



Global Safety Enhancements

The French Nuclear Safety Authority (ASN)'s position

Jean-Luc LACHAUME
ASN/DDG

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- 1. The French Regulatory Body (ASN)**
- 2. The fulfilment of the objectives of the IAEA/Convention on Nuclear Safety**
- 3. Measures to improve safety**
- 4. Current challenges to improve safety**
- 5. Conclusion**

Established by Law as an independent Authority in June 2006

■ **Missions:**

- ✓ «On behalf of the State, ASN **supervises nuclear safety and radiation protection** in order to protect the **workers, the patients, the public and the environment** from the risks involved in the use of nuclear technology. It contributes to **informing the Public**»

■ **4 Values:**

- ✓ Competence
- ✓ Independence
- ✓ Strictness
- ✓ Transparency

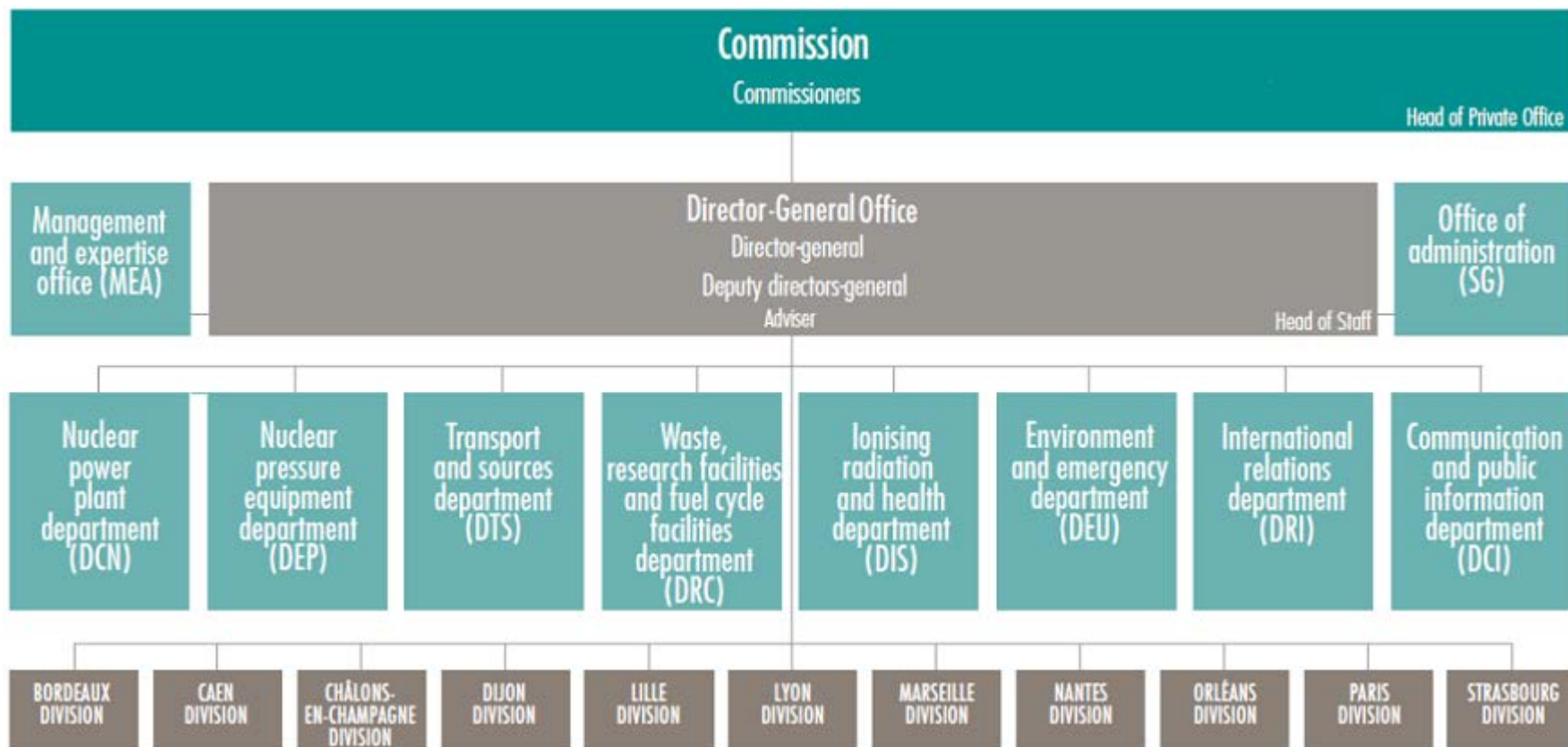
■ **ASN duties:**

- ✓ Regulations
- ✓ Authorisations
- ✓ Inspections/enforcement
- ✓ Public information
- ✓ Emergency preparedness and response

