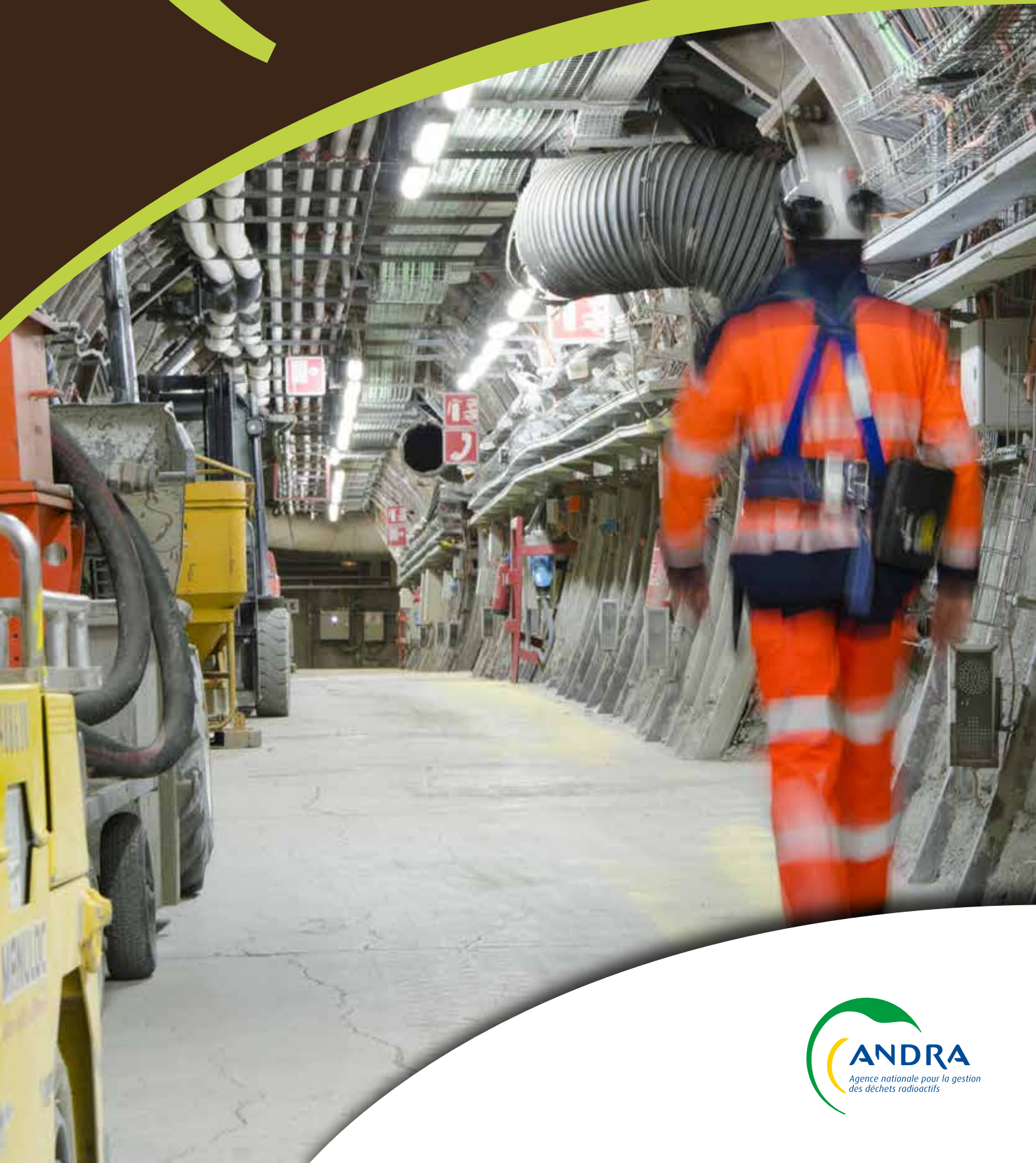


# Andra in Meuse/Haute-Marne





# Contents

**Andra and radioactive waste**

04/05

**Andra in Meuse/Haute-Marne, key implementation stages**

06/09

**Andra in Meuse/Haute-Marne, a scientific and technological hub  
in support of an industrial project**

10/13

**Andra in Meuse/Haute-Marne, an agency involved in developing the region**

14/17

**Andra in Meuse/Haute-Marne, tomorrow...**

18/19



Underground Research Laboratory

Technological Exhibition Facility

Environmental Specimen Bank

# Editorial

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**Based in Meuse and Haute-Marne for more than 25 years now, Andra is preparing the development of the Cigéo project, a safe and permanent solution for managing the most radioactive long-lived French waste, mostly originating in nuclear power plants.**

Andra's Meuse/Haute-Marne Center employs 360 people actively engaged in the work and research necessary for the design of Cigéo and its future siting in the region.

It is made up of the Underground Research Laboratory, the Technological Exhibition Facility where the Cigéo project is presented and the Environmental Specimen Bank which, as part of the Perennial Observatory of the Environment (OPE), is tasked with storing the samples taken from the environment for at least one hundred years.

Andra's teams are currently finalizing the application for a licence to build the disposal facility project. Consultations are under way with the local stakeholders and the population on topics linked with the project.

Beyond its contribution to the growth of the two departments through the jobs created and the equipment sourced locally, Andra also actively participates in the economic and socio-cultural life of the region.

