Long Term Operation in France
Context and Perspectives

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Contents

- Context
- French Regulatory Framework
- Operation beyond 40 years in France
- Conclusions

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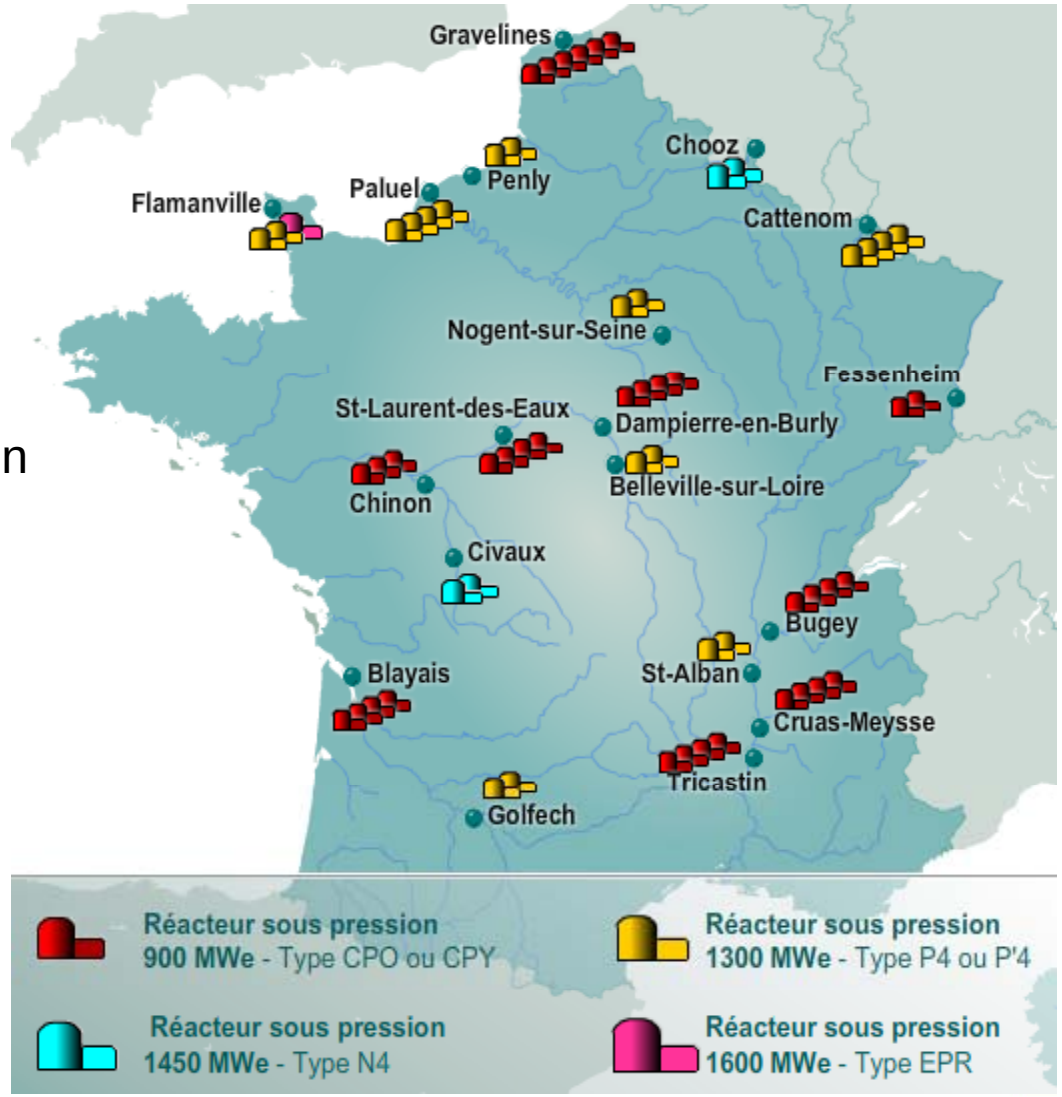
French Nuclear Power Plants

