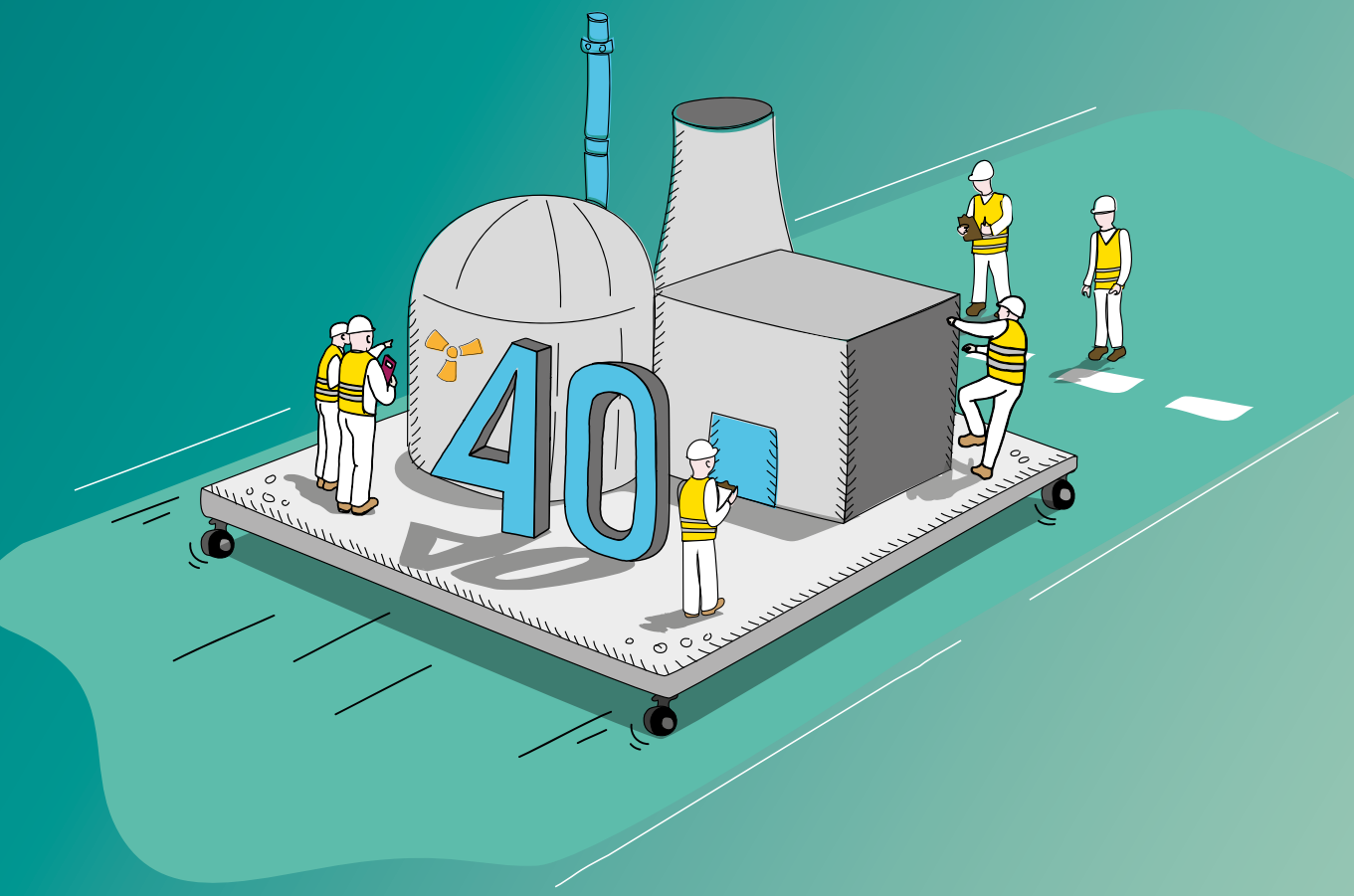
AUTORITÉ DE SÛRETÉ NUCLÉAIRE #02 • FEBRUARY 2021

LES CAHIERS DE L'ASN #02

NUCLEAR POWER PLANTS GOING BEYOND 40 YEARS

What are the conditions for the continued operation of EDF's 900 MWe reactors?



4th periodic safety review process

ASN resolution and requirements

Involvement of the various audiences in the resolution

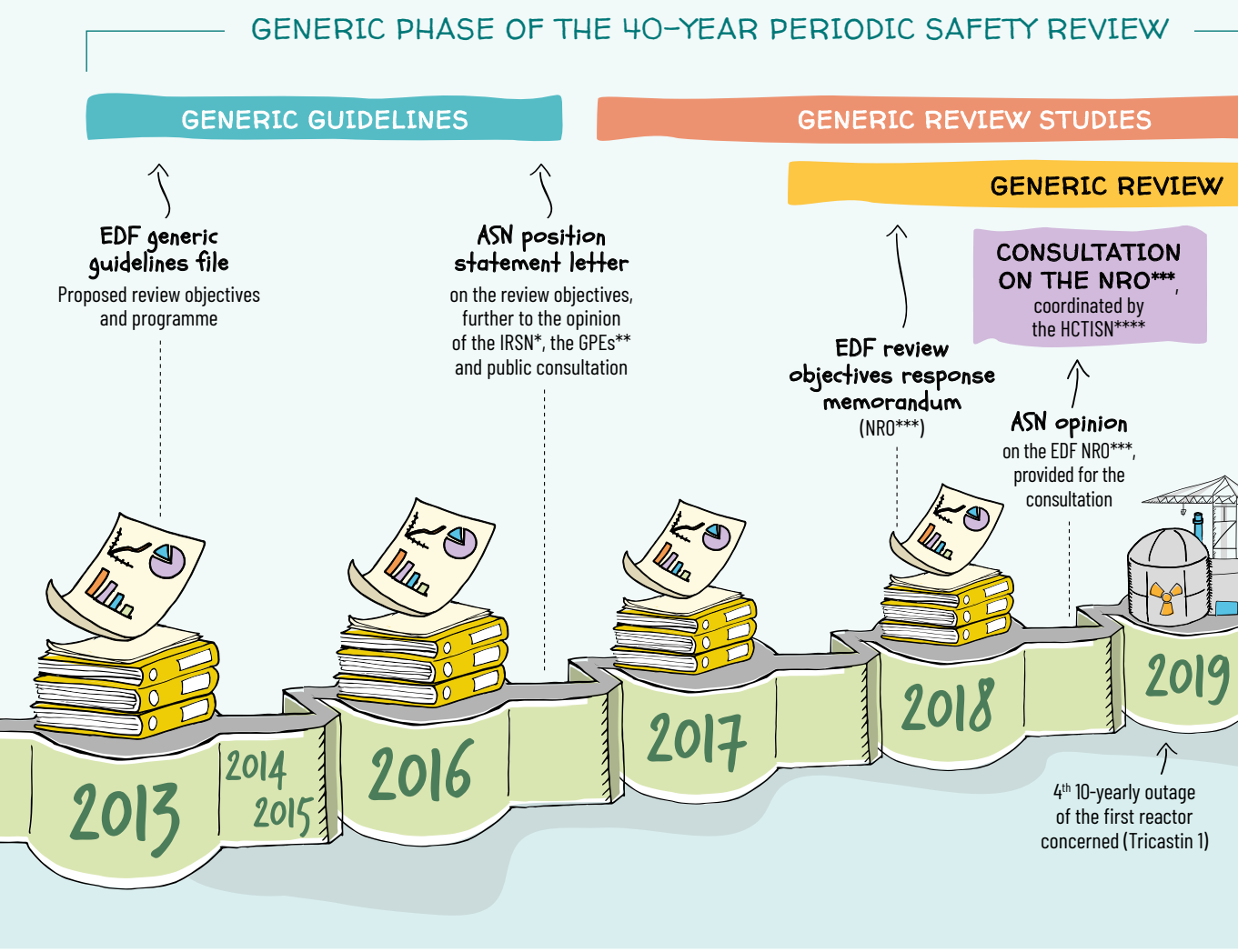
Contents

EDF's 32 reactors of 900 MWe are the oldest reactors in operation in France. After 40 years of service, can their continued operation be considered and under what conditions?

As the operator of its reactors, **EDF** must implement programmes for the inspection and improvement of the safety of its facilities.

As the independent Authority tasked with the oversight of nuclear safety, **ASN** is responsible for determining the conditions for their continued operation.

In the following pages, ASN reports on its conclusions and the resolution it has taken for all the 900 MWe reactors in service, after completing a rigorous review and consultation process.



The periodic safety review

Why have periodic safety reviews?

