Waste management organisation in France

Richard Poisson, International Direction

Scientific seminar in the framework of « Paldiski » project »
CSA, 18/11/2015
1 – General information on Andra
   | Environment
   | Structure

2 – Waste
   | Classification
   | Quantities
   | Origin

3 – General information on each centre
1- General information on Andra Environment Structure
Act of 30 December 1991
First law on the management of RW. It establishes Andra as a public body in charge of the long-term management of RW and focuses on the management of HL and IL-LL waste.

Planning act of 28 June 2006 / French Environmental Code
Define the framework of France national policy on sustainable management of all radioactive materials and waste and its organisation and funding.

Planning act of 13 June 2006
“Transparency and Security in the nuclear field” Act, create the High Committee for transparency and information on nuclear security (HCTISN).

French National radioactive Materials and Waste Management Plan (PNGMDR)
It reviews existing management strategies for radioactive materials and waste, lists needs and sets the goals to be achieved for radioactive waste that is not yet addressed by a definitive management strategy. It is updated every 3 years.
• Andra, the French National Agency for Radioactive Waste Management, was created in 1979 within the French Atomic Energy Commission (CEA)

• Andra was made independent in 1991 by the French law on radwaste management (Law No. 91.1381 of 30 December 1991)

• Its missions were further elaborated in the second law issued in 2006 – PLANNING Act

• Andra is the sole French entity in charge of the radwaste management, including disposal

• Andra reports to Ministries of Energy, Environment and Research

• Annual turnover (2014) - 234 MEUR

• Employees ~ 650 staff at the end of summer 2015

• www.andra.fr (English version available)
Radioactive Waste Management Bodies in France

MINISTRIES

Prime Minister Interministerial Committee

REGULATOR: CONTROL & LICENSING

Independent Authority ASN

Technical Support to ASN

Ministry of Energy

Ministry of Environment

Ministry of Research

Waste Management Organisation

ANDRA

WASTE PRODUCERS

IREVA

EDF

CEA

OTHERS

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Detail of interaction with the safety authority

The ASN establishes safety rules and drafts French Act & Decrees

It is responsible for licensing and regulatory control

1- Safety report (SR) submitted by Andra

2- Request for technical opinion on SR by ASN to IRSN

3- Technical opinion given by IRSN on the SR

4- Opinion on Safety report given by ASN to Andra

The IRSN acts as Technical Support to ASN

Technical experts Support to ASN, can be asked to examine a safety report
Detail of interaction with waste producers

In France, the producer remains the owner of the waste.

He is responsible for the delivery of the waste to our sites.

He is responsible for the packaging of most of the waste delivered to our centers (this will not be the case for the HLW project).

He is responsible for proving satisfaction of his waste to our waste acceptance criteria, this can done be via declarations.

We call on the polluter payer principle.

This is simplified in the case for “small” waste producer’s.
President
Christophe Bouillon

Chief Executive Officer
Pierre Marie ABADIE

Deputy CE and manager of CMHM site (URL)
Jean Paul BAILLET

International Dir.
Gerald OUZOUNIAN

Secretary general
Gaelle SAQUET

HR director
Paul TALNEAU

Communications director
Valérie RENAUD

Risk managt. Dir.
Soraya TABET

Engineering
Marc LEGUILL

Industrial Dir.
Michel DUTZER

R&D Dir.
Frederic PLAS

Cigèo porject
Frederic LANEAU

- Operational centers in the Aube district
- La Manche site
Andra’s Missions

1. Planned disposal facilities (LL-LL, HL & IL-LL)
   • Design, licensing and construction

2. Operated disposal facilities (LI-SL, VLL)
   • Operation and monitoring of existing disposal sites

3. Public missions
   • National inventory, National waste management plan, waste acceptance criteria
   • Collection of radioactive items, remediation
   • Congresses, Symposia, Publications

4. Activities overseas
   • Industrial cooperations in projects for design of disposal and waste management
2- Waste Classification Amounts Origins
Overview of radioactive waste classification

**Short-lived waste (SL)**
- Period \( \leq 31 \) years
- **Very low level**
- **Low level**
- **Intermediate level**
- **High level**

**Long-lived waste (LL)**
- Period \( > 31 \) years
- **Graphite, radium-bearing waste**
  - **Subsurface disposal**
    - Studies stage in France
- **Waste from dismantling operations**
  - **Surface disposal**
    - Cires since 2003

**Waste from dismantling operations**
- **Surface disposal**
  - CSM 1969-94
  - CSA since 1992

**Waste mainly from day-to-day NPPs’ operation**
- **Surface disposal**

**Waste from SF reprocessing plant**
- **Cigeo Geological disposal facility**
  - to be commissioned in 2030 (approx.)

- Below 100-day period, management through in-situ radioactive decay.
- Only solid waste are to be disposed of.
Breakdown of volume and radioactivity level of radioactive waste

Source: National inventory 2015
### The French National inventory - 2015 edition

**IN THE TABLE, THE VOLUMES ARE COMPARED WITH THOSE AT THE END OF 2010 (2012 EDITION OF THE NATIONAL INVENTORY).**

<table>
<thead>
<tr>
<th>Category</th>
<th>Volume at the end of 2013*</th>
<th>Difference for 2013 - 2010**</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLW</td>
<td>3,200</td>
<td>500</td>
</tr>
<tr>
<td>ILW-LL</td>
<td>44,000</td>
<td>4,000</td>
</tr>
<tr>
<td>LLW-LL</td>
<td>91,000</td>
<td>4,500</td>
</tr>
<tr>
<td>LILW-SL</td>
<td>880,000</td>
<td>52,000</td>
</tr>
<tr>
<td>VLLW</td>
<td>440,000</td>
<td>77,000</td>
</tr>
<tr>
<td>DSF***</td>
<td>3,800</td>
<td>200</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td>~1,460,000</td>
<td>~140,000</td>
</tr>
</tbody>
</table>

