

**Geological disposal of radioactive waste
as a “megaproject”:
the French experience and prospects**

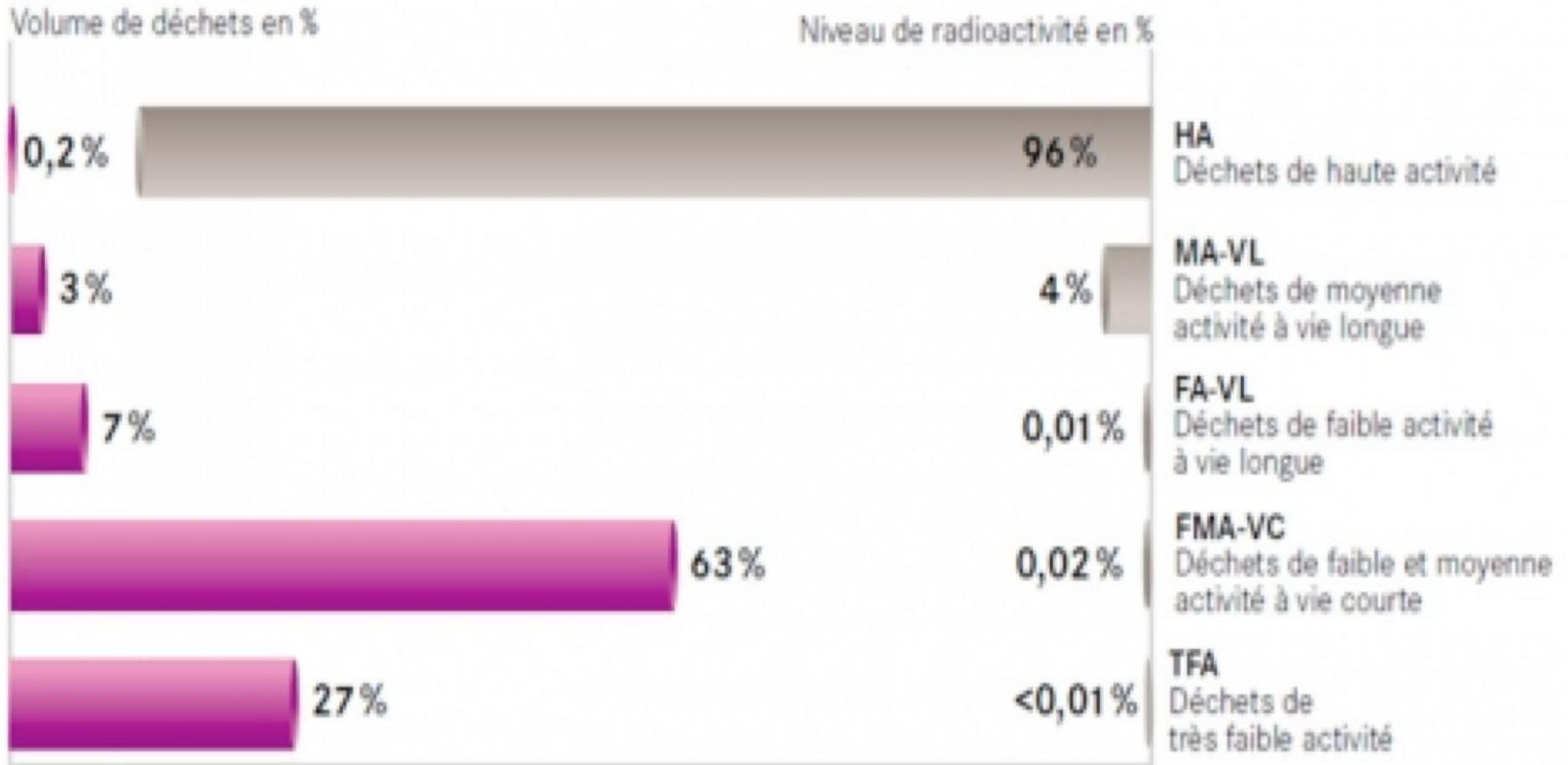
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REFORM group meeting
26 August 2013, Salzburg