If the Cigéo project is given the go-ahead, the site will become a leading industrial hub for research and education.

## Emilia Huret

Head of the  
Meuse/Haute-Marne Center

## Patrice Torres

Director in charge of  
industry and Eastern  
France activities



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# Andra and radioactive waste

Each year, several tens of thousands of cubic meters of radioactive waste are produced in France by the various activities using the properties of radioactivity: nuclear power generation, research, national defence, industry and the health sector.

To date, Andra's two disposal facilities in the Aube handle 90% of the volume of radioactive waste produced annually. For reasons of safety, the remaining 10% cannot be stored in these surface disposal facilities.

Some of them, the high-level waste (HLW) and the long-lived intermediate-level waste (ILW-LL), have a high radioactivity level and will remain dangerous for several hundred thousand years. A suitable solution must be implemented to manage such waste, as set out in the June 28 2006 Act: reversible disposal in a deep geological formation.

## □ ANDRA

The National Agency for Radioactive Waste Management is a public undertaking in charge of designing and operating solutions for the safe management of all French radioactive waste, in order to protect present and future generations from the hazards which they generate. Independent of the radioactive waste producers, Andra is placed under the supervision of the French Government ministries in charge of energy, research and the environment.

**724 employees (as of December 31 2021) are divided among 5 sites:**

- **the head office** at Châtenay-Malabry in Île-de-France,
- **Andra's two Industrial facilities** in the Aube (10): the Aube Disposal Facility (CSA) located at Soulaines-Dhuys, Ville-aux-Bois and Épothémont and the Industrial Facility for Waste Grouping, Storage and Disposal (Cires) at Morvilliers and La Chaise,

- **the Manche Disposal Facility** (CSM) at Digulleville (50),
- **the Meuse/Haute-Marne Facility** (CMHM) comprising the Underground Research Laboratory and the Environmental Specimen Bank in Bure, Meuse (55), and the Technological Exhibition Facility in Saudron, Haute-Marne (52).



## □ RADIOACTIVE WASTE

Radioactive waste refers to radioactive substances for which no subsequent use is planned or intended. It contains radioactive atoms (radionuclides), such as caesium, uranium, iodine, cobalt, radium and tritium, to name but a few. Depending on the nature of these radionuclides, the waste will remain more or less radioactive for varying lengths of time.

By the end of 2020, there was a total of approximately 1,700,000 m<sup>3</sup> of radioactive waste in France.

## □ CLASSIFICATION OF RADIOACTIVE WASTE

In France, radioactive waste is classified according to 5 categories: high-level waste (HLW), intermediate-level long-lived waste (ILW-LL), low-level long-lived waste (LLW-LL), low- and intermediate-level short-lived waste (LILW-SL), and very low-level waste (VLLW).

This classification is based on a number of criteria, including the level of radioactivity and half-life.

**The HLW and ILW-LL waste volumes** which may be disposed of in Cigéo are estimated at about:

- 10,000 m<sup>3</sup> for HLW
- 73,000 m<sup>3</sup> for ILW-LL

This represents about 3% of the total volume of waste resulting from the operating and future dismantling of France's current nuclear power plant fleet, but accounts for 99% of its radioactivity.

1 ILW-LL packages in their concrete disposal container

2 HLW package

### Deep geological disposal

Deep geological disposal consists of isolating radioactive waste from humans and the environment for very long periods of time, in rock strata several hundred metres below ground level which act as a natural barrier, passively ensuring safety in the long term without depending on human intervention and without becoming a burden on future generations.



#### Did you know

40% of HLW and 60% of ILW-LL planned for disposal at Cigéo has already been produced.

2





# Andra in Meuse/Haute-Marne, key implementation stages

## □ A FIRST ACT CREATES ANDRA

On 30 December 1991, the French Parliament passed a law on research into radioactive waste management. Under this Act, Andra was set up as a public body. It was tasked with conducting studies into the deep geological disposal of HLW and ILW-LL, primarily by building underground research laboratories. To this end, between 1994 and 1996, Andra studied the geology of the various French departments [administrative division of France] that offered to host a research laboratory. Four sites were selected based on their geological characteristics: an argillaceous layer in three departments (Gard, Meuse and Haute-Marne) and a granite massif in the fourth department (Vienne). The results revealed that the geological features of the Meuse and Haute-Marne sites, which were grouped together on account of the continuity of the argillaceous layer studied, were particularly suitable.

At the end of 1998, the French government announced that the Meuse/Haute-Marne site had been selected as the location of an underground research laboratory, while the site in the Gard was ruled out and the results of the study on the Vienne site were deemed inconclusive.

## □ 2000: CONSTRUCTION OF THE UNDERGROUND RESEARCH LABORATORY BEGINS

The geological surveys carried out in the area bordering the Meuse and Haute-Marne departments confirmed the benefits of an argillaceous, or clay rock, stratum, formed in the Callovo-Oxfordian period and which has remained stable for 160 million years; a homogeneous layer that is 130 metres thick and located at a depth of around 500 metres.

In 1999, following a public inquiry, Andra was granted authorisation to build and operate the Underground Research Laboratory in Bure, Meuse. Excavating the shafts of the Laboratory began in 2000.

