

# World-Wide Activities towards Geological Disposal and Japanese Direction

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# The topics I would like to talk about today

1. Geological Disposal is World-Wide Activity
2. Background of Selecting “Geological Disposal”  
— Based on world-wide R&D and discussion
3. Scheme of Implementing Geological Disposal
4. Each Country is Making Efforts over Long-Time Period
5. Lessons from Advanced Countries

# 1. Geological Disposal is World-Wide Activity

## ● Final disposal of high-level radioactive waste

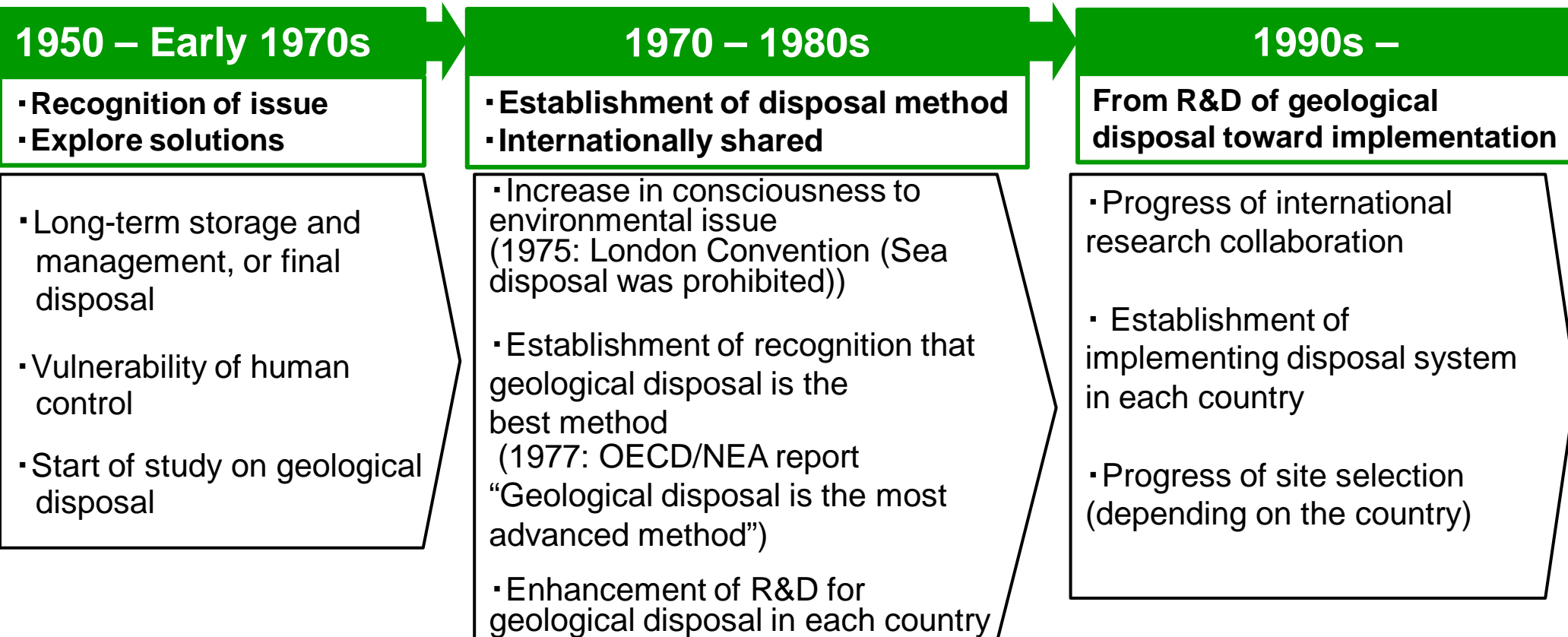
➔ Common issue for all countries which utilize nuclear power

## ● Common policy in each country

- ➔
- Human control of HLW is difficult because it takes very long time for radioactivity decay
  - Current generation should pave the way for solving the issue not to transfer excessive management burden for future generations
  - For such purpose, HLW need to be properly isolated from human environment for a long time
  - Deep geological disposal in stable rock formation is the best method, no alternative method is identified at the present moment

## 2. Background of Selecting “Geological Disposal” — Based on world-wide R&D and discussion

● Selection of the most suitable disposal method has been studied as a national common issue since the introduction of nuclear power.



