

International Atomic Energy Agency

C2-Use of the European Utility Requirements for formulating National Needs

Pierre BERBEY, EDF/SEPTEN

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Use of the European Utility Requirements for formulating National Needs

- **Update on the EUR document and the EUR organisation**
- **A first screening of the available designs: the EUR volume 3**
- **How other organisations can use EUR to formulate their general needs and requirement?**



Update on the EUR document and the EUR organisation

- EUR document
- Partners and external stakeholders
- Observed trends and expected evolution

EUR: a mature cooperative organisation of European utilities

- working together since 1992
- committed to keep the nuclear option open
- sharing specification and development works for Gen 3 LWR plants
- today involving most of the major European electricity producers.
- operating a very large nuclear fleet: more than 130 LWRs + others
- in competition with each other



EUR: a hub to harmonise European utilities views & requirements and to make Gen 3 a reality in Europe

- a utility network to share experience in plant specification, design evaluation, licensing ...
- a common bridge with the external stakeholders
 - the vendors
 - the EUR counterparts outside Europe: EPRI, Asian utilities, ...
 - the regulators: safety, HV grid, ...
 - the international organisations: IAEA, OECD, EU, ...



The EUR document

volume 1



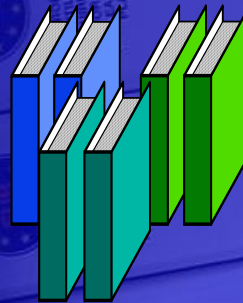
main policies
& objectives

volume 2



generic
nuclear island
requirements

volume 3



Applications of
EUR to specific
projects

volume 4



generic
conventional island
requirements



The EUR document

- **Volume 1** presents the main utility objectives and the summaries the main requirements.
- **Volume 2** is a set of generic nuclear island requirements. The contents cover most of what a Plant Owner has to specify for the assessment, licensing, design, supply, construction, tests and operation of a future LWR power plant.
- **Volume 3** includes evaluations of the selected LWR designs that are felt feasible for the European market. There is a subset of volume 3 per project, produced with contribution of the corresponding vendor.
- **Volume 4** is a set of generic requirements for the power generation plant organised by chapters that deal with the specific systems.

revision A: 03/1994
revision B: 11/1995
revision C: 04/2001

BWR 90: 06/1999
EPR: 12/1999
EP1000: 12/1999
ABWR: 12/2001
SWR 1000: 02/2002
AP1000: 06/2006
AES92: 06/2006

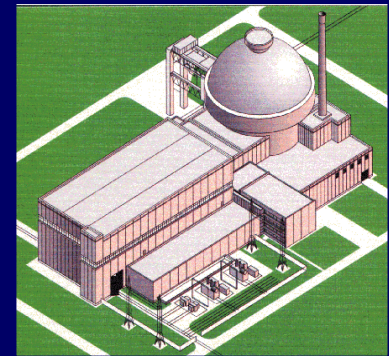
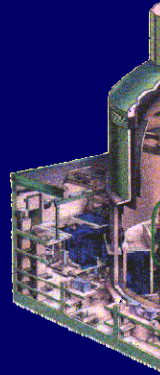
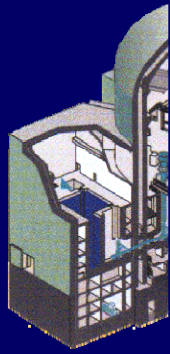
revision A: 11/1996
revision B: 03/2000
revision C: 10/2007



EUR volume 3

- 7 subsets of volume 3 already published

BWR 90/	EPR	EP 1000	SWR 100	ABWR	AP 1000	VVER AES 92
1400 MW	1600 MW	1000 MWe	1000 MW	1400 MW	1000 MWe	1000 MWe
evolution	4-SG evo	3-SG PWR	BWR with	evolution	2-SG PWR	4-SG PWR with passive
Westingho	Areva	safety feati	features	General E	safety feati	safety features
		Westingho	Areva		Westingho	AEP Moscow, GP, KI



the trends: evaluations of the Gen 3 projects

- the EUR volume 3 is more and more used as a pre-qualification of the Gen 3 designs
- an industrial role given to the EUR organisation:
 - keeping a short list of Gen 3 projects that can be called for a bid, at each EUR utility's disposal
 - the evaluations of compliance must follow on the projects and be kept updated
 - the corresponding EUR requirements might be adapted
- volume 3 kept updated: revision B of the EPR evaluation going on, preliminary works on MHI's APWR evaluation, other Gen 3 LWR projects to be considered
- A powerful tool to make the Gen 3 designs fit the utility requirements and to promote the designs of interest for the utilities



