



# Waste management organisation in France

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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 establish Andra as a public body in charge of the long-term management of RW and focus on the management of HL and IL-LL waste.

## Planning act of 28 June 2006 / French Environmental Code

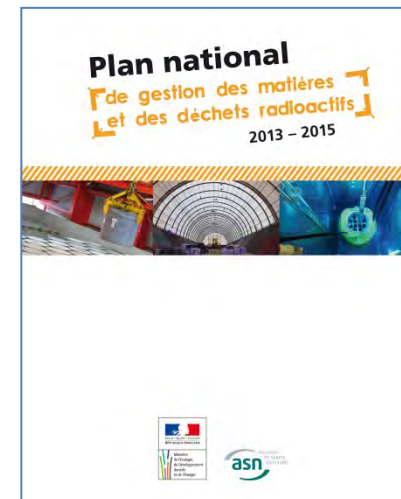
Define the framework of France national polivy on sustainable management of all radioactive materials and waste and its organisation and funding.

## 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 ans 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](http://www.andra.fr) (English version available)

## Radioactive materials and waste

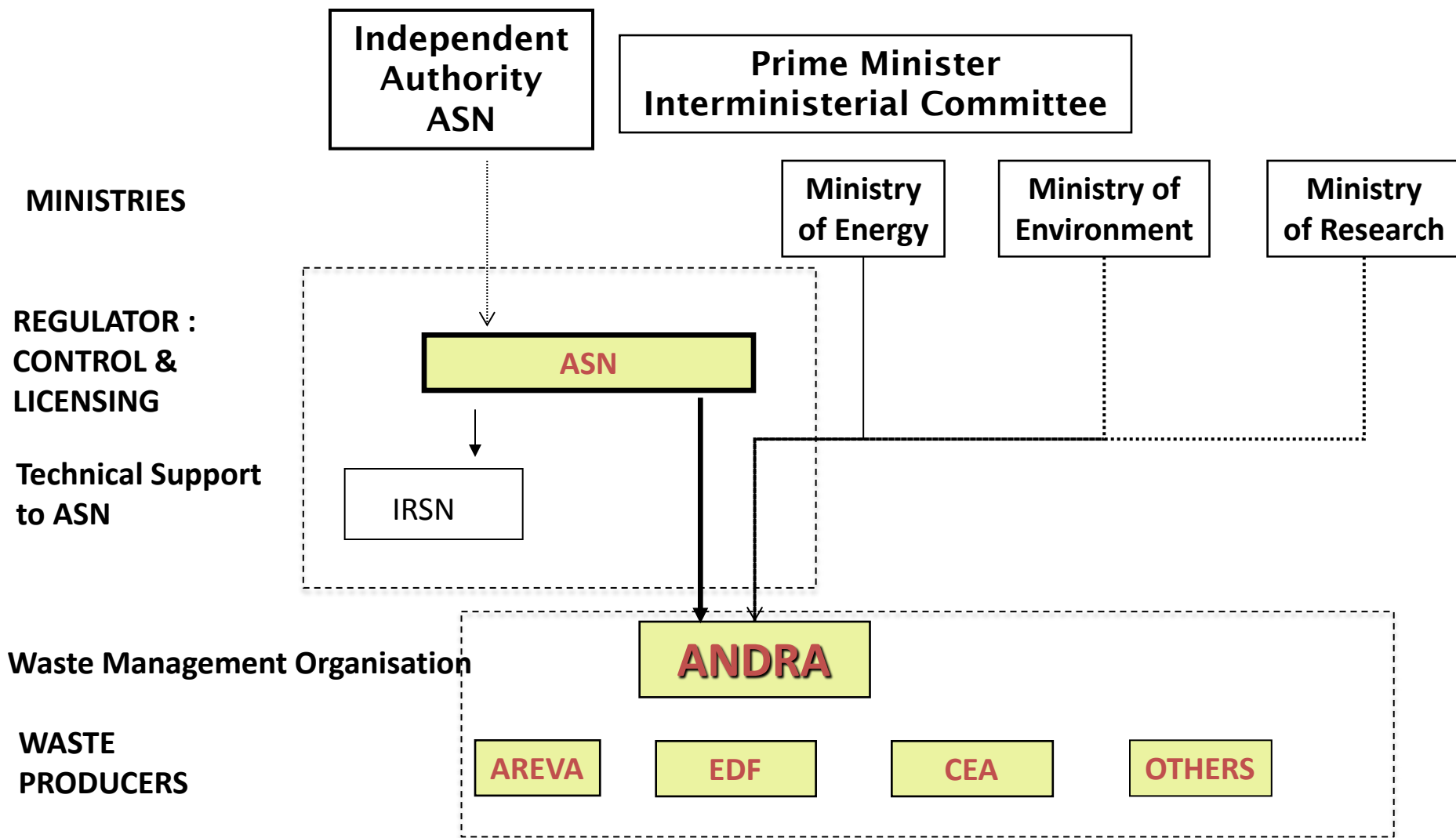
Planning Act of 28 June 2006

Consolidated version established by Asova



Download on  
[www.andra.fr](http://www.andra.fr)

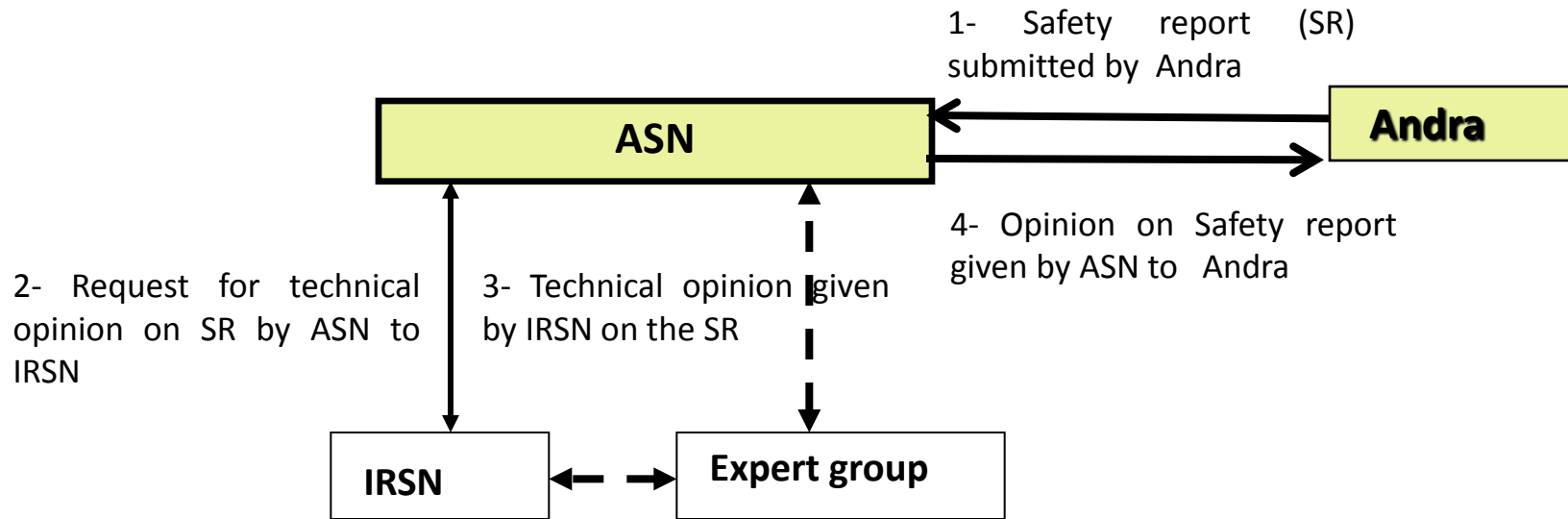
# Radioactive Waste Management Bodies in France



