Chooz nuclear power plant

Low-carbon, safe and competitive power generation at the heart of the Grand-Est region
## Chooz identity card

| Date commissioned          | Unit 1: 1996  
|                            | Unit 1: 1997  
| Output 2019                | 17.9 TWh     
| Number of reactor units    | 2            
| Total installed capacity   | 2 x 1 450 MW 
| Total staff numbers        | 769 EDF employees and 271 permanent contract workers |
2019 was a year of challenges that were brilliantly met by the Chooz workforce. Our teams successfully completed the unit-2 ten-year outage while maintaining high standards of operational and industrial safety performance. This substantial outage, involving more than 2 000 EDF employees and contract workers for a period of 144 days, was effective in enhancing plant safety. More than 100 million Euros were spent, 20 000 activities completed and 50 plant modifications implemented in order to continue operating the plant for the next 10 years.

Once again, nuclear safety was treated as the overriding priority by the Chooz workforce. 24 safety-significant events were reported in 2019, only 1 of which was given an INES-1 rating on a scale of 7. The regulator conducted 20 inspections at the site, 7 of which were unannounced. In 2019, 110 emergency drills, fire drills and police drills (involving a specialised branch of the Gendarmerie) were conducted in order to test organisational effectiveness.

In terms of power output, Chooz NPP supplied the national grid with 17.9 billion carbon-free kilowatt-hours. This accounts for 4.7% of nuclear power in France and 42% of the power used in the Grand-Est region! This achievement was accompanied by excellent results in the area of personnel safety, where the number of industrial accidents per one million hours worked amounted to 1.1, with not a single rad-worker exceeding the statutory exposure limit of 20 mSv/year.

With close to 800 employees and 200 permanent contract workers, the plant – located in the Ardennes – contributes significantly to the local economy in France and in Belgium alike. It hired 30 people and hosted 57 apprentices 93 work-experience students. Furthermore, nearly 76 500 hours of training were delivered to plant employees in 2019.

In addition to its core business of power generation, Chooz NPP has continued to play an active role in the life of the local community where it contributes to the economy and to non-profit initiatives. Throughout the year, it has upheld its commitment of open interaction with the French and Belgium communities by keeping them regularly informed of the latest developments, of its environmental performance and of events it has reported to the regulator and local authorities.

In 2020, the Chooz workforce will continue to generate safe and low-carbon electricity. It will use the two scheduled outages, including one ten-year outage, as an opportunity to further enhance plant performance.
1. Generating power in support of the energy transition 5
2. Nuclear safety, an overriding priority 7
3. Worker safety 12
4. Environmental safety, a daily concern 13
5. Sustaining high levels of performance and competitive strength across the nuclear fleet 15
6. Nuclear power plants, essential contributors to the life of the region 177
7. Keeping the public constantly informed 188
1. Generating power in support of the energy transition

France’s 58 operating reactors feature the same technology. They are all pressurized-water reactors (PWR), commissioned over the period of 1977 to 1999 across the country. Chooz NPP forms part of this standardised fleet where plants are able to pool their engineering, operating and maintenance resources whilst also having access to a substantial amount of operating experience which can be used on all French sites.

Chooz NPP is located in the town of Chooz, which sits within the Ardennes administrative division. Comprising 2 reactor units, it generated 17.9 billion kWh in 2019, accounting for 4.7% of France’s nuclear output and 42% of the electricity used in the Grand-Est region. Day in and day out, more than 1 000 men and women work hard at generating safe and competitive electrical power with low CO₂ emissions.
The role played by nuclear power plants in France's energy mix

Nuclear is France’s third largest industry behind the automotive and aviation industries. With its 19 operating plants, EDF is entirely responsible for this fleet. In order to ensure that everyone enjoys a constant and high-quality supply of clean and affordable electricity, EDF uses a combination of energy sources: nuclear, hydro, wind, solar and biomass. Among these sources, nuclear energy – along with hydro – is the only one that is continuously used. Both form the “bedrock” of France’s generation capacity, nuclear accounting for the majority of the country’s power supply. This predominant position in France’s energy mix is due to the political decision taken by France in the 1960s, whereby it would diversify its energy sources in order to maintain energy self-sufficiency.