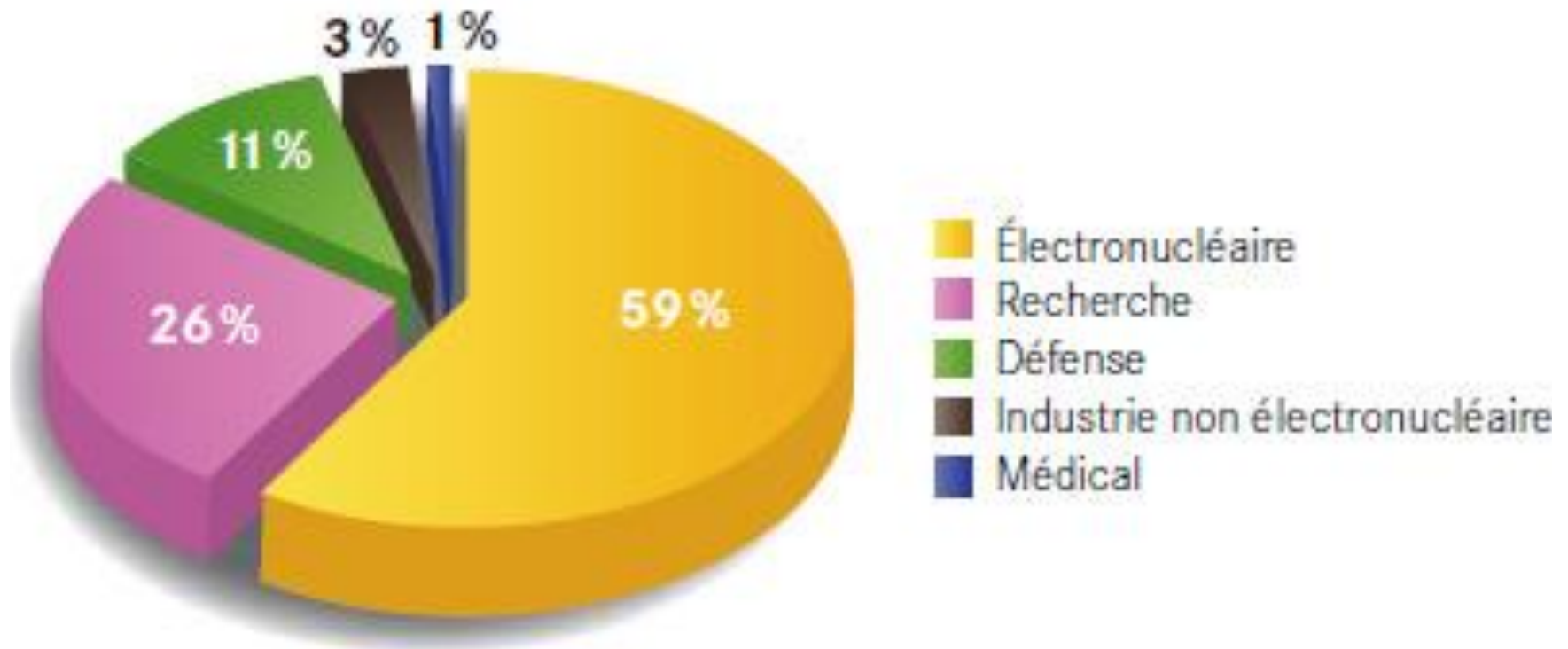
Current situation of “Cigéo”: the high- and medium-level radwaste repository

- **2009**: proposal by Andra (the radwaste management agency) for the creation of a geological disposal site at Bure, between two “départements” and two regions (Lorraine & Champagne-Ardenne)
- **March 2010**: government validates the proposal, after consultation with the safety authority, evaluation commission, and local stakeholders
- **May-December 2013**: mandatory public debate on Cigéo
- **2017**: Construction of Cigéo to begin

Waste volume and radioactivity



Waste by source



Main civil nuclear sites



History & timetable of Cigéo (I)

1986-89: failed site investigations (local opposition)

1991: “Bataille Law” – 15-year research on three options

- 1) Geol disposal; 2) interim storage; 3) partitioning & transmutation

1998: Choice of Bure (between Meuse & Haute-Marne) for an URL

2000: URL construction & economic compensations begin

2005: Andra concludes that Bure site is “perfectly apt to host a repository”

2005-06: “public debate” on the general options of radwaste management

2006: “Planning Law”: **reversible** geological disposal as the reference;
further research on transmutation and interim storage

2006: Law on transparency and safety in nuclear matters – creation of
ASN (independent safety authority)

History & timetable of Cigéo (II)

2010: government validates a 30 km² zone for the site

2013: public debate organised by CNDP

2015: application by Andra for a construction licence

2016: law on reversibility

2017: beginning of construction work

2025: start of disposal

Polluter pays principle

1. Commercial agreements: Andra with EDF, Areva & CEA

- Andra estimates the cost, the Ministry verifies
- EDF 78%, CEA 17%, and Areva 5%