# 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*



*The IRSN acts as Technical Support to ASN*

*Technical experts Support to ASN, can be asked to examine a safety report*



In France, the producer remains the owner of the waste

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

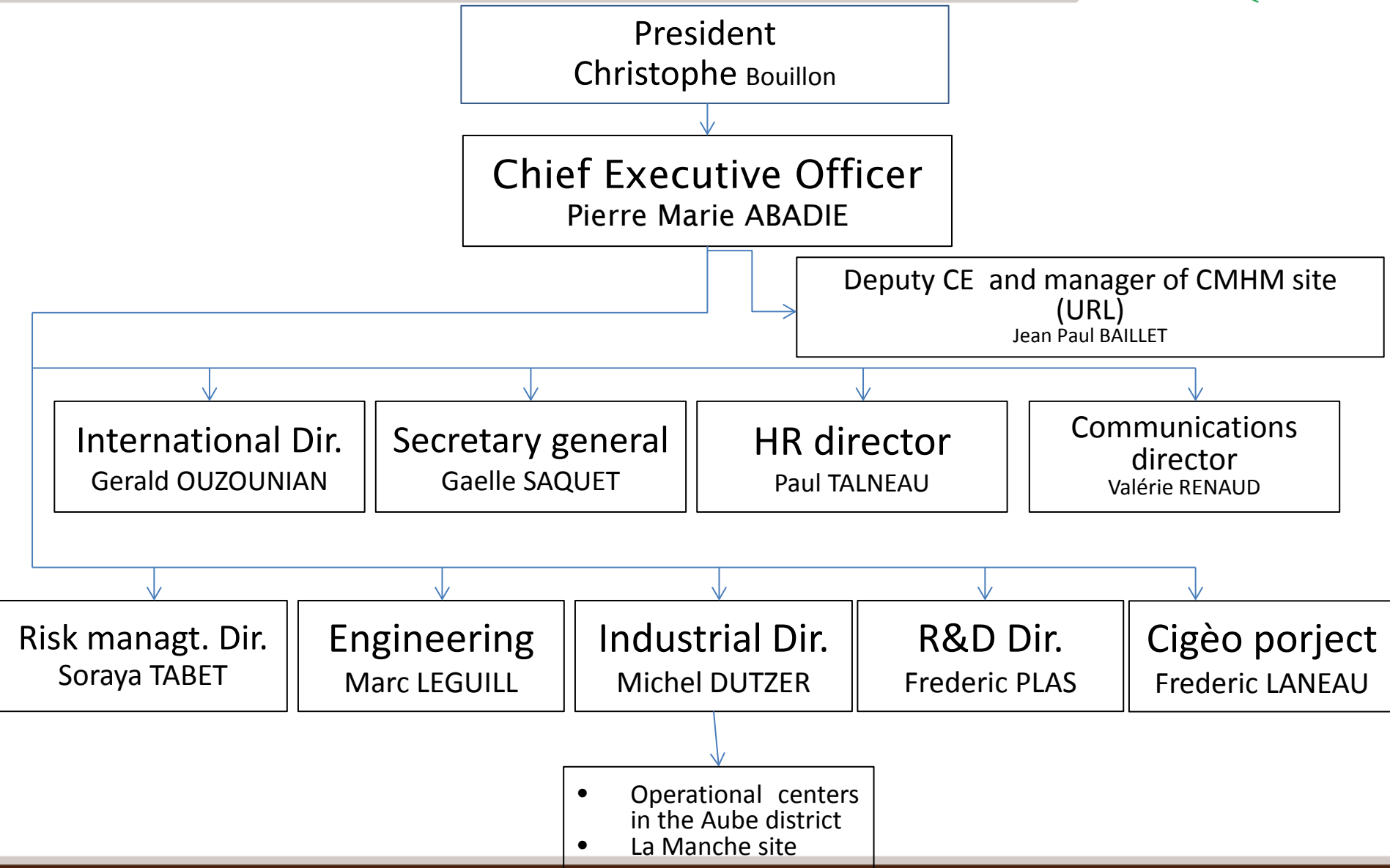
He is responsible for the packaging of most of the waste delivered to our centers (this will not be the case for the HLW project)

