

# The Cigeo Project

France's Industrial Centre for Geological Disposal of radioactive waste







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# Introduction

The Cigeo project, led by the French National Radioactive Waste Management Agency (Andra) consists of the disposal of the most highly radioactive waste, which is also very long-lived, in a deep geological repository at a site straddling the Meuse and Haute-Marne departments in Northeast France, to protect humans and the environment from this hazardous waste over the very long term.

The French Parliament adopted the principle of deep geological disposal over ten years ago as the safest solution for this waste. France is not alone in opting for deep geological disposal: this is the favoured option at European and international level too.

The Cigeo project is the outcome of more than 25 years of regularly reviewed research, three laws passed in 1991, 2006 and 2016, and two public debates held in 2005 and 2013. It meets the ethical imperative of removing the burden of managing this waste from future generations.

## *What is Andra?*

Andra is the French National Radioactive Waste Management Agency. It works with commitment and responsibility to fulfil the activities in the general interest entrusted to it by the State on behalf of the French people: managing the radioactive waste produced by past and present generations and making that waste safe for future generations.

# Waste that will remain **highly dangerous for a very long time**

Radioactive waste is generated mainly by nuclear power production, but also by industry and by the health, research and defence sectors. The vast majority of such waste is managed at existing facilities: 90% of the total volume of radioactive waste produced in France each year currently goes for surface disposal at Andra's disposal facilities in Manche and Aube (this is very low-level waste and low-level and intermediate-level short-lived waste).

However, high-level waste (HLW) and intermediate-level long-lived waste (ILW-LL) cannot be disposed of in surface or near-surface facilities because of the risks it poses and the fact that it remains hazardous for a very long time (tens or hundreds of thousands of years).

**This waste accounts for a small percentage of the total volume and the vast majority of the radioactivity of all radioactive waste. At present, 60% of ILW-LL and 40% of HLW has already been generated.**

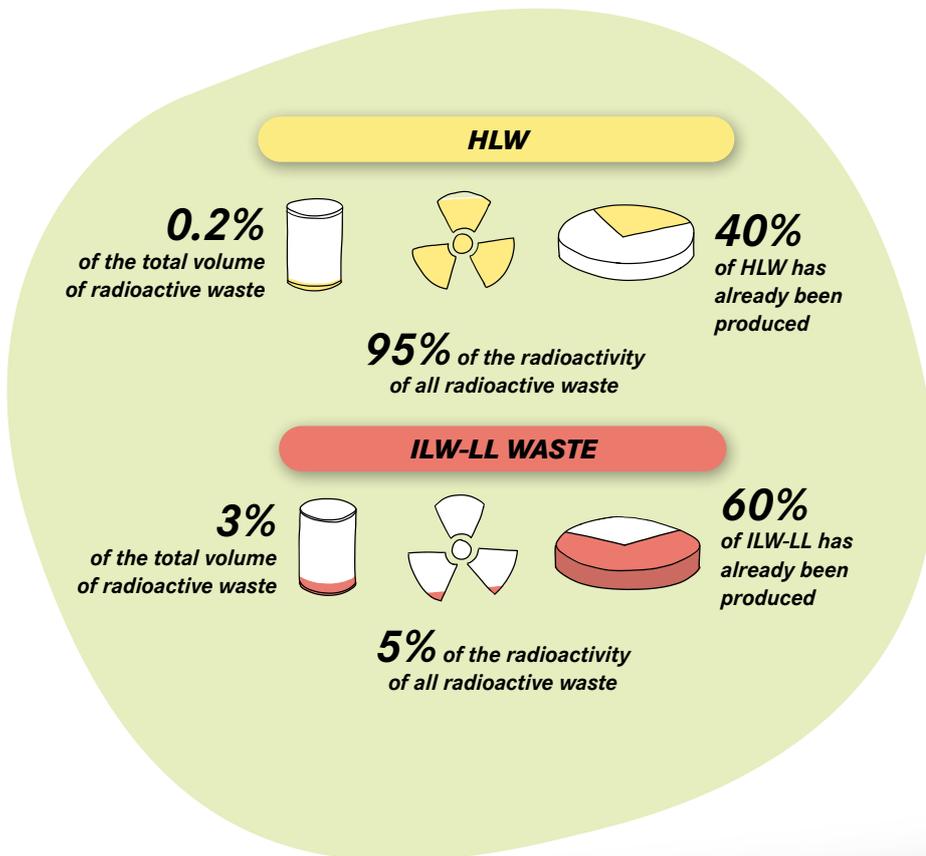
## WHAT IS THIS WASTE?

**HLW** is mainly the result of reprocessing spent fuel from nuclear power plants. It is incorporated into a molten glass matrix which is poured into stainless steel waste canisters.

**ILW-LL waste** is more varied. It includes structural components that surround fuel assemblies and residue from operating and maintenance of nuclear facilities. It is conditioned in metal or concrete containers.



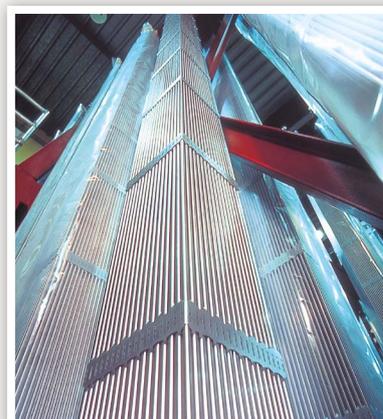
► Radioactive waste metal from spent fuel reprocessing





## AN ADAPTABLE DISPOSAL FACILITY

Andra is looking at the possibilities for disposing of other waste for which there is no disposal solution or which is currently considered to be recoverable material rather than waste (e.g. spent fuel).



► Fuel assemblies used in nuclear reactors

The Cigeo project is designed to take all the HLW and ILW-LL that has been produced and will be produced by existing nuclear facilities until they are dismantled (nuclear power plants, research centres, etc.).