Japan

1962:  
R&D for deep sea disposal  
(\*1966: Commencement of  
commercial reactors)

1976:  
R&D focusing on geological  
disposal

1999:  
Geological disposal is  
technically feasible in  
Japan

# Reference - International discussion

## OECD/NEA report (1977)

- For long-lived wastes the objective of radioactive waste management is to ensure the required degree of isolation from man over a time scale which precludes completely any form of reliance on long-term surveillance.
- Potential disposal solutions (options) include: geological disposal, geological formations under the ocean floor, disposal on the ocean floor, disposal in glaciated areas, extra-terrestrial disposal and destruction by nuclear transmission. Among them, containment in stable geological formations on land (geological disposal) is at present the most advanced.
- Administration, enhanced R&D and demonstration experiments should concentrate on the most suitable waste management technology and disposal method. Geological disposal is the first candidate both in one country and international level.

## Council Directive of EU for the radioactive waste management (2011)

- The reprocessing or direct disposal of spent fuel, whatever option is chosen, the geological disposal of high-level waste should be considered.
- Storage is a step for management, and disposal is the end point of the management. The storage of HLW requires human involvement is an interim solution.
- It is broadly accepted at the technical level that, at this time, geological disposal represents the safest option. Member States of EU shall prepare a plan toward geological disposal by 2015.

# 3. Scheme of Implementing Geological Disposal

## ① Implementation scheme



- Establish specific organization (implementer) to carry out geological disposal responsibly
- Independent regulator conducts safety review

## ② Funding for final disposal



- Waste producer should pay for fund to cover future cost (people making use of nuclear power should cover the cost )
- Implementer carries out dedicated geological investigation in staged manner

## ③ Site selection



- Municipalities make decisions whether they proceed to the next stage considering the opinions of local residents

# ① Implementation scheme

- Specific organization (implementer) for final disposal project is established under the law.
  - Implementer is responsible for long-term project including site selection (investigation), construction/operation/post-closure management for a certain period of repository.