Operational flexibility supporting the growing proportion of renewables

France’s multi-annual energy plan calls for the proportion of nuclear output to be reduced to 50% by 2035, with a greater proportion of renewables. With this expansion of renewables in the energy mix, nuclear will have to step back and let renewables take over when weather conditions allow. Conversely, nuclear output may increase if there is a drop in wind or solar power. Since the 1980s, nuclear power plants have always been flexible enough for power supply to be constantly adjusted to highly variable demand, depending on the times of day and night. In recent years, with the development of intermittent renewable energy sources, EDF has further enhanced the operational flexibility of its reactors. EDF’s expertise in the load-following capability of its nuclear fleet is a decisive factor when it comes to successfully completing the energy transition.

CO₂-neutral electricity

Keeping some nuclear capacity is essential if we are to meet the growing needs for an abundant and constant supply of electrical power while continuing to aim for France’s carbon neutrality by 2050 as part of the fight against climate change. A key factor in this struggle, the reduction of CO₂ emissions makes CO₂-free nuclear power an essential component of tomorrow’s energy mix.

When a nuclear power plant generates electricity, it does not emit any CO₂. The plume rising from these plants is composed of water vapour. The cooling towers’ tubular shape generates a natural draft which removes heat contained in the water of plant cooling systems. They return this heat to the atmosphere in the form of water-vapour clouds, which contain no radioactivity at all.

In order to calculate the amount of CO₂ emitted for every kWh generated, scientists conduct a Life Cycle Assessment (LCA). This measuring tool considers all stages in the life cycle of the energy source being assessed: mining and enrichment of raw materials, manufacturing, processing, power transmission and distribution and last but not least, site construction and decommissioning. As far as renewables are concerned, CO₂ emissions are primarily due to the construction of plant facilities. They are estimated at 14 to 80 g CO₂ equiv./kWh for solar power, chiefly due to the cell manufacturing process, and at 8 to 20 g CO₂ equiv./kWh for wind power. By comparison, the calculation gives a result of 4 g/kWh for EDF’s nuclear sector, three quarters of this amount being generated by the front end of the fuel cycle. Fossil fuels, however, emit large amounts of CO₂.
2. Nuclear safety, an overriding priority

Throughout a nuclear power plant’s life cycle including design, operation and decommissioning, nuclear power generation is governed by safety precautions in order to prevent any adverse effects on people and the environment. All the stages in this life cycle have to abide by a set of rigorous procedures.

**Nuclear safety – a predominant factor throughout the life cycle of a nuclear power plant**

a) **Construction**

Construction comprises two key phases:

- **Basic design**: The project’s basic outlines are agreed (architecture, siting, size, interior layout, etc.). At the same time, the site is surveyed to determine the plant’s exact location and its compliance with requirements; an administrative procedure is established for obtaining authorisation to establish a nuclear power plant.

- **Detailed design**: This phase includes the production of detailed design drawings and runs throughout the plant construction phase. From the outset, all of a power plant’s nuclear buildings are designed to withstand all types of external hazard, whether these be due to natural, accidental or malevolent causes (earthquakes, floods, airplane crashes, etc.).

b) **Operating phase**

During this period, 3 types of maintenance are performed:

- **Routine**: The plant’s components are monitored in order to make the necessary adjustments or repairs.

- **Planned**: Approximately every 18 months, each unit is shut down for 5 to 6 weeks in order to refuel a part of the reactor core.

- **Ten-yearly**: Every ten years, the unit undergoes an in-depth and comprehensive inspection which focuses on its main components (reactor vessel, reactor coolant system, steam generators, containment structure, etc.). At the end of this inspection, the nuclear regulatory authority grants its approval for continued operation.

c) **Decommissioning**

EDF assumes full technical and financial responsibility for the commissioning of its nuclear power plants once they stop operating. Its priority is to guarantee the safety and protection of the environment surrounding a plant under decommissioning, with the same level of rigour and transparency that it applies to the operation of its 58 nuclear reactors.
Chooz nuclear power station is the French fleet’s first pressurized-water reactor to undergo decommissioning: Chooz A.

Located inside a cavern into the hillside, this reactor started being decommissioned in 2007 after a decommissioning licence was granted. Almost all of the facility has been dismantled following a process comprising several steps, the most noteworthy of which being:

- Transportation of the fuel to the reprocessing plant and drainage of all systems. Thanks to this operation alone, 99.9% of radioactivity contained in the plant systems was removed;
- Decommissioning followed by demolition of buildings located inside the hill housing the reactor (turbine building, administrative buildings), decontamination of soil;
- Dismantling of electro-mechanical components in underground caves (total volume: 60,000 m³);
- Decontamination and removal of major components including steam generators (each one standing 14 metres high and weighing 110 tons) and the pressuriser.

