1,300 MWE NUCLEAR REACTORS

Operation beyond 40 years: the issues of the 4th periodic safety review

The methods of the 4th periodic safety review

The safety issues for the 1,300 MWe reactors

Public information and participation

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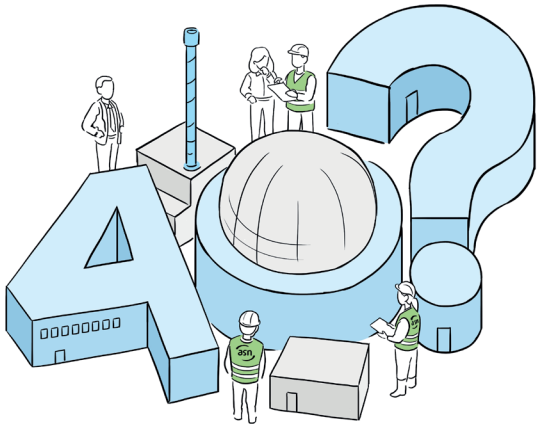
In France, 20 nuclear reactors with a power of 1,300 MWe, spread over 8 sites, will reach their 40th year of operation within the next few years. On this occasion, these reactors will undergo a periodic safety review*, which will be able to define the conditions that will determine their continued operation for a further 10 years.

Conformity review, control of ageing, safety improvements – notably in the light of the most recent technologies – this 4th periodic safety review* will be subject to the same requirements as that of the 900 MWe reactors. It will thus benefit from all the lessons learned from the periodic safety review* of these reactors.

The 4th periodic safety review of the 1,300 MWe reactors will also benefit from an enhanced process to involve the public. This “Cahier de l’ASN” booklet contributes to this by aiming to promote the understanding of a major step in the life of France’s Nuclear Power Plants (NPPs) in the next few years.



* *See glossary page 21*

Increased safety for the 1,300 MWe reactors

In France, the NPPs undergo an in-depth periodic safety review* every 10 years, in order to check their level of safety and make any necessary improvements.

For each review, the preparatory work entails extensive exchanges between EDF, the reactor licensee*, and ASN, to define the review programme and the safety objectives to be met.

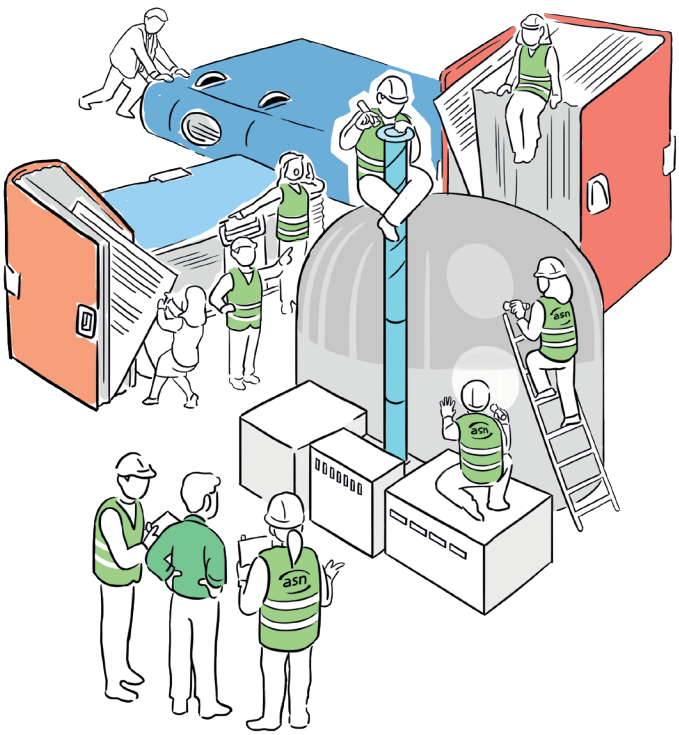
The 4th periodic safety review* for the 1,300 MWe reactors follows on from that of the 900 MWe[1] reactors.

Two issues must be examined during the periodic safety reviews*:

• it is necessary to ensure that the operation of the facility complies with the applicable safety rules and that the ageing phenomena affecting equipment and materials have been correctly identified, dealt with and managed. The licensee* must demonstrate that it can guarantee this management for the coming 10 years. In order to address this need, the conformity check in particular comprises a hydraulic test* of the reactor coolant system and a test of the reactor's containment*;

• the reactor baseline safety requirements in force may become obsolete in the light of lessons learned and changing knowledge and techniques. They must then be reassessed in order to "upgrade" them and bring them closer in line with those of the most recent reactors. This safety reassessment is a key aspect of the approach adopted in France.

The 4th periodic safety review* of the 1,300 MWe reactors is based on the safety improvements defined for the 900 MWe reactors. There are in fact many similarities between these two types of reactors and no notable event significantly altering the risk assessment of these installations has occurred since the 4th periodic safety review of the 900 MWe reactors.



1. See "Cahier de l'ASN" magazine no. 1.

** See glossary page 21*

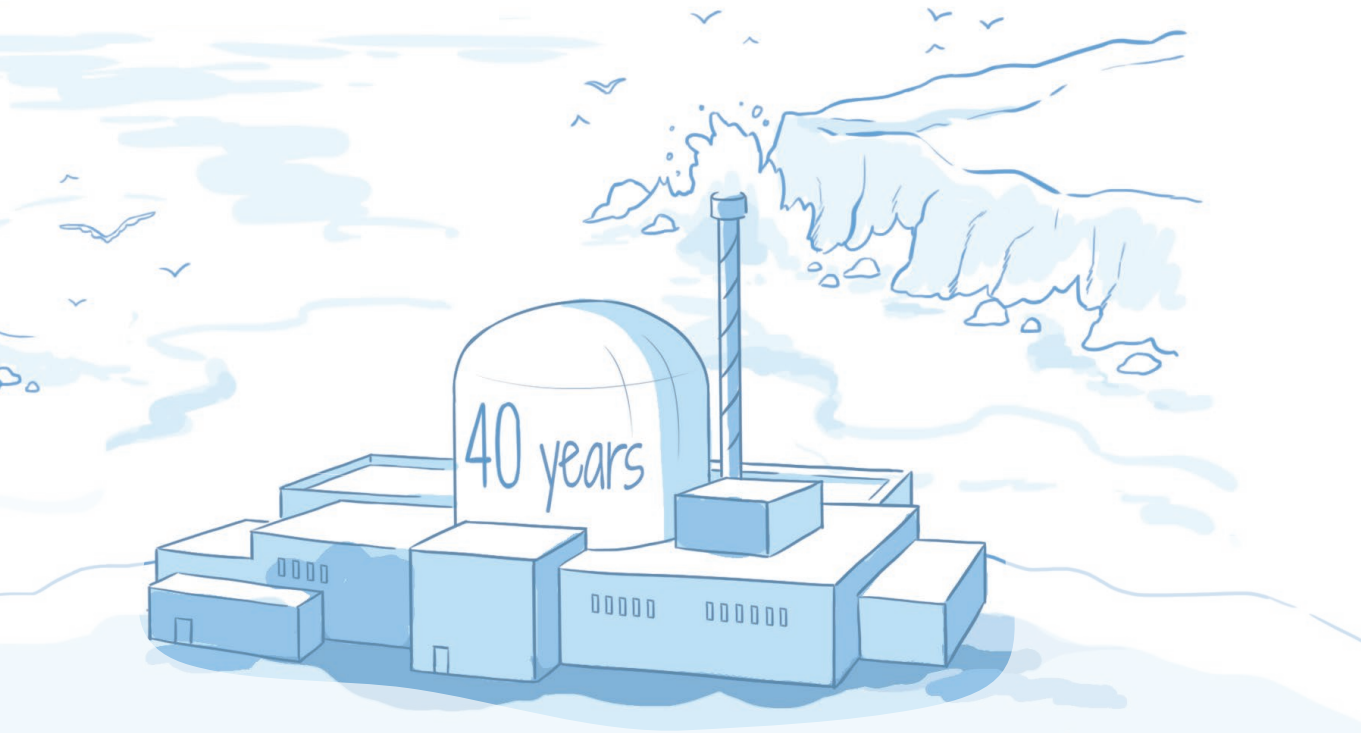
The objectives of this periodic safety review* thus notably aim to:
– move closer to the safety level of the Flamanville EPR* reactor,
– incorporate additional safety systems capable of withstanding extreme hazards and defined in the wake of the accident that struck the Fukushima NPP.