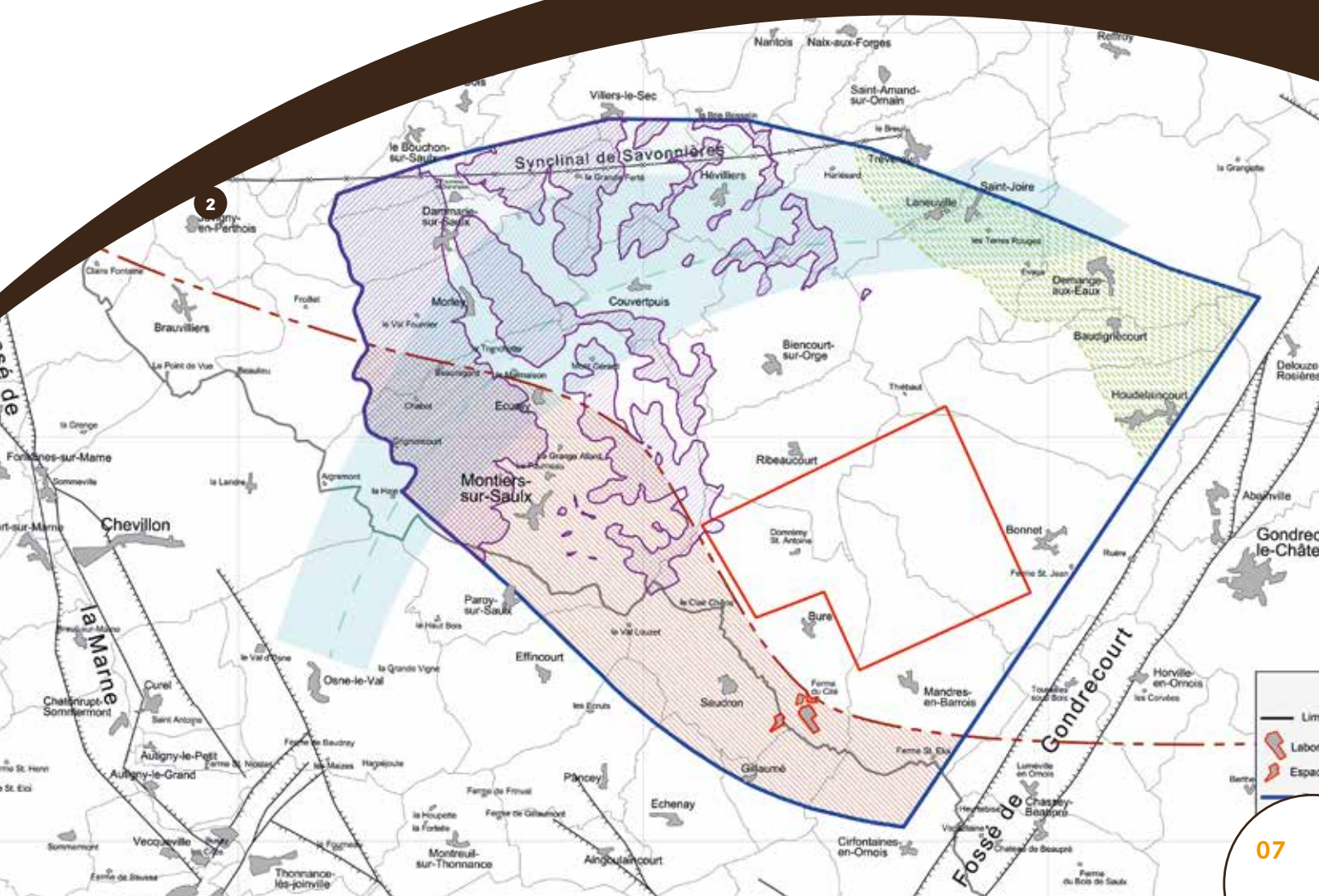
- 1 The shaft sinking zone at the Underground Research Laboratory, February 2001
- 2 Map of the Transposition Zone (outlined in blue) and the Zira (outlined in red)
- 3 Aerial view of the Laboratory, October 2002



**RESEARCH WHICH HAS BORNE ITS FRUIT**

The studies undertaken by Andra, particularly those performed from the surface or in the drifts of the Underground Research Laboratory, have enabled it to demonstrate the feasibility and safety of deep geological disposal in the sector studied.

The results of the studies, submitted to the French government in a report entitled Dossier 2005, helped to identify an area of 250 km<sup>2</sup> around the Underground Research Laboratory, known as the **“Transposition Zone”**. The properties of the geological stratum found in this zone and likely to be used for disposing of waste packages are similar to those observed at the Laboratory. The National Assessment Board (CNE) and the French Nuclear Safety Authority (ASN) assessed the Dossier and confirmed Andra's results.



# Andra in Meuse/Haute-Marne, key implementation stages

**IN 2006, FOLLOWING A PUBLIC DEBATE ON RADIOACTIVE WASTE MANAGEMENT IN FRANCE, A SECOND ACT APPROVING THE CHOICE OF DEEP GEOLOGICAL DISPOSAL WAS PASSED.**

Based on the results of the research, its assessment and the first public debate, the Act on the sustainable management of radioactive material and waste, passed on 26 June 2006, adopted deep geological disposal as the reference solution for the long-term management of high-level and intermediate-level long-lived waste.