In France, the authorisation to create a nuclear facility is issued by the Government, after consulting ASN. This authorisation is issued for an unlimited duration, and the facility undergoes an in-depth "periodic safety review" every ten years to assess the conditions for continued operation of the facility for the following ten years.

In the course of the periodic safety review, 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.

How are they conducted?

The periodic safety reviews of the 900 MWe reactors are carried out in two complementary phases: **a first "generic" phase common to all the reactors, as they are all designed to a similar model, and a second "specific" phase which takes into account the characteristics specific to each facility,** particularly their geographical location.

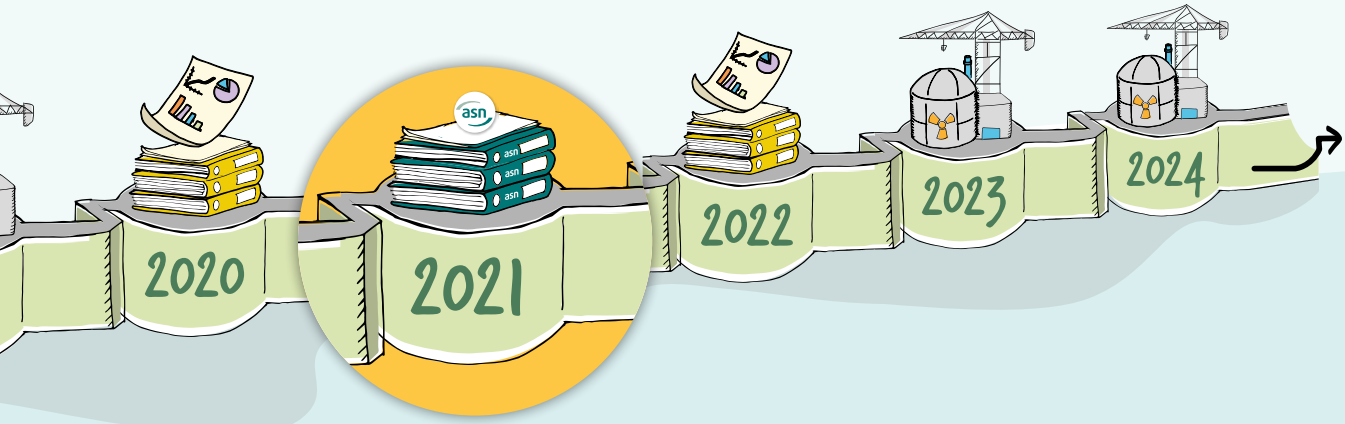
SPECIFIC PHASE

This phase, which is specific to each facility, is described on page 7

RESULTS

ASN resolution
on the generic phase further to the opinion of IRSN*, the GPEs** and consultation of the public

Generic ASN requirements



* *Institut de Radioprotection et de Sûreté Nucléaire* - French Institute for Radiation Protection and Nuclear Safety
** *Groupes Permanents d'Experts* - Advisory Committees of Experts
*** *Note de Réponse aux Objectifs* – Objectives response memorandum
**** *Haut Comité pour la transparence et l'information sur la sécurité nucléaire* High Committee for Transparency and Information on Nuclear Safety

ASN made a position statement on the objectives of the safety review in 2016. To develop its position, in 2014 and 2015 it consulted its technical support organisation, IRSN (Institute for Radiation Protection and Nuclear Safety) and the Advisory Committees of Experts – as it does regularly – for their opinions. It also consulted the public.

ASN then examined the generic studies of the safety review and again consulted IRSN, the Advisory Committees of Experts and the public for their opinions. ASN also took part in the national consultation on the subject coordinated by the HCTISN (High Committee for Transparency and Information on Nuclear Safety) in 2018 and 2019.

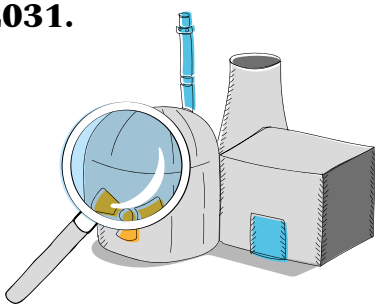
Today ASN states its requirements for the works that will be required in the 900 MWe reactors as a whole. The resolution setting out these requirements underwent a public consultation and was discussed beforehand with the stakeholders (licensees, local information committees, environmental associations, etc.) in 2020 and 2021.

The periodic safety reviews **schedule**

The 4th periodic safety reviews of the 900 MWe reactors are scheduled by EDF to run between 2020 and 2031.

The 900 MWe reactors were put into service between 1977 and 1987.
The 4th periodic safety review of each reactor will take place 10 years after its 3rd safety review. However, it does not always take place in the fortieth year of reactor operation on account of the time lags resulting from the first reviews.

Reactor 1 of the Tricastin nuclear power plant (NPP) was the first to undergo its 3rd periodic safety review, therefore it was the first reactor to undergo its 4th periodic safety review, which took place in 2020.



THE PERIODIC SAFETY REVIEWS SCHEDULE UNTIL 2031

2020
- Tricastin 1

2021
- Bugey 2
- Bugey 4
- Tricastin 2

2022
- Bugey 5
- Blayais 1
- Dampierre 1
- Gravelines 1
- Dampierre 2

2023
- Gravelines 3
- Tricastin 3

2024
- Bugey 3
- Blayais 2
- Dampierre 3
- Gravelines 2
- Chinon B1
- Gravelines 4
- Saint-Laurent B2

2025
- Tricastin 4
- Dampierre 4
- Saint-Laurent B1
- Cruas 3

2026
- Blayais 3
- Blayais 4
- Cruas 1

2027
- Gravelines 5
- Chinon B2
- Cruas 4

2029
- Cruas 2

2030
- Chinon B3
- Gravelines 6

2031
- Chinon B4

Ten-yearly outage:
Long reactor outage (about 6 months) during which the licensee carries out checks and modifications in order to reinforce the level of safety. The ten-yearly outage is one step in the periodic safety review leading to the submission of a concluding report to ASN.