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

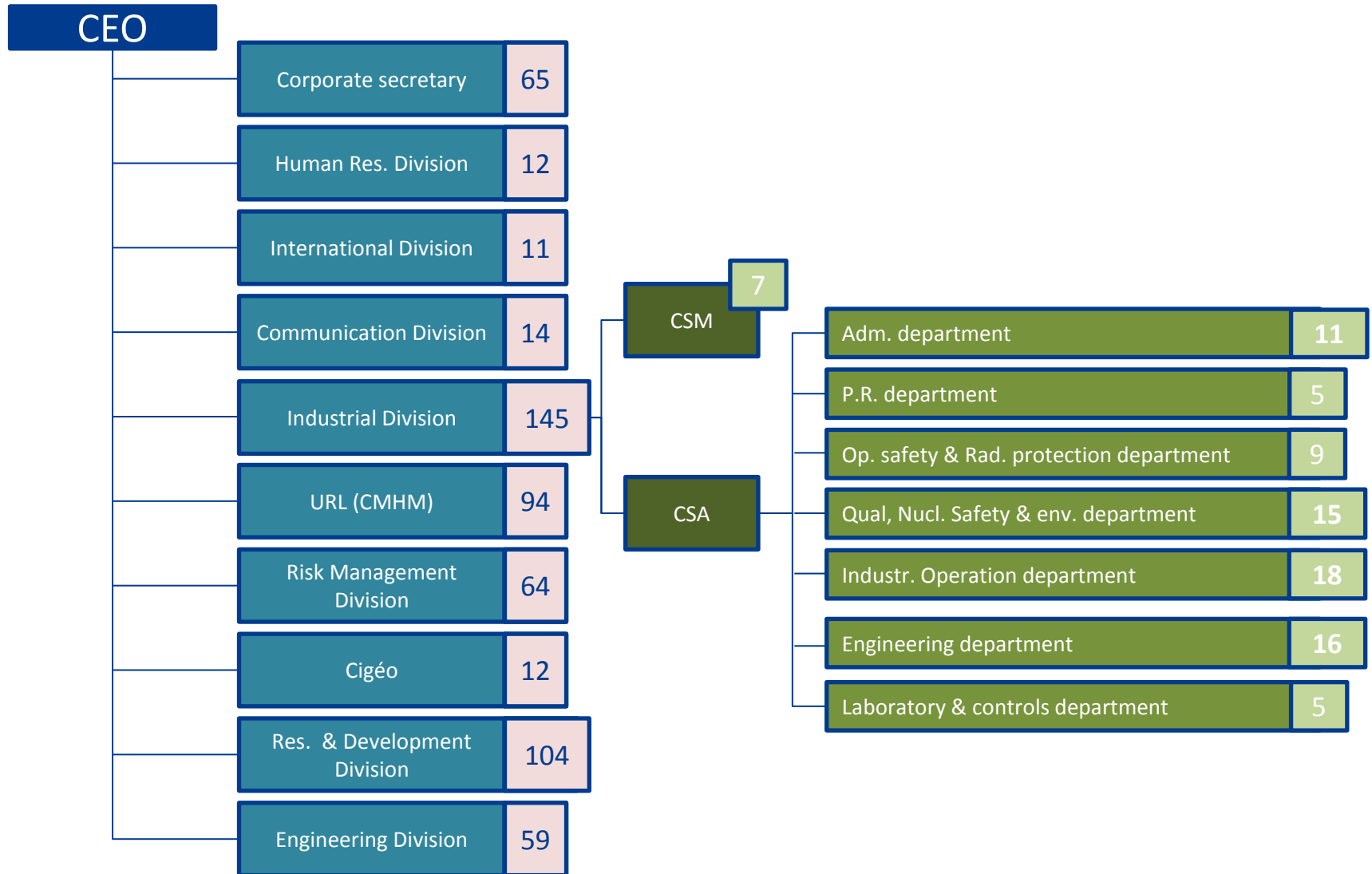
We call on the polluter payer principle

This is simplified in the case for “small” waste producer’s

# Organisation chart



# General Organization of Andra



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

**Long-lived waste (LL)**  
Period  $>$  31 years

<p><b>Very low level</b></p>	<p>Waste from dismantling operations <b>Surface disposal</b> – CIRES since 2003</p>	
<p><b>Low level</b></p>	<p>Waste mainly from day-to-day NPPs' operation <b>Surface disposal</b> CSM 1969-94 CSA since 1992</p>	<p>Graphite, radium-bearing waste <b>Subsurface disposal</b> Studies stage in France</p>
<p><b>Intermediate level</b></p>		
<p><b>High level</b></p>	<p>Waste from SF reprocessing plant <b>Cigeo Geological disposal facility</b> to be commissioned in 2030 (approx.)</p>	

- 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).