In 2017, the Chooz-A decommissioning process entered its final phase: dismantling of the reactor vessel. This is due to be completed in 2022.

Decommissioning operations are currently employing 21 members of EDF personnel and around 50 contract workers.

In order to fulfil its industrial responsibilities in keeping with its decommissioning plan, EDF is building a temporary waste storage facility on the site of Bugey power plant (located in the Ain administrative division), pending the construction of a geological repository, which will be a permanent solution for managing this waste. The ICEDA facility (French acronym for “temporary active-waste storage and encapsulation facility”) will be used to encapsulate and temporarily store long-lived medium-level waste from the nine reactors currently being decommissioned. It is due to be commissioned in the first quarter of 2020.

To date, EDF has started dismantling nine permanently shut-down reactors located on six sites: Brennîlis (Brittany), Chooz (Grand-Est), Chinon and Saint-Laurent (Pays de Loire), Bugey and Creys-Malville (Rhône-Alpes).
Nuclear-safety personnel

Each power plant has a team that is specifically in charge of nuclear safety. Day in and day out, they ensure that the nuclear plant abides by all nuclear-safety regulations. The members of this on-call group can be called upon outside of normal business hours at any time of the day or night. In addition, EDF delivers more than two million hours of nuclear-safety training per year.

A constantly regulated and monitored industry

EDF is constantly seeking to enhance the safety of its nuclear facilities. This requires it to perform an increasing number of checks and monitoring activities in liaison with the nuclear regulatory authority (ASN). France’s nuclear fleet is recognised as an international benchmark in the area of nuclear safety.

All EDF nuclear power plants are required to undergo regulatory audits by the ASN, which – independently and on behalf of the state – monitors nuclear safety and radiation protection measures taken to protect workers, local residents and the environment from risks associated with the operation of a nuclear power plant.

The regulator carries out announced and unannounced inspections on nuclear power plants from the design phase through to the dismantling phase. The scope of these inspections includes purpose-built pressurised equipment as well as the management and transportation of radioactive materials and waste.

Every year, more than 400 announced and unannounced inspections are conducted across France’s nuclear fleet. These inspections give rise to “follow-up letters” that are posted on the regulator’s website (www.asn.fr). The plant then has two months within which to address the regulators’ findings and if necessary, set out any actions it has implemented.

Only the ASN has the authority to approve the commissioning or continued operation of a nuclear power plant in France. A piece of legislation passed on June, 13th 2006 relating to nuclear safety and transparency (known as the TSN act and now incorporated into environmental legislation) has made the ASN an independent administrative authority.

In addition, EDF’s nuclear power plants are regularly assessed against international best practice by inspectors and experts from the International Atomic Energy Agency (IAEA) in the course of OSART reviews (Operational Safety Review Team).
**Transparent operating practices**

In addition to the information gathered during its inspections, ASN also receives data from the licensee, as required by the significant-event reporting procedure. EDF is therefore required to report all significant events occurring on its nuclear facilities to the nuclear regulatory authority. ASN’s role is then to check that plant issues have been adequately investigated and that measures have been taken to address the situation and prevent these events from recurring.

All events relating to nuclear power plant operations are reported to the nuclear regulatory authority and are made public. They are rated on an International Nuclear Event Scale known as the INES scale.

**INES SCALE**

*International nuclear event scale*

<table>
<thead>
<tr>
<th>Incident Level</th>
<th>Description</th>
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<tbody>
<tr>
<td>0</td>
<td>Deviation. No safety significance</td>
</tr>
<tr>
<td>1</td>
<td>Anomaly</td>
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<tr>
<td>2</td>
<td>Incident</td>
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<tr>
<td>3</td>
<td>Serious incident</td>
</tr>
<tr>
<td>4</td>
<td>Accident with local consequences</td>
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<tr>
<td>5</td>
<td>Accident with wider consequences</td>
</tr>
<tr>
<td>6</td>
<td>Serious accident</td>
</tr>
<tr>
<td>7</td>
<td>Major accident</td>
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</table>