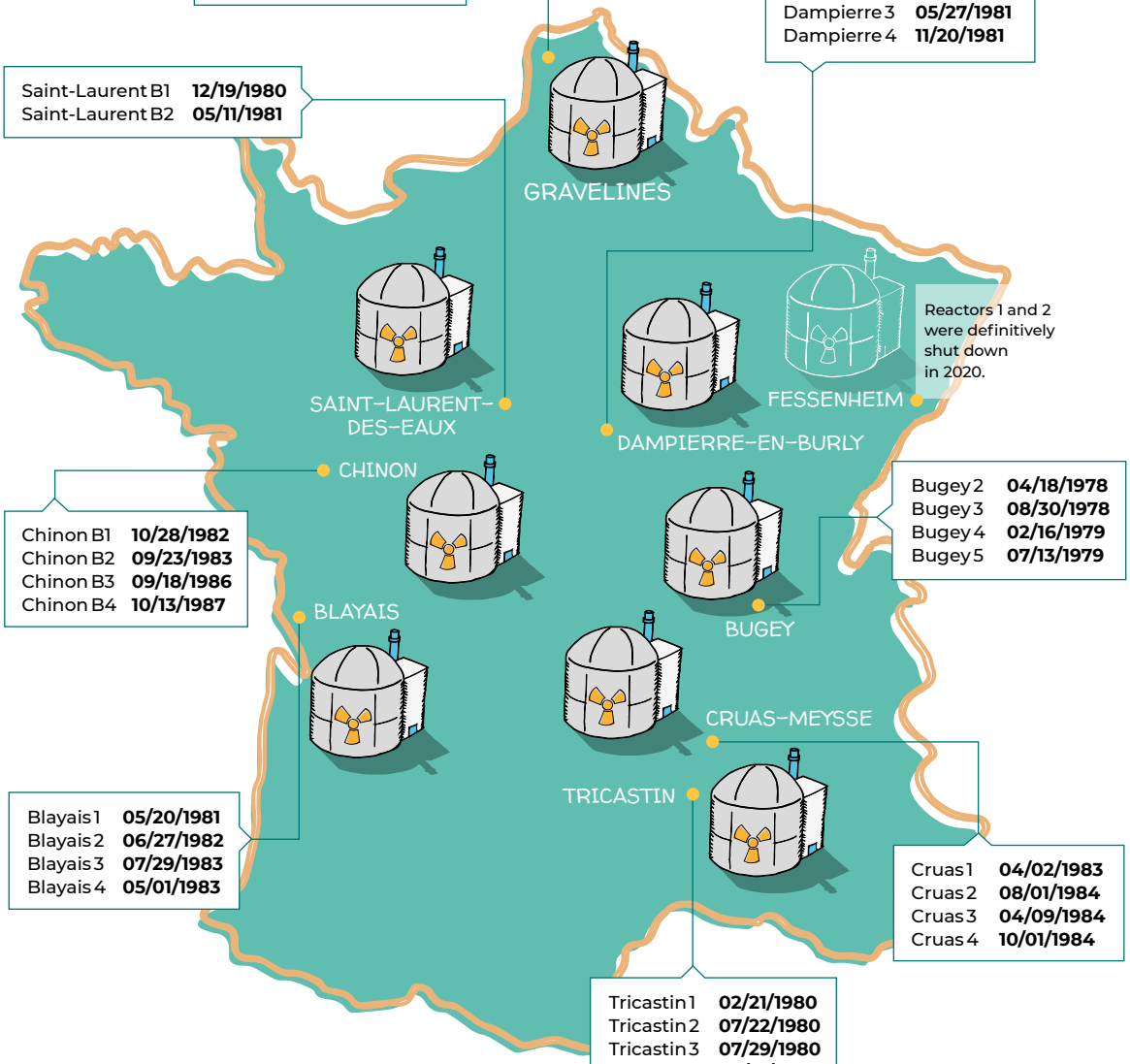
WHAT THE LAW SAYS

The 10-year frequency for the periodic safety reviews of nuclear facilities was introduced by the Act on transparency and security in the nuclear field ("TSN" Act) of 2006.

All basic nuclear installations (BNI) on French territory are subject to this regulatory requirement.

900 MWe REACTOR START-UP DATES

32 reactors concerned



Work to enhance safety

ASN asks EDF to carry out the majority of the safety improvements before submitting the safety review concluding report for each reactor, which in practice means during the 10-yearly outage of each reactor. The other improvements must be carried out within 5 years at the most after submitting this report. For the majority of the reactors, EDF plans performing this work within 3 years following submission of the concluding report.

These time frames are extended for the first reactors to undergo their periodic safety review on account of the necessary preparation time. More specifically, all the improvements must be carried out within 6 years for the Tricastin 1 and 2, Bugey 2, 4 and 5, Gravelines 1 and Dampierre 1 reactors.

This staggering is linked to the scale of the works on each reactor, which will moreover be carried out concurrently on several 900 MWe reactors. It takes into account the ability of the industrial fabric to conduct the works with the required standard of quality and the associated training necessary for the operators to familiarise themselves with these changes.

Other requirements have a deadline that is common to all the reactors. For example:

End 2024: special tests on the Blayais, Chinon, Cruas-Meysse, Dampierre-en-Burly, Gravelines, Saint-Laurent-des-Eaux and Tricastin reactors

End 2024: reassessment of organisational and human factors

End 2025: special tests on the Bugey reactors

End 2027: replacement of heat insulation that could release fibres in the event of a break in the primary system containment

Year N+5

Year N+4

Complementary safety improvements required by ASN:

- Completion of deployment of the "hardened safety core", protection against extreme hazards
- Steam generator ultimate auxiliary feedwater system
- Injection at reactor coolant pump (RCP) seals
- Management of contaminated water

Year N+3

Year N+2

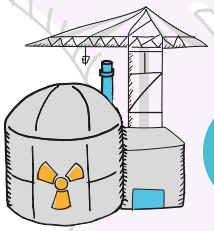
ASN resolution on the continued operation of the reactor concerned

Year N+1

Public inquiry

Year N

Submission of the periodic safety review concluding report to ASN by EDF



Year N-1

10-yearly outage

Major part of the checks on compliance with the safety baseline requirements:

- Primary system hydrostatic pressure test
- Containment test
- Verification of safety-important systems or environmental protection-important systems
- Correction of the detected deviations

Major part of the safety improvements:

- Additional spent fuel pool cooling system
- Ultimate heat sink system
- Reduction of iodine releases in accident situations
- Improved protection against certain hazards (fire, explosion, flooding, earthquake, etc.)

At the end of the 4th periodic safety review, what does the ASN resolution stipulate?

The generic phase of the 4th periodic safety review of the 900 MWe reactors ended late 2020. ASN sets out the inspections and modifications EDF must implement on its reactors to meet the safety review objectives.

ASN underlines the ambitious objectives of the 4th periodic safety review of the 900 MWe reactors and the substantial work carried out by EDF in the generic phase.

It also underlines the scale of the modifications planned by EDF, the implementation of which will represent significant safety improvements.

These improvements more particularly concern control of the risks associated with hazards (fire, flooding, earthquake, etc.), the safety of the spent fuel storage pool and the management of core meltdown accidents.

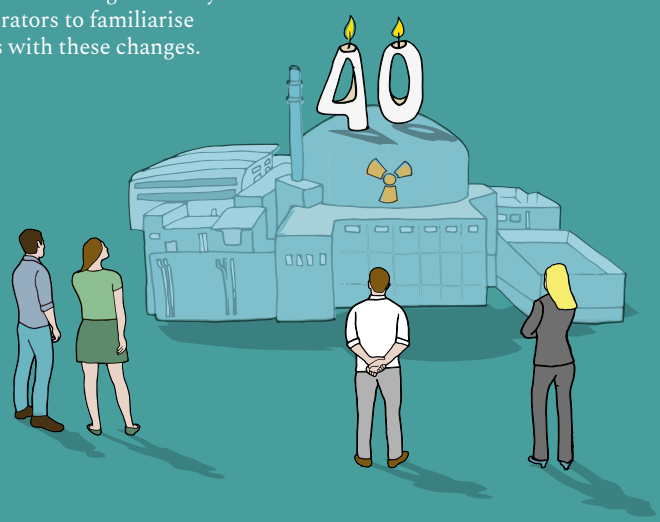
During the examination, EDF undertook to supplement its technical file to respond to the majority of the points raised by ASN.
Finally, ASN prescribes the implementation of the major safety improvements planned by EDF, along with certain additional measures it considers necessary to achieve the safety review objectives. The measures planned at the generic stage of the safety review and those that will be defined in the studies specific to each site, will have to be applied on each reactor with a view to their continued operation.

ASN asks EDF to carry out the majority of the safety improvements before submitting the safety review concluding report, which in practice means during the 10-yearly outage of each reactor.

The other improvements must be carried out within 5 years at the most after submitting this report. This time frame is increased to 6 years for the first reactors, namely Tricastin 1 and 2, Bugey 2, 4 and 5, Gravelines 1 and Dampierre 1. This staggering is linked to the scale of the works on each reactor, which will moreover be carried out concurrently on several 900 MWe reactors. It takes into account the ability of the industrial fabric to conduct the works with the required standard of quality and the associated training necessary for the operators to familiarise themselves with these changes.

Given the scale of the modifications envisaged under the safety review, EDF has put in place specific organisational arrangements to improve the activities of modification design and embodiment, production of the operational documentation and capitalising on the lessons learned from experience feedback.

ASN requires EDF to report annually on the actions implemented to meet the requirements and their deadlines, and also on the industrial capability of both EDF and its outside contractors to complete the modifications of the facilities within the set time frames. ASN requires that this information be made public.



At the end of the generic phase of the safety review, ASN considers that all the measures planned by EDF combined with those prescribed by ASN open the prospect of continued operation of the 900 MWe reactors for the 10 years following their 4th periodic safety review.

ASN considers that the measures planned by EDF, supplemented by the replies to the requirements formulated by ASN, will make it possible to achieve the safety review objectives and bring the level of safety of the 900 MWe reactors close to that of the most recent reactors (third generation), in particular:

- **by verifying, over a wide perimeter, the compliance of the reactors with the safety rules** applicable to them *(see page 10)*;
- **by improving the way potential hazards** (earthquake, flooding, explosion, fire, etc.) **are taken into account.** The reactors will also be able to withstand more severe hazards than those considered until now *(see page 12)*;
- **by improving the provisions for managing spent fuel pool accident situations** *(see page 14)*;
- **by reducing the risk of a core meltdown accident and mitigating the consequences of this type of accident,** particularly by limiting situations that would necessitate depressurisation of the containment and by reducing the risk of containment basemat melt-through by the "corium" consisting of molten nuclear fuel, steel and concrete. These measures will thus significantly reduce releases into the environment during this type of accident *(see page 16)*;
- **by mitigating the radiological consequences of the accidents studied in the safety report.** This will significantly reduce the occurrence of situations that involve implementing population protection measures (sheltering, evacuation, taking iodine tablets) *(see page 18)*;
- **by identifying the improvements enabling each site to reduce its environmental impacts** *(see page 19)*.