2. Tax for research on interim storage and final disposal

Total cost (2005): 13.5-16.5 billion euros over more than 100 years

- Uncertainties!! Discounting, placements in investment funds...
- Court of audit: 35 billion a more realistic figure

Waste storage concept

Reprocessing, MOX; vitrification

Reversible geological disposal

Clay formation

Volume of waste to be disposed of:

- 10 000 m³ high-level waste (appr. 60 000 packages)
- 70 000 m³ long-lived medium-level waste (180 000 packages)

Size of the **underground repository area**: 15 km² (FIN: 2.4 km²)

Most of the waste exists already

- 60% of medium-level waste
- 30% of high-level waste

1991 Bataille Law

Since 1998 a key requirement as defined by government

2006 Planning Law: reversible geological disposal as reference option

Andra to define the details of reversibility

- 1) Technical reversibility (retrievability)
- 2) Decisional reversibility (able to return to an earlier dec-making stage)

The key aim still stepwise closure – where's the true reversibility?

Institutional framework

Government in the lead – Parliament has gained more power

Ministry of Energy (Min of ecology, sustainable development and energy)

Andra: the state agency (industrial and commercial) for radwaste management
(1979; independent of waste producers since 1991)

- Ministries of energy, research and the environment
- Headquarters in Paris, but local office in Bure
- Also responsible for research on interim storage and geological disposal & public information

Waste producers: EDF, CEA, Areva

Safety authorities

- **ASN** (2006 Law on Transparency – independent safety authority)
- **IRSN** (expert safety organisation)

Advisory & evaluating bodies

- **OPECST** (parliamentary office for science and technology)
- **CNE** (national evaluation commission)
- **HCTISN** (High committee for transparency and information on nuclear security)
- **Court of Audit** (examines the finances of the project)
- **CNEF** (national commission in charge of evaluating the financing and pricing of radioactive waste management)

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Central government

- Regions
- Departmental prefects
- Andra at Bure

Local/regional self-government

- Regions (Lorraine & Champagne-Ardenne)
- Départements (Meuse & Haute-Marne)
- Municipalities (“zone de proximité”) & federations of municipalities

Local businesses

- Chambers of commerce, agriculture, sectors of industry
- “Energic”