*In m³ conditioned equivalent*

**BREAKDOWN OF THE TOTAL VOLUME OF WASTE BY ECONOMIC SECTOR AND MANAGEMENT METHOD**

<table>
<thead>
<tr>
<th>Volume (m³) at the end of 2013</th>
<th>Nuclear power</th>
<th>Research</th>
<th>Defence</th>
<th>Industry other than nuclear power</th>
<th>Medical</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLW</td>
<td>2,700</td>
<td>190</td>
<td>230</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ILW-LL</td>
<td>26,000</td>
<td>10,000</td>
<td>6,200</td>
<td>170</td>
<td>-</td>
</tr>
<tr>
<td>LLW-LL</td>
<td>42,000</td>
<td>20,000</td>
<td>17,000</td>
<td>12,000</td>
<td>2</td>
</tr>
<tr>
<td>LILW-SL</td>
<td>580,000</td>
<td>200,000</td>
<td>61,000</td>
<td>22,000</td>
<td>8,500</td>
</tr>
<tr>
<td>VLLW</td>
<td>220,000</td>
<td>160,000</td>
<td>42,000</td>
<td>11,000</td>
<td>3</td>
</tr>
<tr>
<td>DSF</td>
<td>2,400</td>
<td>740</td>
<td>650</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td><strong>880,000</strong></td>
<td><strong>390,000</strong></td>
<td><strong>130,000</strong></td>
<td><strong>45,000</strong></td>
<td><strong>8,500</strong></td>
</tr>
</tbody>
</table>
### 2015 National Inventory: future scenarios

**After 2030, taking into account two contrasted scenarios**

**SCENARIO 1:** Continuation of nuclear power generation
- Operating time of 50 years
- All spent fuel is processed
- Recycling of materials in the current nuclear fleet or a future one with a new reactors generation

**SCENARIO 2:** Non-renewal of the nuclear fleet
- Operating time of 40 years
- No processing of spent fuel

<table>
<thead>
<tr>
<th>HLW</th>
<th>SCENARIO 1</th>
<th>SCENARIO 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uranium oxide fuel from nuclear power reactors</td>
<td></td>
<td>~50,000 assemblies</td>
</tr>
<tr>
<td>Plutonium and uranium mixed oxide fuel from nuclear power reactors</td>
<td>10,000</td>
<td>~7000 assemblies</td>
</tr>
<tr>
<td>Vitrified waste (m³)</td>
<td>3,900</td>
<td></td>
</tr>
<tr>
<td>ILW-LL (m³)</td>
<td>72,000</td>
<td>65,000</td>
</tr>
<tr>
<td>LLW-LL (m³)</td>
<td>180,000</td>
<td>180,000</td>
</tr>
<tr>
<td>LILW-LL (m³)</td>
<td>1,900,000</td>
<td>1,800,000</td>
</tr>
<tr>
<td>VLLW (m³)</td>
<td>2,200,000</td>
<td>2,100,000</td>
</tr>
</tbody>
</table>

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1-4 December 2015
Breakdown of radioactive waste by economic sector at the end of 2010

- Nuclear power: 59%
- Research: 26%
- Defence: 11%
- Industry apart from nuclear power: 3%
- Medical: 1%

The production of radioactive waste in France represents the equivalent of 2 kg per year and per inhabitant.
General information on each centre
Opened in: 1992
(first package received on Jan. 13, 1992)

Capacity: 1,000,000 m³

Operating life: 60 years (followed by monitoring for 300 years)

Average annual volume: 12,000 m³
≈30,000 packages

30% of total capacity filled (Oct. 2015)

Main equipments:
Industrial and administrative buildings, storm basin, restaurant, supply facility,…

A nuclear facility (⇒ CLI)
Costs elements (1)

**Investments for the CSA:**

**Initial investment:**

Approx. 200 M€, financed by the 3 « main » waste producers. Their shares are based on the ratio of their prospectives consumptions of the total disposal capacity.

**Investment comprising:**

- Land acquisition
- Installations
- 2 first stages of vaults (39 vaults)
- Maitrise d’ouvrage et maîtrise d’oeuvre.

**Additional investments made until 2014 (autofinanced):**

- Renewing / upgrading installations: Approx. 28,5 M€
- Additional vaults: Approx. 72 M€ (111 vaults)

At the creation of CSA, producers spent 4,5 M€ to the surrounding communities as part of the local développement.
Financing the CSA operation:
⇒ Operation costs are covered by 5-years contracts signed with the 3 main producers (last contract 2015-2019)
⇒ The structure of the contracts is based on the decomposition of the operation costs with:
  - Price per unit & type of packages
  - Specific flat rates for all expenses independent of the waste packages quantity (regular expenses, amortisation, studies, packages inspections, taxes)
⇒ Cost is of approx 40 M€/year
Opened in: 1969
Capacity: 527,000 m³
Operating life: 25 years (Last WP in 1994)

Cost is approx 4M€/year including maintenance work and taxes (30%)

Main equipments:
Monitoring and water collection

A nuclear facility (=> CLI)
The VLLW: the CIRES

Financed by Andra
500€/m³
CLIS
280 000 m³
650 000 m³
Projects: Cigèo

Financed via a tax levied on nuclear installations
Operational in 2030 (current date)
Local involvement (CLIS, GIP, purchasing, …)
Projects: Low Level LL

- Inventory is mixed
- Two design options are under investigation
  - 15 to 30m depth ⇒ open pit + reworked clay cover
  - 50 to 200m depth ⇒ underground drifts
- Financed via commercial type contract with waste producers
Thank you for your attention