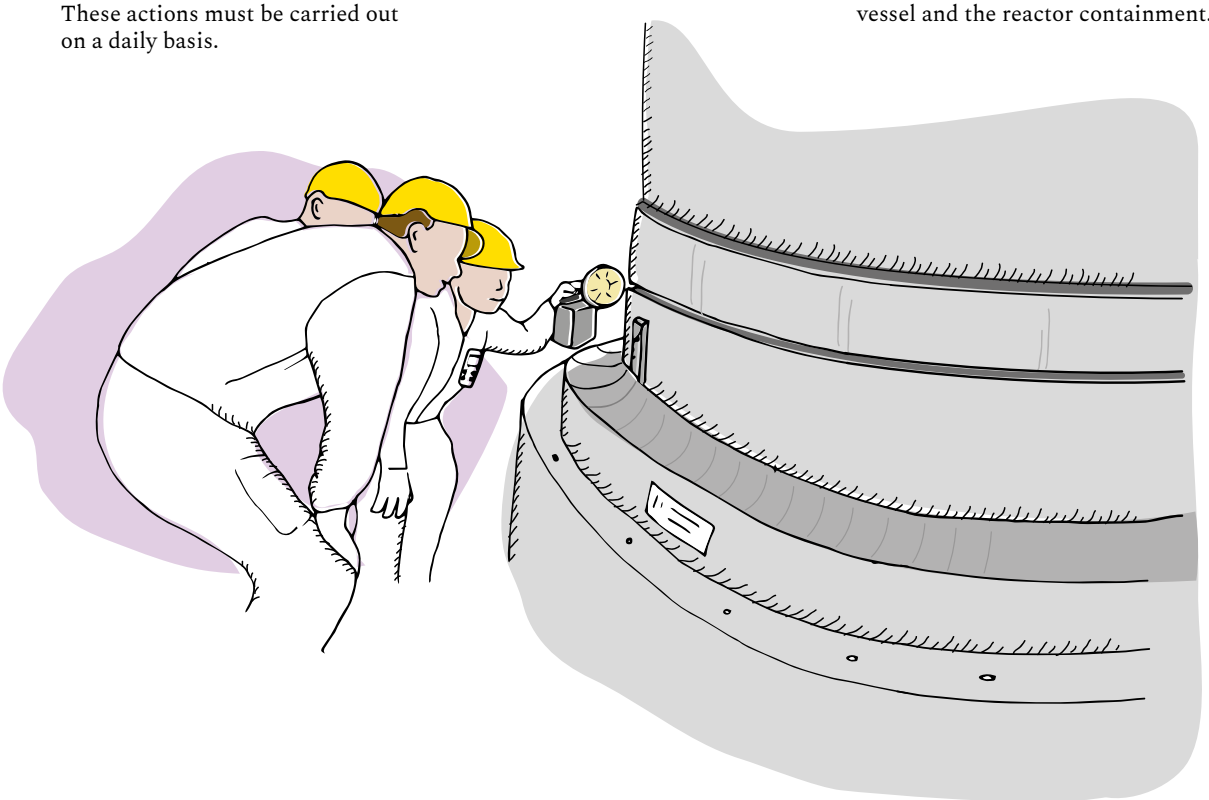
AGEING AND CONFORMITY OF THE FACILITIES

Why is it important to manage ageing and ensure the conformity of the facilities?

The actions that contribute to the management of ageing and the conformity (surveillance, maintenance, inspection, addressing detected deviations, replacement of equipment) serve to ensure that the facilities comply with their safety baseline requirements, that is to say all the **rules governing the safe operation of the facility**. These actions must be carried out on a daily basis.

The conformity of the reactors is vital for their safe operation. Verifying compliance with the baseline safety requirements is a fundamental objective of the periodic safety reviews.

At the time of their 4th periodic safety review, the reactors will have been in operational service for about forty years. Their continued operation beyond this safety review requires **the updating of design studies and equipment replacements.** Particular attention must be paid to the on-replaceable components such as the reactor vessel and the reactor containment.



What measures are planned by EDF?

The 4th periodic safety review provides the opportunity to re-examine the conformity of certain items of equipment or systems, such as the electrical power sources.

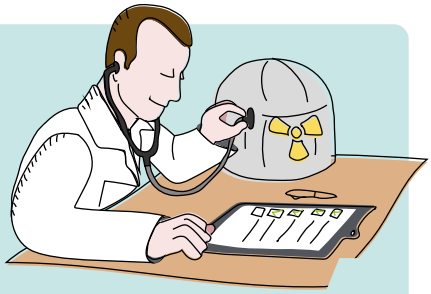
EDF has planned to implement a reactor **conformity review programme** that will, among other things, allow the application of the existing preventive maintenance programmes to be verified. EDF has moreover supplemented its actions by having multidisciplinary teams conduct field visits in certain premises containing systems that are necessary in accident situations.

For the management of equipment ageing and obsolescence, EDF has put in place:
- a generic analysis of ageing and its consequences;
- a local analysis specific to each reactor conducted during its 10-yearly outage.

EDF has substantiated **the ability of the reactor vessels** that display no defects to function for the 10 years following their 4th ten-yearly outage, taking into account the development of material characteristics. Inspections to check there are no prejudicial defects in the steel shall be carried out during the 10-yearly outage of each reactor. Certain reactor vessels whose past inspections have revealed manufacturing defects shall undergo specific studies prior to the 10-yearly outage of each reactor concerned.

Lastly, **EDF has undertaken to remedy previously identified deviations impacting safety** by the 4th ten-yearly outage of each reactor at the latest. The deviations detected during the ten-yearly outage will be corrected as soon as possible, taking account of their **significance for safety**.

THE ASN RESOLUTION



The EDF programme to manage ageing and verify the conformity of its reactors, supplemented by measures demanded by ASN, is satisfactory. It will enable the objectives targeted for the safety review to be achieved.

ASN nevertheless asks EDF, in addition to the measures planned initially:

- **to perform additional tests** to check the operation of certain systems necessary in accident situations, such as the steam generator auxiliary feedwater system;
- **to speed up deployment of the facility modifications** in order to ensure that the planned means for recirculating the borated water in the event of an accident will be able to fulfil their functions.

These points are set out as requirements in ASN resolution 2021-DC-0706 of 23 February 2021.

EDF must be particularly attentive to application of the programme for verifying reactor conformity. ASN plans to **carry out specific inspections on each reactor on this account, particularly during the 10-yearly outage.**