■ **Some principles:**

- ✓ Integrated view of nuclear safety and radiation protection
- ✓ Graduated approach
- ✓ Necessity of **continuous improvement of nuclear safety** using best available technology approach
- ✓ Rigour in decision making
- ✓ Openness
- ✓ International benchmark

The French Regulatory Body (ASN)



- The Commission guarantees the independence of ASN
- The Commission defines ASN's strategy, submits ASN opinions to the Government and issues ASN's main resolutions

■ **ASN's technical support bodies**

- ✓ **For major issues: advisory committees of experts**
 - Give opinions and recommendations → ASN resolutions
 - Comprise experts from university and associative backgrounds, as well as from the licensees
- ✓ **Institute for Radiation Protection and Nuclear Safety - IRSN**
 - Created by the law of 9th May 2001
 - Run and implement research programs to consolidate expertise and knowledge in the nuclear field and the associated risks
 - ASN main technical support organisation (TSO)

■ **Resources**










- ✓ **ASN staff:** about 500, half in headquarters (Paris suburbs), half in regional offices, including 230 nuclear safety inspectors. **ASN budget:** ~ 70M€(10Md¥)
- ✓ **IRSN :** about 400 persons within IRSN; **expertise costs:** ~ 80M€(11Md¥).

Supervision of nuclear activities: ~ 900 persons and ~ 150M€(21 Md¥)

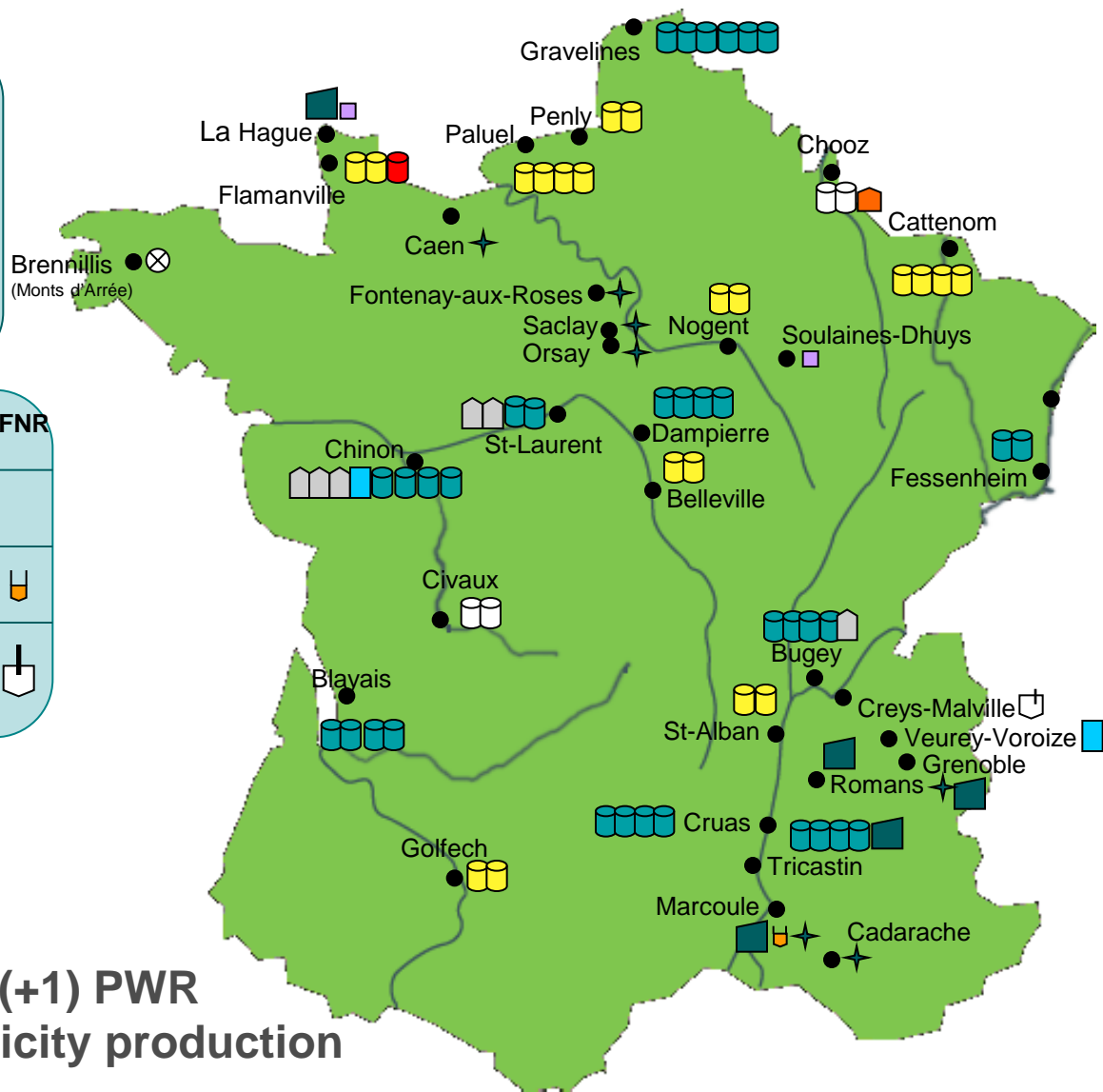
The French Regulatory Body

Regulated activities

-  **Fuel cycle**
(enrichment, fabrication, retreatment))
-  **Waste disposal sites**
-  **Research centers**
-  **Laboratories**

