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The French NPPs' 4th Periodic Safety Review and the LTO Perspectives

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French NPP fleet

- Standardized fleet:
 - 58 PWRs (+1)
 - 1 vendor
 - 1 licensee
- 1979 → 1990: ¾th of the fleet built
- Fleet age:
 - French fleet average age
 - 30 years (1st criticality)
 - 28 years (connection to the grid)
 - NPP average age (1st criticality)
 - 900 MWe: 34 reactors → 33 years
 - 1300 MWe: 20 reactors → 27 years
 - 1450 MWe: 4 reactors → 17 years
 - Oldest reactor: 38 years old

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Regulatory framework (1/2)

- Regulatory framework in France:
 - The operator is responsible for the safety of its installation
 - No legal time limit for service operation of a nuclear installation
 - Every 10 years: a mandatory periodic safety review (PSR)
 - Continuous supervision performed by the regulator (ASN)

If serious and immediate hazard: ASN can stop the installation at any time

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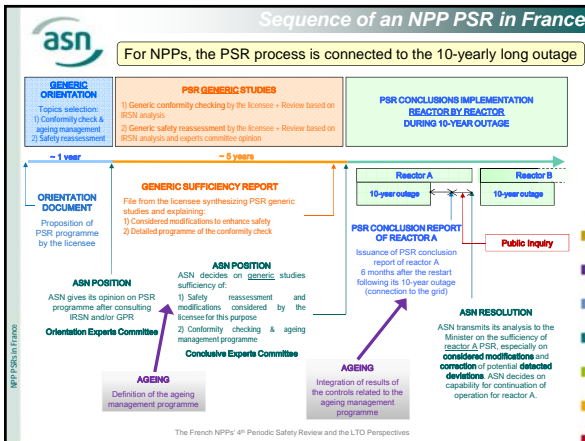
asn Regulatory framework (2/2)

MP/PSR in France

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▪ **PSR in France: the Process**

- 3 main goals:
 - Operate a conformity check with current safety requirements
 - Check the ageing management programs
 - Improve the safety of the installation with regards to the new safety objectives: currently Gen. 3+ (EPR type) objectives.
- A two-step process:
 - A generic step addressing generic questions relevant to a category of reactors (900 MWe, 1300 MWe...).
 - A specific review for each reactor
 - 4th PSR of 900 MWe reactors (2019-2030)



asn Operation beyond 40 years

MP/PSR in France

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- French NPPs initially designed for a 40-year operating period
 - EDF wishes to « extend the service operation significantly beyond 40 years »
- 10-year safety reviews → continuous safety improvement, and safety level homogenisation across NPP fleet
- In the coming years
 - GEN III reactor(s) to be commissioned with significant safety improvement achieved compared to reactors currently in operation (especially concerning potential radioactive releases from accidents with core melt).

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How to accept continued operation of existing reactors after their PSRs, given that new designs comply with more stringent safety objectives?

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Extension of operation duration

Timeline: 01/2009 (EDF), 06/2010 (Principles), 09/2011 (Generic Programme), 01/2012 (GPR), 06/2013 (Pre-orientation 4th PSR), 10/2013 (DOR), 04/2015 (Orientation 4th 900 PSR)

→ Situation of the installation (conformity/ageing)
 Directly related with continued operation
 → Safety reevaluation objective
 Objective defined in relation with:
 • State of knowledge
 • Comparison with the most recent safety standards

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asn Main ASN positions for pre-orientation of 4th 900 PSR & 4th 1300 PSR

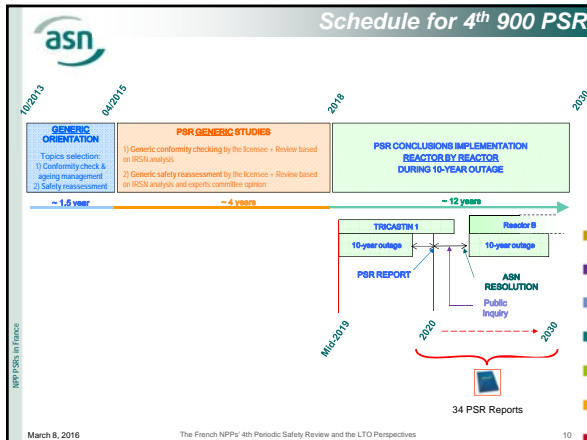
State of the installation

- Conformity**
 - ⇒ Enhanced propositions for scope of on-site verifications
 - ⇒ Correction of anomalies and deviations during 4th PSR at the latest
- Ageing & Obsolescence**
 - ⇒ Improve knowledge of ageing mechanisms
 - ⇒ Mechanical behaviour of RPV: conservative and deterministic methods
 - ⇒ Exceptional maintenance: more visibility

Safety reevaluation

- ⇒ Safety objectives WENRA New reactors Nov. 2010
- Directive 2014/87/Euratom July 2014
- ⇒ 3 main topics:
 - limitations of radiological consequences for design accidents
 - prevention & limitation of consequences for severe accidents
 - safety of storing of spent fuel

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- Conclusions**
- ASN exercises a **continuous oversight** of the nuclear installations
 - Periodic safety reviews (PSRs)** are a **major step** in the process of the reactors' **continued operation**
 - Safe operation of a plant requires the **continuous reassessment** of its **safety** through PSRs
 - The PSR, while **addressing technical issues**, should also be an **opportunity to implement transparency**, especially in the perspective of continued operation beyond 40 years
 - Main issues in view of continued operation beyond 40 years:**
 - Strengthening & maintaining the installation conformity, including managing ageing phenomena
 - Achieving an ambitious safety level increase, by taking as reference the safety objectives defined for new reactors (e.g. EPR)

Thank you for your attention

Any question?