Civil society

- CLIS (Bure)
- NGOs

GIPs of Meuse & Haute-Marne

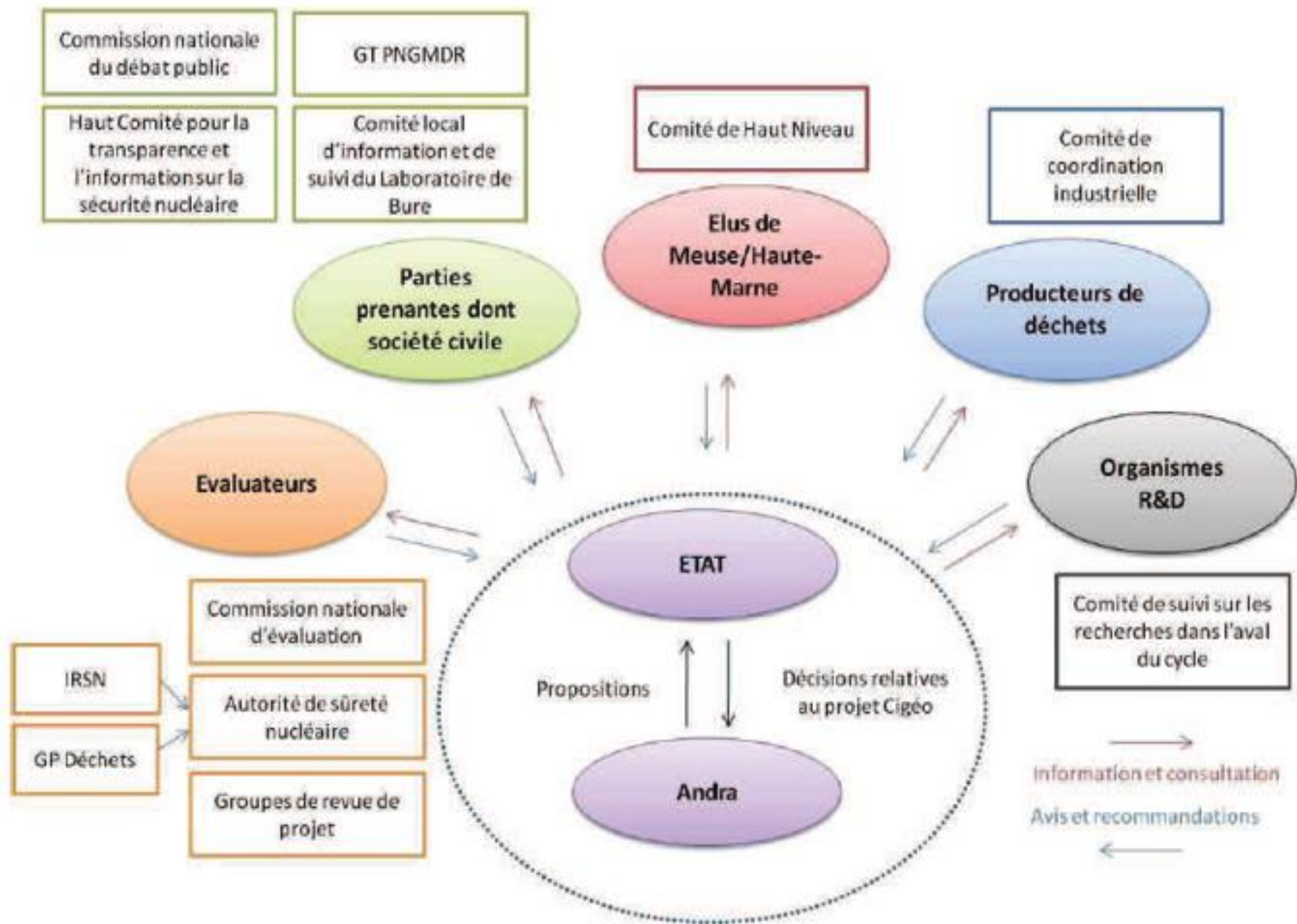
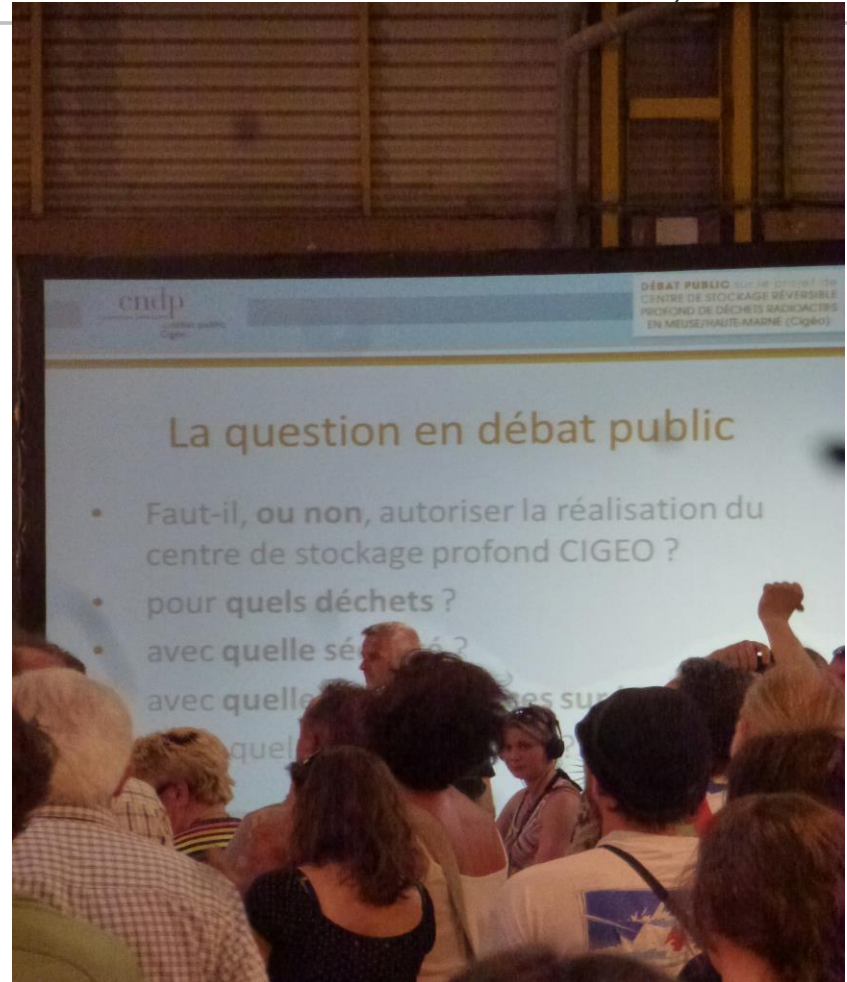


Figure 7

La gouvernance externe du projet Cigéo

Local siting challenges



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Uncertain local/regional impacts in a poor, declining region

Needs of transport, electricity, water, materials, etc. – estimates exist, choices to be made

Job creation

- Up to 2500 *direct* jobs during construction

Uncertainties and questions

- Local or external enterprises to benefit?
- Insufficient local skills base?
- Where will the employees settle?
- Spouses, children: jobs, schools, services, cinema...?