58 + 1PWR					Graphite Gaz	Gaz Eau lourde	1 FNR
300 MWe	900 MWe	1300 MWe	1450 MWe	1600 MWe			
							
							
							

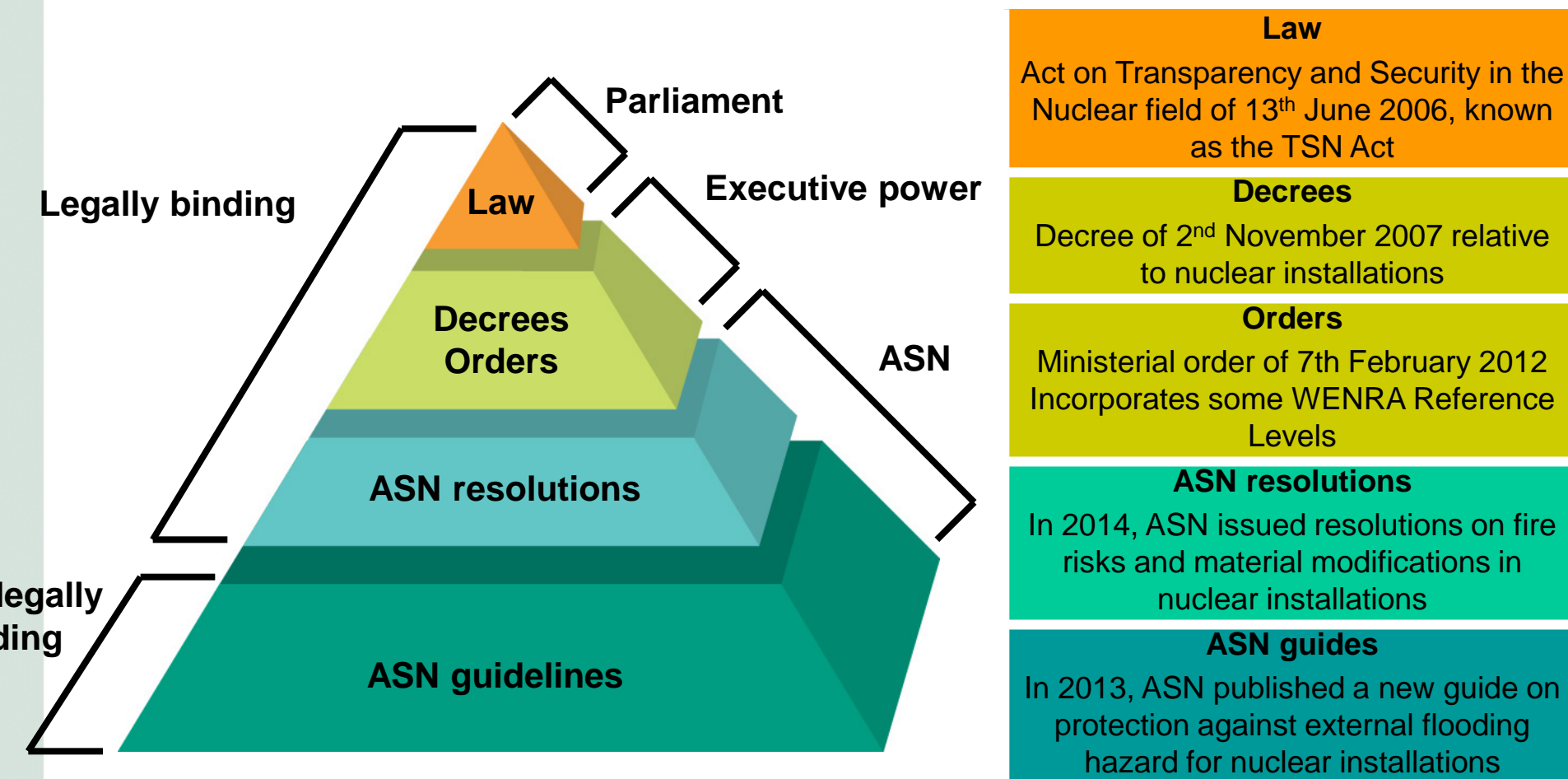
- Whole fuel cycle
- 4 major operators
- 1 manufacturer
- Standardized fleet of 58 (+1) PWR
- 80% of the French electricity production



