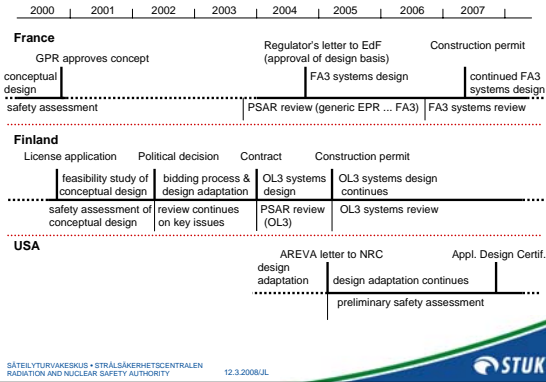


Finnish experience from the International Cooperation on the EPR

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Progress of EPR projects in different countries



International co-operation of regulators on the EPR

- France-Germany 1989 - 2000
- joint oversight of the EPR design progress by regulators and their expert organizations (IRSN, GRS)
 - expert approval of conceptual design in 2000 – no formal decisions by the regulatory bodies
- France - Finland 2003 -
- bilateral meetings 2-3 times / year between regulatory experts - topics discussed in-depth in parallel sessions among experts
 - exchange of review reports and analysis results
 - STUK participation in GPR meetings ("French ACRS")
- France - Finland - USA 2006 -
- MDEP Stage 1 (Multinational Design Evaluation Project)
 - topical trilateral meetings
 - exchange of review reports and analysis results
 - phone conferences and e-mail exchange
 - USNRC inspector worked on EPR construction site in Finland

Exchange of review reports and results of independent safety analysis - 1

French safety experts (IRSN) have issued an extensive set of Design Review Reports

- 75 reports during EPR conceptual design, from 1992 to 2000.
- 10 reports during PSAR review, each addressing several topics.
- the reports have been available to STUK during its own review.

STUK has ordered a comprehensive set of independent analysis on transients, DBAs, beyond DBAs and core meltdown accidents from both Finnish and German expert organizations - some cases were analysed by different organisations with different codes.

- all reports describing the analysis methods and results are freely available to foreign counterparts

Exchange of review reports and results of independent safety analysis - 2

STUK has found that

- IRSN reports are most useful reference material for STUK staff in conducting the safety review – they provide new insights and help in focusing on critical issues
- having more than one independent analysis is valuable – if the results differ significantly from vendor analysis (as has happened in some cases that are relevant for systems and structural design), there is more basis for inter-comparison and for improving the accuracy

Discussions on key topics

- Direct discussions between the staff of ASN - IRSN and STUK have brought useful insights and have helped to identify relevant experience (including research results) that serves as reference for review
 - recent three-party meetings have continued good exchange of information in the same manner
 - focused discussions directly among the experts on the respective topic are most efficient and effective
 - many issues can be clarified between the meetings by phone or mail communication when experts get to know each other
 - not too much resources should be spent for steering and management groups – such meetings should be separate from expert discussions
- Topics of the next expert meetings will be the digital I&C systems, PRA, function of the ECCS and criticality safety

Discussion on differences in EPR versions - 1

- All EPR versions now deviate more or less from the conceptual design approved in the year 2000
 - some deviations are evidently similar in all versions, like
 - adding the steel liner to inner containment,
 - strengthening of the outer containment and some other buildings against large airplane crash,
 - improving design features for core melt management, and
 - improving the containment sump design
 - differences between the three versions are found, among other things, in
 - the I&C systems (e.g., diversity of platforms and other components, use of back-up)
 - spent fuel storage pool and its cooling systems
 - use of pipe whip restraints on the primary circuit and steam piping
 - primary circuit pressure relief and depressurisation system
 - containment gas venting in severe accident conditions

Discussion on differences in EPR versions - 2

It is desirable to minimise the design differences (except those that are site specific) in future EPR versions – at least the design differences that are required by national regulators and argued with safety aspects

- STUK has drafted a comprehensive list of design modifications made in Olkiluoto 3 – as compared with the original concept of year 2000 – this list has been given to fellow regulators.
- however, it is difficult to make exhaustive comparisons of different designs by the regulators alone because the regulators do not know well the designs made for other countries
- vendor should provide input to the regulators and highlight for their information the differences that result from regulatory requirements

Discussion on differences in EPR versions - 3

The regulators should have readiness to seek jointly for common safety requirements unless their positions are bound to national legislation

- report on differences between OL3 and FA3 was issued by AREVA in 2005 and it could be used as a starting point for regulator's in-depth discussion
 - for the plants under construction the differences may be too late remove but regulators in countries considering EPR would benefit from open comparison of different requirements and their basis
- EPR evidently meets with a good margin most of the written US regulations and many changes may not be needed in the USA
- other countries have less prescriptive regulations and they would be in a good position when considering the most appropriate harmonised approach to each safety issue

Discussion on differences in EPR versions - 4

The EPR is a proper plant for seeking harmonised safety features because it takes explicitly into account the latest safety requirements, including

- postulation of core meltdown
- external impact from a large plane crash

Some other modern designs in the market to day do not have similar design requirements, and for such plants it is necessary to clarify the design basis and the respective regulatory positions before starting a joint review

Exchange of experiences from oversight

The boundary conditions for the nuclear construction today are quite different from the circumstances where the currently operating plants were constructed

- shortage of experienced designers, preventing fast start of new projects
- deterioration of global infrastructure of equipment suppliers
 - factories producing "nuclear quality" have disappeared
 - former skills used in manufacturing have disappeared
 - long subcontractor chains are being used and are not always easily manageable by the vendor
- digital I&C is a major headache to all regulators

Results of audits and inspections should be shared, and joint multinational regulatory audits to vendors and large equipment suppliers should be considered

Conclusions - 1

- Review and inspections done by a regulatory body in one country cannot substitute national review
 - each regulator must develop comprehensive and in-depth understanding of the safety design in order to be able to regulate the plant during operation
- It seems not feasible to harmonise fully the safety requirements that can make an impact to the design details – some requirements are embedded to national legislation which cannot be changed easily

Conclusions - 2

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- Exchange of information on the review findings broadens the view on and understanding of the salient safety features
 - this is a clear benefit to the safety in all participating countries
- Co-operation among regulators makes the work of all parties more effective and efficient
 - no need to duplicate all independent analysis – but other regulators may want to request additional variations of analysed events to be looked at, and this strengthens the overall evaluation of risks
 - other regulators could use the results of audits and inspections made by one regulator – or the regulators could plan and conduct audits and inspections together

Thank you for your interest !

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Olkiluoto 3, on 2008-03-05