“Compensation” schemes

EDF, Areva, CEA: direct support through projects (e.g. 2nd generation biofuels, archives)

GIPs (Groupements d'intérêt public) for both départements

- since 2000 (URL)
- officially not compensation, but “economic support” designed to help the local communities enable the installation of Cigéo
- 30 million euro per year for each department
- 10% to be used at discretion by municipalities, 90% project-based
- decision-making & governance: **head of dépt council**, prefects of the 2 depts, the “other” GIP, Andra, waste producers, the nearby municipalities and federations of municipalities

Tensions and debates around economic support

- “Structuring” or one-off investments?
- Which municipalities have the right to receive the money?
- Who is to decide on the utilisation?
- Different strategies of the two départements
- ***Bribery, “prostitution”, blackmailing?***
- “Without the opponents, GIPs would never have come about”

Communication & participation



arch

Main venues/instruments for participation

Local information and surveillance committees (**CLIS**) since 1999

Mandatory public debates organised by CNDP as the main vehicle for participation

- CNDP nominates an ad hoc committee (CPDP) for each debate
- Duration 4 months (in the case of Cigéo, about 6 months)
- Background documentation prepared by the developer
- Stakeholders prepare position papers prior to and during the debate
- Public meetings as the main form of debate
- Only consultative function; no recommendations

First “public debate” (CNDP) in 2005-2006

- to inform the parliamentary debate in preparation of the Law 2006
- “National debate on energy” (2003): atmosphere of scepticism
- concomitant with CNDP debates on the Flamanville EPR and a transmission line from Flamanville to the grid
- long-term interim storage identified as a major option to be examined further; yet the Law retained reversible geological disposal as the preferred option
- frustration and scepticism amongst the opponents/critics
- yet, the debates of 2005-06 ***allowed CNDP to gain authority & legitimacy***

Public debate 2013





Public debate on Cigéo 2013

- launched 15 May 2013
- debate on energy transition: compromise on timing – Cigéo debate in two phases
- first two local debates (23/05 & 17/06) cancelled after being obstructed by the opponents
- decision by CPDP to no longer hold public meetings (cf. debate on nanotech), and to extend the debate until mid-Dec
- future of the debate uncertain

Conclusions

Scale – megaproject?

- one of the largest ever industrial projects in France/Europe: the usual problems associated with megaprojects...

Levels and structures of governance

- complex accountability structures – making the best of uncertainty? **Reversibility** – “imposed” flexibility, adaptability, reflexivity?

Schedule

- unlikely to hold – already judging by the way the public debate has started...

Economically declining, sparsely populated, “non-nuclearised” area

- low skills and competence level; poor infrastructure, in an area without a nuclear industry tradition
- problem compounded by the very small size of many municipalities
- ambiguity: huge expectations of economic (and social) benefits, yet scepticism and mistrust (“Radwaste here? Really not a great idea, but we’ll be doomed unless we get the project...”)
- economic support as “bribery”, “prostitution”...
- if something goes wrong, e.g. if the socioeconomic benefits do not materialise, then what?

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Complexity of the governance arrangements

Multiple levels

- central state (national, regional, departmental, local...)
- local/regional authorities
- Andra: Paris vs. Bure

Responsibilities

- the central state unwilling to make hard decisions – in order not to appear to impose an undesired project
- the local/regional authorities expect the state to decide and “tell us where the road is going to pass, so that we can plan”

Combination of revolutionary & state-centric *tradition*

- central state simultaneously called for rescue and despised for its authoritarianism

Persistent atmosphere of mistrust, despite the 20+ years of more participatory policy (sincerity?)

Lack of “empowerment” of the local communities (cf. FIN, SWE)

- e.g. GIPs: state actors in majority; “divide and rule”

CNDP & its operation model & cycles of participation: is the “honeymoon” over?

- Cigéo debate as an opportunity for innovation?