Following this decision, Andra was tasked with conducting studies to design and build a deep disposal facility. The Act also made Andra responsible for leading the waste storage studies and combining them with those on deep geological disposal. It also decided to continue the research on partitioning and transmutation carried out by the CEA.

**IN 2009, ANDRA PROPOSED A 30 KM<sup>2</sup> UNDERGROUND ZONE WITHIN THE TRANSPOSITION ZONE, REFERRED TO AS THE "ZONE OF INTEREST FOR DETAILED SURVEY", or ZIRA, to be used to pursue the studies for siting the disposal facility. After consulting France's Nuclear Safety Authority, the National Assessment Board, elected officials and the Local Information and Oversight Committee, the French government approved the ZIRA and authorised Andra to conduct a new series of geological surveys.**

**THE PROJECT WAS NAMED CIGEO AND ENTERED ITS INDUSTRIAL DESIGN PHASE IN 2010.**

The same year, following a public inquiry, Andra was granted authorisation to continue operating the Underground Research Laboratory until 2030.

At the end of 2012, Andra produced a conceptual industrial design for the Cigeo facility, which was then submitted for public debate.



### Virtual tour of the Underground Research Laboratory:

[meusehautemarne.andra.fr/mini-sites/visite-virtuelle](http://meusehautemarne.andra.fr/mini-sites/visite-virtuelle)

### Consultation space:

[concertation.andra.fr](http://concertation.andra.fr)



- 1 Consultation on the Cigéo project water cycle
- 2 Excavating an HLW cell
- 3 Monitoring an experiment
- 4 Press conference to launch the public debate in April 2013





- **IN 2014, FOLLOWING THE PUBLIC DEBATE, ANDRA PRESENTED THE DEVELOPMENT PLANS FOR THE CIGEO PROJECT.** Taking into account the opinions and expectations expressed during the public debate and by its assessors and in line with the stepwise approach initiated by the Act of 1991, Andra decided to pursue the Cigeo Project subject to 4 modifications, while refining its position on reversibility and making commitments concerning disposal facility safety, regional development and project cost management.
- **ACT NO. 2016-1015 OF JULY 25 2016 DEFINES DISPOSAL REVERSIBILITY, LEAVING OPTIONS OPEN IN TECHNICAL TERMS** and in terms of governance for future generations, which will have to operate the disposal facility for more than 100 years.

- **IN 2018, L'ANDRA LAUNCHED A NEW POST-PUBLIC DEBATE CONSULTATION PHASE WITH THE REGIONAL STAKEHOLDERS** on topics related to the environmental and regional insertion of Cigéo. The water cycle, energy, transport infrastructures, regional development and the living environment were addressed in the form of workshops and field tours. The views and contributions of the participants were taken into account when preparing the Application for a Licence to Build Cigéo (DAC), which will be filed in 2022.
- **IN 2021, FOLLOWING THE FILING OF THE PUBLIC UTILITY APPLICATION, A PUBLIC INQUIRY WAS HELD** between September 15 and October 23 2021 under the aegis of a neutral and independent inquiry commission. The overall findings and the report were published on December 20 2021 and gave a favourable response to the public utility declaration, combined with 5 recommendations.



### Did you know ?

In 2011, **the European directive** 2011/70/EURATOM of July 19 establishing a Community Framework for the responsible and safe management of spent fuel and radioactive waste stated that **geological disposal is the safest and most sustainable solution** as the end-point of high-level waste management.





# Andra in Meuse/Haute-Marne, a scientific and technological hub in support of an industrial project

## □ THE UNDERGROUND RESEARCH LABORATORY: A UNIQUE TOOL

The Underground Research Laboratory is the only research tool of its kind in France. Located 490 metres underground, it enables scientific and technological research to be carried out directly within the Callovo-Oxfordian clay layer.

### The Laboratory's underground installations consist of:

- **two shafts** with an effective diameter of 4 and 5 metres, excavated to depths of up to 503 and 508 metres respectively, which create a link between the underground facilities and the surface,
- **an experimental drift** measuring 41 metres in length in the upper part of the argillite layer, at a depth of 445 metres, used for observation and measurements,
- **a network of more than 2000 metres of drifts** located at a depth of 490 metres below the surface, at the centre of the argillaceous layer.

The research carried out by Andra at the Laboratory is mainly based on setting up scientific experiments, in collaboration with many partners, and on conducting technological tests directly within the rock formation.

### Did you know ?

The Laboratory contains more than **1000 metres of cell demonstrators** for high-level waste (HLW).

- 1 Site machinery working in a drift within the Underground Research Laboratory
- 2 Map showing the Laboratory drifts
- 3 Technological Exhibition Facility



**THE TECHNOLOGICAL EXHIBITION FACILITY, AT THE CORE OF INDUSTRIAL DESIGN**

The 4,000 m<sup>2</sup> Technological Exhibition Facility is an experimentation and public information centre built to present the Cigeo project through exhibitions, scale models and industrial prototypes of technological solutions that may be used in the future deep geological disposal facility.