Waste that will be produced by nuclear facilities currently being built (Flamanville EPR, ITER and the Jules Horowitz experimental

reactor) has also been taken into account. This amounts to around 10,000 m<sup>3</sup> of HLW and 75,000 m<sup>3</sup> of ILW-LL, i.e. around 85,000 m<sup>3</sup> of radioactive waste in total.

**This waste is currently stored in interim surface facilities at the sites where it was produced (mainly La Hague, Marcoule and Cadarache), pending its disposal in Cigeo.**

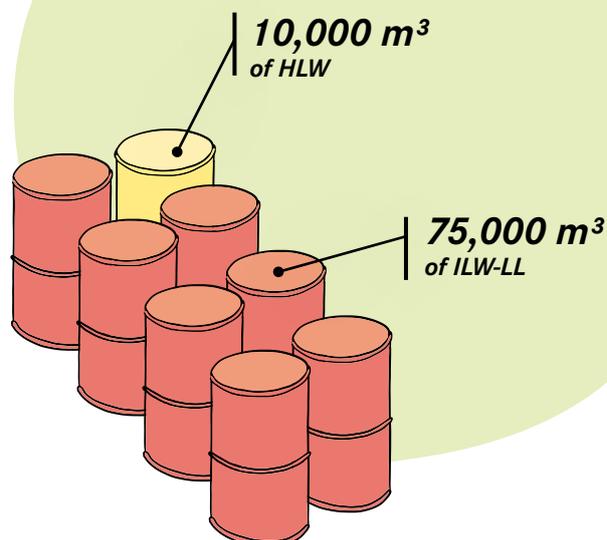


► ILW-LL



► HLW

*The Cigeo project is designed to accommodate around:*



# History of the Cigeo project

## More than 20 years of research

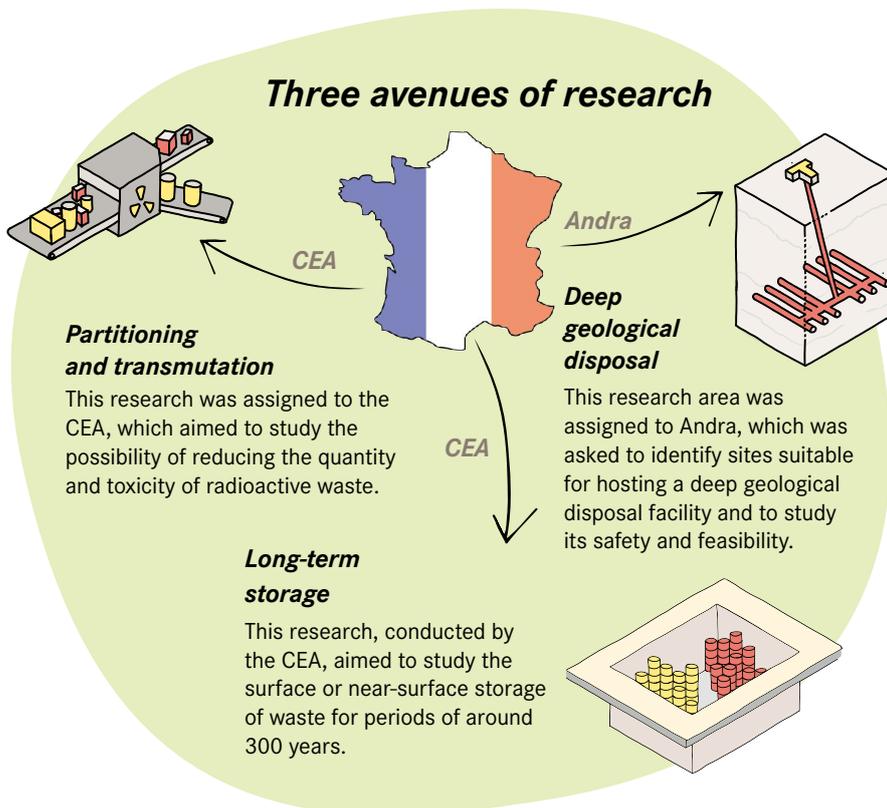
In 1991, the French parliament started to address the problem of managing radioactive waste, passing the "Bataille Act" on 30 December 1991. This Act set the main priorities for research into managing the most highly radioactive waste. **Three research areas were identified: partitioning and transmutation, long-term storage (two areas for which the CEA<sup>1</sup> was given responsibility) and deep geological disposal, assigned to Andra**, which has been conducting research at an underground research laboratory (see page 8).

Andra and the CEA submitted the results of fifteen years' research in these areas to the French government in 2005. On the basis of the files submitted to it, the French Nuclear Safety Authority (ASN) took the view that<sup>2</sup>:

- partitioning and transmutation technology was not sufficiently advanced and, in any case, could not be used to eliminate all of this waste;

- long-term storage did not constitute a permanent solution;
- **deep geological disposal was the only permanent disposal solution possible.**

In 2006, on the basis of the scientific results, their review by the ASN and a public debate conducted in 2005, **the French parliament ratified the choice of deep geological disposal and tasked Andra with designing a disposal facility in the Meuse and Haute-Marne departments.** Research on partitioning and transmutation, and also on storage, is being pursued as waste management options that may be used in addition to disposal.



1. The French Alternative Energies and Atomic Energy Commission.

2. ASN Opinion of 1 February 2006 on research relating to the management of high-level long-lived waste (HLW-LL) carried out in the context of the law of 30 December 1991.

# The Underground Research Laboratory and the choice of the Meuse/Haute-Marne site



## CALLOVO- OXFORDIAN ARGILLITE

The geological stratum chosen as the location of the Cigeo underground facility is an argillaceous sedimentary stratum that is 160 million years old: Callovo-Oxfordian argillite. It is 145 metres thick, lies at a depth of between 400 and 600 metres and it is stable. Its properties, particularly its stability and very low permeability, make it suitable for a deep disposal facility.