**EDF’s commitments further to the Fukushima accident**

Right after the Fukushima accident in March 2011, France’s nuclear power plants underwent supplementary safety reviews seeking to assess their resilience to extreme conditions exceeding the severity of the Fukushima accident. Further to these reviews, conducted by EDF and challenged by independent regulatory inspections, the regulator pronounced the safety level of France’s nuclear fleet to be satisfactory. EDF immediately initiated an action plan to implement upgrades demanded by the regulator to deal with such conditions, including the most unlikely ones. Spanning a number of years, this plan includes:

- In 2019, Chooz NPP reported 23 level-0 events and 2 level-1 events.
- Some of these events (1 in 2019) are common to a number of reactors: these are called “generic” events. None of these events have adversely affected plant safety.

**NOTE**

The INES scale ranges from level 0 (deviation with no safety significance) to level 7 (most severe accident), the latter being applied to the Chernobyl accident (1986) and the Fukushima accident (2011).
- Establishment of the Rapid-Response Nuclear Unit (FARN), which – in the event of an emergency – is able to respond to the needs of any nuclear site in France, and simultaneously on all reactors belonging to the same site. The four centers regional bases, located at Civaux, Dampierre, Paluel and Bugey, are fully operational.

- The construction, on each site, of a new emergency control center capable of withstanding extreme conditions such as earthquakes or floods, far beyond current requirements and designed to manage a severe accident simultaneously affecting all reactors on one site. These facilities will be able to accommodate full operating teams and experts over a number of days, who will work closely together with EDF’s corporate organisation and the public authorities.

- Installation of ultimate-backup diesels (DUS) on all reactor units (excluding Fessenheim NPP). The idea is to have additional power supply in the event of losing both off-site power sources and both on-site power sources.

- In total, the arrangements implemented further to the supplementary safety reviews will incur a cost of approximately ten billion Euros for the entire nuclear fleet, half of which was already earmarked for work required in order to obtain approval for the units to operate beyond a forty-year period.

### A joint risk-management effort by the plant and the public authorities

Emergency drills are regularly conducted to test the effectiveness of warning systems and technical response to emergencies. Whilst the likelihood of an emergency remains extremely low owing to the numerous arrangements implemented during the design and operating phases, risk management relies on the establishment of emergency plans involving the plant and the public authorities, in order to cope with all situations:

- On-site emergency plan, under EDF’s responsibility,
- Off-site emergency plan, under the responsibility of the departmental prefect and the public authority, in order to take all necessary measures to protect the public and the environment in the event of uncontrolled releases or discharges.

In 2005, it was decided that the perimeter of the off-site emergency plan would cover a 10-km radius around EDF’s nuclear power plants. In 2018, an inter-departmental instruction relating to iodine-tablet distribution campaigns within the off-site emergency perimeter expanded this perimeter from 10 to 20 km.

### Post-Fukushima measures being implemented at Chooz NPP

- At Chooz, the construction of an emergency control centre is scheduled for 2024.

- In 2019, Chooz NPP completed the construction of buildings housing its two ultimate-backup diesels (DUS) and commissioned them. Even before installing these permanent DUS, the station had already installed intermediate emergency diesels.

### Emergency response drills at Chooz NPP

- In 2019, 110 drills were carried out at Chooz NPP in order to test the effectiveness of its organisational arrangements and to make the necessary improvements: 14 on-site emergency drills, 40 fire drills and 56 site-security drills.
3. Worker safety

Radiation protection

Protecting workers who could potentially be exposed to ionising radiation on nuclear power plants is one of EDF’s priorities. Whether these workers are EDF employees or contractors, the same radiation-protection measures are applied. The aim is to minimise everyone’s exposure to radiation.

French law sets a maximum annual limit for personnel working in nuclear areas. This limit is set at 20 mSv over a 12-month rolling period. As a preventive measure, EDF has itself set a lower limit than that required by current legislation: 18 mSv.

Exposure levels, which are recorded by means of measuring instruments that workers are required to carry with them, are regularly submitted to the IRSN (Institute for Radiation Protection and Nuclear Safety), an independent body responsible for monitoring workers exposed to ionising radiation. Results are published once a year on the IRSN website and in the regulator’s annual report.

Industrial safety: constant risk awareness

EDF is particularly mindful of the safety of all people working on its facilities, whether they are performing routine operating tasks or maintenance work.