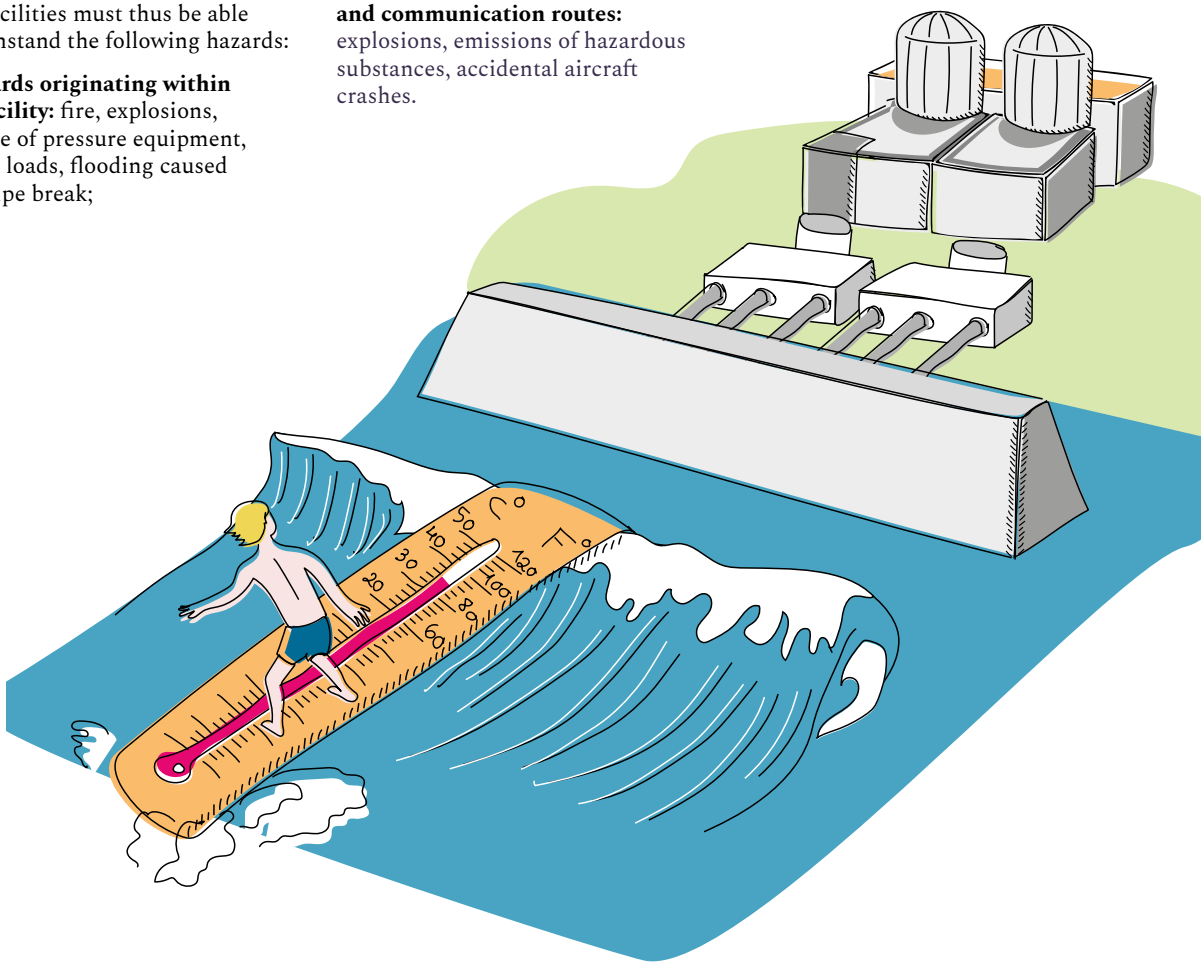
RISKS ASSOCIATED WITH HAZARDS

What hazards must the nuclear power plants be able to face up to?

The NPPs are designed to withstand various hazards which can originate both inside and outside the facility and lead directly or indirectly to damage to safety-important equipment and structures.

The facilities must thus be able to withstand the following hazards:

- **hazards originating within the facility:** fire, explosions, rupture of pressure equipment, falling loads, flooding caused by a pipe break;
- **hazards of natural origin:** earthquakes, lightning, flooding, extreme weather or climatic conditions such as heat waves and tornadoes;
- **hazards induced by the neighbouring industrial activities and communication routes:** explosions, emissions of hazardous substances, accidental aircraft crashes.



What measures are planned by EDF?

EDF has reassessed the severity of the hazards to consider in the light of developments in knowledge, and has substantiated that, in the event of a hazard, the reactor can be shut down and maintained lastingly in a safe state.

For hazards of climatic origin, EDF has put in place a surveillance system in order to collect data on heat waves and the rise in sea levels and to reassess the severity of the corresponding hazards.

This periodic safety review provides the opportunity to **deploy the "hardened safety core" of safety measures prescribed by ASN** in 2012 in the wake of the Fukushima NPP accident.

These measures will make it possible to withstand certain hazards (earthquake, flooding, etc.) of extreme intensity, going beyond the levels considered until now.

Most of the studies relative to hazards depend on the sites and will be completed during the safety review phase specific to each reactor. This is the case, for example, with the studies to reassess the earthquake resistance of the facilities.

The studies carried out so far have identified a number of necessary modifications, such as the removal of certain water entry routes in conditions of high-intensity rainfall, the installation of grids against projectiles caused by high winds, the installation of fail-safe devices for switching between the external electrical power sources in case of fire, and the addition of molecular hydrogen leak detection and neutralisation systems in the battery charging rooms, as hydrogen can cause an explosion.

EDF has moreover checked that the particular ambient environment conditions that could be created in a hazard situation are acceptable in the premises in which actions must be carried out. It has undertaken to supplement its demonstration concerning the ability to route resources to these premises and to carry out, in good time, the requisite actions for all accidents, including those leading to core meltdown.

THE ASN RESOLUTION

ASN underlines the substantial work carried out by EDF to update all the hazard studies, whether the hazards originate inside or outside the facility. The methods adopted by EDF to define the hazard levels are acceptable.
The modifications resulting from these studies represent a significant improvement in the control of the risks associated with hazards and will enable the objectives of the safety review to be achieved.

This being said, ASN considers that EDF must, in addition to the initially planned measures, integrate the following in the 4th periodic safety review of the 900 MWe reactors:

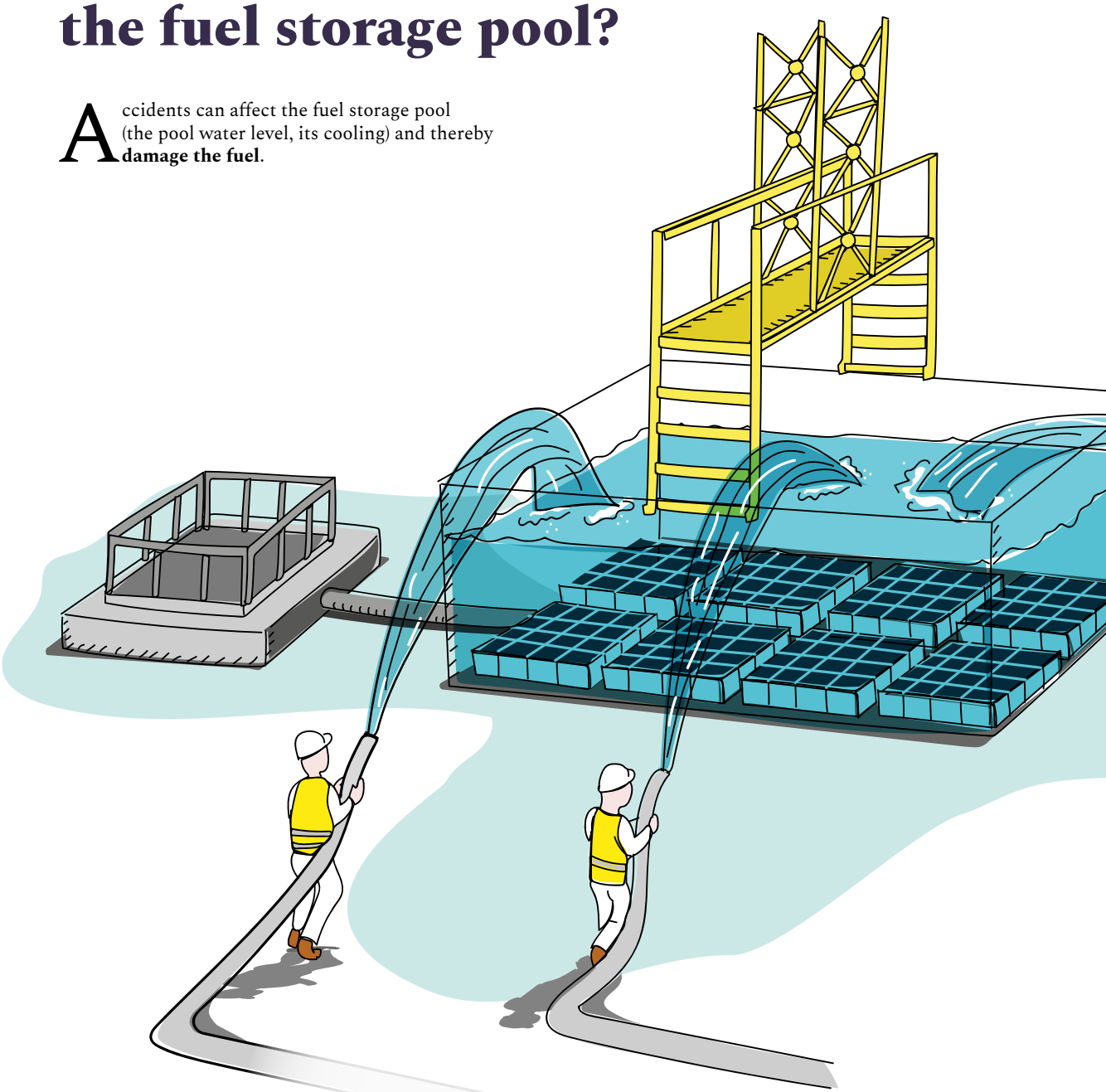
- **a study of the ability of the facilities to cope with even higher temperature levels;**
- **the identification of the most sensitive equipment items** whose resistance in the event of fire or explosion is essential for reactor safety, and the defining of measures to reduce the risk of their failure.

These points are set out as requirements in ASN resolution 2021-DC-0706 of 23 February 2021.

ACCIDENTS AFFECTING
THE FUEL STORAGE POOL

What are the consequences of accidents that can affect the fuel storage pool?

Accidents can affect the fuel storage pool (the pool water level, its cooling) and thereby **damage the fuel**.