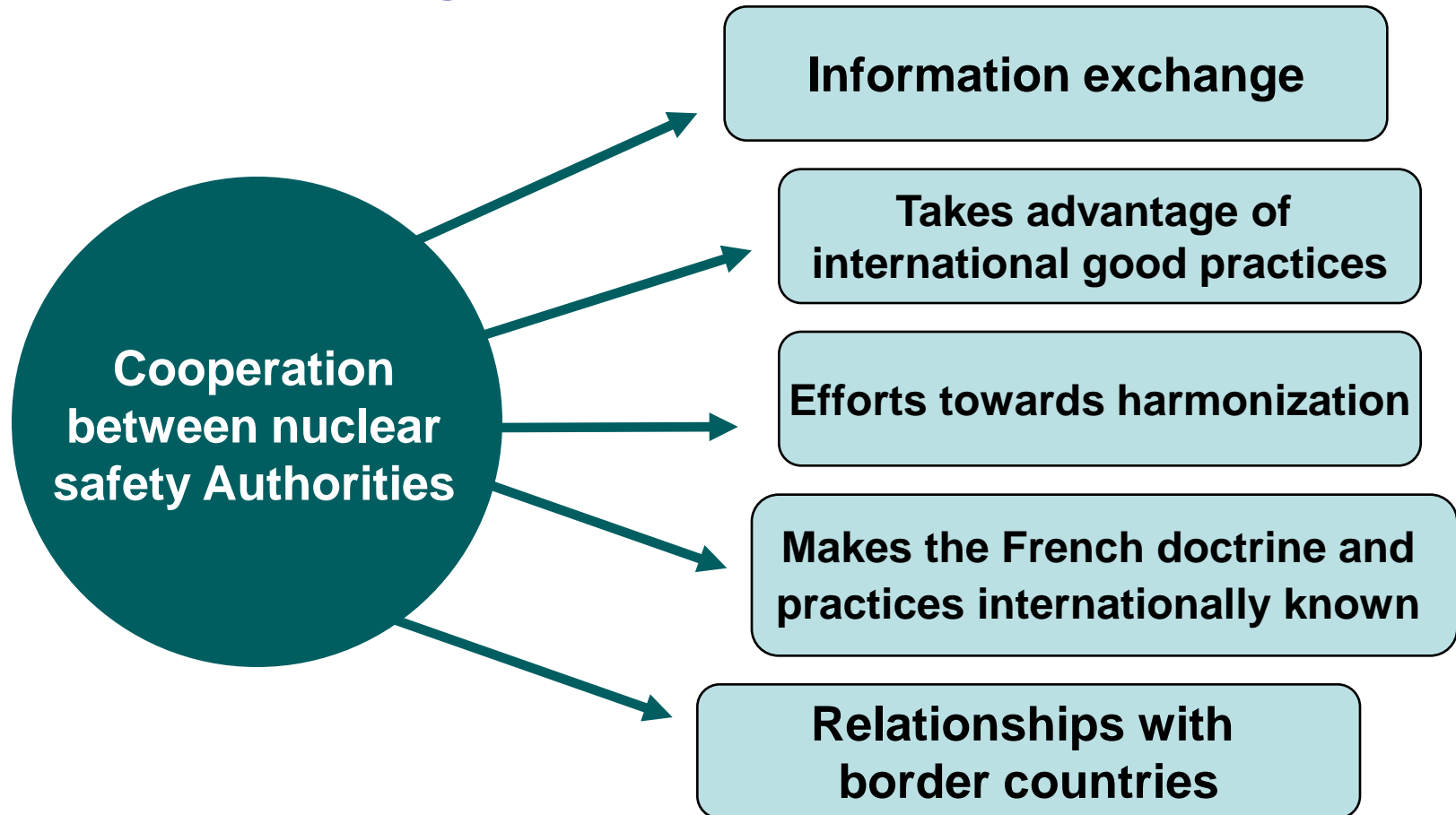
The objectives of the IAEA/Convention on Nuclear Safety (CNS)

- to achieve and maintain a **high level of nuclear safety** worldwide through the enhancement of national measures and international co-operation including, where appropriate, safety-related technical co-operation;
- to establish and maintain **effective defences** in nuclear installations against potential radiological hazards in order to protect individuals, society and the environment from harmful effects of ionizing radiation from such installations;
- to **prevent accidents with radiological consequences** and **to mitigate such consequences** should they occur.