Moreover, and as for the 900 MWe reactors, EDF shall be required to improve the ability of its reactors to withstand natural hazards, such as heatwaves, earthquakes or flooding. The aim is to be able to deal with hazards of an intensity far in excess of the situations normally encountered.

WHAT THE LAW SAYS

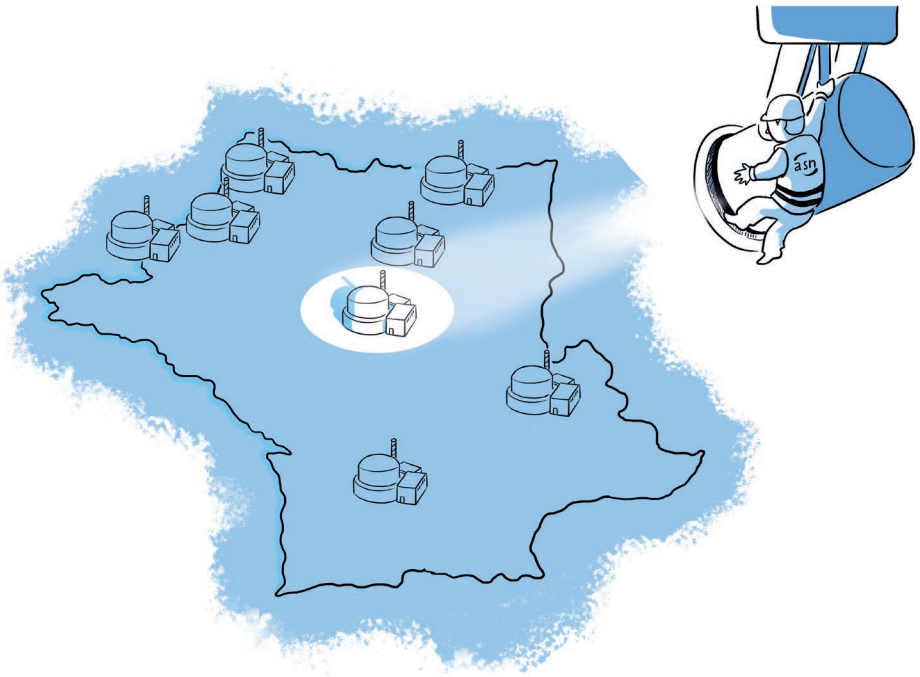
In France, the authorisation to create a nuclear facility is issued by the Government, after consulting ASN. This authorisation is issued with no time limit, but an in-depth examination of the installation, called the periodic safety review*, must be performed every 10 years in order to reassess the installation's operating conditions for the following 10 years.

During the periodic safety reviews*, the licensee must ensure that the operation of the facility complies with the applicable safety rules and that the equipment ageing phenomena are adequately managed. The licensee must also improve the safety of its facility by bringing it closer to the levels achieved by the most recent facilities.



From the generic to the specific

The safety improvement programme drawn up by EDF for the 4th periodic safety reviews* reconciles an overall approach for all the 1,300 MWe reactors in France with aspects specific to each installation.



The reactors of the 1,300 MWe NPPs were all designed according to the same model (the term "plant series"* is also used), as were the 900 MWe reactors.

This is why the modifications decided on within the context of a periodic safety review* generally apply to all the reactors with the same power. This is the generic part of the periodic safety review.

Over and above the issues concerning all the 1,300 MWe reactors, account must be taken of the particularities of each NPP, installed in a specific environment, for example on the coast or on a river. Therefore, the safety improvement measures decided on for all the reactors in the same plant series must be supplemented by provisions particular to each nuclear facility: this is the specific aspect of the review, which notably takes account of the risks inherent in the site on which the reactor is installed (flooding, earthquake, etc.).

The periodic safety review* is therefore based both on the characteristics common to the reactors of the same plant series* and on a specific analysis of each facility.

It leads to a range of requirements issued by ASN, in order to bring about a lasting improvement in the safety of the facilities. The licensee* will then implement these requirements over a period of several years, under the oversight of ASN: civil engineering work, upgrading of the facility's operating procedures, installation or refurbishment of emergency equipment, steps to improve mitigation of the impact of a natural hazard or consolidate spent fuel storage, etc. For each site, the ASN requirements will ensure long-term improvement of the safety of the facility.

* See glossary page 21

ASN involved the public in the early stages of the 4th periodic safety review* process for the 1,300 MWe reactors, asking them for their opinion concerning the definition of objectives.

ASN'S ROLE

ASN monitors the correct performance of each step of the periodic safety review*. It adopts a stance on the guidelines proposed by EDF and examines the studies carried out to reassess the facility's safety case. **It conducts inspections in each of the NPPs**, in particular during work related to the review. Finally, it adopts a stance on the conditions relating to the continued operation of the reactors, first of all from a generic standpoint and then reactor by reactor at the end of the review.

THE GUIDELINES OF THE PERIODIC SAFETY REVIEW

Compliance with the design baseline requirements:

> Manage equipment ageing
> Conduct a wide-ranging program of conformity checks
> Correct any deviations with an impact on safety as rapidly as possible

Safety improvement:

> Reinforce the ability of the facilities to withstand hazards (fire, earthquake, heatwave, etc.)
> Minimise situations requiring population protection measures
> Mitigate the consequence of a core meltdown accident
> Increase the safety of fuel storage

The main steps in the 4th periodic safety review process for the 1,300 MWe reactors

In 2017, EDF sent ASN its proposals for the main objectives of the periodic safety review* of the 1,300 MWe reactors.

In 2019, ASN issued a position statement on these objectives, taking account of the opinions of its technical support organisation, IRSN*, and its Advisory Committee (GPE)*, the members of which come from a range of scientific and technical backgrounds and from various associations.

ASN considered that the general objectives set by EDF for this review are acceptable in principle, subject to certain modifications or additions. The requests made by ASN are to a large extent based on those made in 2016 for the 4th periodic safety review of the 900 MWe reactors.

From 2021 to 2024, ASN examined the generic studies common to all the 1,300 MWe reactors, which were produced by EDF in response to the objectives of the review.