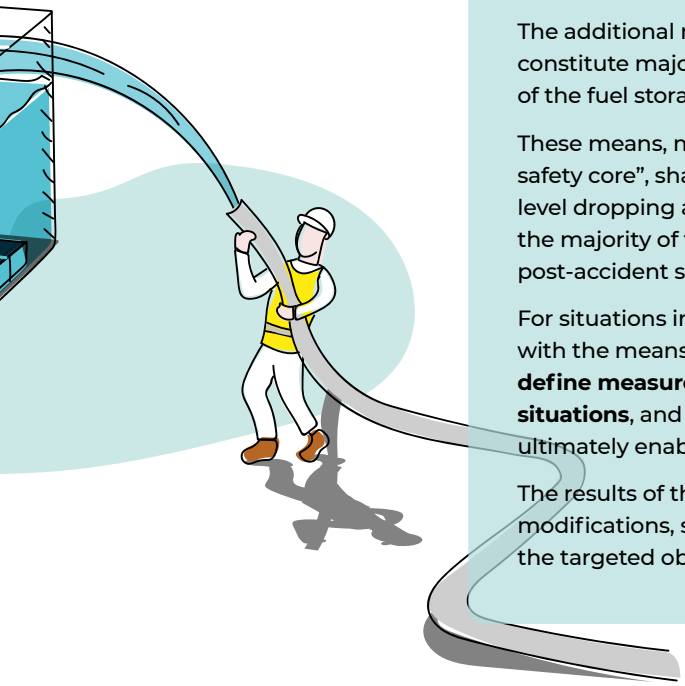


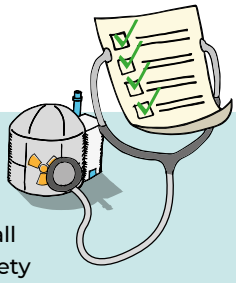
What measures are planned by EDF?

EDF has planned to put in place during the 10-yearly outage **a water make-up system** from a diversified ultimate water source and a complementary cooling system for the fuel storage pool.

EDF has widened the scope of the accident situations studied for the fuel storage pool. **These studies have led to modification proposals**, such as the addition of fire protection screens or automatic systems to close certain valves should the pool water level drop.

Lastly, EDF has demonstrated that **the accidental crash of a light aircraft does not call into question the cooling** of the fuel assemblies in the storage pool.





THE ASN RESOLUTION

The additional means planned by EDF shall constitute major improvements in the safety of the fuel storage pools.

These means, most of which are part of the “hardened safety core”, shall greatly reduce the risk of the pool water level dropping and exposing the fuel assemblies and, in the majority of the situations considered, shall enable a final post-accident state to be reached without pool boiling.

For situations in which such a state could not be reached with the means considered in the safety case, **EDF must define measures to improve the prevention of these situations**, and post-accident management measures that ultimately enable such as state to be reached.

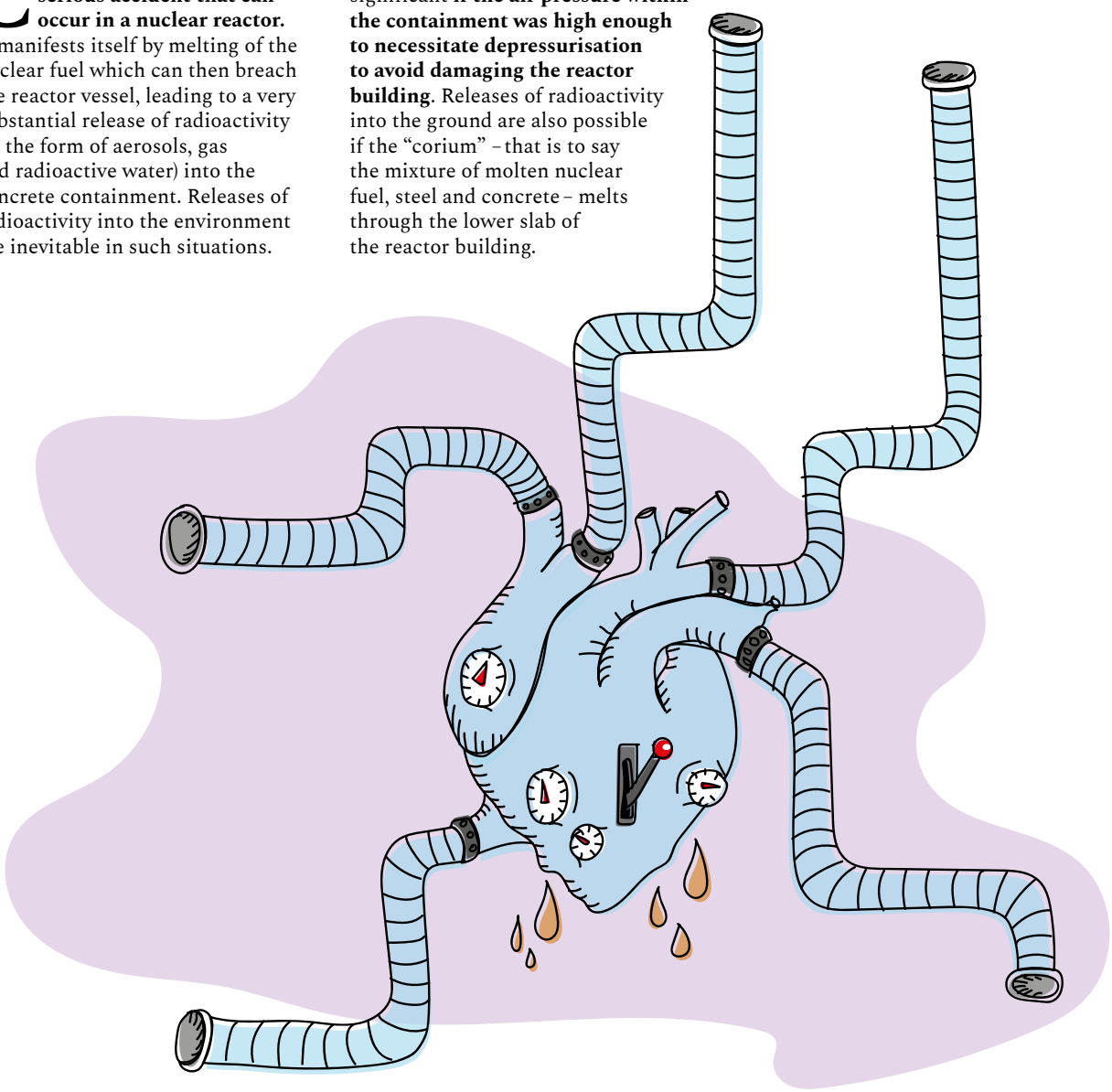
The results of the studies conducted by EDF and the planned modifications, supplemented by the ASN requests, will enable the targeted objectives of this safety review to be met.

ACCIDENTS
WITH CORE MELTDOWN

What is a core meltdown accident?

Core meltdown is the most serious accident that can occur in a nuclear reactor. It manifests itself by melting of the nuclear fuel which can then breach the reactor vessel, leading to a very substantial release of radioactivity (in the form of aerosols, gas and radioactive water) into the concrete containment. Releases of radioactivity into the environment are inevitable in such situations.

These releases would be particularly significant **if the air pressure within the containment was high enough to necessitate depressurisation to avoid damaging the reactor building**. Releases of radioactivity into the ground are also possible if the "corium" – that is to say the mixture of molten nuclear fuel, steel and concrete – melts through the lower slab of the reactor building.



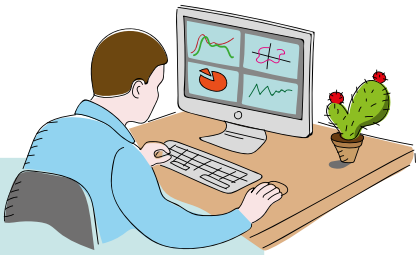
What measures are planned by EDF?

EDF has adopted the objective of preventing lasting environmental effects in the event of a core meltdown accident. EDF has thus planned to modify its facilities in order to:

- **be able to remove the heat produced by the core to the exterior of the containment**, without it being necessary to depressurise the containment. This greatly reduces the releases of radioactivity into the atmosphere;
- **be able to cool the corium** that has melted through the reactor vessel in the bottom of the reactor building and avoid melt-through of the lower concrete slab. This limits the pollution of the groundwater.

EDF plans **setting up systems for managing such accidents more effectively.** This will involve putting in place, during the 10-yearly outage, new systems (including new pumps, new pipes, new heat exchangers) forming part of the "hardened safety core", modifications in the reactor pit and in certain neighbouring premises, along with the mobile means deployed by EDF's Nuclear Rapid Intervention Force (FARN).

Lastly, EDF plans **taking measures to limit leaks of contaminated water** outside the reactor building and the fuel building in the event of an accident leading to core meltdown, and to have means for reducing contamination of the water present in the reactor building following an accident that has resulted in core meltdown. In order to limit the extent and duration of contamination should contaminated water leak outside the building, EDF shall also examine – for each site – the means of limiting the dispersal of radioactive substances outside the site, through the soil and the groundwater.