- ~80% electricity nuclear
- One operator EDF
- One vendor AREVA
- Standardised
- 3/4 of the fleet constructed between 1979 and 1990
- NPP average age (1st criticality)
  - 29 y for the 34 *900MWe* reactors
  - 23 y for the 20 *1300MWe* reactors
  - 13 y for the 4 *1450MWe* reactors
- Average age of the French fleet :
  - 26 years (first criticality)
  - 24 years (connexion to the grid)



Context

- **High-stakes issues for ASN**
  - 3rd periodic safety reviews
  - Long Term Operation (beyond 40 years)
  - Licensing new NPP (s)

- **Fukushima accident**
  - Experience feedback (~ 10 years)
  - Immediate actions (end of 2011)
    - Complementary safety assessments
    - Inspections
  - Long term actions → impact on high-stakes issues

Contents

- Context
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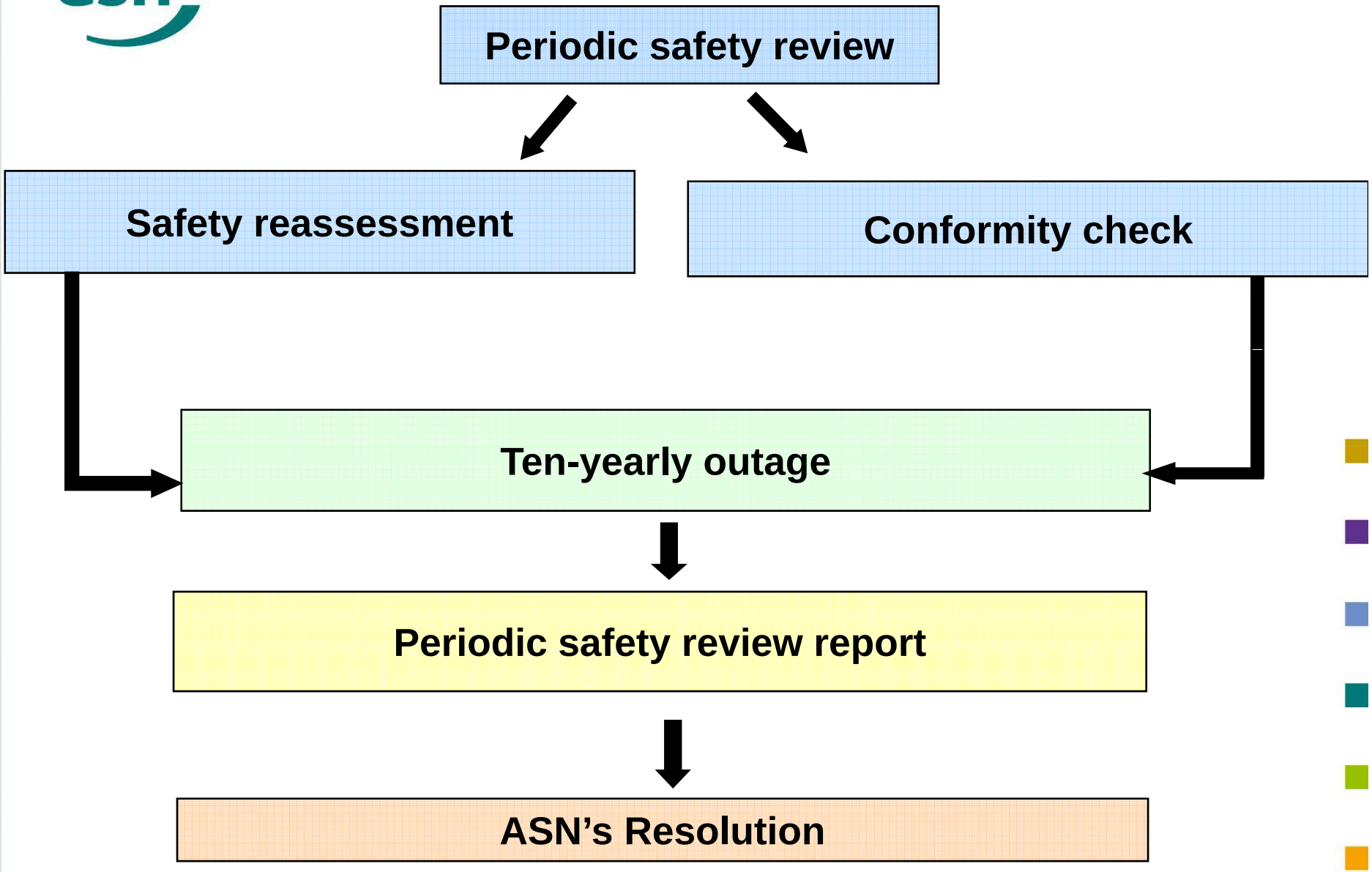
Regulatory framework