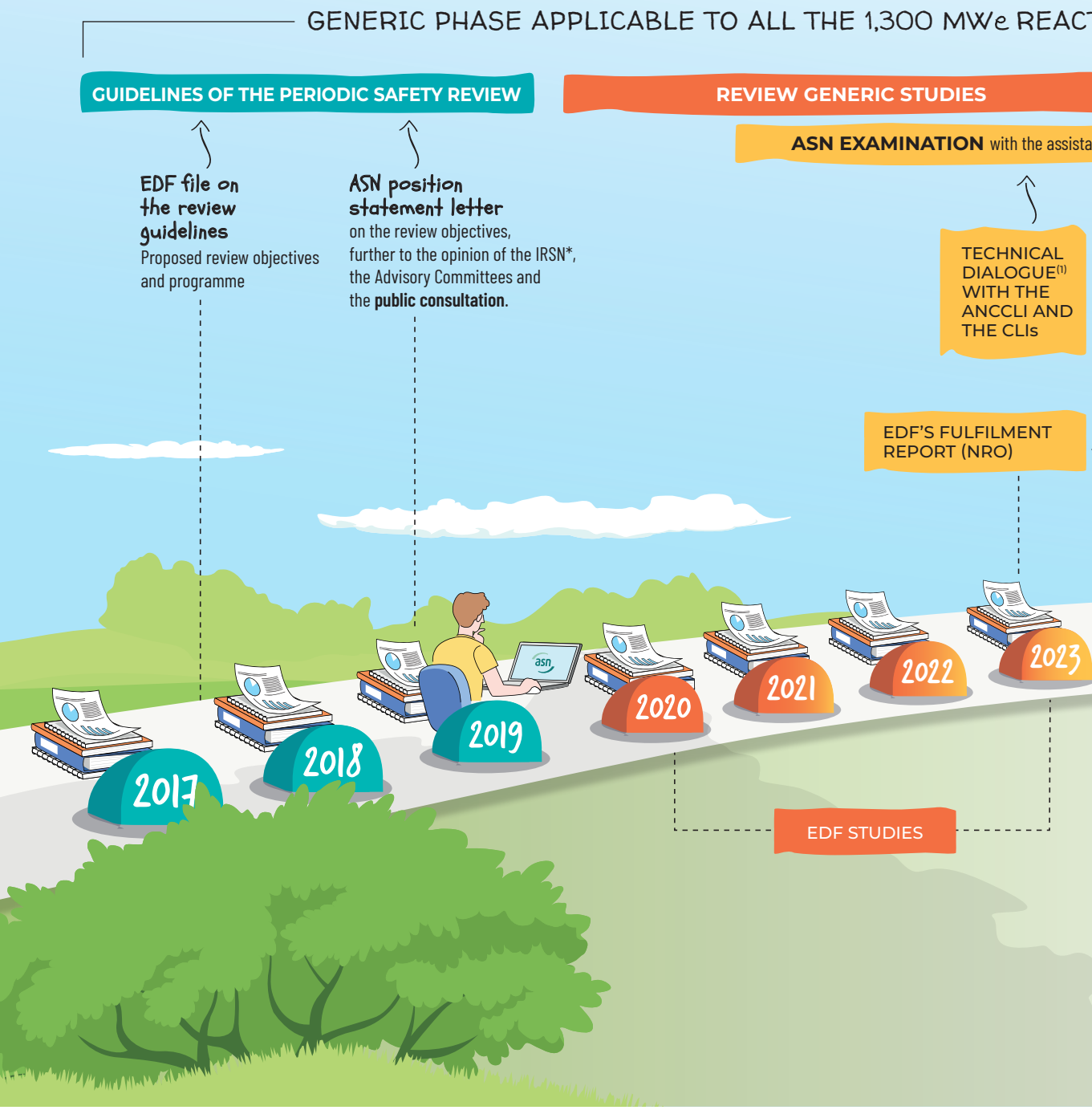
In 2025, ASN will issue a position statement on the EDF programme concerning all the 1,300 MWe reactors, six months before the beginning of the ten yearly outage inspections* of the first reactor undergoing its 4th periodic safety review*.

After an on-line consultation of the public, ASN will then regulate the continued operation of each reactor by means of technical requirements.

The two main phases in detail

ASN expects the experience acquired with the 900 MWe reactors to be put to good use in order to improve the periodic safety review process for the 1,300 MWe reactors.

This process begins well before the checks on the facility and the work which will enable the reactor's safety to be improved.



* See glossary page 21

The periodic safety review* process covers all the topics important for the safety of the facilities and the protection of the population and the environment. Thanks to the experience acquired through the 4th periodic safety review* of the 900 MWe reactors, it was possible to optimise the studies produced and the examination processes used for the 4th periodic safety review of the 1,300 MWe reactors.
ASN will thus issue a position statement six months before the beginning of the ten-yearly outage inspection* of the first reactor to undergo this periodic safety review.

The review will then be performed on each of the reactors, starting in 2026. ASN will regulate the continued operation of each reactor following a public inquiry*.

TORS

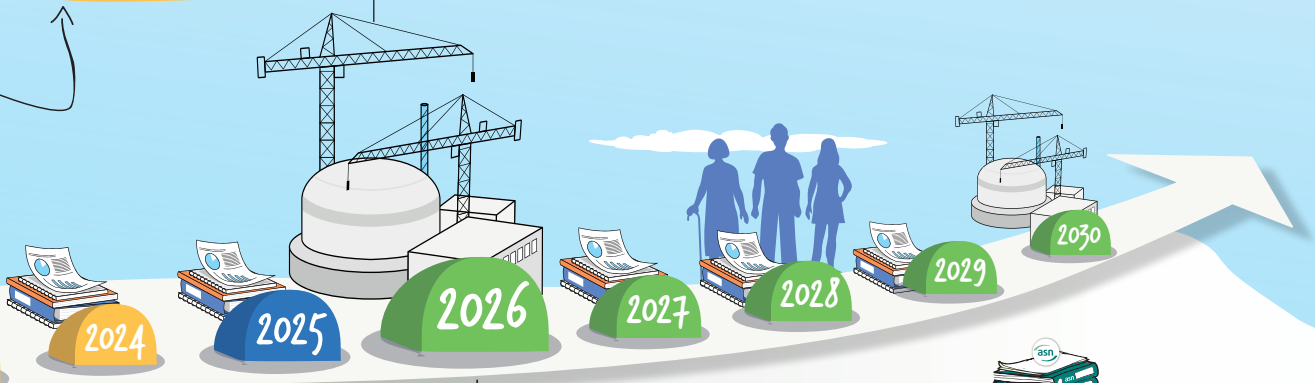
RESULTS

nce of IRSN

ASN resolution
on the generic phase further to the opinion of the Advisory Committees and the public consultation
ASN generic requirements

PRIOR CONSULTATION
managed by the HCTISN[2]

PHASE SPECIFIC TO EACH REACTOR



Meeting of Advisory Committees
on the following topics:
- hazards
- severe accidents
- reactor vessel
- accident studies

Meeting of Advisory Committees
on the results

TEN-YEARLY OUTAGE INSPECTION[3] OF THE FIRST REACTOR

EDF periodic safety review concluding report

PUBLIC INQUIRY

ASN report to the Minister

After consultation of the public, ASN resolution regulating the continued operation of each reactor

INTEGRATION OF THE CONCLUSIONS OF THE REVIEW OF THE FIRST 1,300 MWe[3] REACTORS

1. Organised by IRSN, the Anccli and ASN.
2. High Committee for Transparency and Information on Nuclear Security.
3. Paluel 1 and 2, Cattenom 1 are the first reactors to be concerned by these periodic safety reviews.

The schedule for the periodic safety reviews

The 4th periodic safety reviews* for the 1,300 MWe reactors are scheduled by EDF to take place between 2027 and 2035.

The twenty 1,300 MWe reactors entered service between 1984 and 1994. EDF has drawn up a schedule which includes the transmission to ASN of the conclusions of the 4th periodic safety reviews* of the reactors concerned. This schedule (below) was drawn up on the basis of the date of the previous periodic safety review*. Paluel NPP reactors 1 and 2 and Cattenom NPP reactor 1 were the first to undergo their 3rd periodic safety review* and they will therefore be the first reactors to undergo their 4th periodic safety review*.