THE ASN RESOLUTION

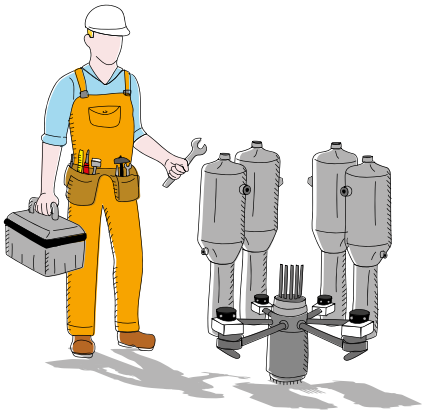
ASN underlines the very substantial work carried out by EDF on the mitigation of the consequences of accidents with core meltdown and the ambitious nature of the associated modifications programme. This programme will bring major progress in safety and meet the targeted objectives of this safety review.

Nevertheless, in the light of its examination, ASN considers that EDF must supplement the planned measures for managing an accident with core meltdown, more specifically by:

- **reinforcing certain concrete walls** in the premises in which the corium would spread;
- **means for injecting an additional volume of borated water** in the reactor building.

These points are set out as requirements in ASN resolution 2021-DC-0706 of 23 February 2021.

ACCIDENTS
WITHOUT CORE MELTDOWN



What is an accident without core meltdown?

An accident without core meltdown is an accident during which the nuclear fuel suffers little or no damage. It can nevertheless lead to releases of radioactivity into the environment. **Controlling such accidents can prevent core meltdown.**

The reactor safety case addresses both accidents resulting from a single failure (e.g. a primary system break) and accidents resulting from multiple and cumulative failures (e.g. loss of the site's internal and external electrical power supplies, known as "site blackout" – SBO).

What measures are planned by EDF?

EDF has planned updating its safety case in the light of developments in knowledge. It has set itself the objective of moving towards levels of radioactive releases into the environment that do not necessitate population protection measures (sheltering, evacuation, taking iodine tablets).

During the generic phase of the safety review, EDF re-examined all the studies associated with the different accident scenarios.

More specifically, **EDF has assessed the effects of physical phenomena not previously considered in the safety case,** such as deformation of the nuclear fuel assemblies.

EDF has planned to modify its facilities to mitigate the consequences of certain accidents. In particular, modifications are planned to limit the quantity of radioactive water released into the environment in the event of an accident involving steam generator tube rupture.

THE ASN RESOLUTION

The modifications planned by EDF will improve the management of incident and accident situations without core meltdown and therefore also improve the preventions of accidents with core meltdown.

They will lead to a reduction in the radiological consequences of the accidents studied in the safety case. This will significantly reduce the occurrence of situations requiring population protection measures.

EDF must further pursue its efforts to mitigate the radiological consequences of steam generator tube rupture accidents, which lead to the most significant radiological consequences.

The results of the studies and the modifications planned by EDF, supplemented by the measures requested by ASN, will enable the targeted objectives of this safety review to be met.

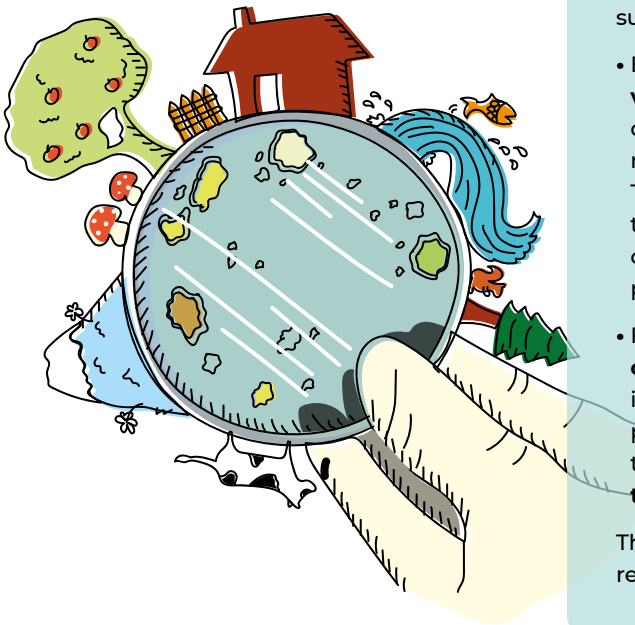
What impacts do the NPPs have on the environment?

Normal operation of the NPPs has impacts on the environment. These impacts stem in particular from water intakes, effluent discharges, noise and vibrations, airborne dust, odours, the dispersal of pathogenic microorganisms and the production of waste.
The environmental impacts are specific to each site.

What measures are planned by EDF?

The generic phase of the safety review **served to define the actions** that will be implemented for each reactor to review the **control of the environmental impacts**.

EDF has thus defined the scope of the verifications and studies to carry out, for example on the chemical and radiological status of the soils.



THE ASN RESOLUTION

ASN considers that the analysis and verification programme planned by EDF must be supplemented.

- EDF must in particular **conduct additional verifications** with respect to those performed during standard operation, particularly with regard to the best techniques available. These complements concern in particular the equipment involved in the treatment of effluents and the conditioning and packaging of waste.
- Furthermore, ASN has asked EDF to **consolidate the facility impact studies** in accordance with the form currently provided for by the Environment Code and to **identify improvements that will reduce the environmental impacts.**

These points are set out as requirements in ASN resolution 2021-DC-0706 of 23 February 2021.

Reactor inspections and safety improvements

The periodic safety review is materialised by a large-scale inspection of the facilities and improvements in the safety measures. This work will be subject to verifications on the ground by ASN in all the facilities concerned.

Improving protection against hazards

Substantial work shall be carried out on each NPP, such as the reinforcement of a flooding protection embankment, as we can see here.

Improving the safety of the fuel storage pools

Additional water make-up and cooling systems shall be introduced.

Check the primary system

The primary system of each reactor undergoes a hydrostatic pressure test. This resistance test consists in subjecting the primary system to a pressure that is 30% higher than its operating pressure.

Mitigate the consequence of a core meltdown accident

A new heat exchanger will remove the heat from the containment and cool down the corium.

Preparing the response to an accident situation

Additional connection points shall be provided to facilitate the intervention of the FARN team in the event of an accident, as shown here for pool cooling.

The citizens involved in the resolution

The various audiences – local information committees and environmental protection associations, the general public, etc. – have been involved in the development of the ASN resolutions on the continued operation of the 900 MWe reactors in France beyond 40 years.

Public CONSULTATION

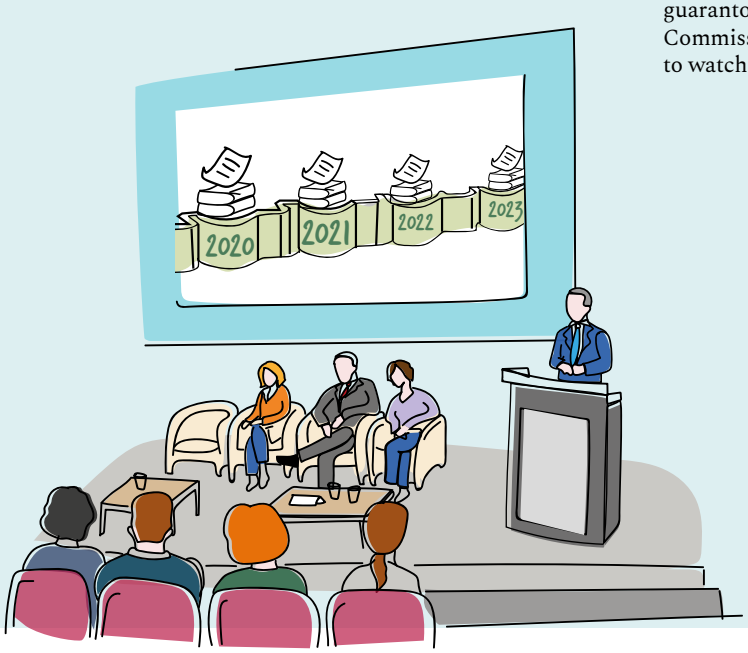
From September 2018 to March 2019

11 June 2019
Result of the public consultation

The HCTISN organised a 6-month public consultation on the measures proposed by EDF to improve the safety of its reactors in the context of their 4th periodic safety review.

This voluntary and unprecedented procedure mobilised EDF, the National association of local information committees and commissions (Anccli), ASN and IRSN.

Two guarantors chosen from the national list of guarantors established by the National Public Debates Commission (CNDP) were designated by the HCTISN to watch over the smooth running of the consultation.