## Utilities' cooperative



Finland



Sweden



Canada



Switzerland

## Public corporation



France



UK

## Governmental organization



Germany

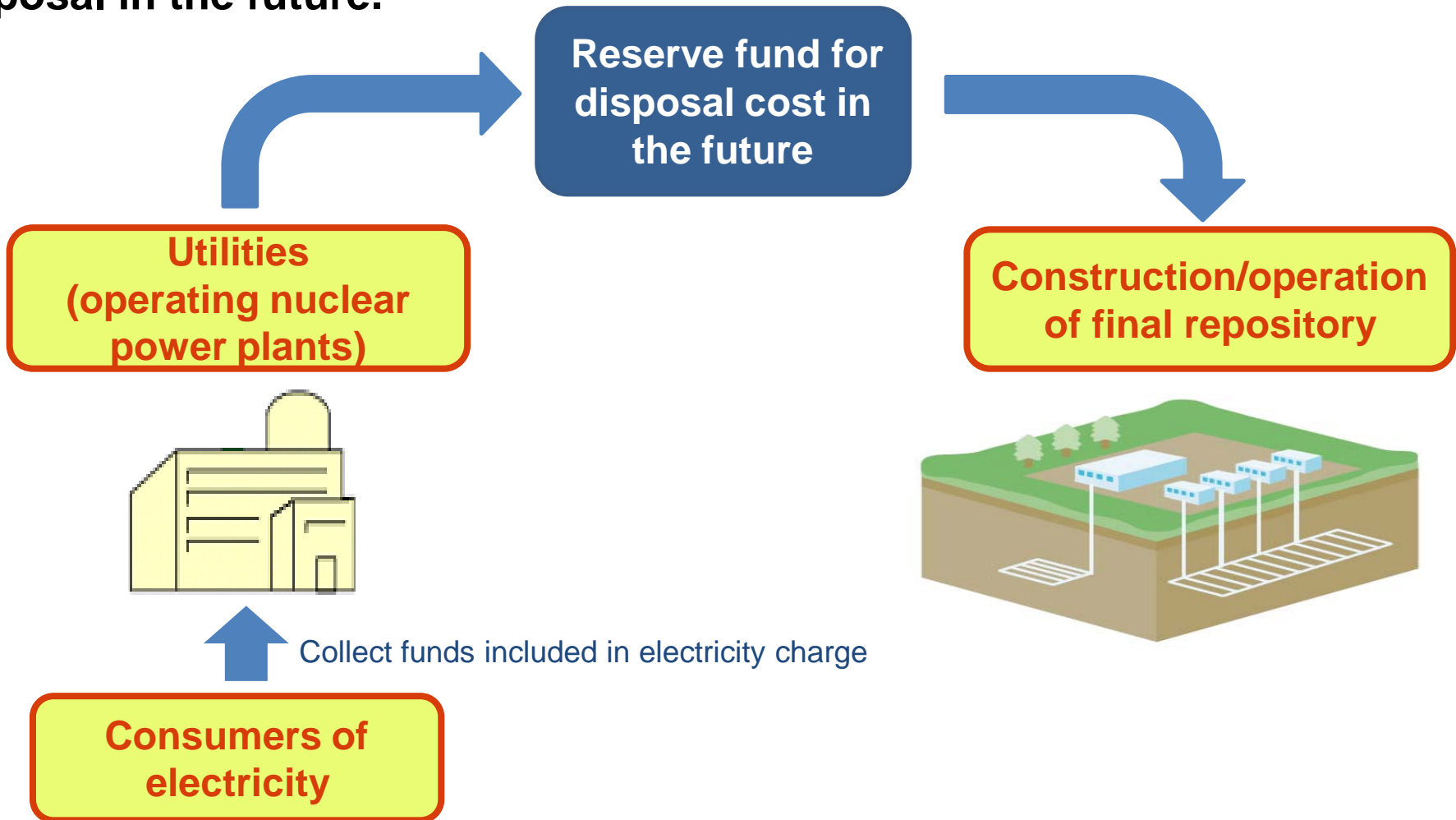


US

- Safety of the project is secured by the reviews/approvals of independent regulator.
  - Regulator rigorously reviews and judges whether implementer is qualified to secure long-term safety of repository.

## ② Funding for final disposal

- Users of nuclear power should cover the cost required in the future.
- Specifically, utilities which operate nuclear power plants reserve fund according to the amount of the waste produced and such fund will be used for disposal in the future.

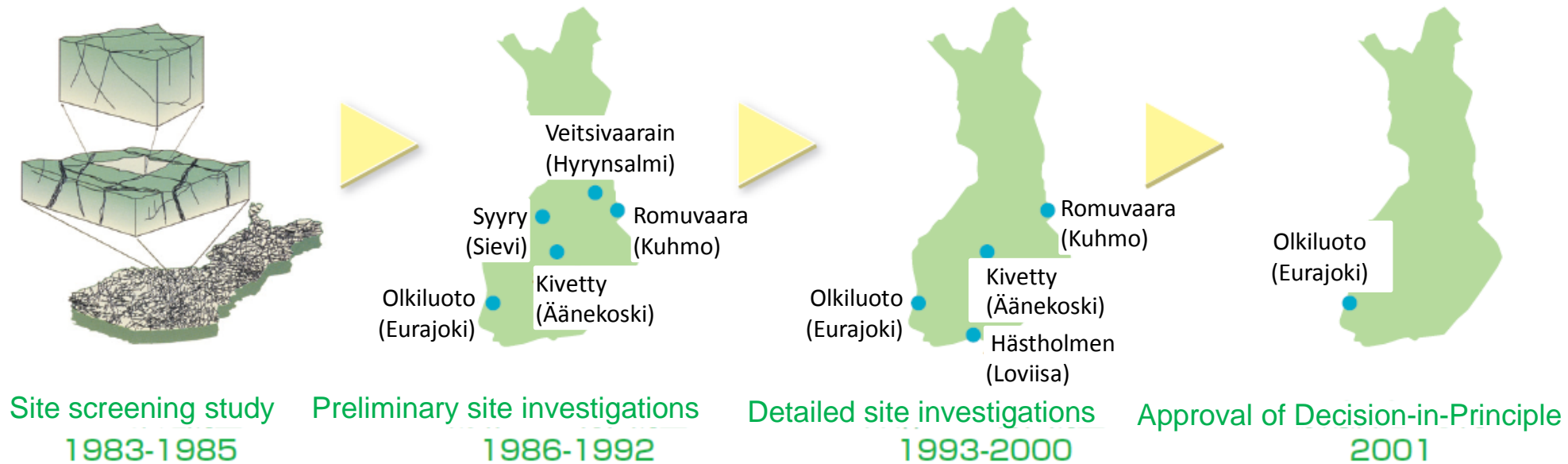




# ③ Staged site selection

- Implementer of final disposal project carries out dedicated investigations in step-wise manner in order to check if suitable geological condition exists, or if engineering measures could overcome the issues.
- Municipalities make decisions whether they proceed to the next stage considering the opinions of local residents.