A heavy initial schedule

With three reactors to undergo their periodic safety review* no later than 2027, the schedule for the first year of the 4th periodic safety review of the 1,300 MWe reactors represents a large volume of installations, whereas only one of the 900 MWe reactors was concerned in the first year of their review.

This situation demands even greater preparation on the part of EDF for performance of the ten-yearly outage inspections* which precede the issue of the review concluding reports.

It is during these ten-yearly outage inspections*, to be held in 2026 for Paluel reactors 1 and 2 and Cattenom reactor 1, that many of the checks and much of the work to improve safety included in the review are carried out. However, owing to their scale, it is impossible to deploy all the safety improvements during the ten-yearly outage inspections*. Some of the work is in fact carried out several years later. In order to ensure that the improvements most important for safety are made as early as possible, ASN issued a position statement in 2023 regarding the work to be done during the ten-yearly outage inspections* associated with the 4th periodic safety review of the 1,300 MWe reactors.

THE PERIODIC* SAFETY REVIEWS UNTIL 2035

2027
- Cattenom 1
- Paluel 1
- Paluel 2

2029
- Saint-Alban 1
- Saint-Alban 2

2030
- Belleville 2
- Cattenom 2
- Flamanville 1
- Flamanville 2
- Nogent 1
- Nogent 2
- Paluel 3
- Paluel 4

2031
- Belleville 1
- Cattenom 3

2032
- Penly 1

2033
- Cattenom 4
- Golfech 1

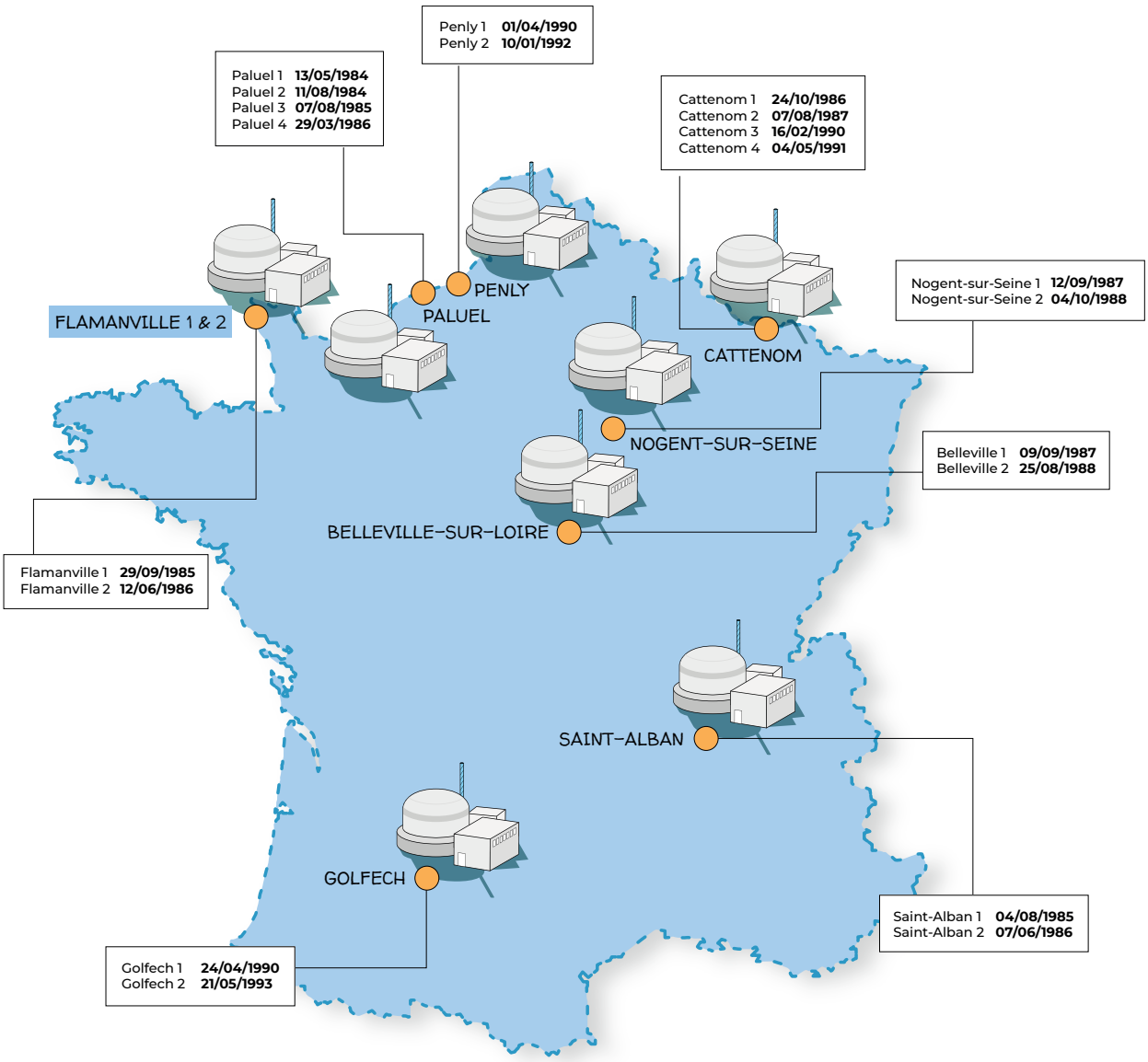
2034
- Penly 2

2035
- Golfech 2

* See glossary page 21

1,300 MWe REACTOR START-UP DATES

20 reactors concerned



Points requiring particular attention to ensure safer NPPs

During the periodic safety review*, EDF carries out in-depth checks and inspections on the reactor, along with tests. The purpose of these checks and tests is to ensure that the installation complies with the applicable safety rules and that the ageing phenomena affecting equipment and materials have been correctly identified, dealt with and managed.

For this review, the checks and tests will more specifically concern the emergency diesel generators, the equipment taking part in the containment function, the ability of the systems to withstand an earthquake, as well as the fire risk. EDF will also carry out a hydraulic test* of the reactor coolant system and a pressure test of the containment*.

