

## WM2015 Conference Panel Report

**PANEL SESSION 014:   Featured Country – France**

**Session Co-Chairs:**       **Pierre-Marie Abadie, CEO - ANDRA**  
  **Gérald Ouzounian, ANDRA**

**Panel Reporter:**           **Jean-Michel Bosgiraud, ANDRA**

**Panelists:**

- **Dominique Dapei**, *Deputy Head of the Nuclear Fuel Division, EDF*
- **Christophe Behar**, *Director of Nuclear Energy, CEA*
- **Dominique Mockly**, *Senior Vice President of Back End Business Group, AREVA*
- **Pierre-Marie Abadie**, *CEO - ANDRA*
- **Gerard Kottmann**, *The French Nuclear Industry (AIFEN)*

An intercompany panel was convened at WM2015 to discuss in Session 13 and Session 14 the various industrial aspects of Decommissioning and Dismantling (D&D) of Nuclear Facilities in France and the related Waste Management (WM) Issues. In Session 13, the technical and financial stakes (related to D&D and WM) were first presented by the principle waste generators concerned, while the array of D&D services offered by the French industry was later detailed. In Session 14 a focus was made on the industrial development of Cigéo (the French Deep Geological Repository) for IL-LLW and HL-LLW storage.

**Summary of Presentations:**

ANDRA is a Public Body created by law (December 1991) to deal with Nuclear Waste management (ANDRA's more general missions and its spectrum of activities were described in Session 13). In 2006 a new law was passed by the French parliament, detailing the road map of Cigéo.

The Cigéo facility is a unique facility, designed to be safely operated over one century for the purpose of waste disposal, with one objective; protect mankind and the environment over a million-year period.

The Cigéo design phase has been ongoing since January 2012 and is now in its preliminary engineering phase. The contractual set-up chosen for this purpose includes a general engineering contractor (in charge of the technical coordination) and specialized engineering contracts (nuclear process underground, nuclear surface facilities, non- nuclear surface facilities, underground facilities, transport system in ramp, off-site infrastructures). ANDRA provides its own input on specific core-business issues like the definition and qualification of waste storage packages, the sealing of underground works and of course long term safety assessment.

Besides, ANDRA continues its own R&D work on scientific issues (storage phenomenology) with its network of universities, laboratories and research institutes, with which collaboration agreements have been executed. ANDRA also carries on a specific in-situ scientific R&D (and now more and more technological developments) in its Underground Research Laboratory (URL) at Bure, located at close vicinity of the future Cigéo installations. More than 10 years of experience have been gained in this facility, providing a significant amount on data on hydrogeological and geomechanical issues.

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The Cigéo underground disposal zone is located at a 525m depth in a clayish host rock (Callovo-Oxfordian Argillites) with a 150m thickness. The footprint of the underground facilities is estimated at 15 km<sup>2</sup>. The Cigéo surface installations (straddling the Meuse and Haute-Marne Departments) are split in 2 specialized zones: the first one dedicated to receiving, inspecting and packaging the primary waste containers (prior to their transfer underground), the second one dedicated to underground excavation and construction operations. The transportation of nuclear packages will be carried-out in shielded casks via a funicular system in a 1/10 dip ramp.

The Cigéo design basis must integrate two major requirements (beyond the industrial and scientific aspects):

- The need to minimize all types of risks (e.g. reduction of the fire load of all components, optimization of the underground architecture to provide escape routes, managing coactivity by properly segregating the excavation works from the nuclear operations...)
- The need to keep open the reversibility options and the package retrievable possibilities throughout the project life.

In the year 2013 and in early 2014, the Cigéo Project passed an important milestone with a Public Debate (taking place from May to December 2013), followed by a Citizen Conference (December 2013 - January 2014). As an outcome, ANDRA has decided to modify the Cigéo Development Plan:

- The nuclear facility will start-up its operations with an industrial pilot phase (for about 10 years) before any decision is taken by the legislator to work at “nominal” storage flux,
- The civil society will be more involved in the project, including in the decision concerning the progressive closure and sealing of the facility.
- At the time the official main milestone remains unchanged: commissioning of a first nuclear waste storage package in 2025 (in the pilot zone), as long as the license agreement is granted in 2020.

The integration of Cigéo in its social environment is also of paramount importance to keep the public acceptance it has gained so far. Since 2010, economic support has been provided in the area through departmental support funds managed by two public interest groups (one for each department), while waste generators (EDF, CEA and AREVA) are moving activities into the area.

A new integration phase started in 2014 with a government-led Territorial Development Contract (CDT) whose aim is to organise the general operational configuration and adapt the area infrastructures to the Cigéo needs by 2017.

### **Synopsis of Panel Discussions:**

During the Session, panelists and members of the audience made comments on the presentation delivered by Pierre-Marie Abadie and raised questions related to the Cigéo Project. This section details the main subjects discussed.

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As the principal nuclear waste generator in France, EDF informed the attendees that they provide a strong partnership to ANDRA in the fields of territorial integration, technical matters (optimization of concepts, waste acceptance criteria and package specifications), scientific R&D.

CEA emphasized the fact that Cigéo is of paramount importance to demonstrate the nuclear actors' collective capacity to succeed in the dealing of 50 years of nuclear waste legacy. Thus CEA is also supporting ANDRA in its R&D work and territorial engagement, while working on the reduction of actinides (fast breeder reactors) to optimize the use of the future storage capacities.

For AREVA, the Cigéo Project is perceived as a key element in building the credibility of the French Nuclear Industry general policy.

A first question was raised in the audience, concerning the impact of the "Public Debate" outcomes on the Cigéo general development calendar. It was responded that the main milestone was kept unchanged (storage package commissioned in 2025) but that the License filing milestone had been postponed from the end of 2015 to the end of 2017, in order to work with a more detailed technical basis (at that time the detailed engineering phase will have been completed).

A second question was raised in the audience about the schedule considered for the (HL-LLW) vitrified waste packages storage, considering the significant impact of thermal decay over the architecture layout. It was responded that the pilot phase would incorporate only the oldest packages (with the lowest thermal power), while the second storage campaign would not take place before 2075 (i.e. 50 years later).

A third question was raised in the audience about the Cigéo project life cost ("possession cost") and the need for dedicated assets (in the waste generators balance sheets) to counter-balance the corresponding liabilities: How is it conceivable to cover the anticipated cost over a 120 year duration? It was answered that this issue is effectively a very difficult one, about which discussions on methodology are still ongoing with the generators, the evaluators and the regulators (including the Ministry of Energy). Anyway, on a yearly basis, this financing is not a real difficulty and constitutes a minor percentage of the electricity consumers' bills (the same can be said about the financial provisions made to cover the D&D cost of existing nuclear installations).

### **Conclusions:**

The topic of DGR in OECD countries is a very sensitive issue with many ups and downs on a long and bumpy road. So far, the Finish (POSIVA), Swedish (SKB) and French (ANDRA) projects are moving forward.

For Cigéo, a legal milestone should be passed in 2016 with the voting of a law detailing the legal and technical conditions governing the storage reversibility and its progressive closure phases. In the meantime, ANDRA and the waste generators must keep working on the engineering and technological development, the scientific R&D and the territorial engagement.