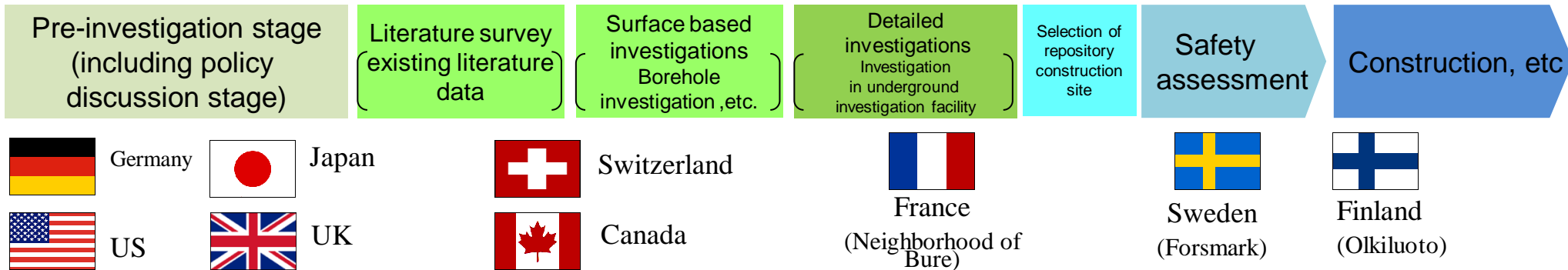
*【Siting process in Finland】*



Reference : "HLW Disposal in Other Countries" (2015)

# 4. Each Country is Making Efforts over Long-Time Period

- Each country has made long-time efforts for R&D and site selection since around 1970s. However it hasn't always gone smoothly and each country tackles with various difficulties.
- For example, US, Germany and UK once decided candidate sites or investigation areas, however, such decisions were turned down later and policies and approaches are under reconsideration.
- On the other hand, in Sweden and France experienced oppositions from local residents in siting areas, there have been progress in site selection. In Finland, the Finnish government granted a construction licence for a spent nuclear fuel disposal facility.

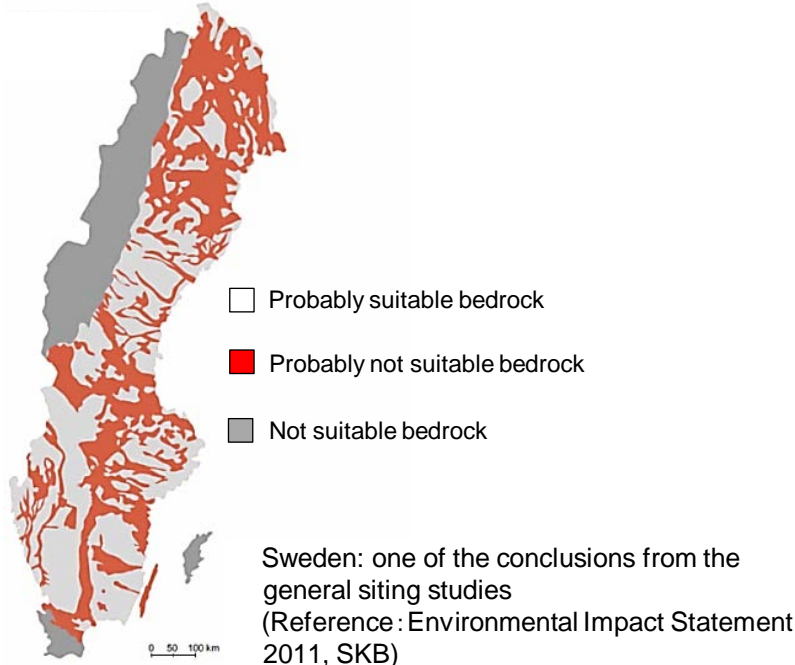


# 5. Lessons from Advanced Countries ①

## Trust for safety

### ◇ Staged investigation focusing on safety

- In Sweden, SKB (implementer) provides discussion materials for the public/municipalities, including the implementation of nationwide/prefectural literature surveys showing suitable areas with a map, etc. and implements staged site investigation for a repository focusing on safety.