1st - Achieve and maintain a high level of nuclear safety through the French regulation which is continuously improved



1st - Achieve and maintain a high level of nuclear safety through the international co-operation



Bilateral cooperation: ~30 countries

Multilateral relationships: IAEA, NEA, EU

Clubs and initiatives: INRA, WENRA, HERCA, MDEP, FRAREG

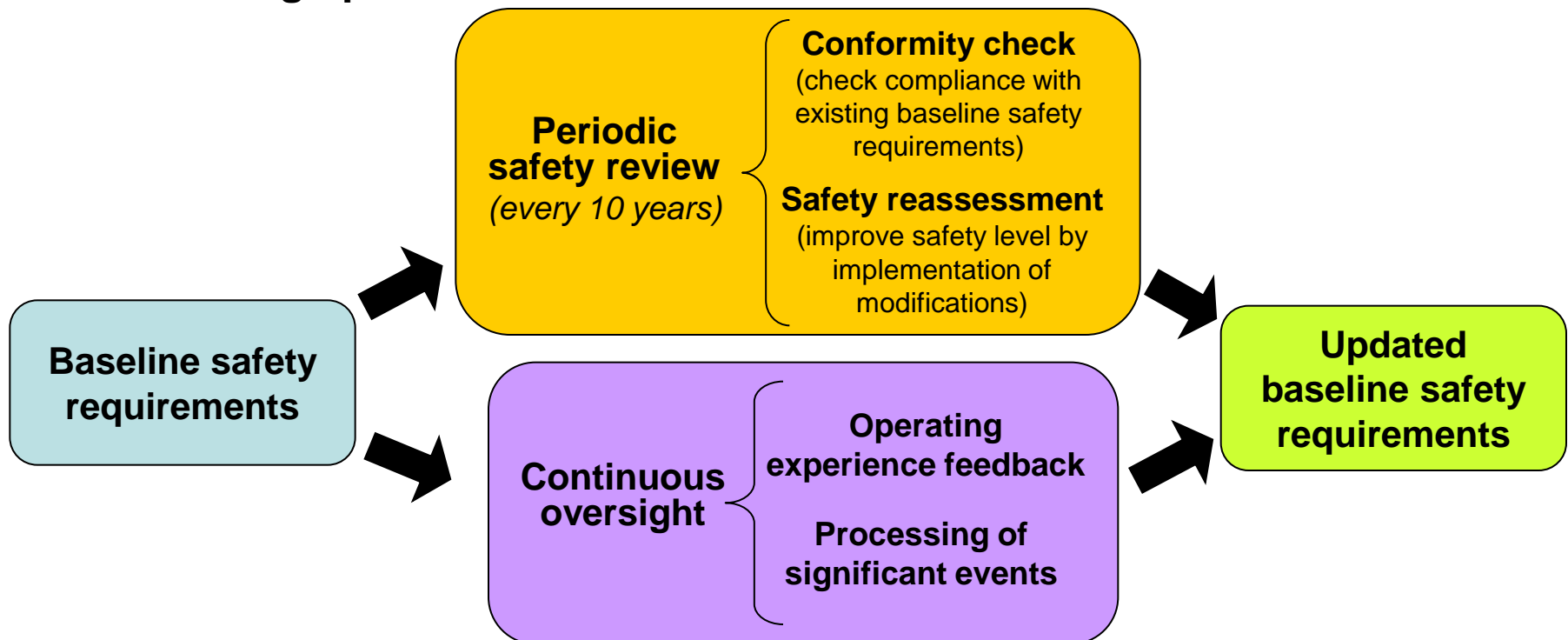
1st - Achieve and maintain a high level of nuclear safety through the international co-operation

The excellent cooperation between ASN and NRA

- **A bilateral agreement recently revised**
- **Recent activities**
 - September 2013: bilateral meeting + visit of La Hague reprocessing plant
 - February 2014: ASN mission in Japan on « human factors »; exchanges with Fukushima Daini staff
 - May 2014: an observer from NRA will attend an emergency drill in France
 - October 2014: NRA/ASN bilateral meeting
 - ...

2nd - Establish and maintain effective defences in nuclear installations

- ✓ **Before construction:**
 - Analysis of a **preliminary safety analysis report (PSAR)**
- ✓ **Before commissioning and operation:**
 - Analysis of the **final safety analysis report (FSAR)**
- ✓ **During operation:**