In 1994, investigations were carried out at four candidate sites (in Gard, Vienne, Meuse and Haute-Marne) for the purpose of setting up an underground research laboratory for studying the feasibility of deep geological disposal. Preliminary studies showed that the geology of the Meuse and Haute-Marne sites, now merged into a single site, was particularly suitable.

In 2000, construction of the Underground Research Laboratory began at this site, on the border of the two departments. Situated at a depth of 490 metres and consisting of a network of almost two kilometres of drifts so far, this research facility has been used for scientific and technological research carried out directly within

the Callovo-Oxfordian argillite stratum and, in 2005, led to the conclusion that deep geological disposal was feasible. The Laboratory is still used to conduct studies and experiments for the design of Cigeo.

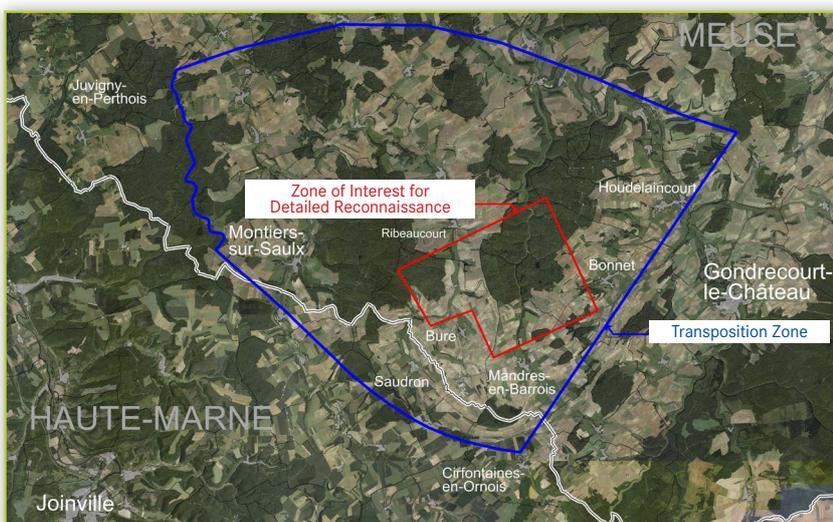
In 2005, an area of 250 km<sup>2</sup>, around the Underground Research Laboratory, known as the "transposition zone", was identified as having a geology identical to that of the laboratory: the clay layer is stable and its properties would allow the very long-term containment of the radioactivity.

**In 2009, Andra proposed to the government an underground area of 30 km<sup>2</sup> located within the transposition zone: the**

**zone of interest for detailed reconnaissance (ZIRA). This zone was defined on the basis of both scientific criteria related to the safety and geology of the site and criteria identified by local elected officials and local residents during a consultation.**

The ZIRA was approved by the government after opinions were issued by the ASN and the National Assessment Board, and after consulting elected officials and the Local Information and Oversight Committee (CLIS) for the Underground Research Laboratory.

**If Cigeo is licensed, the underground facility will be built in this zone.**



# Why deep geological disposal?



► Drift in the Underground Research Laboratory

The danger posed by radioactive waste diminishes over time because the radioactivity contained in it decays. However, some radioactive waste will remain hazardous for hundreds of thousands of years.

**The principle of deep disposal is to confine this waste and isolate it from humans and the environment over these very long time scales.**

The disposal facility's depth and design, and the type of rock in which it is located, as well as the geological stability, mean that the waste can be isolated from human activity and natural events on the surface (e.g. erosion and glaciation) in the very long term. Once closed, the facility will not require any further human intervention: the safety of the site is described as

"passive". The geological stratum delays and reduces migration of the radioactive substances (contained in the waste) to the surface.

**All the countries that use nuclear energy have chosen deep geological disposal as a safe, permanent means of managing their most highly radioactive waste in the very long term.**

## ETHICAL RESPONSIBILITY

Because it offers a safe management method in the very long term, deep disposal meets the ethical objective of not passing on to future generations responsibility for waste produced by activities from which we benefit every day.

## Key dates

**1991:** "Bataille Act" was passed, setting out three research areas for the highest-level radioactive waste.

**1994-1996:** Geological investigations conducted by Andra to identify suitable geological sites.

**1998:** The Meuse/Haute-Marne site was selected by the government for the construction of an underground research laboratory.

**2000:** Construction of Andra's Underground Research Laboratory in the Meuse/Haute-Marne began.

**2005:** Andra concluded that deep geological disposal in Meuse/Haute-Marne is feasible and safe, in "Dossier 2005 Argile".

**2005:** Public debate on the management of the most highly radioactive waste.

**2006:** Vote on the law of 28 June adopting reversible deep geological disposal as the solution for this type of waste.

**2009:** The government approved the 30 km<sup>2</sup> underground zone proposed by Andra for studying the siting of the Cigeo underground facility.

**2011:** Decree authorising Andra to continue its activities in the Underground Research Laboratory until 2030.

**2012:** Presentation of the conceptual design for the disposal facility

**2013:** Public debate on the Cigeo project organised by the National Public Debate Commission.

**2016:** Safety Options Report and the Retrieval Technical Options Report submitted to the ASN. Cigeo moved into the detailed engineering design phase.

**2016:** Law of 25 July on the conditions for developing Cigeo and for reversibility.

**2020:** Application for the Declaration of Public Utility for the Cigeo project submitted.

# Safety at the heart of Cigeo

The main purpose of Cigeo is to protect humans and the environment from the danger posed by the most highly radioactive waste, while keeping the burdens this places on future generations to a minimum.

Cigeo is designed to remain safe during its construction and its operation, which will last for around a hundred years, and after its closure.