Thanks to these unrelenting risk-prevention efforts, the frequency rate has decreased.

Radiation protection at Chooz NPP

- In 2019, no-one working at Chooz NPP exceeded a dose of 11 mSv. Thanks to the numerous preventive measures implemented by the plant, collective radiation exposure (i.e. total dose received by exposed personnel on a nuclear facility) amounted to 1,869.74 man.mSv at Chooz B and 59.9 man.mSv at Chooz A, which is being decommissioned.

- Chooz B reported 7 radiological events with a level-0 INES rating on a scale comprising 7 levels. None of these events had any consequences for the health of the people involved.

Industrial safety at Chooz NPP

- At Chooz NPP, the accident frequency rate, defined as the number of lost-time accidents per one million hours worked, amounted to 1.1 in 2019.
4. Environmental safety, a daily concern

Continuously seeking to improve environmental safety performance is a major commitment.

The potential effects of nuclear power plants – radioactivity, heat, noise, chemical discharges, landscape – have been addressed since the design phase onwards. Before building each of its plants, EDF conducted an initial radioecological survey which served as a reference for analyses conducted throughout the operating phase.

The environmental monitoring programme is established in accordance with legislation. This programme determines the nature, frequency and location of the various sampling operations, as well as the type of analysis that has to be performed. Its strict application is verified on the occasion of announced and unannounced inspections by the regulator, who carries out independent appraisals.

In addition to this arrangement, annual radioecological and hydrobiological studies are conducted to assess the impact of plant operations on ecosystems. EDF has these studies conducted by external qualified laboratories (IRSN, IRSTEA, Ifremer, Onema, university labs and private labs, etc.). Every ten years, a more in-depth radioecological study is carried out. The wide range of analyses conducted during these studies provides a more accurate view of a power plant’s impact on the environment and objectively reflects the quality of plant operations.

In July 2004, all nuclear power plants were granted ISO 14001 environmental certification. This international standard certifies that effective environmental safety measures are being implemented.

For each power plant, a statutory directive stipulates the nature, frequency and type of checks to be performed on each parameter (flow, concentration, activity levels, temperature, etc.). This applies to water abstractions as well as to radioactive waste, chemical and thermal discharges. Since February, 1st 2010, and along with all other nuclear operators (CEA, Andra, French navy, etc.), EDF’s nuclear power plants submit their environmental monitoring results to the national environmental radioactivity monitoring network. This nationwide network was set up under the supervision of the nuclear regulatory authority (ASN) and is managed by the IRSN. All this data is available on the following website: www.mesure-radioactivite.fr.
Rigorous management of radioactive waste

Nuclear power plant operations generate radioactive waste which is tightly controlled:

- Short-lived radioactive waste, which loses at least one half of its activity every 30 years and accounts for 0.1% of total waste activity,
- Long-lived waste from the processing of spent nuclear fuel. 96% of the latter is made of materials that can be recycled to produce new fuel whilst 4% of the waste cannot be recycled.

Since 1985, progress made in managing this waste has decreased its volume by a factor of three across the fleet.

The decision to recycle spent fuel

Since the 1980s, the strategy applied by EDF with regard to the nuclear fuel cycle, in line with national energy policy, is to process spent fuel (uranium that can be recycled to produce plutonium). This process enables recyclable materials contained in spent fuel to be reused for producing new fuel. It also enables non-recyclable radioactive waste to be isolated and encapsulated in a solid and durable form, thereby preventing the spread of radioactivity to the environment.

In 2019, approximately 1100 tons of spent fuel were processed in France, including 108 tons from Chooz NPP.
5. Sustaining high levels of performance and competitive strength across the nuclear fleet

Reactor safety review

Nuclear power plants were designed to operate for at least forty years. Upon completion of a series of tests and reviews, it is the regulator who grants or declines approval for the continued operation of these plants for the next ten years, following the ten-year outages.

A ten-year outage includes a safety review that looks at technological improvements and operating experience from all nuclear facilities around the world. On the basis of this data, modifications are implemented to continue enhancing plant safety.

Three types of outage are scheduled every 12 to 18 months, during which the reactor is shut down in order to refuel and perform maintenance on all facilities:

- Refuelling outage;
- Maintenance outage, during which refuelling is also performed, as well as a substantial amount of routine maintenance work;
- Ten-yearly outage, which concludes statutory in-depth inspections of main components such as the reactor vessel, the reactor coolant system and the reactor containment.