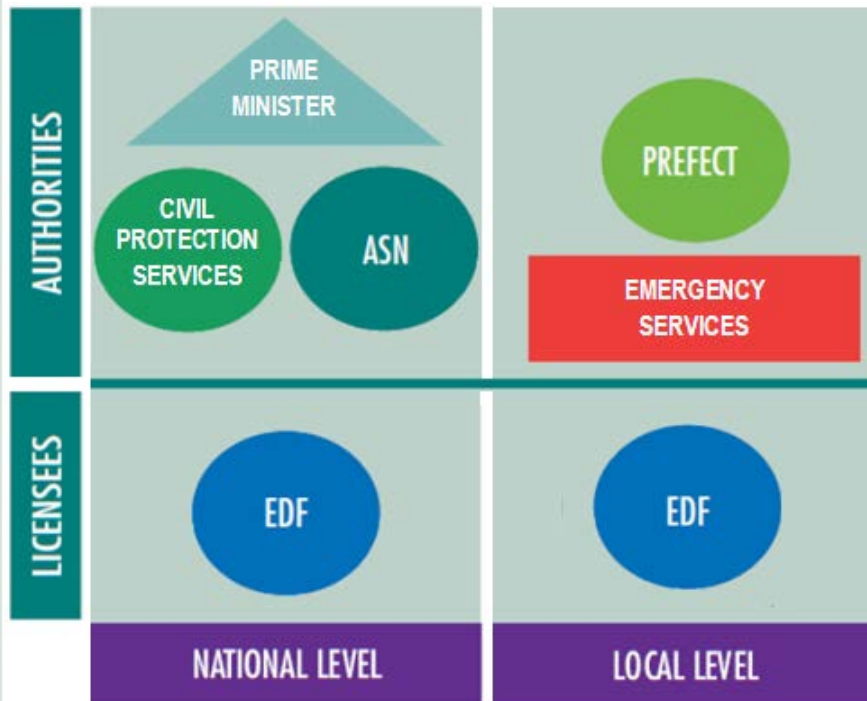


3rd - Prevent accident and mitigate radiological consequences

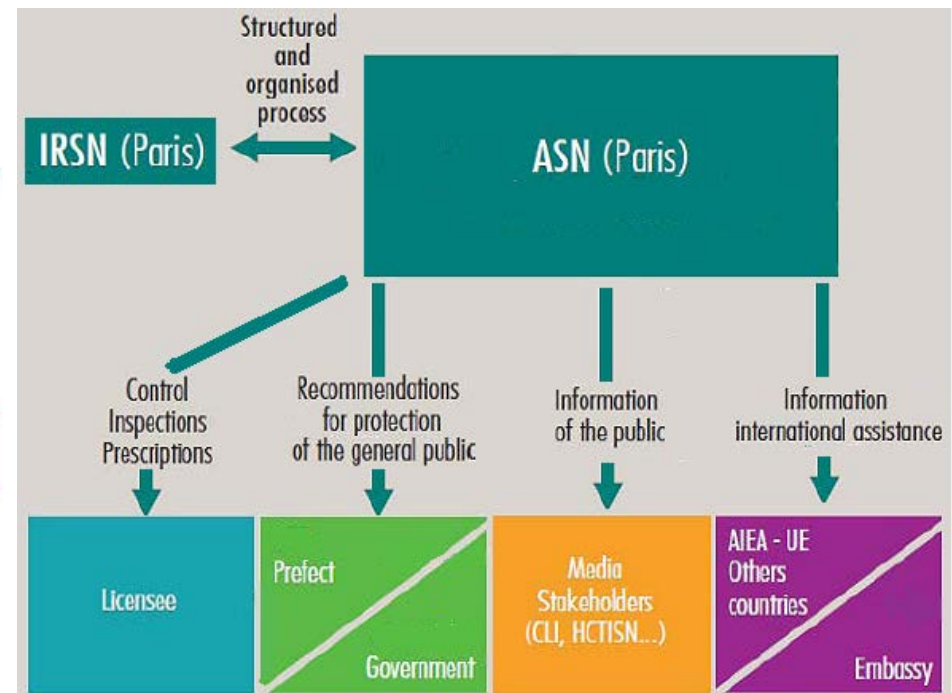
- ✓ Prevention : implementation of the principle of “**defence in depth**”
- ✓ **Management of incidents and accidents:**
 - Use of the **state-oriented approach**
 - In case of core degradation → Severe Accident Management Guidelines (**SAMG**)
 - For all reactors in service, several **measures are implemented** to cope with risks associated to severe accident situations, in particular :
 - Hydrogen passive autocatalytic recombiners (PAR)
 - Containment venting-filtration system (sand filters)
 - Primary circuit depressurization system
 - Implementation of a specific emergency response organisation