**Cigeo's safety relies to a large extent on the geological stratum in which the underground facilities will be built.** This stratum, which has been stable for more than a hundred million years, has containment properties that can slow down the migration of the radionuclides in the radioactive waste to the surface.

**Its safety also relies on design choices such as:**

- **the general layout of the disposal facility**, for example, the separation of nuclear areas from work areas;
- **the facilities and structures:** e.g. the methods used for excavating and lining the drifts and disposal cells;
- **the materials used**, such as non-flammable materials and substances;
- **the requirements** regarding waste package characteristics and inspections;
- **the instrumentation and sensors** used to monitor changes in the disposal facility and also to detect any problems;

## ASN OPINION ON THE SAFETY OPTIONS FOR CIGEO

In its Opinion of 11 January 2018, the French Nuclear Safety Authority (ASN) stated that "overall, the project has attained a satisfactory level of technological maturity at the stage of the Safety Options Report".

Andra had submitted the Safety Options Report for Cigeo to the French Nuclear Safety Authority (ASN) in April 2016. This report presented the main safety choices guiding the project design, which are based on more than 20 years of regularly reviewed scientific and technical research. The Safety Options Report was primarily produced to firmly establish the principles, methods and main design choices necessary for the forthcoming safety demonstration, which will be presented in the construction licence application file. This application file was examined by the ASN, backed by IRSN, multidisciplinary advisory committees and an international review coordinated by the IAEA<sup>1</sup>.

- **the organisation** set up for facility operating, for example, the use of automated and remote-controlled equipment and machinery, for example.

To ensure that the disposal facility will be safe, Andra based its design on methods and analyses from the nuclear industry as well as from sectors that involve underground work (mining, tunnelling, etc.) and international experience feedback.



► Inspecting waste packages

1. International Atomic Energy Agency



# Safety at Cigeo during the operating phase

**For every risk identified during the operating phase, several lines of defence will be included in the disposal facility design to prevent or neutralise that risk.**

For example, to prevent fire breaking out, the presence of flammable objects in the nuclear zone is kept to a minimum: petrol engines are therefore prohibited. If fire does break out despite these preventive measures, steps have been taken to limit its impact: enhanced monitoring to detect fire, extinguisher systems,

the organisation of an emergency response, easy evacuation due to the disposal facility layout, fire-resistant disposal containers, etc.

Another example is that, to prevent the risks associated with co-activity, i.e. excavation work being carried out at the same time as operating activities, there will be strict separation between the two activities. They will be carried out in physically separate areas, with separate access and independent ventilation systems.

# Closure of Cigeo and very long-term safety

**To ensure waste disposed of for very long periods of time is kept safe without the need for human intervention, the underground structures at Cigeo will need to be closed off.**

This closure will be carried out gradually, in accordance with a special licensing process.

Before the final closure of Cigeo, the initial repository zone closure

operations will be carried out: the dismantling of operating equipment and the construction of drift closure structures (backfills, seals) so that the geological barrier can play its containment role.

To ensure that the disposal facility will remain safe no matter what happens, all the phenomena that could degrade its performance and jeopardise its safety are taken into account (earthquake,

## THE IMPACT OF CIGEO DURING OPERATING AND POST-CLOSURE

Like any nuclear facility, Cigeo will be a source of radioactive releases.

In the vicinity of the facility, during operating, the impact of these releases will be limited to 0.01 mSv/year. This is well below the regulatory limit (1 mSv/year) and the impact of natural radioactivity (2.4 mSv/year on average in France).

Following the closure of the disposal facility, safety assessments have shown that the very long-term impact will remain much lower than that of natural radioactivity, even under degraded conditions (in the case of intrusion, for example).

erosion, intrusion, etc.) and their consequences are evaluated. Studies have shown, for example, that Cigeo would withstand the strongest earthquake that is geologically possible in the layer in which it is located.

# Cigeo and reversibility

The law of 25 July 2016 defines reversibility as "the capability for future generations either to continue building and operating consecutive phases of a disposal facility or to review the decisions made in the past and modify the management solutions".

## A democratic process

The Cigeo project is the outcome of a lengthy democratic process involving the passing of **three laws in 1991, 2006 and 2016, and two national public debates, in 2005 and 2013**, with the result that solutions have been found collectively for managing the most hazardous radioactive waste.

Following the public debate in 2013, Andra made a commitment to ensure greater public involvement in decisions about the disposal facility (see page 22 "Planning for Cigeo with local stakeholders and the public").

## Regular assessments and milestones

Since research into deep geological disposal began, as a result of the Law of 31 December 1991, all the studies conducted by Andra have been regularly reviewed by French and international safety and scientific authorities.

**Before construction can begin, the project must be examined by the French Nuclear Safety Authority (ASN) and a construction licence must be granted by decree.** Permission must also be granted by the ASN for the first radioactive waste packages to be received during the industrial pilot phase. Finally, the law of 25 July 2016 provides for a further law to be passed at the end of the industrial pilot phase. Regular safety assessments will then be carried out by the ASN, and a series of parliamentary approvals will also be required.

## Research and Continuous Improvement

Andra has been conducting research into deep geological disposal and Cigeo for more than 25 years. **This R&D, aimed at continuously improving knowledge, will continue throughout Cigeo's operating phase in order to incorporate the latest scientific and technological advances.**

## Memory

Once the disposal facility is closed, safety must be ensured passively and must not require any human intervention. Nevertheless, surveillance will be maintained and **action will be taken to preserve and pass on a memory of the facility for as long as possible, for at least 500 years, as required by the ASN.**



## Stepwise development

Given the long operating life of Cigeo (over 100 years), not all the facilities will be built from the outset. Following an initial construction phase, **they will be deployed progressively, in parallel with operating at the disposal facility.** This will promote the reversibility of the disposal facility and enable integration of all improvements made possible by scientific and technical progress and feedback.