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

*in m<sup>3</sup> conditioned equivalent*

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

Volume (m <sup>3</sup> ) at the end of 2013	Nuclear power	Research	Defence	Industry other than nuclear power	Medical
HLW	2,700	190	230	-	-
ILW-LL	26,000	10,000	6,200	170	-
LLW-LL	42,000	20,000	17,000	12,000	2
LILW-SL	580,000	200,000	61,000	22,000	8,500
VLLW	220,000	160,000	42,000	11,000	3
DSF	2,400	740	650	4	1
<b>Grand total</b>	<b>880,000</b>	<b>390,000</b>	<b>130,000</b>	<b>45,000</b>	<b>8,500</b>



# 2015 National Inventory : future scenarios

## After 2030, taking into account two contrasted scenarios

### SCENARIO 1 : Continuation of nuclear power generation

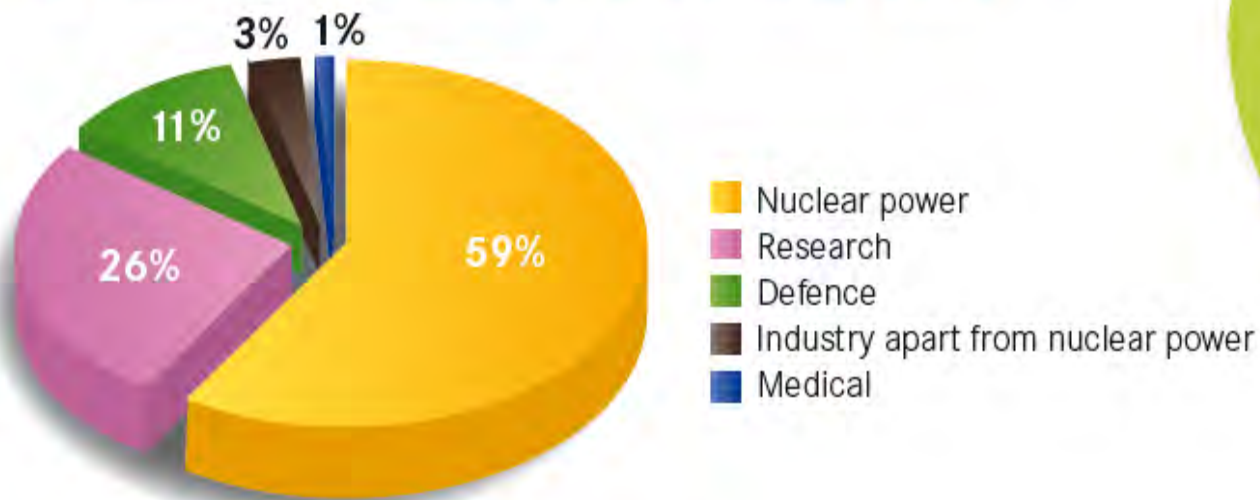
- ✓ Operating time of 50 years
- ✓ All spent fuel is processed
- ✓ Recycling of materials in the current nuclear fleet or a future one with a new reactors generation