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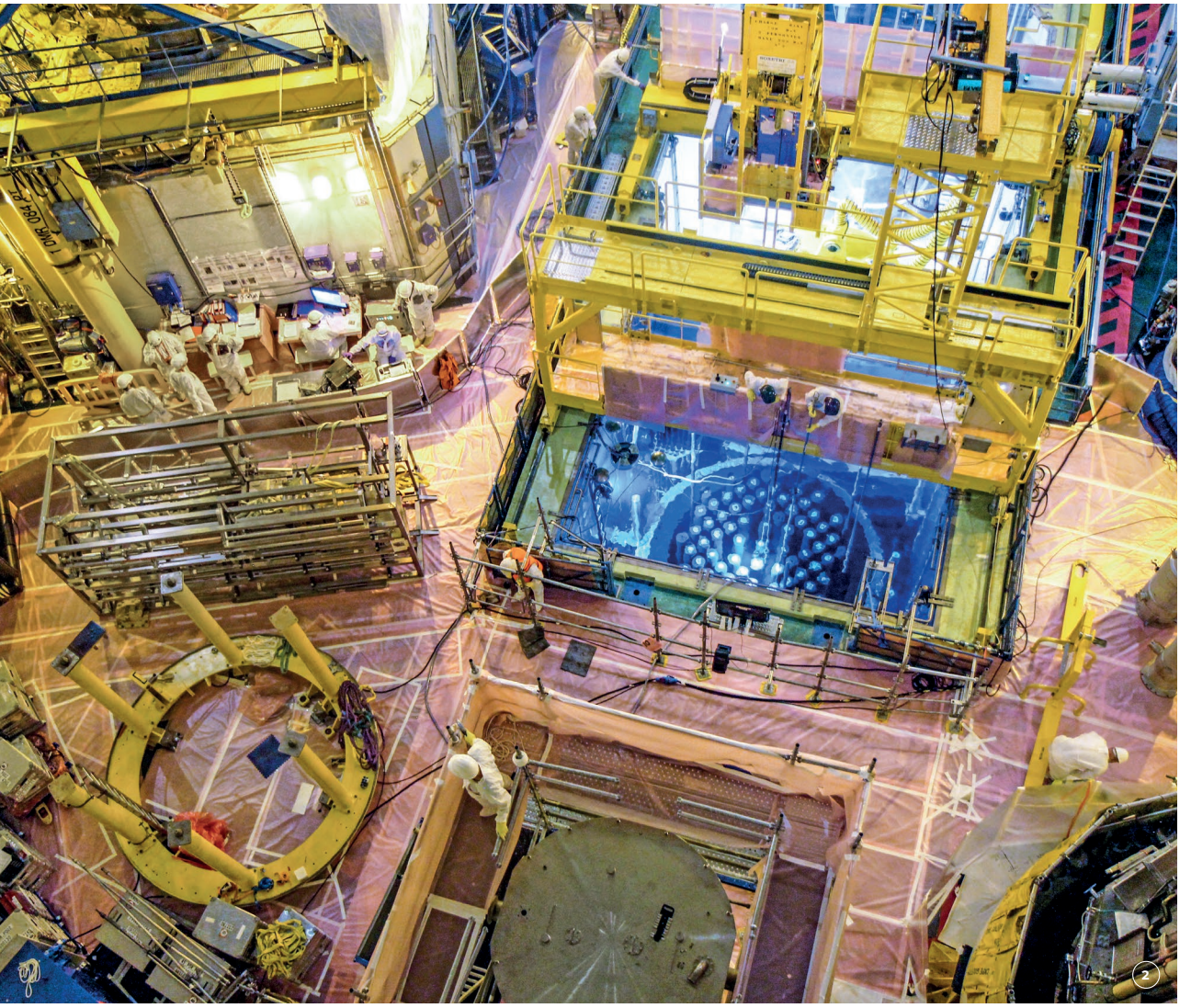
* See glossary page 21



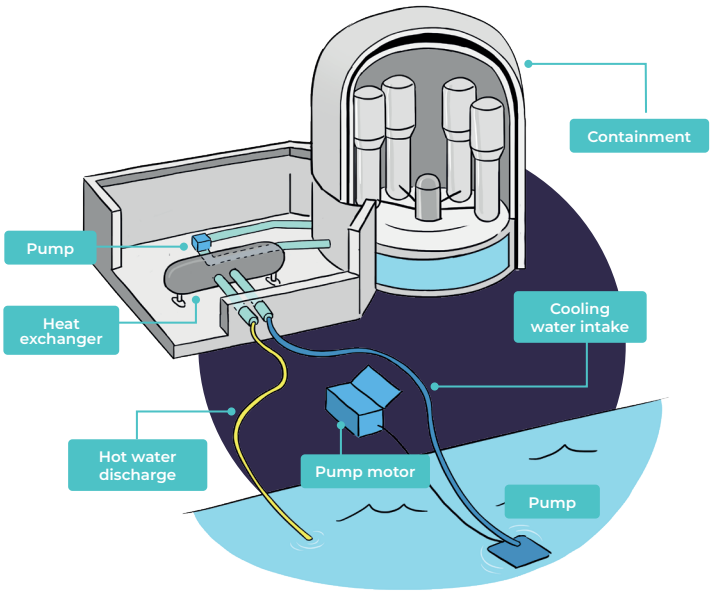
1 Check on the reactor vessel closure head during hydraulic test of the reactor coolant system.
BELLEVILLE-SUR-LOIRE NPP
Credits: ASN/DR

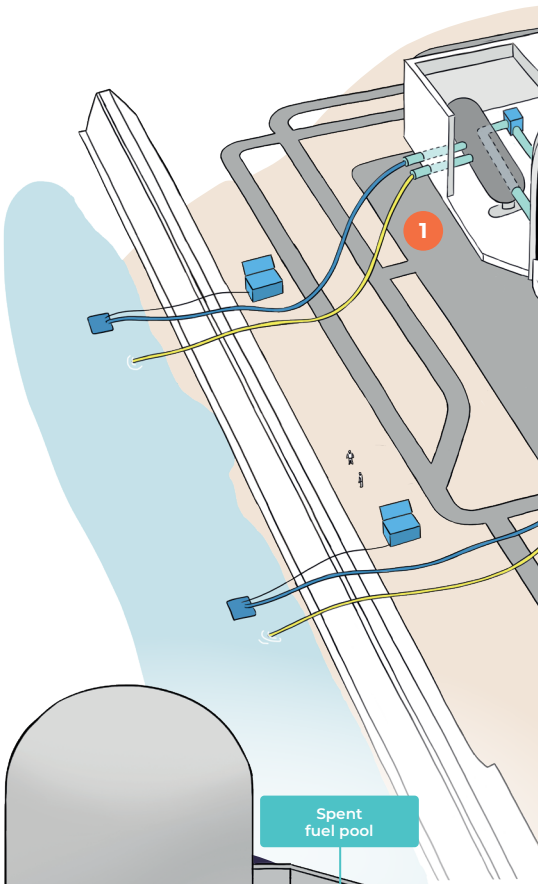
2 Check on fuel assemblies in the reactor building.
GOLFECH NPP
Credits: EDF Golfech/CAPA PICTURES

3 Check on an emergency diesel generator.
SAINT-ALBAN NPP
Credits: ASN/N. Robin

Safety improvements to the 1,300 MWe NPPs

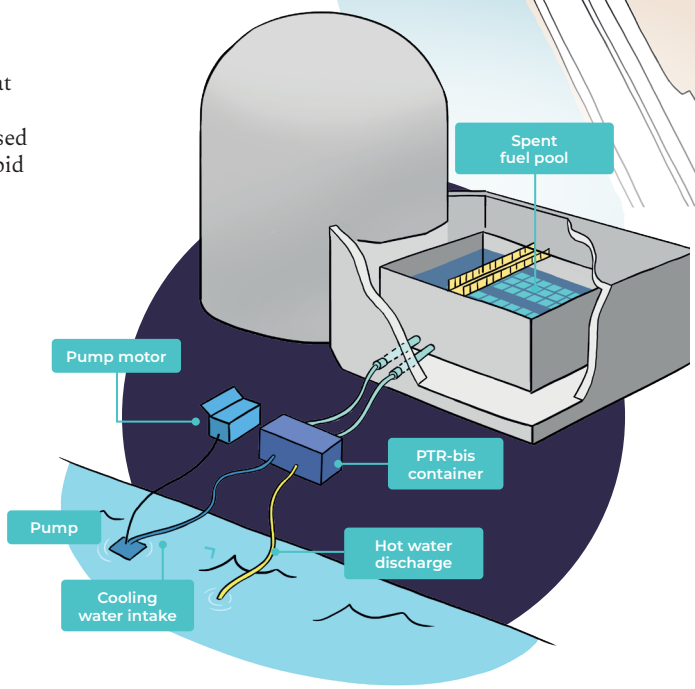
These new provisions are designed to function after an external hazard (earthquake, flood, tornado) of extreme intensity.