## Master Plan for Operations

The Master Plan for Operations (PDE) sets out the "reference" inventory and progressive development for Cigeo, the objectives of the industrial pilot phase and the options afforded thanks to reversibility in terms of managing the project. This document forms the basis for reversibility: **it is the document in which changes to the operation of Cigeo decided by future generations will be recorded.** In April 2016, Andra produced an initial version of the document, which will be subject to change right up until the construction licence application is submitted, in consultation with the public.



## An industrial pilot phase at the start of operating

The industrial pilot phase will begin during the construction of Cigeo and will continue when operating begins. In particular, it will be used **to carry out tests under real conditions** and will include "inactive" operations, such as equipment tests, as well as "active" operations, i.e. operations in the presence of waste packages (once the licence has been granted).



## Retrievability

**From the design phase of Cigeo, technical measures have been included to facilitate the possible retrieval of waste packages during the operating phase, expected to last around a hundred years** (linings to limit cell deformation, robots for retrieving packages, sensors to monitor changes, testing, etc.), should future generations decide to retrieve them. Beyond a hundred years, the disposal facility will be monitored to assess its behaviour and decide whether or not to extend the retrievability period.



## Adaptability

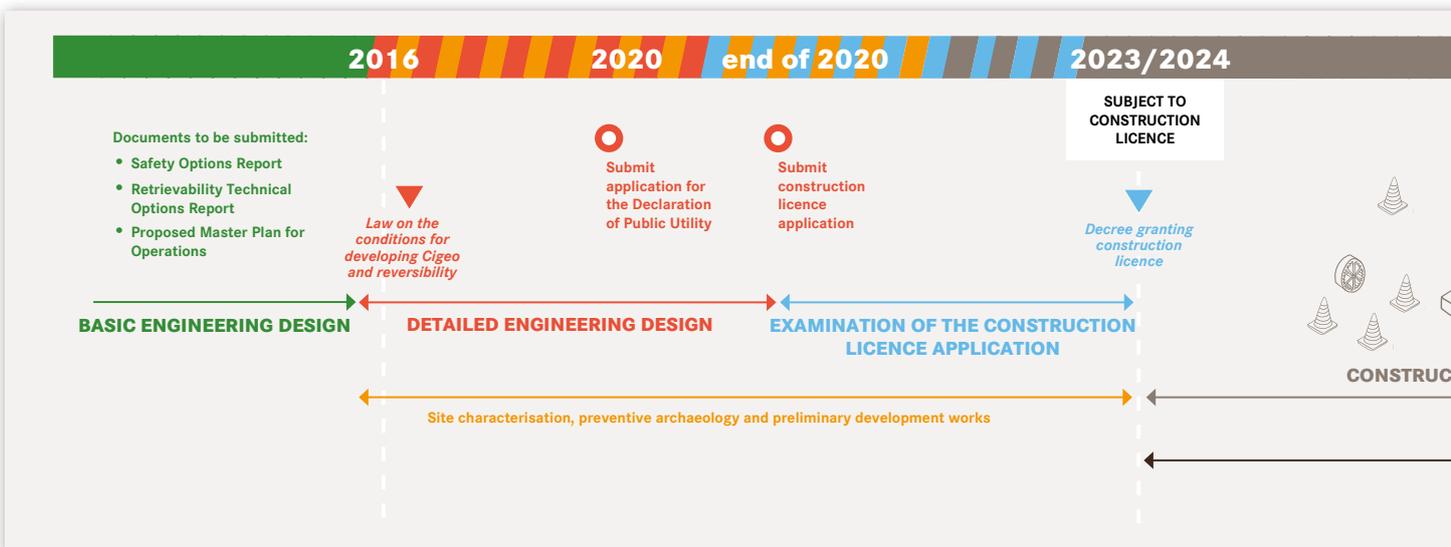
The facilities at Cigeo will be adaptable so that future generations can, for example, **modify existing equipment, build new structures or dispose of other French waste for which no disposal solution exists.**

# Facilities at Cigeo

Cigeo will consist of the surface facilities located in two areas (the "Ramp" zone and the "Shaft" zone), and an underground facility with surface-to-bottom connections and disposal sections. This underground facility will be deployed gradually over a period of more than 100 years, at a depth of 500 metres, over an area that is expected to eventually reach approximately 15 km<sup>2</sup>.