### SCENARIO 2: Non-renewal of the nuclear fleet

- ✓ Operating time of 40 years
- ✓ No processing of spent fuel

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

## Breakdown of radioactive waste by economic sector at the end of 2010



The production of radioactive waste in France represents the equivalent of **2 kg per year and per inhabitant**



# General information on each centre

# LILW-SL repository : CSA



Opened in: **1992**  
(first package received on Jan. 13, **1992**)

Capacity: **1,000,000 m<sup>3</sup>**

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

Average annual volume: **12,000 m<sup>3</sup>**  
**~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)



## 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 prospective 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 development .

### 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 independant of the waste packages quantity (regular expenses, amortisation, studies, packages inspections, taxes)
- ⇒ Cost is of approx 40 M€/year





Main equipments:  
Monitoring and water collection

A nuclear facility (=> CLI)

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%)

# The VLLW: the CIRES

Financed by Andra

500€/m<sup>3</sup>

CLIS

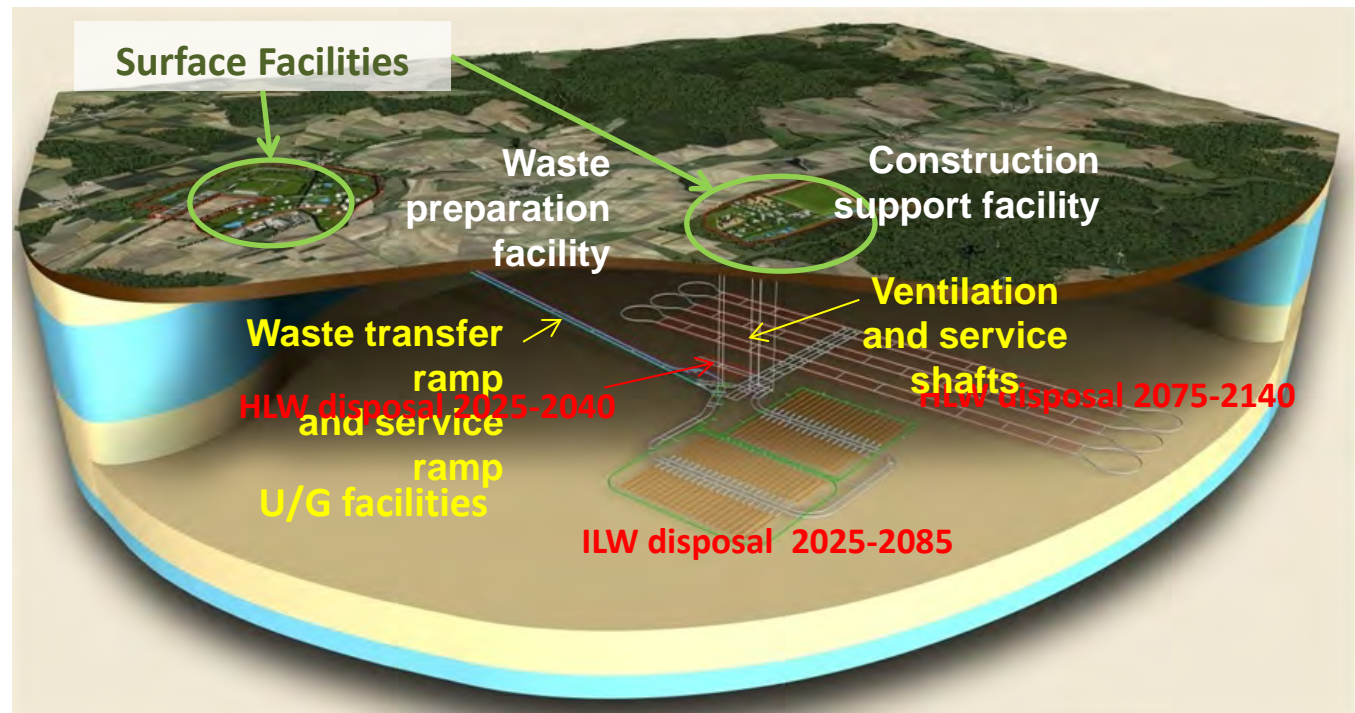
280 000 m<sup>3</sup>

650 000 m<sup>3</sup>

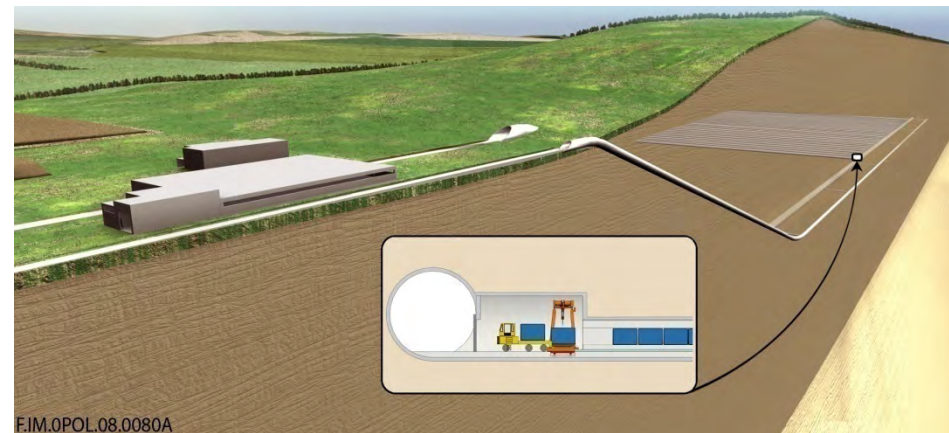
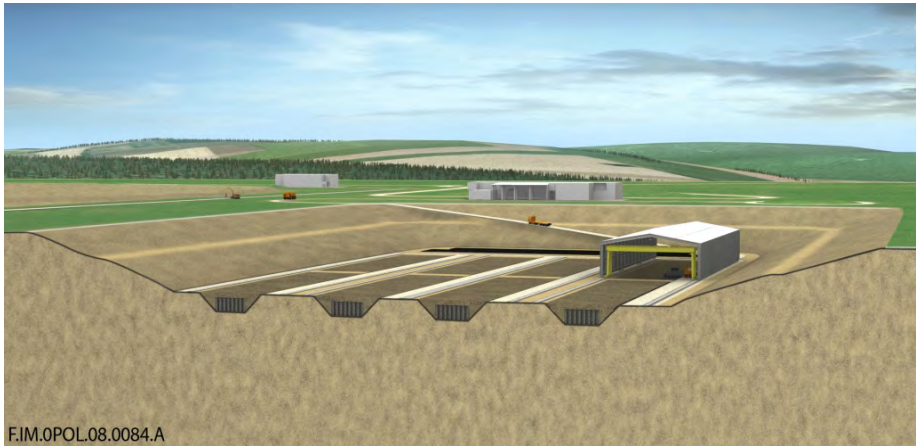




Financed via a tax levied on nuclear installations  
Operational in 2030 (current date)  
Local involvement (CLIS, GIP, purchasing, ...)



- | Inventory is mixed
- | Two design options are under investigation
  - » 15 to 30m depth  $\Rightarrow$  open pit + reworked clay cover
  - » 50 to 200m depth  $\Rightarrow$  underground drifts
- | Financed via commercial type contract with waste producers





# Thank you for your attention