1 Containment ultimate cooling system

This system evacuates heat from the reactor building in the event of a core melt accident, by circulating the water to be cooled through an exchanger by means of a pump. The fixed heat exchanger is itself cooled by river or sea water, by means of a mobile ultimate heat sink (immersed pump, motor, piping, etc.), brought in by the Rapid Response Nuclear Taskforce (FARN).



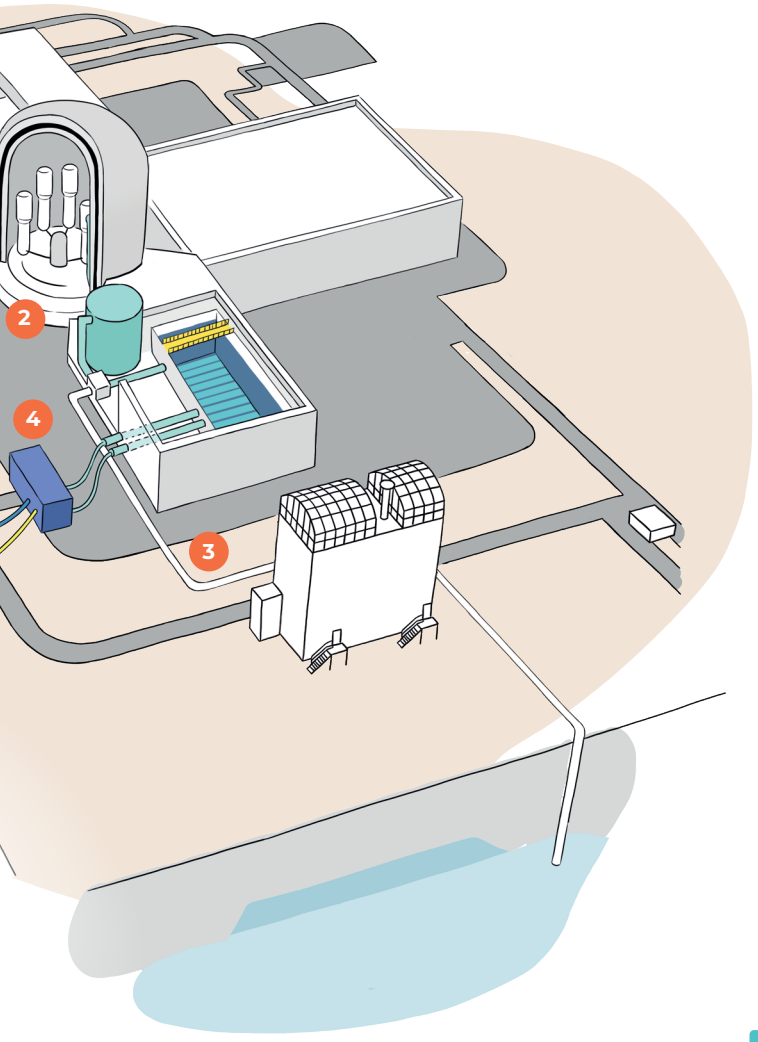
4 PTR-bis* additional cooling system

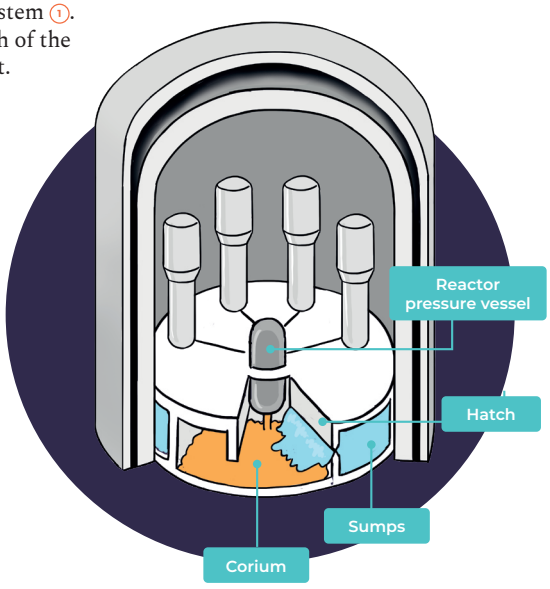
In the event of an accident with loss of the normal PTR spent fuel pool cooling system, the PTR-bis*, which consists of fixed parts but also mobile components brought in by the FARN, enables cooling of the pool to resume.

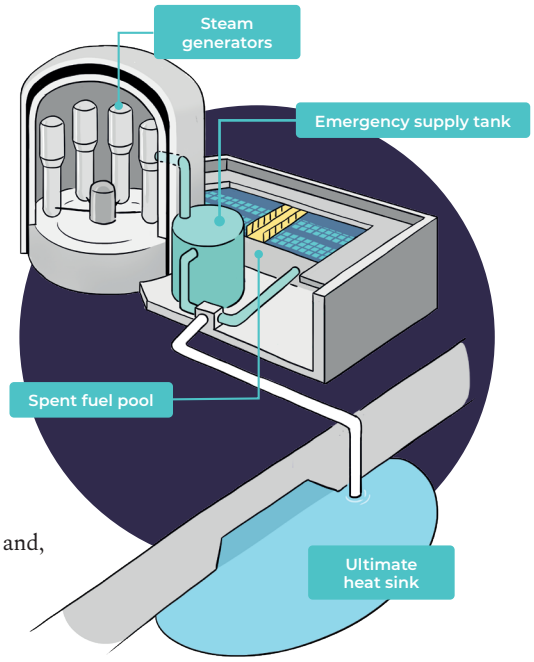
* See glossary page 21

2 Corium stabilisation device*

In the event of a core melt accident, if the corium* perforates the pressure vessel, a system of hatches is actuated and enables the water that has accumulated in the containment's sumps zone to cover the layer of corium* that has spread out and thus enable it to be cooled via the containment's ultimate cooling system ①.
This system prevents melt-through of the bottom of the reactor containment.







3 Supply from the ultimate heat sink

Pumps supply water from the groundwater, ponds or storage tanks on the one hand to the steam generators and, on the other, to the fuel storage pool.

Consultation and participation of the public

In the same way as for the 900 MWe reactors, the 4th periodic safety review of the 1,300 MWe reactors included a consultation process organised by the HCTISN*, with participation by ASN. Its purpose: to make information accessible and to collect the public's opinion on-line and during the local consultation meetings to be organised.

ASN regularly organises on-line public consultations regarding its draft resolutions, as for example it did in 2019 for its position statement on the guidelines of the 4th periodic safety review of the 1,300 MWe reactors.

In 2023, ASN and IRSN* continued this public involvement approach for the 4th periodic safety review of the 1,300 MWe reactors, holding discussions with the Anccli* and the CLIs* on the safety issues to be covered by the review, notably in order to incorporate them into the assessments. This public participation will continue in 2024, the prior consultation organised by the HCTISN* as part of the preparation of ASN's position statement on the generic phase, which should be published in 2025.

In the same way as for the prior consultation for the 4th periodic safety review* of the 900 MWe reactors, the HCTISN* deploys considerable resources so that the public can be extensively involved throughout the consultation period, which will take place during the first half of 2024.

The public will be able to hold discussions with experts from EDF, ASN and the IRSN* during public meetings and webinars, ask questions and access information on an on-line platform specifically created for this consultation. This prior consultation will cover EDF's proposals, described in the Fulfilment Report, and the public will be asked to help determine some of the topics to be covered by the debates to be organised.