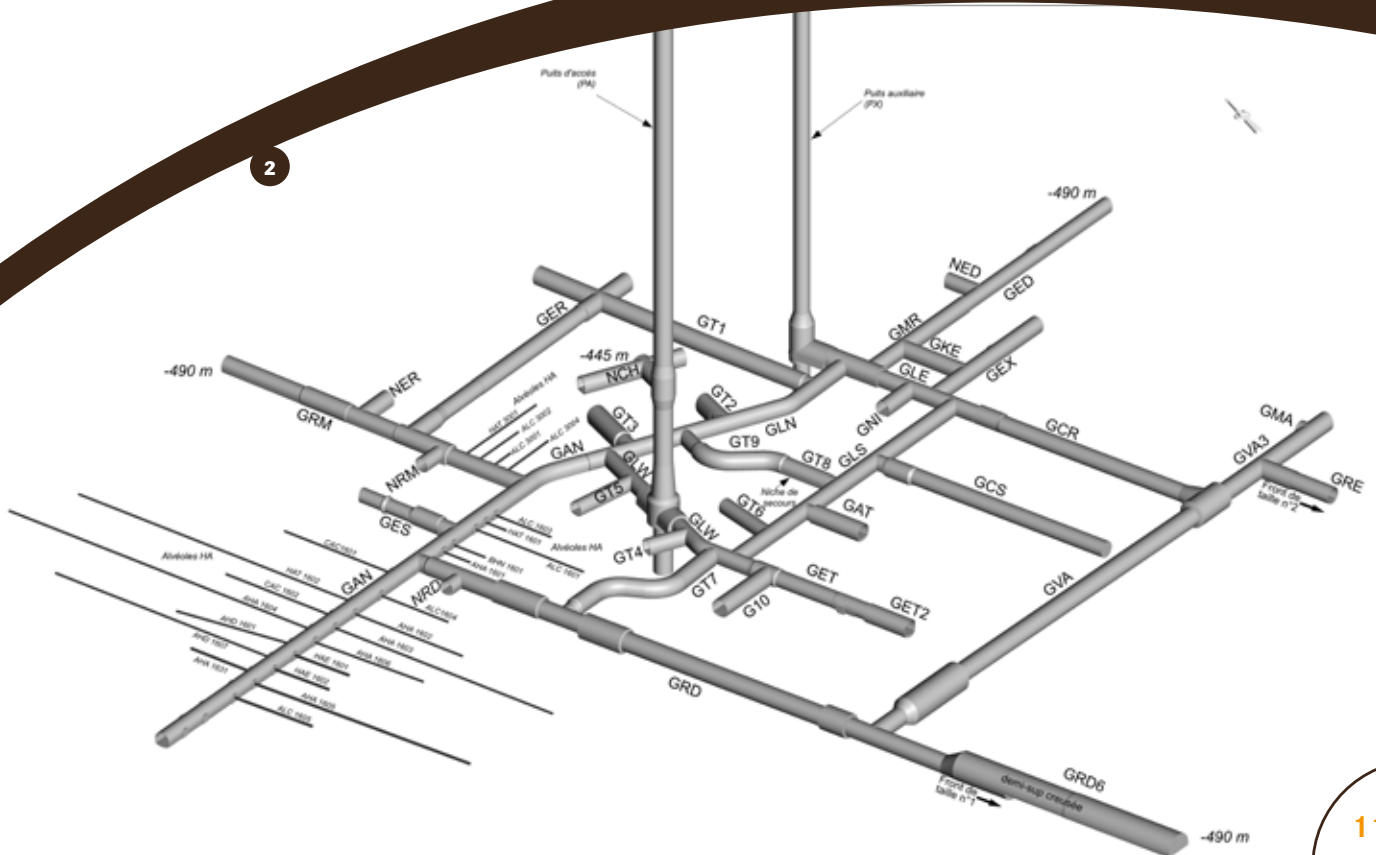


**THE CORE SAMPLE LIBRARY**

Located in Gondrecourt-le-Château, this 7,000 m<sup>2</sup> building houses the geological core samples collected during the borehole drilling campaigns carried out in the French subsoil during the search for suitable rock formations for the disposal of radioactive waste: argillaceous rock in the Aube, Aisne and Gard areas; granite formations in the Vienne area; and sandstone, limestone, marls and clays in the Meuse and Haute-Marne areas. These samples remain a source of information regularly consulted by experts in the Earth Sciences.

**Did you know ?**

Designed for scientific and technical studies carried out as part of the disposal facility project, **the Underground Research Laboratory does not contain any radioactive waste** and, in accordance with the decree granting a licence, **no waste may be disposed of there.**



# Andra in Meuse/Haute-Marne, a scientific and technological hub in support of an industrial project

## □ THE PERENNIAL OBSERVATORY OF THE ENVIRONMENT (OPE), ITS MEASUREMENT STATIONS AND ENVIRONMENTAL SPECIMEN BANK

In 2007, Andra set up the “Perennial Observatory of the Environment” (OPE). The aim of the OPE is to establish the initial state of the current environment around the future disposal facility and then to monitor how it changes throughout the construction and operating life of the Cigeo Facility, in addition to regulatory environmental monitoring. The OPE is a unique facility that reflects the exceptional nature and operating life of the Cigeo Project.

The OPE, along with its measurement equipment and protocols, was defined in collaboration with expert scientific organisations that are renowned in their fields, such as INRA and AirLorraine, among others. Many of these organisations are tasked with performing measurements and analyses.