Investments to prepare for the future

EDF is constantly investing to maintain high operational safety standards, for example, through the Grand Carénage (fleet refit) programme.

From 2015 to 2025, EDF is running this extensive upgrade programme which seeks to extend its fleet's service life beyond 40 years of operation in order to meet France’s energy requirements over the coming decades. The programme comprises the following:

- Refurbishment or replacement of major components, which needs to be done after 30 to 35 years of operation: steam generators, main generators, transformers, condensers, reheaters, etc.
- Planned, routine maintenance work during annual and ten-year outages.
- Safety enhancements demanded by the regulator, so that the latter can grant its approval for a further 10 years of operation. This part includes the implementation of modifications agreed further to the post-Fukushima supplementary safety reviews.
This programme standardises the work already undertaken to support the long-term operation of EDF’s generation facilities. It is rolled out from site to site as the refuelling, maintenance and ten-year outages progress, while maintaining a balance between power supply and demand.

EDF has remained within the limits of the *Grand Carénage* budget: initially estimated at 55 billion Euros for the period running from 2014 to 2025, it has been rationalised and brought down to 45 billion Euros as things currently stand.

This total amount reflects a recurring level of spending on maintenance and upgrades amounting to 3 billion Euros a year, combined with additional investments reflecting the atypical nature of the *Grand Carénage*, somewhere in the region of 1.2 billion Euros a year.

2014-2025 is the peak investment period. After 2025, these investments should gradually decrease and return to the recurring rate of approximately 3 billion Euros/year by 2030.

In concrete terms, by analysing the current average cost of a customer invoice, *Grand Carénage* investments amount to less than 1 Euro-cent/KWh.

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At Chooz NPP, reactor no. 2 was shut down for its ten-year outage in 2019, which lasted 144 days. On reactor no. 1, the ten-year outage will start in February 2020.
6. Nuclear power plants, essential contributors to the life of the region

France’s nuclear industry employs 50 000 people (50% EDF, 50% contractors) and creates 220 000 direct and indirect jobs: this makes it the 3rd biggest industry in France.

Substantial economic spin-offs for the regions

Nuclear power plants contribute to the growth of the economic fabric in the regions where they are located. They employ EDF personnel as well as permanent workers from contract companies. In addition to this, more contract workers are employed for maintenance outages, ranging from 600 to 2 000 depending on the type of outage. Numerous local companies are used, particularly for maintenance purposes. Each plant also applies a locally-based procurement policy for a wide range of services. Power plants also contribute significantly to the payment of local taxes.

Training and staffing

Just like other companies in the industry, EDF has proactively addressed this issue by focusing on the need for initial training, continuing training and knowledge transfer (in-house training, apprenticeships, etc.). For example, each person working on a nuclear power plant undergoes 12 to 24 months of training before being authorised to work. Our employees undergo twice the amount of training than that delivered by other industries.

On average, the company offers more than 1 200 new placements every year. Approximately 36% of newcomers were placement students within the Group. Each placement student is supported by a management-appointed mentor, who guides, trains and coaches the placement student throughout the proficiency training period. This mentor is the student's designated contact person. He or she checks the training outcomes and gives their opinion on the advisability of hiring the student.

EDF also runs a shadow-training programme. Shadow trainers are experienced employees who are valued by their colleagues. They pass on their knowledge of the plant and facilitate role-play training, based on the focus areas agreed with the mentor.

Strong partnerships with local players

Throughout the year, the plant works together with elected representatives and all local partners.

Chooz NPP’s socio-economic impact

- In 2019, Chooz NPP spent more than 100 million Euros on investments.
- Contracts signed with local maintenance companies amount to 2.1 million Euros.
- The plant pays 78.5 million Euros in local taxes, including 20.1 million Euros in land tax alone.

Chooz NPP’s staffing plan

- 30 people hired, 57 apprentices and 93 internships in 2019.

Chooz NPP partnerships

- The station sponsors AFM-Téléthon, Restos du Cœur, UNICEF, Técap21, the Club Nautique Givetois and the Entente Nord Ardennes football club.
7. Keeping the public constantly informed

Chooz NPP regularly keeps the public up to date on operational issues and latest developments.