The Fulfilment Report (NRO)

The NRO proposed by the licensee* of the NPPs (EDF) defines the solutions it envisages in order to address the objectives of the periodic safety review*. Among the solutions proposed to help improve the safety of the facilities commissioned 40 years ago, some entail changes that are essential:

- improve the resilience of the facilities to large-scale natural hazards (heat wave, intense cold, fire, flooding, etc.),
- install new back-up systems to supply water and cool the spent fuel pool,
- be able to retain the corium*, the fuel residue created in the event of a core melt.

* See glossary page 21

Greater public participation

The public is involved in each phase of the periodic safety review process:

In 2019, ASN consulted the public on its position regarding the guidelines of the review;

In 2022 and 2023, ASN took part in a cycle of meetings organised jointly with the IRSN*, the Anccli* and EDF, in order to collate the expectations and queries of the public concerning the periodic safety review*;

In 2024, a prior consultation on the generic phase of the 4th periodic safety review* of the 1,300 MWe reactors will be organised by the HCTISN* to collect the public's opinion on EDF's Fulfilment Report. ASN will take part in this consultation;

In 2025, ASN will consult the public on its draft resolution regarding the generic phase of the 4th periodic safety review of the 1,300 MWe reactors. This resolution will regulate the continued operation of the reactors concerned by means of generic prescriptions;

A public inquiry* will then be held at the local level, reactor by reactor, following the ten-yearly outage inspections*;

Finally, ***and for each reactor, ASN will obtain the public's opinion*** on its draft resolution on the conditions for continued operation of the reactor concerned.

In 2019, the main observations from the general public collected during the consultation organised by ASN about its draft position statement regarding the generic guidelines for the "40 year" periodic safety review concerned:

- ageing of reactor pressure vessels,
- a comparison between the 1,300 MWe reactors and the third-generation EPR* type reactors,
- the detrimental effects caused by the facilities in normal operation (discharges into the air and into water, noise, waste, etc.),
- the management of deviations and anomalies that could affect the nuclear reactors.

Every year, ASN conducts a survey to obtain the opinion of the general public and residents living around NPPs with regard to nuclear safety in France, and their positions concerning nuclear energy.

Question

The French NPPs were initially designed for a service life of 40 years. Most of them are today between 30 and 40 years old. Some are today proposing to extend their service life up to 50 years. Are you in favour of or opposed to this extension?

General public

Don't know	Strongly opposed	Relatively opposed	Relatively favourable	Very favourable
6%	12%	24%	45%	13%

BNI residents* **0-10 km**

Don't know	Strongly opposed	Relatively opposed	Relatively favourable	Very favourable
15%	6%	21%	45%	13%

BNI residents **11-20 km**

Don't know	Strongly opposed	Relatively opposed	Relatively favourable	Very favourable
5%	5%	27%	50%	13%

The French population is increasingly in favour of extending the service lifetime of the NPPs. A majority now share this opinion.

Survey conducted by Kantar Public, between October and December 2022, with 2,033 respondents, including 267 local residents 0-10 km around a Basic Nuclear Installation (BNI*) and 282 residents 11-20 km around a BNI*.

Your questions, our answers

During this 4th periodic safety review, is it ASN that decides whether or not to shut down a reactor?

ASN can suspend the operation of a reactor at any moment in the event of serious and imminent danger. This is part of its duty of permanent oversight of nuclear facilities. **A decision such as this is possible during a periodic safety review and at any time during the life of the reactor.**

Reviews are however an opportunity to reinforce the safety level of the reactors. If EDF considers that, for technical or economic reasons, it cannot implement ASN's requirements, it will have to shut down its reactor.

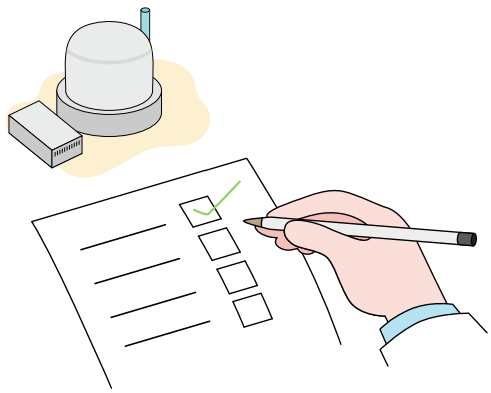
Lastly, final shutdown of a nuclear reactor for energy policy reasons is decided on by the Government and not by ASN.

Why does ASN not make its position known regarding the continued operation of a reactor immediately following its ten-yearly outage inspection*?

The licensee* transmits the review concluding report about six months after the reactor's ten-yearly outage inspection*. This includes the results of the checks carried out during this ten-yearly outage inspection*.

This report is examined by ASN and the proposed additional works are submitted to a public inquiry. ASN then issues a position statement on continued operation up until the next periodic safety review.

Pending ASN's decision and the performance of the works, the reactor can continue to function. In the same way as after each refuelling outage (or every 12 to 18 months), its restart remains subject to ASN approval.



* See glossary page 21

How will the 4th periodic safety review of the 1,300 MWe reactors benefit from the experience of the 4th periodic safety review* of the 900 MWe reactors?

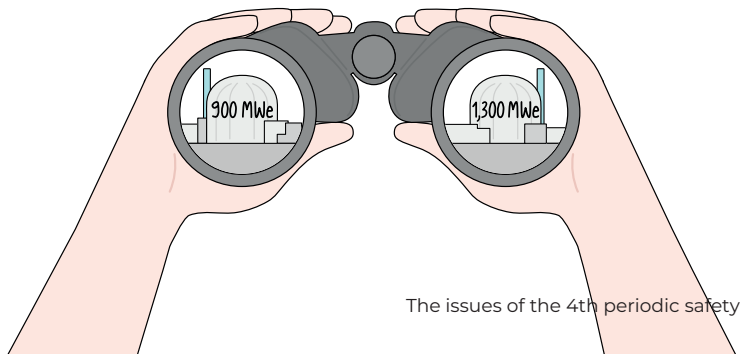
The objectives of the two periodic safety reviews* are similar, notably with the aim of upgrading towards the level of safety of the Flamanville EPR* reactor. Moreover, numerous baseline safety requirements and study methods examined for the 4th periodic safety review* of the 900 MWe reactors are being reused for the review of the 1,300 MWe reactors. Many of the modifications adopted for the 900 MWe reactors are also reused for the 1,300 MWe reactors. This reuse enables ASN to speed up the examination of the generic phase of the 4th periodic safety review* of the 1,300 MWe reactors, while enabling EDF to better anticipate the design of the modifications.

What are the differences between the 1,300 MWe and 900 MWe reactors?

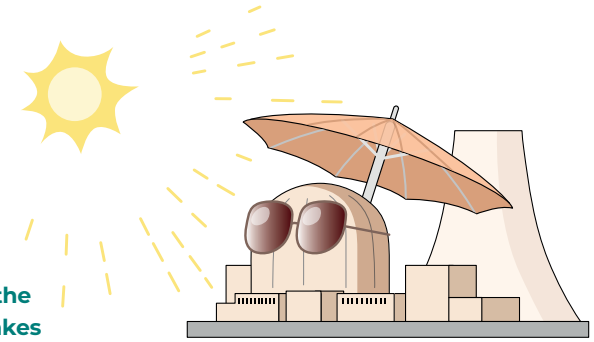
Although the 1,300 MWe reactors are very similar to those of 900 MWe, there are also a number of specific features that must be pointed out.