## Provisional timetable for Cigeo



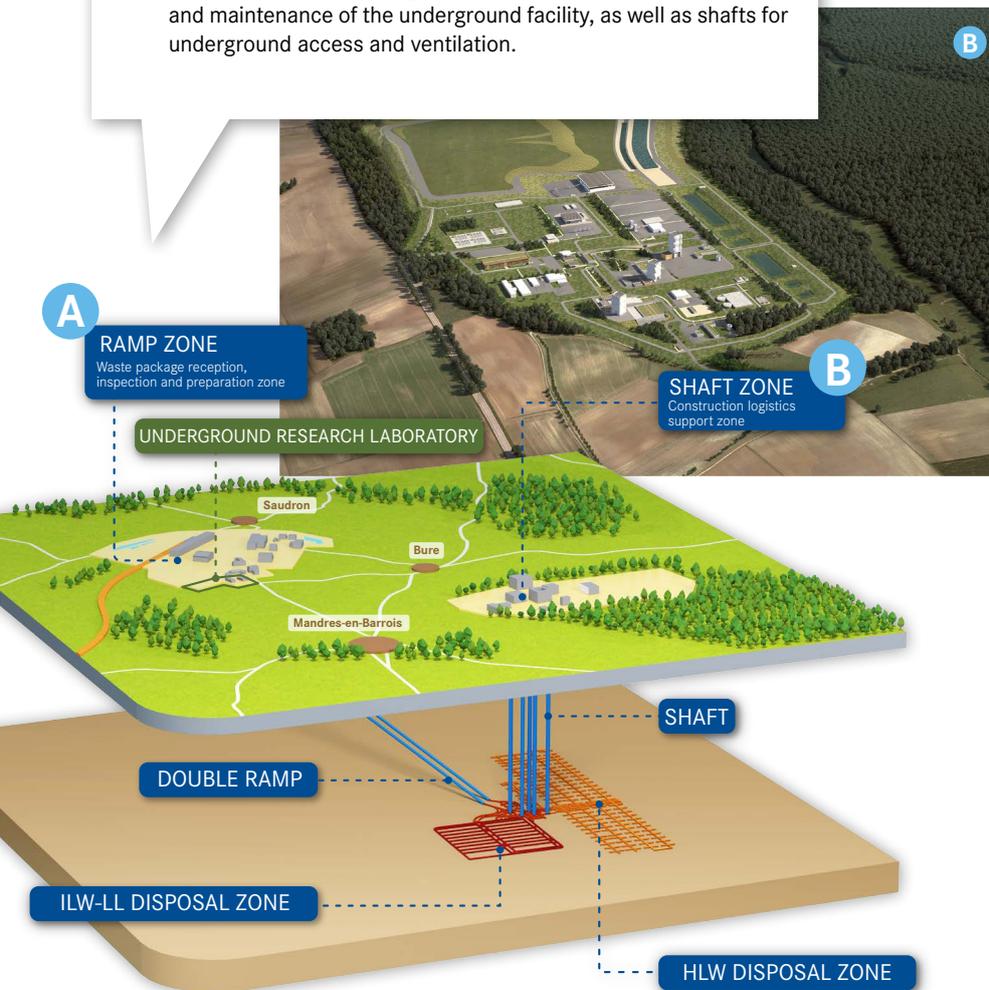
## Surface facilities

### A Ramp zone

This consists of a rail terminal for receiving the convoys of radioactive waste, a building for the reception, inspection and preparation of packages, buildings to house workshops and offices and an open-access area for the public.

### B Shaft zone

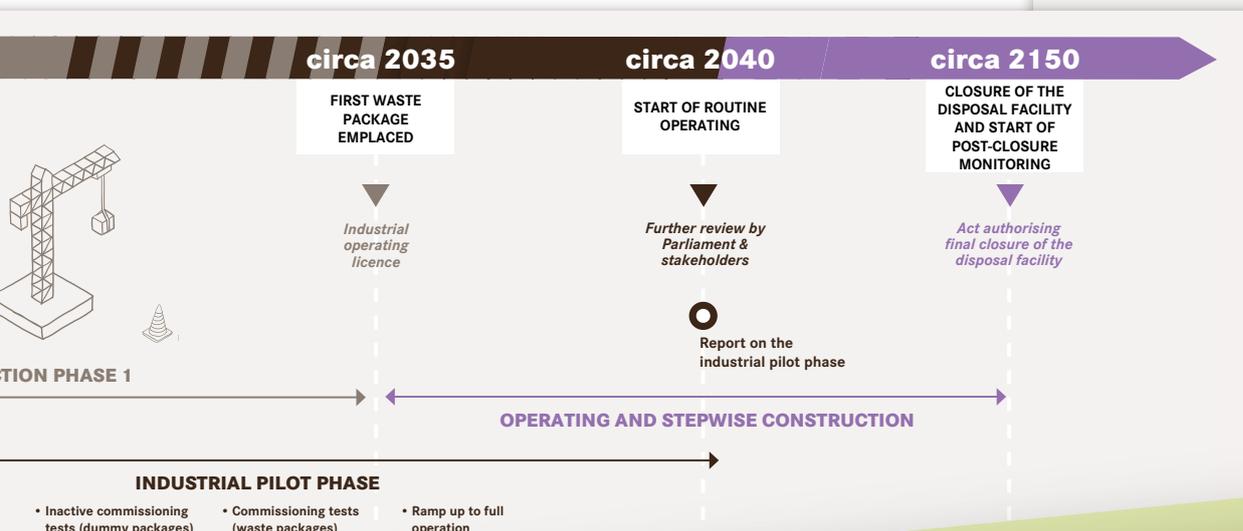
Located directly above the repository, this is the zone from which the underground work will be carried out. It will include infrastructure and buildings related to the construction, operation and maintenance of the underground facility, as well as shafts for underground access and ventilation.



## FUNDING BY THE WASTE PRODUCERS

As part of a responsible approach, funding of the design, construction, operation and closure of Cigeo is being provided by current generations so that the burden is not passed on to future generations. This means in effect that provisions are set aside by the three waste producers concerned (EDF, the CEA and Orano) and are regularly updated.

In January 2016, the French Ministry for Ecology, Sustainable Development and Energy set a target cost of 25 billion euros for this project. This cost is based on Andra's costing records and on opinions issued by ASN and waste producers. The French Court of Auditors (Cour des comptes) estimated that the cost of disposal was between 1 and 2% of the total cost of electricity production over the entire operating life of a reactor.



# How Cigeo will operate

## *Transporting waste packages to Cigeo*

Packages of HLW and ILW-LL waste will arrive at Cigeo for their final disposal mainly by train from the waste producers' sites where they are stored. Only a few types of ILW-LL waste will be brought in on lorries by road. The number of rail convoys will gradually increase to a maximum of five trains per month in the 2050s and 2060s. Bringing the packages in by train will require a rail connection to be built between Gondrecourt-le-Château and Cigeo's Ramp zone.