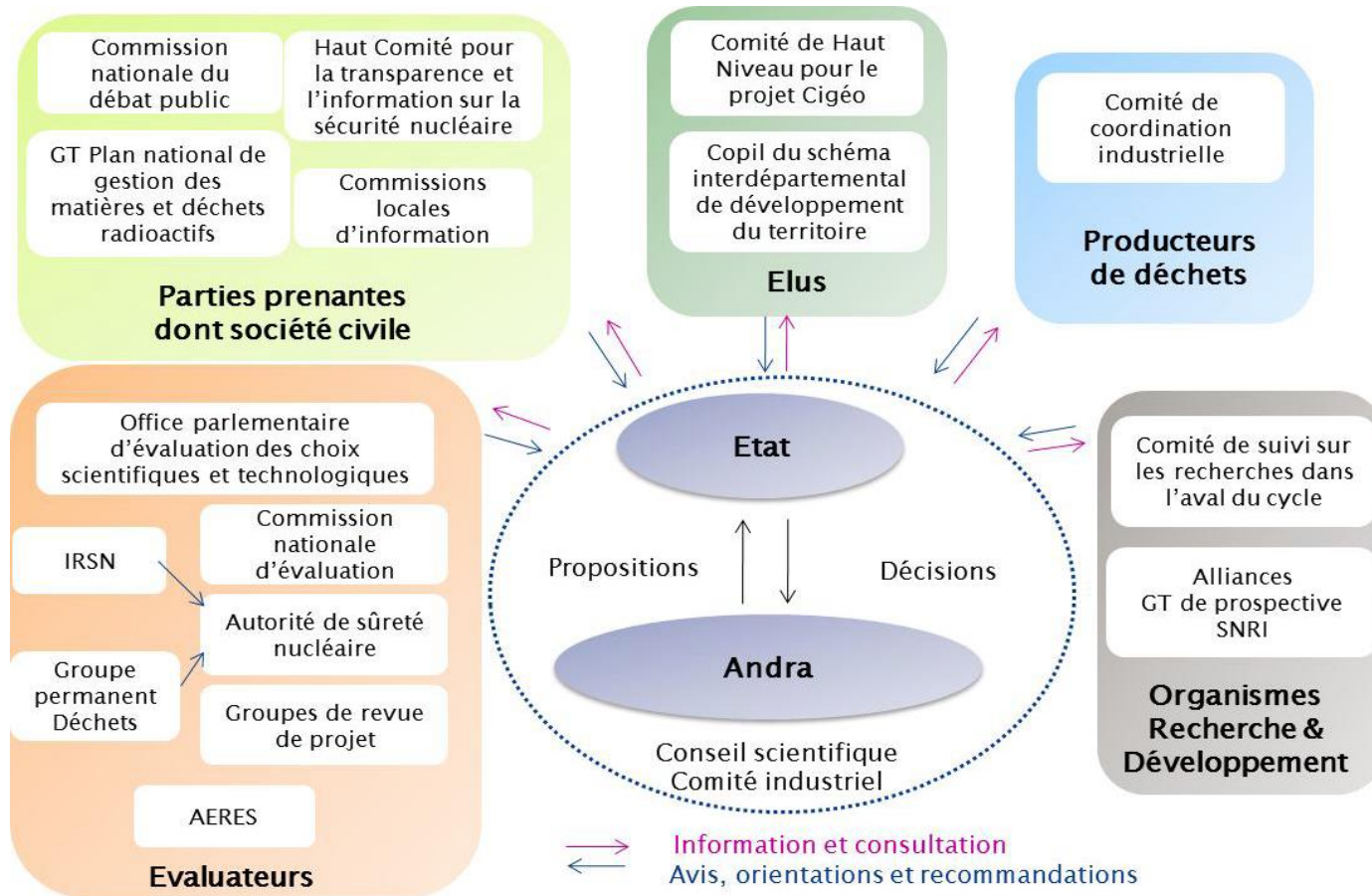
- Downplayed, even criticised, by the opponents (“if Andra has money to spend, it should spend it on risk and safety research”)
- For the advocates of the project, crucial to legitimise, demonstrate the expected socioeconomic benefits
- Dilemma of the advocates of the project: must demonstrate the socioeconomic benefits (to ensure acceptance), but exaggerating the benefits risks to provoke a backlash

- Progressive opening up of the French “nucleocracy”
- Radwaste disposal as a test case: preparation of the Bataille Law, opening up, separation of responsibilities, independent regulatory authorities
- Lack of tradition in institutionalised local participation:
 - state-led authoritarianism (must be public to count as legitimate), and
 - “revolutionary grassroots romanticism”
- Extremely small municipalities (Bure: 98 inhabitants...)