Apart from the power of the reactors, we should for example mention the containment* which has a double wall on the 1,300 MWe reactors, whereas it only has a single wall on the 900 MWe reactors.

The particularities of the 1,300 MWe reactors are taken into account during the studies carried out on the occasion of their 4th periodic safety review*, whether to guarantee management of equipment ageing or to improve the safety of the installations.

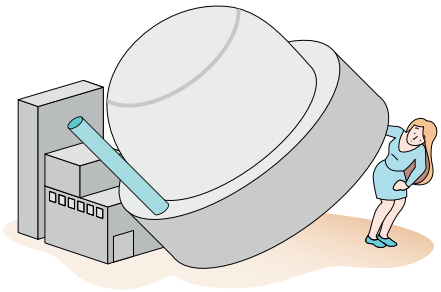


Does the 4th periodic safety review of the 1,300 MWe reactors take account of climate change?



EDF periodically assesses possible changes in the hazards resulting from climate change and makes sure that these changes are not likely to compromise the protection of the NPPs. The 4th periodic safety review* will lead EDF to reinforce its NPPs so that they can withstand more intense climatic hazards. For example, within the framework of this review, EDF studies the ability of the installations to withstand higher temperature levels than those hitherto taken into account.

Following their 4th periodic safety review*, will the 1,300 MWe reactors be just as safe as the new generation reactors?



The safety objectives of the Flamanville EPR* reactor have been taken as the reference for the continued operation of the 1,300 MWe reactors beyond 40 years. On completion of the review, there will still be differences between the level of safety of the EPR* reactor and that of the 1,300 MWe reactors. This is because there are differences in design, such as the more favourable layout of the various EPR* reactor buildings, the protection of the fuel storage pool building, or the safety systems designed to cope with an accident.

Nevertheless, the 4th periodic safety review* will bring the level of safety of the 1,300 MWe reactors closer to that of the third generation reactors. EDF in particular plans to reinforce the electrical power and cooling supplies and the protection of the reactors against hazards of extreme intensity. The safety review will enable the radiological consequences of accidents to be reduced. It will also lead EDF to deploy safety improvements derived directly from the new generation reactors: this is for example the case with the function for stabilising and cooling the corium* inside the reactor containment*.

* See glossary page 21

GLOSSARY

Advisory Committee of Experts (GPE): created and convened at ASN's request, the GPEs issue an opinion on certain technical files with particularly high potential consequences prior to decisions being taken. The GPEs consist of experts appointed individually for their competence and are open to civil society. Their members come from industrial, university and association backgrounds and from expert assessment and research organisations.

Anccli: National Association of Local Information Committees and Commissions. The Anccli comprises the 35 Local Information Committees (CLIs) in France. By ensuring regular monitoring and issuing clarifications and information that can be readily understood by the general public, Anccli helps give the CLIs the means to fulfil their public information duties. It is also heavily involved in the discussion and exchange bodies set up by its partners (HCTISN, ASN, IRSN, etc.).

CLI: Local Information Committee. A CLI is set up for each nuclear power plant and brings together the licensee, ASN, the representatives of the local authorities in the vicinity of the plant and the local residents, along with representatives of the State and members of associations.

Containment: leaktight concrete shell containing the reactor vessel, the reactor coolant system, the steam generators and the main elements important for safety in a pressurised water reactor. The containment of the 1,300 MWe reactors has two walls: the inner pre-stressed concrete wall and the outer reinforced concrete wall. Leaktightness is provided by the inner wall and by a ventilation system which, between the two walls, collects and filters residual leaks from the inner wall before discharge. Resistance to external hazards is primarily provided by the outer containment wall.

Corium: mass of molten fuels and nuclear reactor core structural elements mixed together, which could form in the event of a severe accident.

EPR: European Pressurised Reactor (now renamed Evolutionary Power Reactor). New type of nuclear reactor incorporating numerous improvements in terms of safety, fuel use and economic operation. In France, one EPR reactor is located in Flamanville.

HCTISN: High Committee for Transparency and Information on Nuclear Security. Information, consultation and debating body concerning the risks linked to nuclear activities.

Hydraulic test: required every 10 years by the regulations, the hydraulic test is an overall strength test which involves subjecting the system to a pressure 20% higher than its design pressure.

IRSN: Institut de Radioprotection et de Sûreté Nucléaire - French Institute for Radiation Protection and Nuclear Safety. The IRSN more particularly provides ASN with expert technical support.

Licensee (nuclear): natural or legal person operating a Basic Nuclear Installation (BNI), or having submitted a creation authorisation application with a view to operating such an installation.

Nuclear Installation: Installation which, due to its nature or the quantity or activity of the radioactive substances it contains, is governed by a particular regulatory system, defined by the Environment Code and the Order of 7 February 2012.

Periodic safety review: in-depth examination of a nuclear facility, stipulated by the regulations to take place every 10 years, designed to ensure the conformity of the facilities, management of the ageing of the facility's components (materials, equipment, systems, etc.) and to raise their level of safety. This review may lead to major works in those areas in which the regulatory and technical requirements have changed significantly.

Plant series: reactor model with specified characteristics; a plant series refers to all the reactors of a given model, which are identical.

PTR-bis: spent fuel pool additional diversified and semi-mobile cooling system. It primarily uses mobile equipment brought in and operated by the Rapid Response Nuclear Taskforce (FARN). All the mobile equipment is designed to allow for simplified transport and on-site deployment and to ensure rapid start-up of the system.

Public inquiry: participative procedure enabling the public to find out about a project liable to have consequences for the population and the environment and to submit observations. For example, the creation or decommissioning authorisation applications for a nuclear installation are the subject of a public inquiry, along with the conclusions of the periodic safety review after the 35th year of operation of a nuclear power reactor.

Ten-yearly outage: lengthy reactor outage (about five months) during which the licensee carries out checks and modifications in order to reinforce the safety level. The ten-yearly outage is one step in the periodic safety review and leads to a concluding report sent to ASN.

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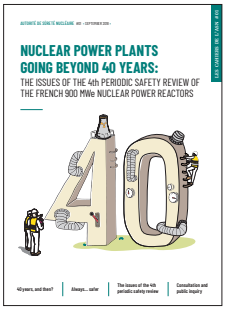

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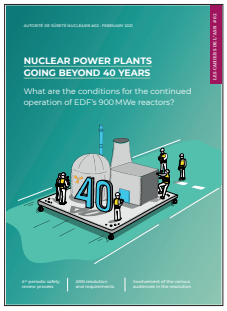

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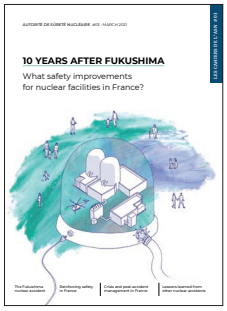

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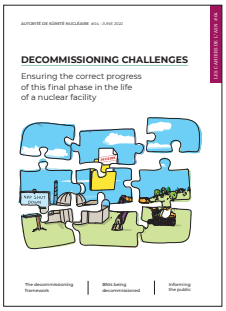

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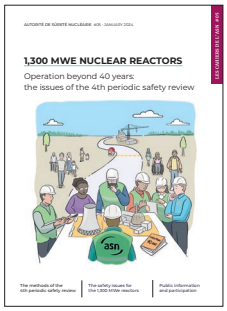

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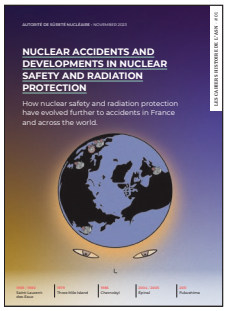

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