## *Inspection and preparation of waste packages*

Waste packages will be subject to a second inspection before being placed, if necessary, in disposal containers:

- Welded steel containers several centimetres thick for HLW waste
- Very thick concrete cubes for ILW-LL waste

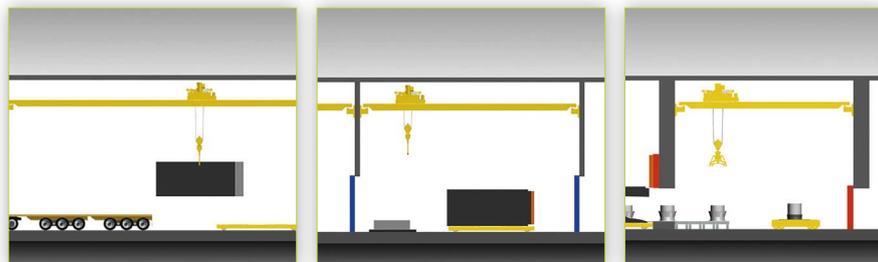
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## *Reception of waste packages*

Waste packages will be received at Cigeo in surface buildings where they will undergo an initial inspection and be unloaded from their transport containers.



► Example for ILW-LL



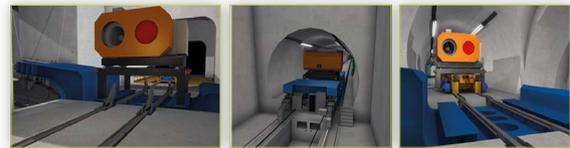
► ILW-LL



► HLW

### ***Transfer of waste packages to the underground installation***

Each cask will be placed on a ramp transfer system which will take the waste packages down to the disposal zone. This transport system is designed to be as safe as possible: the motors are located on the surface; if a breakdown occurs, the cart stays where it is; the carts move at low speeds, etc.



► Example for HLW

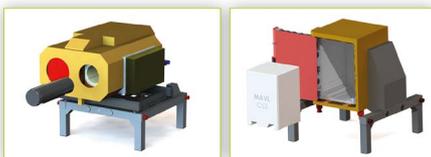
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### ***Emplacement of packages in transfer casks***

The packages will then be placed in a "cask", which will provide radiation protection while they are transferred from the surface to the underground facility.



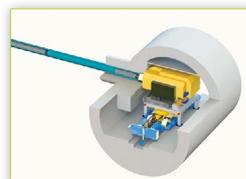
► HLW

► ILW-LL

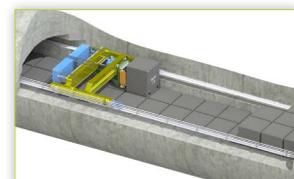
### ***Disposal of waste packages***

Once it reaches the disposal zone 500 metres below the surface, the cask will be transferred to a robotic transfer shuttle, which will take the packages to the disposal cells.

- HLW packages will be emplaced in disposal cells that are approximately 70 cm in diameter and about a hundred metres long. They will be pushed into the cell one behind another by a pusher robot.
- ILW-LL packages will be disposed of in tunnels that are a few hundred metres long and around ten metres in diameter. They will be stacked one on top of another, in layers, by a stacking crane.



► HLW



► ILW-LL

# Integrating Cigeo into the local area

If a licence for Cigeo is granted, first construction activities are expected to start in 2025/2026. Prior to the start of construction, Andra has launched data acquisition studies that will, in particular, be used in the construction licence application, which is due to be submitted in 2022. To prepare the way for constructing Cigeo, preliminary development work will be undertaken by Andra as well as by local players within the framework of the regional development contract.

## Data acquisition

for the construction licence application and regulatory procedures

In order to compile the construction licence application, Andra has begun work on field studies:

- **Geotechnical surveys** must be conducted at both surface sites. These surveys consist of drilling boreholes to a depth of about fifty metres to obtain data for calculating the foundations of the future buildings, and installing one metre-high pillars to serve as a topographical markers.

- In accordance with regulations, a **preventive archaeology** campaign must also be conducted at both sites. This campaign, led by the French National Institute for Preventive Archaeological Research (INRAP), aims to verify whether the land contains any archaeological remains. To do this, one-metre-deep pits are dug and examined by archaeologists (which may require clearing the sites).

- Environmental sampling and observations are carried out by Andra on the future Cigeo site and in the surrounding area. **The data obtained will be used in the Cigeo impact study** which Andra must submit with the construction licence application. For this impact study, Andra also relies on a support structure it set up in 2007, the Perennial Observatory of the Environment (OPE). The OPE is responsible for studying the characteristics of and changes in all environments (water, air, soil, flora and fauna) and provides data for drawing up an initial environment survey, which is necessary for the impact study. In 2013, through the OPE, Andra launched **a series of inventories specific to the two areas where the surface facilities will be sited** covering flora, fauna (birds, bats, insects, mammals, amphibians, reptiles) and habitats.



► Preventive archaeology campaign

# Preliminary works

So that the construction of Cigeo can begin immediately once the construction licence has been granted, preparatory works must first be carried out:

- **preliminary development works** include operations needed to prepare the site to host the first construction companies (site clearance, construction facilities and platforms, services and temporary roads, etc.);
- **off-site connections** allow Cigeo to be served and connected to external utility networks (electricity, water, sanitation, etc.);
- **preparatory construction work** comprises utility networks (electricity, water, sanitation, etc.), and the roads on the site and earthworks in the Ramp zone and Shaft zone.



► Examples of site development work

## Data acquisition

- Preventive archaeology
- Geotechnical surveys
- Sampling and observation of the environment

## Off-site connections

- Connection to external utility networks
- Transport links (rail, roads)

**Construction licence**

## Preliminary development works for the construction site

- Site clearance
- Fences
- Earthworks
- Construction site platforms
- Site facilities
- Networks required for the site

## Preparatory construction work on the surface zones

- Networks and roads within the site
- Earthworks



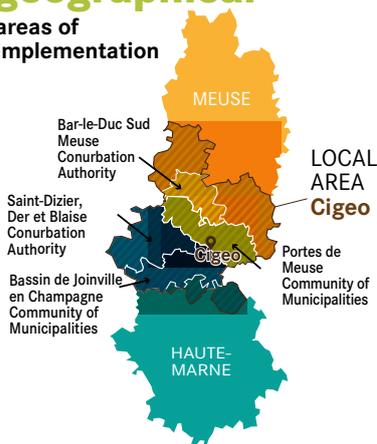
# Building Cigeo together and integrating it in the local area

The Regional Development Project (PDT) is a roadmap for land-use planning and economic development in Cigeo's host region. This document, requested by the State, aims, for the area around Cigeo, to create an environment conducive to ensuring the success of the project, boosting growth in the region and improving quality of life for its inhabitants.

