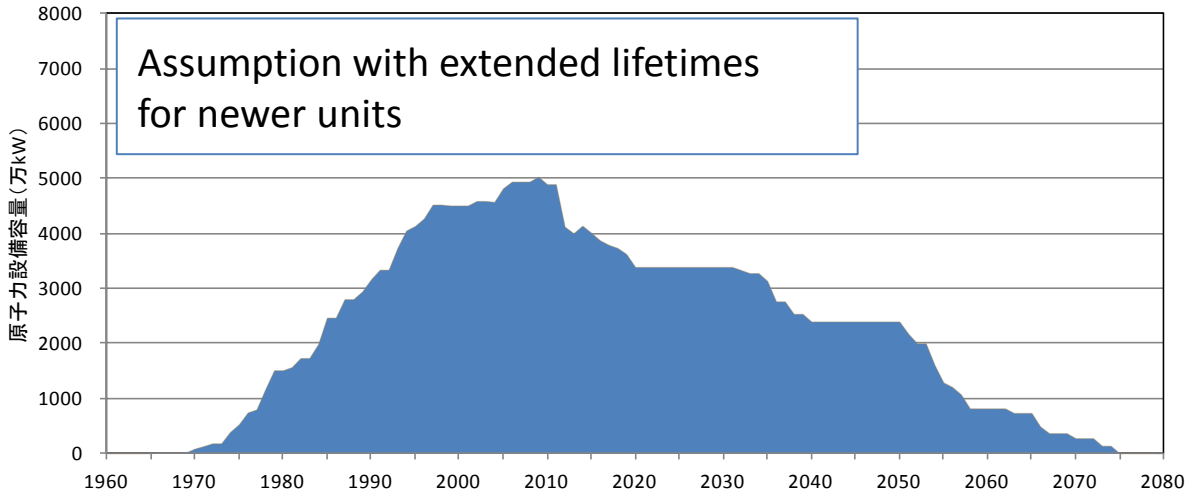


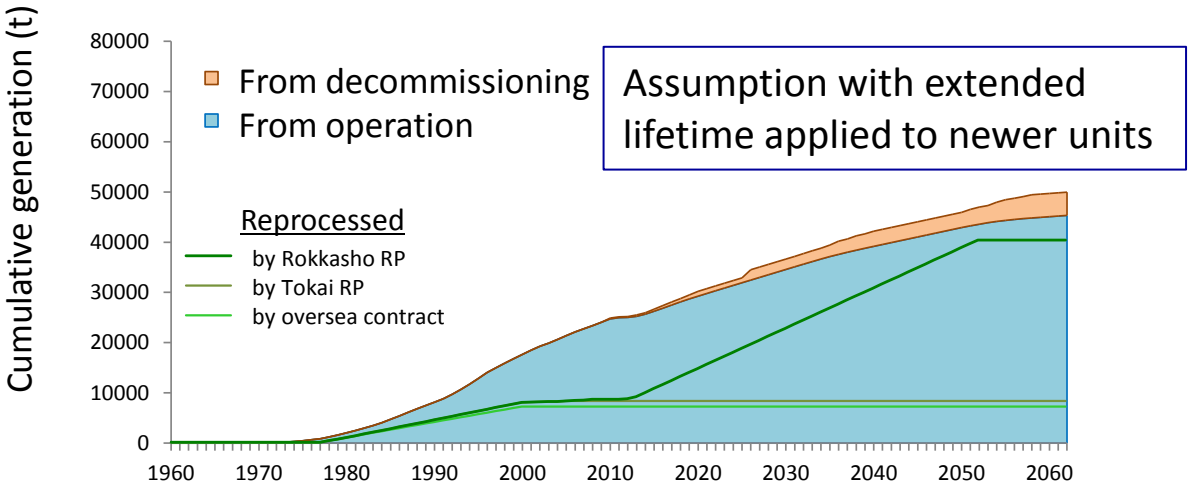
Spent fuel storage



Spent nuclear fuels pile up

If reactor lifetime can be extended gradually





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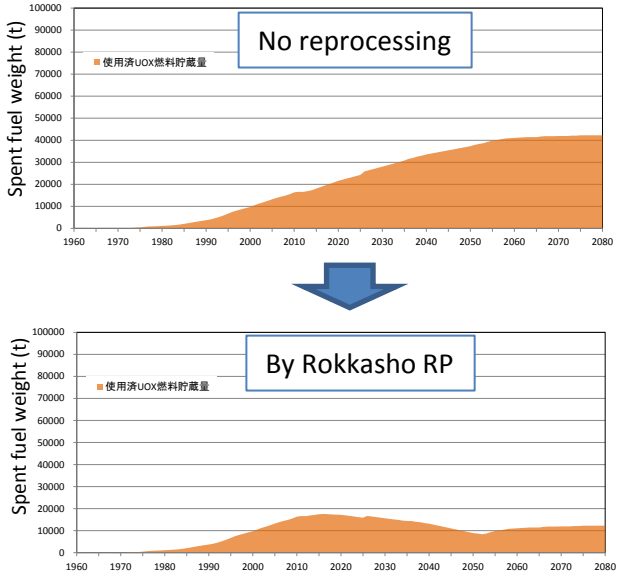

Associated issues

Technically

Delay of Rokkasho Reprocessing Plant by due to the failure of vitrification device
Delay of the operation of Monju, FBR demonstration reactor (research plan revised)

Material management

Large on-site stockpile of spent fuels (70% of full capacity on average)
Limited capacity of the interim storage facility
35 tons oversea stockpile of recovered Plutonium

Policy and regulations

Delay of the restart of nuclear power stations
Unclear nuclear backend policy (being discussed)
Reform of the safety regulation of fuel cycle facilities (more time needed for RRP)
Reform of the electricity business

Public understanding

Less acceptance to nuclear power, as well as fuel cycle
Delay and less understanding on the deep geological disposal

Cost

More expensive than open cycle. (by about 0.4 Yen/kWh)
Lower plant efficiency will spoil the cost efficiency

Safeguard and security are necessary to take the advantage of the closed cycle

Safeguard of Rokkasho Reprocessing Plant

Evaluation by LASCAR
Implementation of advanced safeguard measures
NRTA
OSL (Analytical labo. for authentication)
Solution monitoring (Process parameter monitoring)
IIV taking
Pu monitor

Security issues

- By the reformed nuclear safety regulation, strengthened design basis for external incidents are strongly required.
- In addition to the natural phenomena, human-caused incidents like airplane crush and loss of external power supply would be potential threat. Terrorism or sabotage may be a greater potential risks.