13
public meetings

1,306
people attended the public meetings (meetings, workshops, mirror groups with students)

3,900
visits to the platform
concertation.suretenucleaire.fr

Calendar of actions involving the public and other audiences

2014 - 2016	Technical meetings under the auspices of Anccli and IRSN
2016	Public consultation on ASN's draft position statement on the periodic safety review guidelines
2016 - 2018	Technical meetings under the auspices of Anccli, IRSN and ASN (including a seminar in Valence)
2018 - 2019	**PUBLIC CONSULTATION** organised by the HCTISN
October 2020	Meeting organised by Anccli, IRSN and ASN during which IRSN presented the conclusions of its expert assessments
17 December 2020	Presentation of the draft ASN resolution to the stakeholders (Anccli, etc.)
3 December 2020 to 22 January 2021	**ON-LINE CONSULTATION** organised by ASN
23 February 2021	ASN resolution 2021-DC-0706

On-line CONSULTATION

From 3 December 2020 to 22 January 2021

23 February 2021
ASN resolution 2021-DC-0706

ASN created a dedicated space on its website to enable the public to consult its draft resolution.

The public were invited to give their opinions on this draft resolution.

1,235
comments published on *asn.fr*

ASN took the public's expectations and questions into consideration

- by making sure that the subjects raised had indeed been examined during the examination of the file (if they were part of the review process);
- by publishing on its website a summary of the comments and contributions from the public that accompany the ASN resolution;
- by modifying or clarifying some of the prescriptions of its resolution.

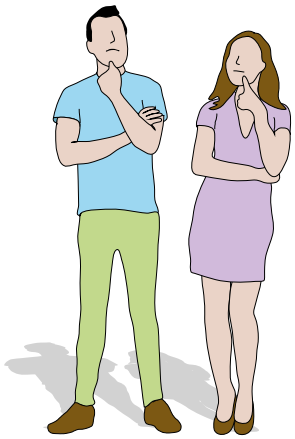
WHAT THE LAW SAYS

A public inquiry will then be held, reactor by reactor, after submission of the periodic safety review concluding report for each reactor.

Your questions, our answers

In the months preceding its formal presentation, the ASN resolution was the subject of extensive discussions with the stakeholders. The answers to the main questions raised by the public can be found in the examination report published on the ASN website. We answer some of these questions here.

Maintaining and transferring skills, training, management of subcontracting, quality of workers, etc. the challenges facing the French NPP licensee are very significant. Is it reasonable to ask as much of EDF?



Deployment of the 4th periodic safety review of the thirty-two (32) 900 MWe reactors represents a major challenge for EDF. **It will necessitate investment in human resources on the part of EDF and its subcontractors of a level not seen since the actual building of these reactors.**

During the safety review, ASN examined the provisions specifically made by EDF to take account of the organisational and human factors in the design and embodiment of the modifications.

ASN also prescribes performing the work on each reactor in two stages, firstly to allow for the capability of the industrial fabric to accomplish the work with the required standard of quality, and secondly to enable the operators to assimilate these major facility modifications in a stepwise manner.

Could ASN demand the shutting down of reactors if EDF cannot perform the required work?

If EDF considers that, for technical or economic reasons, it cannot implement ASN's requirements, the reactor will have to be shut down.

Does ASN have the means to enforce compliance with its requirements?

EDF must report annually to ASN about its industrial capability to carry out the required safety improvements within the set time frames. ASN also asks EDF to look ahead to the risks of drifting from schedule and to remedy any identified difficulties.

ASN has graded enforcement and penalty powers (formal notice, administrative fines, daily fines, ability to carry out seizure, take samples or require payment of a guarantee, etc.). It is ASN's responsibility to use them judiciously. **This is why ASN always tries to find out why a deadline cannot be met before making its decision.**

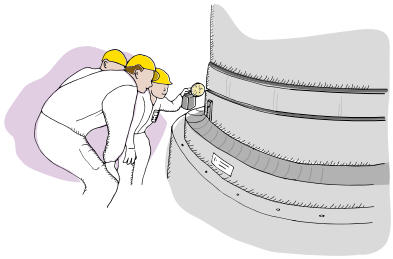
Numerous contributions from the public underlined the question of the closure of a number of nuclear reactors in France in the coming years.

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.
The definitive shutdown of a nuclear reactor for energy policy reasons is decided on by the Government and not by ASN.

Why does the 4th periodic safety review of some reactors not take place in their 40th year of operation?

In effect, the 4th safety review does not always take place after exactly 40 years. It depends on the time lags recorded in the first safety reviews. The 4th safety review takes place 10 years after the 3rd review of each reactor.

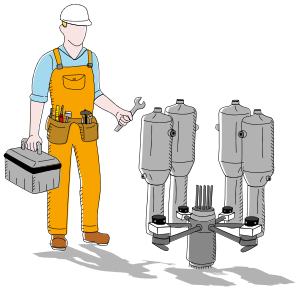
YOUR QUESTIONS, OUR ANSWERS



The ASN resolution on the generic phase of the periodic safety review is issued after a number of 900 MWe reactors have already undergone their 4th ten-yearly outage. Is this not too late?

The ten-yearly outage inspection is simply one of the steps in the periodic safety review. ASN's position statement on the generic phase of the periodic safety review comes well before its resolution on the continued operation of the first reactor concerned, that is to say Tricastin 1, which is planned for the end of 2022.

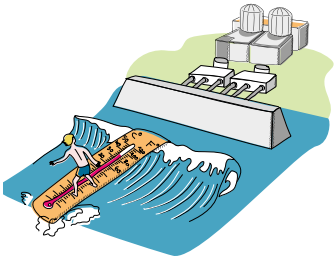
Following their 4th periodic safety review, will the 900 MWe reactors be just as safe as the new generation reactors?



The safety objectives of the new-generation reactors, such as the Flamanville EPR, have been taken as the reference for the continued operation of the 900 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 900 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 number of safety systems to cope with an accident.

Nevertheless, the 4th periodic safety review will bring the level of safety of the 900 MWe reactors closer to that of the third generation reactors. EDF has in particular planned 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 inspired directly from the new generation reactors:** this is the case for example with the function for stabilising and cooling the corium inside the reactor containment.



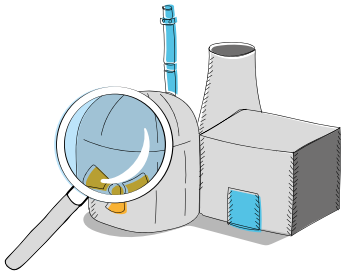
Will the safety review lead to improvements in the protection of the NPPs against the serious disruptions (floods, storms, heat waves, etc.) brought about by climate change?

EDF periodically assesses the possible developments of the hazards resulting from climate change and makes sure that these changes are not likely to call into question the protection of the NPPs.

In addition, the 4th periodic safety review will lead EDF to reinforce its NPPs so that they can withstand greater intensities of climatic hazards (tornadoes for example).

ASN also requires EDF to study the capacity of the facilities **to cope with even higher temperatures** than those considered until now.

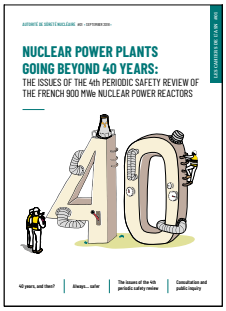
Will the public – the local information committees, people living and working near the NPPs, and beyond – be able to be informed of the work progress?

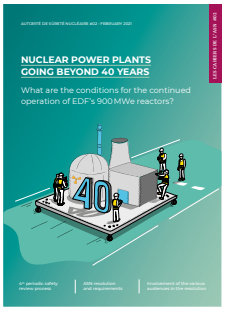


ASN requires EDF to report annually on its actions to satisfy ASN requirements **and asks that this report be made public.**

Can the ASN resolution and its requirements regarding the work to be carried out be used to select the 12 reactors to be definitively shut down by 2035?

The ASN resolution concerns the technical aspects common to all the 900 MWe reactors. It does not address the aspects specific to a reactor or a site. These will be addressed in the periodic safety review of each reactor.





Les cahiers de l'ASN can be downloaded from ***french-nuclear-safety.fr***

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This issue was produced with the **Nuclear power plants department (DCN)** of ASN.

Design and production: BRIEF

Illustrations: Jonathan Shalev/BRIEF

Photo credits: Hydrostatic pressure test (top right): ASN/DR – Pool (in centre): M. Demeure/MaxPPP
Pool cooling system (bottom right): EDF/DR – Heat exchanger (bottom centre): EDF/Cyril Crespeau
Embankment work (on left): EDF/DR

ISSN: 2648-7683 (on-line version)

Date of publication: February 2021

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