## HUMAN DEVELOPMENT: JOBS

Cigeo represents an opportunity for the development of local employment: there will be an increase in the workforce during the period of site preparations. Construction will then require up to 2000 people for five years. The workforce will stabilise at around 600 people for site operating. In addition to these direct jobs, Cigeo will generate indirect jobs (suppliers, service providers) and induced jobs (related to spending by employees working at Cigeo), and this for more than a century.

### 3 geographical areas of implementation



### 4 strategic areas

**Area 1**  
Carry out infrastructure improvements to support the construction of Cigeo

**Area 2**  
Boost the socio-economic potential of the area surrounding the project

**Area 3**  
Enhance the attractiveness of the two departments through core development measures for the region

**Area 4**  
Preserve the economic and environmental excellence of the Meuse and Haute-Marne

**Over EUR 500 million in provisional funding for Areas 1 and 2, including nearly EUR 200 million for Andra.**

*The funding for Areas 3 and 4 will be specified once the licence to construct Cigeo has been granted.*

### 24 signatories

the State, local authorities, public interest groups, industrial operators and industry advisory boards

### 64 projects

#### 38 actions

to be carried out over the period 2020-2024: development works prior to the construction of Cigeo and economic support measures. (**Area 1** and **Area 2**)

#### 26 forward-looking lines of action

to be developed and finalised before the construction licence for Cigeo is granted: services for the population, enhancing the built and landscape heritage, creating sectors of excellence, etc. (**Area 3** and **Area 4**)



# Building Cigeo with **the public**

The size of Cigeo and the ethical issues it raises make it a project of general interest to both current and future generations. For this reason, Andra has chosen to pursue an approach of openness to society and has been innovative in developing public dialogue and consultation, making the issue of radioactive waste management exemplary in terms of environmental democracy.

## Three laws and two national public debates

The Cigeo project is the outcome of a lengthy democratic process involving the passing of three laws (in 1991, 2006 and 2016) and two national public debates, with the result that solutions have been found collectively for managing the most hazardous radioactive waste.

In 2005, the first national public debate was held on the basis of the first fifteen years of research. The public meetings highlighted the need to make an ethical and social choice between two options for managing HLW and ILW-LL: storage or geological disposal. The ASN felt that "deep geological disposal is the only disposal solution possible<sup>1</sup>".

**On the basis of this debate and the assessments carried out, in 2006 the French parliament opted for deep geological disposal but laid down a requirement of reversibility for at least 100 years.**

In 2013, a second national public debate was held on the Cigeo project. Because of the difficulty of holding public meetings, the debate was held online, with more than 76,000 visits, 1,500 questions and 500 opinions. A "citizens' conference" was also held for the first time as part of a public debate.

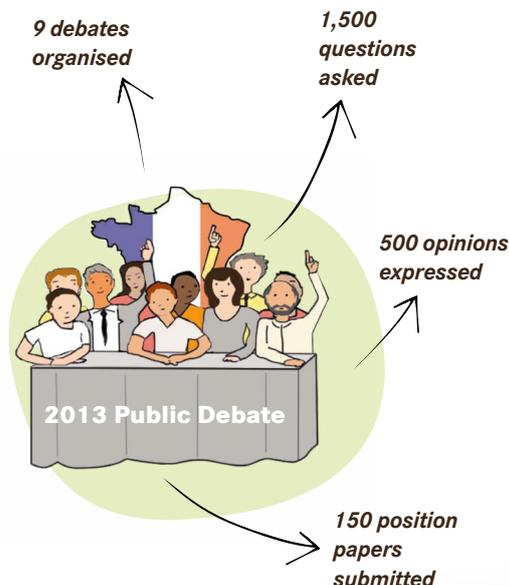
**As part of the follow-up to the public debate, in response to the opinions and expectations expressed, Andra decided to make changes to the Cigeo project, particularly by including an industrial pilot phase at the start-up of the facility and fostering greater engagement with the public.**

In 2016, the French parliament passed a third law (law of 25 July 2016) on the conditions for developing Cigeo and for reversibility.



### PUBLIC DEBATE ON THE PNGMDR

In 2019, a public debate was held - under the aegis of France's National Public Debate Commission (CNDP) - on the national plan for radioactive materials and waste management (PNGMDR), drawn up by the French Ministry for Ecological and Inclusive Transition and the French Nuclear Safety Authority (ASN).



1. ASN Opinion of 1 February 2006 on research relating to the management of high-level long-lived waste (HLW-LL) carried out in the context of the law of 30 December 1991.

# A new stage of consultation with local stakeholders



Since 2017, Andra has been conducting a new phase of consultation on the Cigeo project aimed at closely involving local stakeholders and inhabitants in building the Cigeo project together.



@ Follow all the public consultations on [dialogue.andra.fr](http://dialogue.andra.fr)



## GUARANTORS OF THE CONSULTATION

The National Public Debate Commission (CNDP) has appointed guarantors to support Andra's public consultation process regarding Cigeo. They are tasked with ensuring the smooth running of the consultation on Cigeo launched in 2017 by Andra. To this end, they must ensure that all members of the public affected by and interested in the project have access to the information they need and that they can share their observations and ask questions. They also ensure that any questions raised by the public are recorded and brought to the attention of Andra so that it can answer them and report on the progress of the project.





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