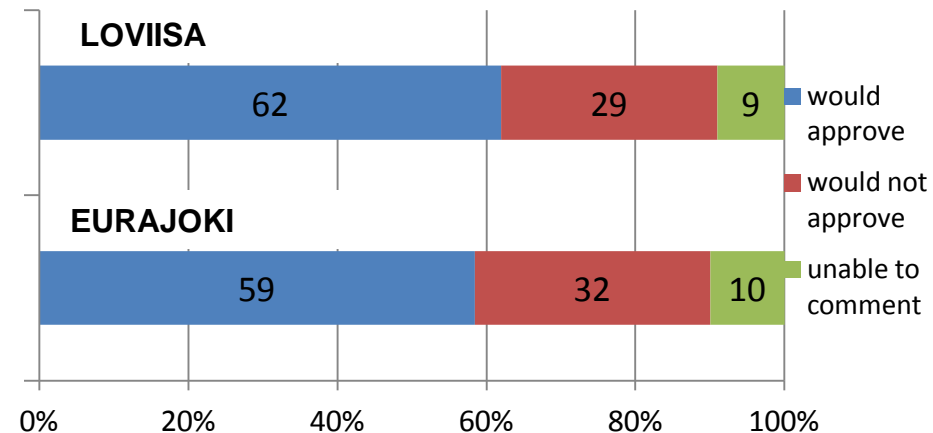
### ◇ Active involvement of regulator

- In Finland, a opinion survey was conducted to local residents in candidate repository sites, which estimates the opinion of local residents for the acceptance of a repository, including their concerns and attitudes for risks. The results showed they have high trust for the regulator.

#### <Opinion survey of local residents>

Question:

"In the event that the investigations and safety assessment by the authorities indicated your own residential community to be safe as a final disposal site for nuclear wastes, would you accept the placement of nuclear wastes produced in Finland within the confines of your home municipality?"



(Reference: Finland: Environmental Impact Assessment (EIA) report 1999, Posiva)

# 5. Lessons from Advanced Countries ②

## Intensive dialogue

- ◇ Staff of implementer hold face-to-face communication
- ◇ Establish venues for information exchange and discussion among local residents

【Sweden】



Photo courtesy of Östhammar Municipality

- Establish organizations discussing effects in the local community in various aspects to make decisions voluntarily. They became venues for information exchange and discussion.

【Finland】



Photo courtesy of Posiva Oy

- The Implementer (Posiva Oy) proactively carries out various local communication activities in which local residents can participate and discuss.

【France】



Photo courtesy of Bure CLIS

- CLIS (Local committee for information and follow-up) is established near underground laboratory with its objectives of information provision and discussion under the law.

# 5. Lessons from Advanced Countries③

## Compensation

- ◇ Acceptance area: partner of long-term project management over 100 years
- ◇ Importance of project implementation and local support for job creation and well-being

### Groupement d'intérêt public (GIP) [France]

- Under the law, GIP is formed in départements where underground laboratory or a future geological repository is located for economical development in the area.
- Today, GIP is established in two départements: Meuse and Haute-Marne where the Bure Underground Research Laboratory is located. Subsidies of about 8 billion yen per year for two départements are used for various needs.

Government

(Subsidies)

GIP

(Support)

Funding through solidarity/technology dissemination tax on nuclear-related facilities

Participation of government, affected municipalities, economic organization, ANDRA (implementer), etc.

- Economic development, job creation
- Infrastructure development (road, etc.)
- Tourism promotion, etc.



Example of local development by GIP

### Agreement on added value project among implementer and municipalities [Sweden]

- In March, 2009, an agreement on added value project for local development was concluded between 4 parties: two municipalities (Oskarshamn and Östhammar) as final candidate sites for a repository, SKB (implementer) and utilities.

< Contents of the agreement >

- Utilities and SKB support two municipalities
- Implement the added value project which creates economic impact totaling about 30 billion yen by 2025

(Main investment areas)

- Business development, supporting local companies
- Infrastructure development (improvement of road and port, etc.)
- Enlargement and diversification of the labor markets
- Transferring SKB's headquarter function, laboratory expansion, etc.

# Direction to aim for

## Trust for safety

- Site selection to put highest priority in ensuring safety  
→ Showing scientifically suitable areas is the first step
- Continuation of R&D, technology enhancement
- Active involvement of regulator

## Intensive dialogue

- Sustain attitudes to respect local opinions
- Listen and respond sincerely to concerns, anxieties and needs of local residents  
→ Establish dialogue scheme with local residents

## Compensation

- Efforts of NUMO to be accepted as a member of local community
- Project implementation and comprehensive supports for socio-economic impact for local community

Trust for administration of nuclear power, implementer and related parties