- Strengthened Defense-in-Depth of the system will be necessary to achieve the robustness of the plant against the human-caused threat.
- This will improve the reliability of the nuclear power system, in terms of gaining public trust and of avoiding political controversy.

Necessary aspects for the recovery of public trust to nuclear power

Understanding the necessity of nuclear power

1. Enhancement of public understanding of the importance of nuclear power for energy security

Safety improvement

2. Reinforcement of safety with strengthened “Defense in Depth”
3. Reformed nuclear safety regulation (Nuclear Regulation Authority)
4. Operator’s voluntary activity to improve safety further

Information

5. Disclosure information in a proper way
6. Transparency of the power generation business

Radiation safety

7. Improvement of public understanding of radiation safety
8. Calming exaggerated media reports

Scientific trust

9. The necessity of an independent academic authority

International concern

Early commissioning of Rokkasho Plant is desired, and result of the Large Scale Reprocessing Plant Safeguards (1988-1992) upon the effectiveness of the safeguard of large reprocessing plant should be verified.

Early consumption of 35 tons of Plutonium stockpile in Europe (France and UK) is expected, even though with the delayed restart of the nuclear power stations as well as of the MOX loading. Associated surface transportation of MOX fuels will be frequent.

Japan-US nuclear cooperation agreement is supposed to expire in 2018

Japan has been granted with advance programmatic consent for reprocessing and the retransfer of the items subject to the agreement to another state.

After the accident of Fukushima-Daiichi NPP and the subsequent undesirable incidents, world's concern is focusing on the reliability of government's governance on the nuclear operations in Japan.