- **French regulatory framework**

  - No limit for service operation for a nuclear facility
  - Requires a periodic safety review every ten years
  - Safety continuous improvement and homogenisation
  - Continuous supervision performed by ASN
  - In case of serious and immediate hazard, ASN can stop the installation at any time

Periodic safety reviews



Contents

- Context
- French Regulatory Framework
- **Operation beyond 40 years in France**
- Conclusions

Long term operation

- EDF wishes to « *extend the service operation significantly beyond 40 years* »
- French NPP initially designed for a 40 years operating period
- Long term operation: beyond 40 years
- 10 yearly safety reviews
  - Reference to objectives for new plants

Long term operation

- In the coming years, new type reactors to be commissioned

Coexistence on long periods of reactors with different levels of

- Improve safety level of reactors currently in operation
  - core melt
  - radioactive releases from accidents

Long term operation
Main Issues

- **Checking and maintaining the reactor conformity**
  - Carrying out an extended Conformity Check ; correcting the anomalies and demonstrating the exhaustive qualification for the fourth ten-yearly outage (at the latest)
  - Justifying the ageing management of non-replaceable items (ex: containment building, pressure vessel)
  - Anticipating the massive component replacements
  - Maintaining skills and knowledge

Long term operation
Main Issues

- **Improving the reactor safety level**
  - Safety level to be defined with respect to the safety objectives defined by WENRA in 2010 for new reactors (similar to EPR safety objectives)
  - R&D taken into account
  - Safety level to be defined taking into account the operation term planned

Long term operation
Technical issues to improve the safety level

- Defining **new safety objectives** to reduce
  - Severe accident frequency
  - The potential radioactive releases resulting from all severe accidents
- Evaluating operating reactor **response to incident and accident situations not included in the design, but considered in the EPR reactor design**
- Investigating provisions with high impact on severe accident prevention and consequence reduction
- **Reinforcing risk prevention** : fire, flooding, earthquake…
- **Extending the application PSA domain**

Long term operation
International concerns

- **Fukushima accident: nuclear safety is international**
  - Sharing national experience and practices internationally
  - Operator commitment for proposing and implementing LTO programs driven by safety principles
  - Developing a particular effort of coordination and consistency among safety authorities concerned by LTO
    - Regionally (ie Europe)
    - Internationally (organizations and associations)

Long term operation
Key dates

- **Definition of the study programme**
  - Early 2012 : ASN position on the main points of the study programme, after an advisory committee meeting to be organized by end 2011
  - 2012 : Specific studies to be carried by EDF
- **Position of ASN on continued operation beyond 40 years**
  - From 2019 until 2029 (for 900MWe reactors) : Position statement for each reactor and incorporation of design changes

Contents

- Context
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Conclusions

- **ASN exercises a continuous oversight of the nuclear installations**
- **Periodic safety reviews are major steps in the process of continued operation of the reactors**
- **Continued operation on the long term**
  - Beyond 40 years
  - Pursuant the WENRA statement, ASN seeks an ambitious safety level taking the safety objectives defined for the new reactors as a reference
  - Strengthening and maintaining the installation conformity by integrating ageing phenomena
  - Full integration of Fukushima experience feedback
- International exchanges to be reinforced on LTO