3rd - Prevent accident and mitigate radiological consequences

Emergency response organisation

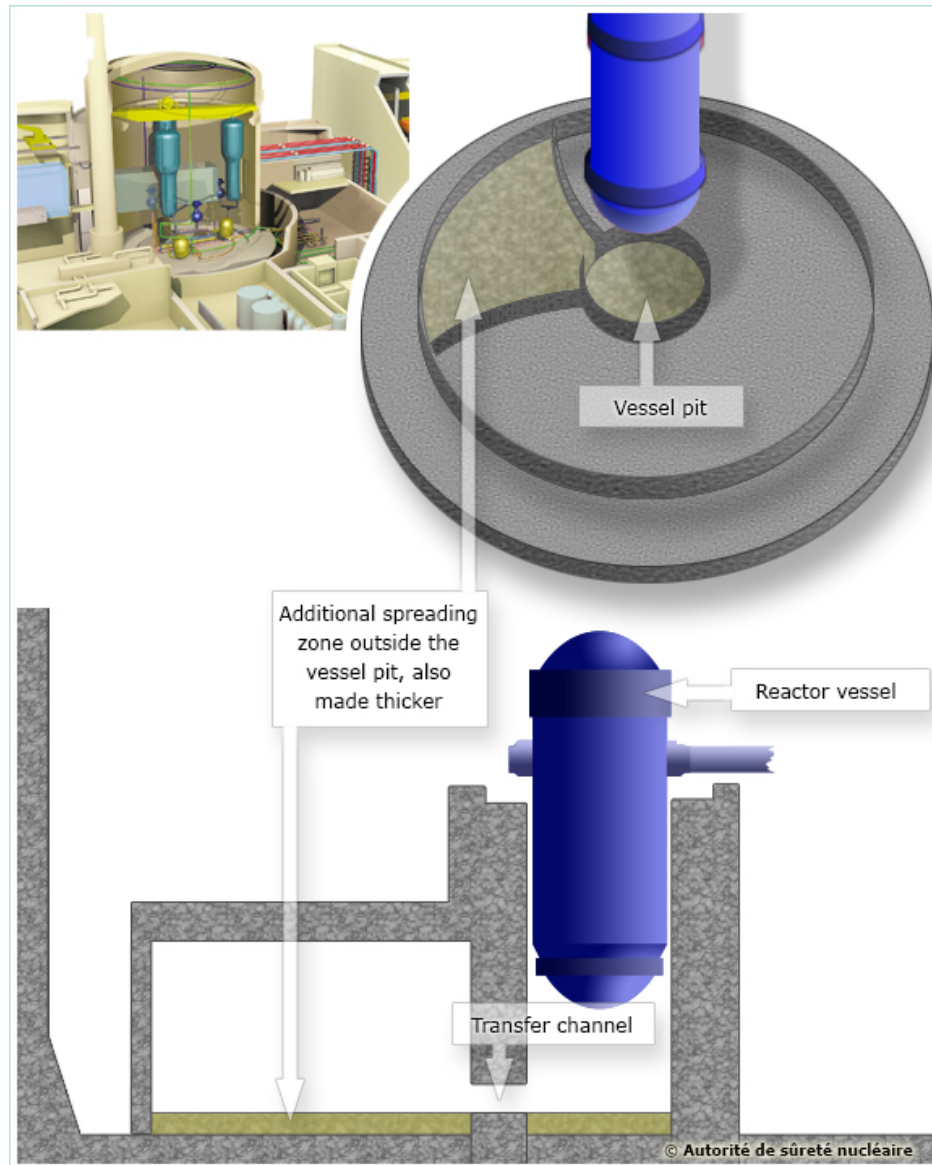


The role of ASN in a nuclear emergency situation



Measures to improve safety

Periodic safety review



Measures to improve safety

Experience feedback - accident at Fukushima Daiichi NPP

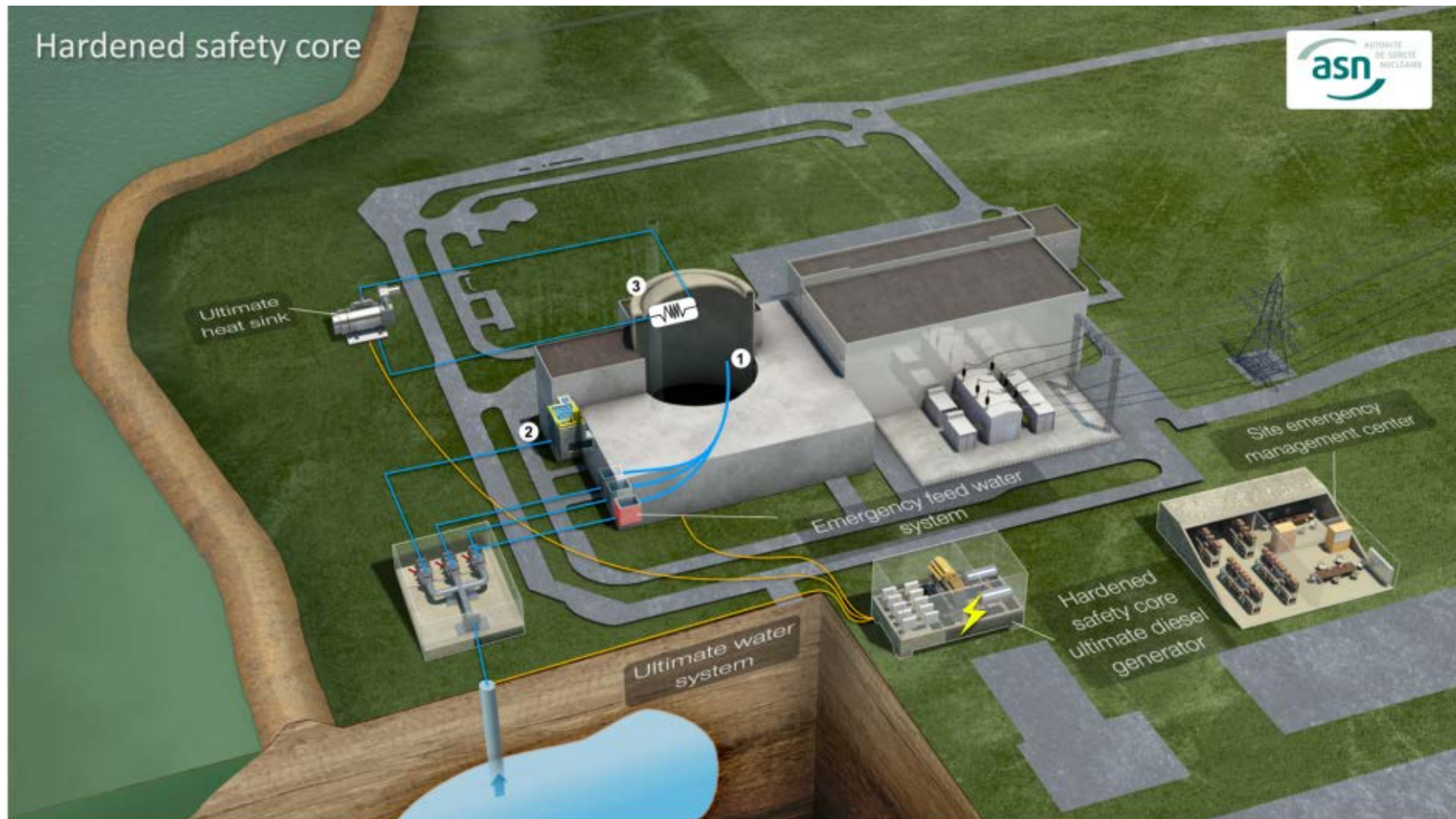
March 11, 2011	Accident at Fukushima Daiichi NPP
May 5, 2011	ASN initiates stress test on the French nuclear installations
January 3, 2012	<p>ASN's opinion following the stress test:</p> <p><i>“The level of safety of the installations examined is sufficient for it not to demand immediate shutdown of none of them. Their continued operation does however require that their robustness to extreme situations be increased beyond their existing safety margins”</i></p>
June 26, 2012	ASN adopted 32 resolutions setting ~ 30 complementary license conditions for each NPP
December 20, 2012	ASN published its National Action Plan
April 22-26, 2013	Peer review at European level on National Action Plan
January 21, 2014	ASN adopted requirements regarding the hardened safety core for NPPs

■ The hardened safety core

- ✓ The global function is to **guarantee ultimately basic safety function** with reinforced means
- ✓ **Objectives:**
 - Prevent severe accident affecting **the reactor or the SFP**
 - Mitigate radiological consequence : preserving integrity of the containment without opening the filtered venting system
 - Enable the licensee to perform its emergency management duties
- ✓ Consists of equipment **designed to withstand beyond design conditions**
- ✓ Relies on fixed means but compatible with mobile means