The zone studied by the OPE covers a surface area of 900 km<sup>2</sup> surrounding Andra's current facilities in Meuse and Haute-Marne. Within this zone, more detailed studies are being conducted on a reference sector of around 240 km<sup>2</sup>, encompassing the zone proposed by Andra for the Cigeo Facility's location.

To define the initial state of the environment then monitor how it changes, **the various types of natural environment are monitored by:**

- observation stations,
- regular sampling,
- satellite images.

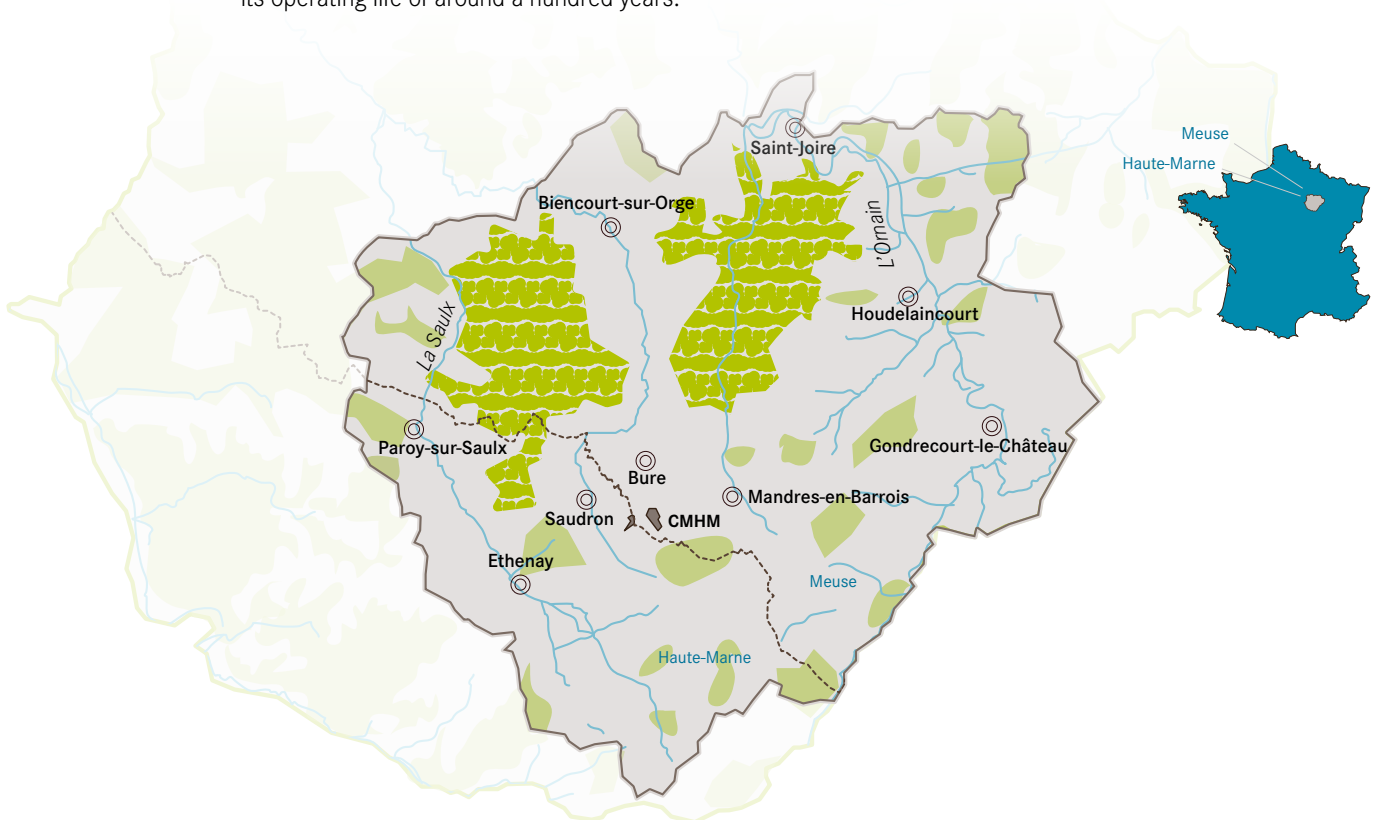


- 1 Environmental Specimen Bank
- 2 Handling samples in a cryogenic unit
- 3 An observation station in Montiers-sur-Saulx Forest

**IN 2014, ANDRA OPENED AN ENVIRONMENTAL SPECIMEN BANK IN BURE.**

This hi-tech building is designed and equipped for the preparation and long-term conservation of samples taken as part of the work carried out at the Perennial Observatory of the Environment. The Environmental Specimen Bank will thus preserve the memory of the environment surrounding the Cigeo Facility throughout its operating life of around a hundred years.

On the ground floor of the Environmental Specimen Bank, there is a Visitors' Centre where the public can observe and learn about the environment, as well as visit the rooms in which samples are prepared and conserved.



**Did you know**

The OPE networks comprise **23 stations** and **3,392 monitoring points**. They create about **730,000 environmental entries** which are managed by a **database** (Géosciences).



# Andra in Meuse/Haute-Marne, an agency involved in developing the region

## A strong, dynamic, local presence in Meuse and Haute-Marne

### □ EMPLOYMENT AND TRAINING

Andra's activities in the Meuse and Haute Marne areas have created 375 direct jobs (175 Andra employees and 200 service providers as of 31/12/2021) and contribute to creating jobs indirectly, particularly through its suppliers and service providers in the region.