- **1991 Bataille Law** (country's first law on nuclear)
- **2006 Planning Law** (reversible geological disposal as the preferred option)
- **2006 Law on nuclear transparency and security**
- **National plan** for the management of radioactive materials and waste (PNGMDR); safety authority & Ministry prepare, Parliament approves
- **1995: “public debate”** on large projects becomes mandatory
- **2018 law to authorise the construction of Cigéo**

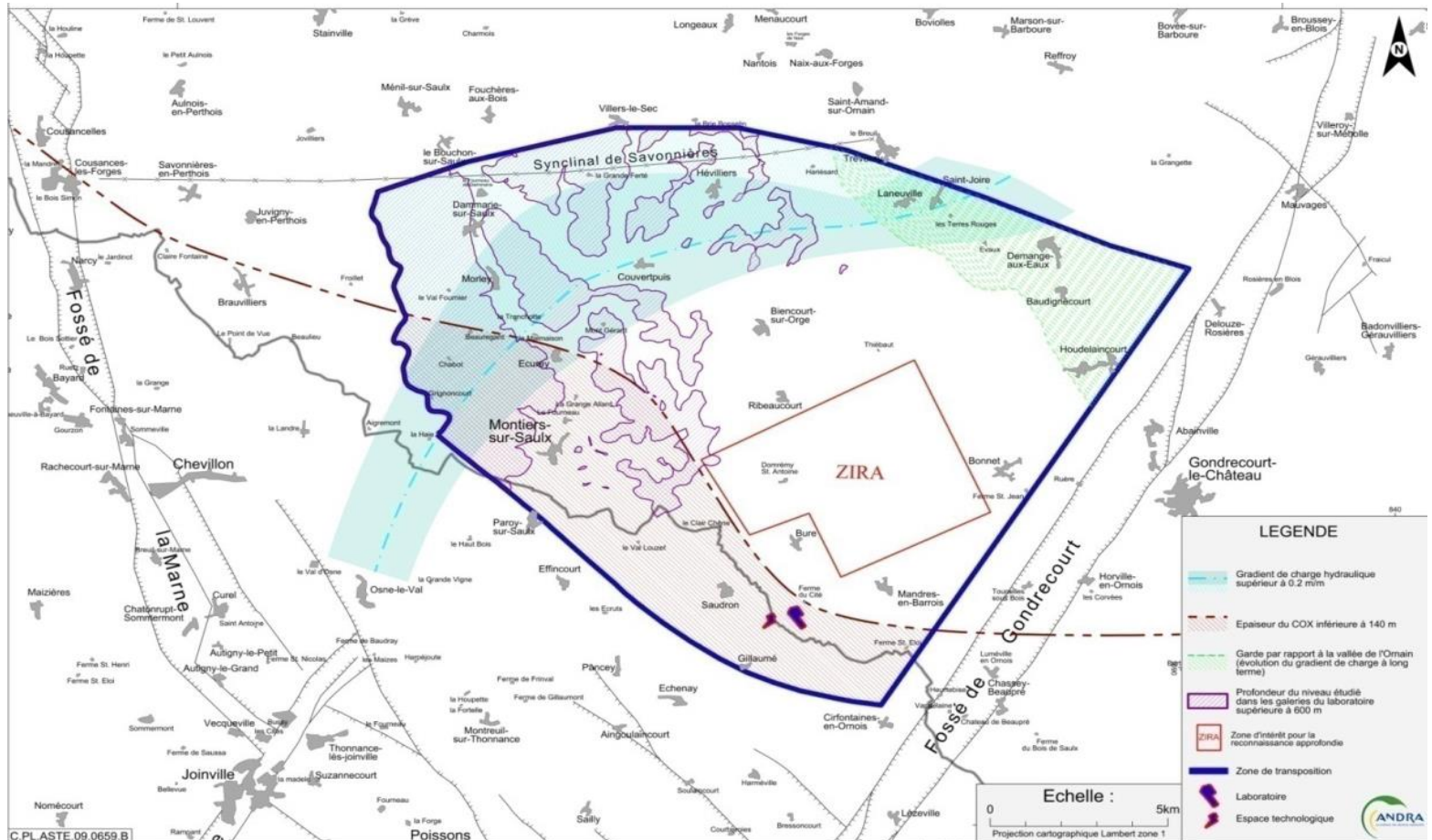
Legal framework

- Sustainable management of radioactive materials and waste
- Search for a permanent solution; future generations...
- “Producers of spent fuel and radioactive waste are responsible for those substances, ***without prejudice to the responsibility their holders have as nuclear activity operators***”