The visitor center is open to all members of the public every Wednesday from 13.30 to 17.30. Visitors are received throughout the year while talks and events are held for students on a regular basis. In 2019, 4 692 people came to seek information about the nuclear industry at the plant's visitor center. More than half of them extended their visit by taking a tour of the plant.

Throughout the year, the plant arranges a number of themed one-day events, often in conjunction with local non-government organisations. On these occasions, the public is given the opportunity to learn about nuclear jobs and gain a clearer understanding of power generation (nature festival, science festival, sustainable development week, industry week, EDF power industry days, cultural heritage days, etc.).

As is the case with all French nuclear power plants, the latest news from Chooz NPP is available on the NPP's news pages at www.edf.fr/chooz

The public can also follow the latest happenings at Chooz NPP via the Twitter feed @EDFChooz.
Every month, a public magazine (Chooz en Perspective) is sent to institutional representatives as well as to French and Belgian elected representatives, to non-government organisations, to local partners, to the media, to local residents and to anyone requesting a copy from the communication department: chooz-communication@edf.fr. It is also available on the following website: edf.fr/chooz, Actualités.

Once a year, a booklet entitled En Bref, setting out the past year’s main events and key figures, is published and made available to the public via the plant’s website at www.edf.fr/chooz, Actualités, as well as in the visitor center.

Every year, in accordance with articles L. 125-15 and L. 125-16 of the environment code, the plant issues a report on nuclear safety and radiation protection which presents the plant’s main results in the areas of nuclear safety, industrial safety, radiation protection and environmental safety over the past year. The report is available on the following website: www.edf.fr/chooz, Sûreté et Environnement.

The plant also attends meetings of the local information liaison council (CLI). This council consists of elected representatives, public authority representatives, nuclear safety specialists, industrial representatives and environmental safety groups. It provides a forum for discussion and communication with the general public. Once a year, a CLI meeting open to general public is held. In 2019, two “public CLI” meetings were held on the subject of extending the perimeter of Chooz NPP’s off-site emergency plan: the first was held on October, 24th in the village of Thilay while the second was held on November, 7th in the village of Fumay.
## KEY MILESTONES

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1981</td>
<td>Public interest survey</td>
</tr>
<tr>
<td>1982</td>
<td>Construction of Chooz NPP’s two reactor units</td>
</tr>
<tr>
<td>1996</td>
<td>Unit 1 connected to the grid</td>
</tr>
<tr>
<td>1997</td>
<td>Unit 2 connected to the grid</td>
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<tr>
<td>1996 to 1998</td>
<td>Construction of Chooz NPP’s two reactor units</td>
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<tr>
<td>1996</td>
<td>Unit 1 connected to the grid</td>
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<td>1997</td>
<td>Unit 2 connected to the grid</td>
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<td>2003</td>
<td>ISO 14001 environmental certification</td>
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<td>2004</td>
<td>100 billion kWh generated by both units</td>
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<td>2005</td>
<td>Renewal of iodine-tablet distribution campaign</td>
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<td>2006</td>
<td>Renewal of ISO 14001 environmental certification</td>
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<td>2007</td>
<td>Chooz NPP celebrates 10 years of power generation</td>
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<td>2008</td>
<td>Unit 1 breaks the world’s nuclear output record with 12.839 billion kWh generated in a calendar year</td>
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<td>2009</td>
<td>First ten-year outage on unit 2</td>
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<td>2010</td>
<td>First ten-year outage on unit 1</td>
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<td>2011</td>
<td>Chooz A: Removal and decontamination of the first two steam generators</td>
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<td>2012</td>
<td>Chooz A: two steam generators sent to the ANDRA repository</td>
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<td>2013</td>
<td>First OSART at Chooz (international review)</td>
</tr>
<tr>
<td>2014</td>
<td>Chooz A: Last two steam generators sent to the ANDRA repository</td>
</tr>
<tr>
<td>2015</td>
<td>Chooz A: Pressuriser sent to the ANDRA repository</td>
</tr>
<tr>
<td>2016</td>
<td>Chooz NPP celebrates 20 years of power generation</td>
</tr>
<tr>
<td>2017</td>
<td>Maintenance outages on units 1 and 2</td>
</tr>
<tr>
<td>2018</td>
<td>First functional tests carried out on station black-out diesels (SBO)</td>
</tr>
<tr>
<td>2019</td>
<td>Second ten-year outage on unit 2</td>
</tr>
</tbody>
</table>