Andra is also involved in training young people, through partnership agreements with the Universities of the Eastern France region, as well as with local vocational colleges. It also runs workstudy programmes and internships for students and supports doctoral theses on subjects related to its activities.

**22 MILLION EUROS  
of local purchases\* in 2021**

**438 LOCAL BUSINESSES  
fulfil an Andra order  
at least once per year**

**1326 ORDERS PLACED WITH  
local businesses in 2021**

\* Buying local means buying a product made in the departments of Haute-Marne, Meuse, Aube and Manche

### □ LOCAL PURCHASING

For several years, Andra, in liaison with Energic ST 52/55 (an association that brings together companies working in the energy and public works sectors), has organised an annual meet-up with local SMEs to enable them to learn about its purchase needs and procedures and prepare for future contracts.





- 1 "Let's buy local" Day
- 2 Students from Lyon's école supérieure de biologie-biochimie visit the Environmental Specimen Bank
- 3 EDF national archives at Bure



### Did you know

According to Andra's estimates, up to **2000 people** will be working on the initial construction of Cigéo. Afterwards, during the operating and construction phase, the workforce will stabilize at around **500/600 people**.

### Economic support for the region

In return for developing a project considered of national importance, Article L. 542-11 of the French Environment Code (based on the Act of 28 June 2006) requires companies that generate radioactive waste (EDF, Orano and CEA) to contribute to funding a Public Interest Group (GIP) in each French department. To this end, the Haute-Marne and Objectif Meuse Public Interest Groups each received 30 million euros in funding.

In addition to these financial obligations, radioactive waste generators have committed to long-lasting partnerships with all stakeholders in Meuse and Haute-Marne, with a view to fostering development in the region. They invest directly in industry and services, for instance in setting up facilities such as the EDF platforms in Velaines and Saint-Dizier, the buildings housing EDF's national archives in Bure and Orano's national archives in Houdelaincourt, and CEA's Syndièse Project in Saudron. EDF will soon be inaugurating a new disposal facility at Tronville-en-Barrois, which will supplement the Velaines facility. This site will provide essential supplies to French nuclear power plants.

The waste generators also support local companies by helping to develop their specialised skills in the energy sector, thus enabling them to grow their business with nuclear operators. In addition, they lead campaigns to manage energy demand and are involved in training young people.

# Andra in Meuse/Haute-Marne, an agency involved in developing the region

## □ AN INDUSTRIAL AND SCIENTIFIC TOURISM HUB

With over 10,000 visitors a year (excluding the Covid period), the CMHM has become a major tourist attraction hub in the region.

Guided tours are held all year round and open days and tours of the drifts are organised several times a year so that local residents can visit the Underground Research Laboratory and talk with Andra employees (for more details, call +33 (0)3 29 75 53 73 or send an email to [visite.55.52@andra.fr](mailto:visite.55.52@andra.fr)).

A large number of foreign delegations are also interested in the activities that take place at the CMHM and the Cigeo Project.

## □ SHARING SCIENTIFIC AND TECHNOLOGICAL CULTURE

One of Andra's missions is to share scientific and technological culture.

To this end, it organises exhibitions and events for schoolchildren and the general public. Andra regularly holds science and culture exhibitions and events at its premises, which are free and accessible to all.

- 1 Graphic display of the construction work on the first building co-organized by Signe and Andra
- 2 "Voyage to the solar system and beyond" exhibition (2020)
- 3 Virtual tour of Andra's Underground Research Laboratory
- 4 Open Day in September 2021





## □ ACTIVE SUPPORT FOR LOCAL ASSOCIATIONS

By sponsoring events and projects every year, Andra contributes to enriching social and cultural activities in the Meuse and Haute-Marne areas.

Andra has adopted a sponsorship charter aimed at giving support to local initiatives. Events and projects must be related to five subject areas: promoting and sharing scientific and technological culture, the environment and discovering nature, memory and safeguarding our heritage, solidarity between generations and, lastly, local community initiatives.

Each year, Andra sponsors a hundred or so projects with a total funding of about 150,000 euros.





# Andra in Meuse/Haute-Marne, tomorrow...

The decision to start Cigeo Facility construction will be taken following a process that will be triggered once Andra submits its licence application, in 2022. This process will include an assessment of the licence application by the French Nuclear Safety Authority and the National Assessment Board, consulting with the local authorities that are directly involved, and a public inquiry. If Cigeo is approved, construction could begin a few years later.