- ✓ **Applies to all the NPPs in operation, as well as to the EPR reactor**
- ✓ The main components are:
 - 1 **Ultimate Diesel Generator** for each reactor (58) by 2018
 - 1 **Ultimate Heat Sink** for each reactor (58) by 2020
 - 1 additional **emergency response centre** for each site (19) by 2020

Measures to improve safety

Experience feedback - accident at Fukushima Daiichi NPP



1 : reactor cooling system

2 : fuel pool cooling system

3 : reactor containment cooling system

January 2014

- **Achieve implementation of all necessary safety improvements, in due time, with a rigorous monitoring**
 - ✓ Post-Fukushima improvements
 - ✓ Possible operation of 900 MWe beyond 40 years
 - ✓ Third ten-yearly PSR (VD3) of 1300 MWe reactors
 - ✓ Management of commissioning licences (EPR, RJH RR)
- ➔ **Ensure sufficient human and financial resources of the operator, with reinforced organisation, to maintain a high level of safety**
- **Improve continuously the regulatory framework (taking into account WENRA RLs and IAEA Safety Standards)**
- **Contribute to European harmonization of the management of emergency and post-accidental situations**

- **ASN performs its duties according to 4 key values**
 - ✓ Competence, independence, rigour, transparency
- **ASN objective is to continuously improve nuclear safety at the national and pursue its commitment at international level**
- **Nuclear safety in France can be considered as “globally satisfactory”**
- **However several nuclear safety challenges have to be faced**
 - ✓ Safety enhancements related to continued operation of existing installations
 - ✓ A comprehensive experience feedback from the Fukushima Daiichi accident is a long process (at least 10 years)