Stepwise definition of the site

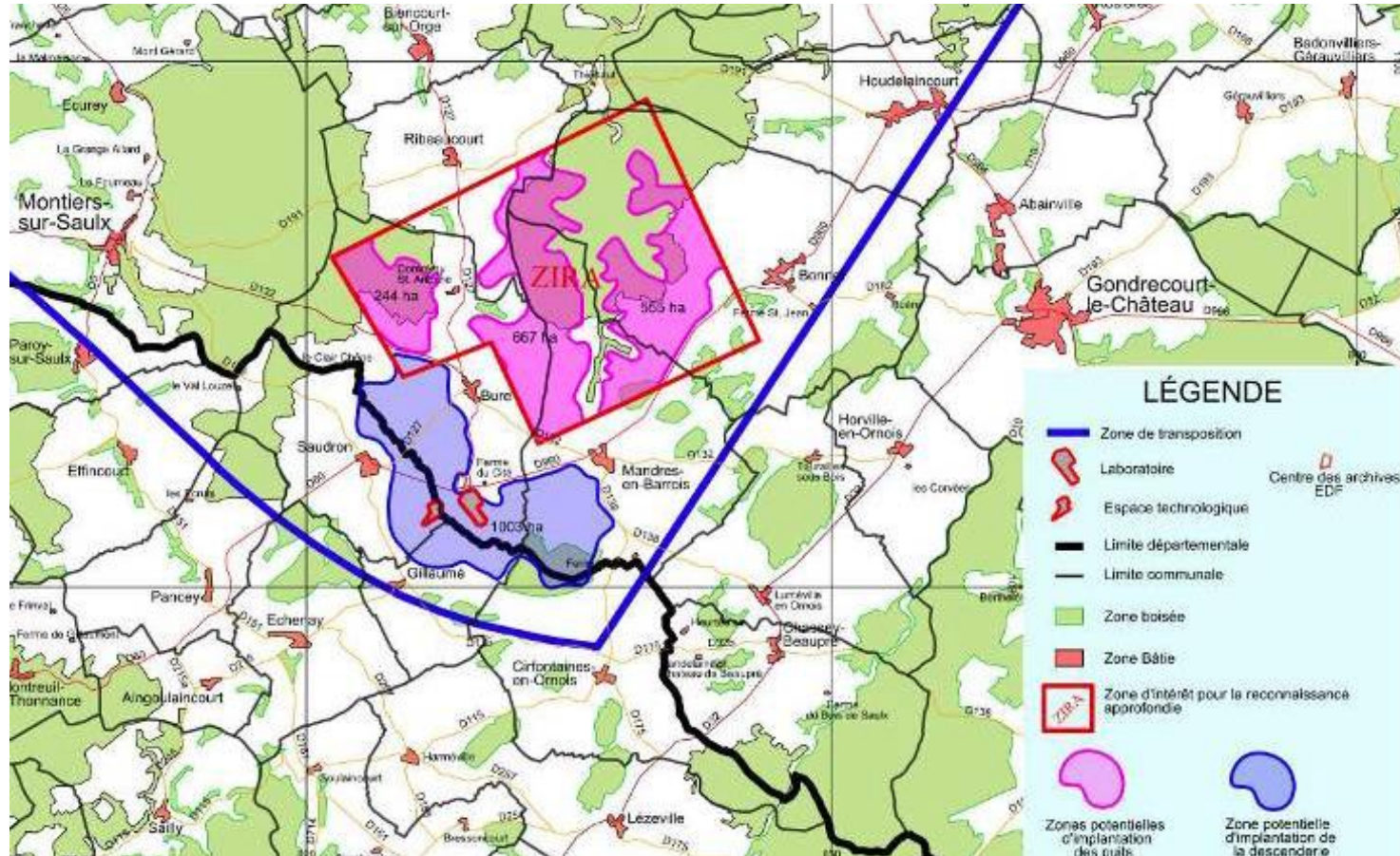
2005: zone de transposition (250 km²) ;
2009: "ZIRA" (30 km²)



Forecast for the future: waste for Cigéo (m3)

	Pour 2020	Pour 2030
HA	4 000	5 300
MA-VL	45 000	49 000
FA-VL	89 000	133 000
FMA-VC	1 000 000	1 200 000
TFA	762 000	1 300 000
Total général	~ 1 900 000	~ 2 700 000

Underground (pink) and surface (blue) installations



Provisional timetable

La vie du centre de stockage