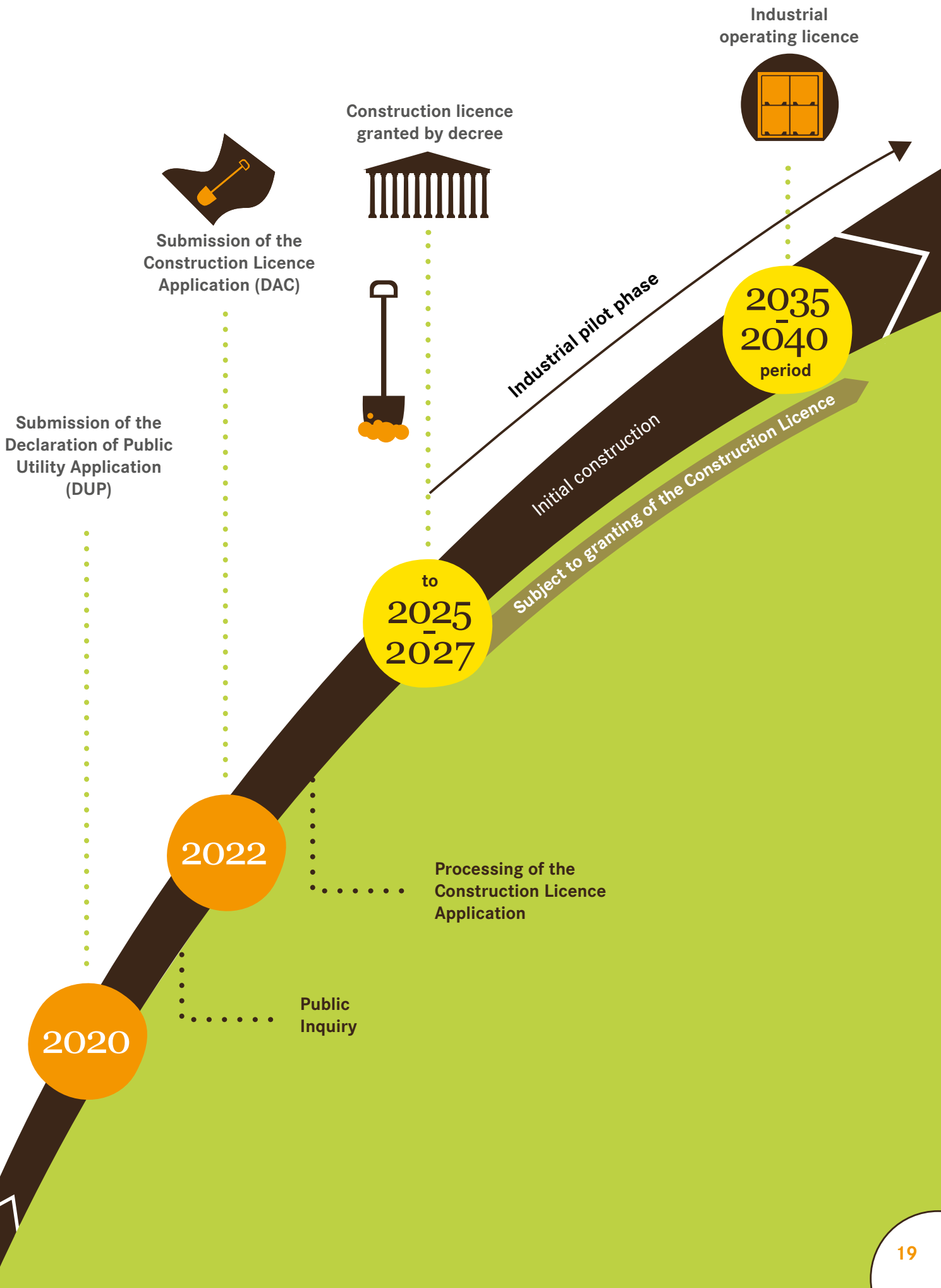
## □ BOOSTING LOCAL DEVELOPMENT

Developing an industrial project of the magnitude of the Cigeo Project involves preparing the area where the facilities will be located. Not only must the necessary infrastructure be built (means of transport, water, electricity and gas supplies, digital networks, etc.), but a strategic framework for employment, economic development and attracting new residents to the area must be implemented.

In October 2019, 24 signatories, including the state, local authorities, Public Interest Groups (GIP), operators and chambers of commerce, committed to a regional development project (PDT) for the support of Cigéo. Commissioned by the French state, the PDT aims to build around Cigéo an environment which will ensure the success of the project, foster regional growth and guarantee the quality of life of the inhabitants by setting up 64 substantive projects, 38 of them scheduled for completion over the 2020-2024 period. This is forecast to represent more than 500 million euros in funding.

## □ AN OUTSTANDING SCIENTIFIC RESEARCH HUB

Andra's research infrastructures in the Meuse and Haute-Marne areas (the Underground Research Laboratory, the Perennial Observatory of the Environment, the Environmental Specimen Bank and the Technological Exhibition Facility) form a unique and outstanding scientific research hub, not only in France but worldwide. The Underground Research Laboratory and the OPE together form the "Structure for the observation and memory of the environment and the Earth", or SOMET, which was certified "Research Infrastructure" by the French Ministry of Higher Education and Research. Andra makes these facilities available for multidisciplinary research, outside the field of radioactive waste management. They are truly remarkable tools for higher education and training, and can be used by students in disciplines including Earth Sciences and Environmental Science, as well as Metrology, Underground Construction and the Humanities and Social Sciences. This is the background to the setup of PoCES, the Underground Environment Centre of Excellence, under the control of the École des mines and Nancy's École supérieure de géologie, of which Andra is partner with the Objectif Meuse GIP: a unique centre of excellence offering continuing education tailored to the specifics of the underground environment.



# Visit the Meuse/Haute-Marne Centre!

Contact the Meuse/Haute-Marne Centre's  
Communication department on

**0805 107 907**  
(toll free)

or by email at

**info.meusehautemarne@andra.fr**



**@Andra\_CMHM**



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