the trends: the generic Gen 3 requirements

- **Volumes 1, 2 & 4 used as development guidelines as well as bid specification**
 - EUR used several times as a technical specification for Gen 3 reactor bids worldwide in the last 3-4 years
 - Still used as a set of development guidelines (EPP, EU-APWR, ...)
- **The EUR document is kept living and usable**
 - Document being enlarged, maintained and improved
 - volume 2: Various inputs to a revision being collected, missing parts from the safety harmonisation processes
 - limited resource available at the utilities: slow pace



the trends: participants to the EUR organisation

- **16 European utilities or utility groups participating**
 - Western Europe and Eastern Europe utilities
- **The EUR organisation keeps enlarging**
 - EnergoAtom (Ukraine), CEZ (Czech Republic) have been welcomed into the EUR organisation
 - ENEL and Endesa have re-entered the organisation
 - MVM (Hungary) to be admitted as an associated member
- **The other European electricity producers that consider nuclear generation can legitimately apply for participation**



the trends: reinforced dialogue with the stakeholders other than the vendors

- **Only organisations involved in Gen 3 LWRs development and deployment**
- **Within Europe**
 - WENRA
 - EC through/with Foratom
- **At global level**
 - EPRI
 - IAEA
 - OECD/NEA
 - MDEP
 - WNA
 - other regional utility groups, codes & standards, ...

➔ inputs to a revision of the EUR document

A first screening of the available designs: the EUR volume 3

- **Gen 3 LWRs only**
 - Positive experience in design, manufacturing, construction, licensing and operation (1960's to today)
 - High operational performance
 - Acceptable technological risk for the investors and the bankers
- **Large units: 1000 to 2000 MWe**
 - Scarce sites
 - Difficult (and quite long) siting procedures
- **Available designs in Europe**
 - By European vendors
 - By any other vendor that plans to be present in Europe

the EUR volume 3: which vendors? which projects?

- **First evaluation started in 1995 as soon as rev B of EUR volume 2 was frozen**
- **The "historical" vendors already present in Europe first to come**
 - **NPI (Framatome + Siemens), ABB Atom, Westinghouse**
 - **then GE and the Russian vendors**
- **Other vendors willing to be present in Europe candidate to the next evaluations**
- **A complete range of Gen 3 projects:**
 - **PWRs and BWRs**
 - **"Evolutionary" and passive safety features**
 - **No Gen 2, no Gen 4**

EUR volume 3: analyses of compliance of selected LWRs vs. the EUR generic requirements

- **analyses at detail level**
 - each of the 4000 requirements (shall, should, may) of the EUR volumes 1 & 2 is analysed by EUR utilities' engineers from information supplied by the vendors.
 - standard scale of compliance for all the projects
 - rationales & references
 - cross-checking between the different assessments
 - several man•years for each project
- **the detailed analyses are not published**
- **only the main deviations are highlighted in the published part as well as the main "compliance with objectives".**



a standard scale of compliance for all the projects

Compliance assessment labels	meanings	acronyms
compliance	the design meets the requirement but does not go significantly beyond.	COM
compliance with objectives only	the design is supposed to achieve the objective of the requirement; either a different approach from the EUR one is used to achieve the same objectives, or the approach is not yet defined.	CWO
non compliance	the design does not meet the requirement ; an assessment of the gap importance must be given.	NOC
non compliance : significantly beyond requirement	the design significantly exceeds what is requested by EUR ; an assessment of the gap importance must be given.	BRE
not applicable	the requirement is not applicable to the design.	NAP
not assessable today	the assessment cannot be made for some reason.	NAS
information needed	Additional information is expected from the vendor or EUR before completion of the assessment.	INF

significant departure from EUR : requirement not met

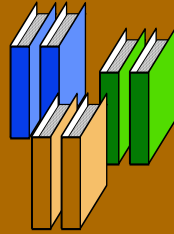
significant departure from EUR : beyond requirement

because of the project development for instance



contents of EUR volume 3

one subset
per
selected
design



Application of EUR to specific designs

Three main parts for each subset:

- ✓ description of the standard nuclear island
- ✓ analysis of the compliance with EUR:
 - ✓ detailed assessment of the level of compliance of the design vs. each EUR requirement (shalls and shoulds)
 - ✓ evaluation of the way the open EUR requirements are met
 - ✓ synthesis by chapter
- ✓ specific requirements by EUR

reference of the
analyse of
compliance :
EUR vol. 1 & 2



Outcome of the EUR Gen 3 projects evaluations

- **A large investment for each project by the vendors and by the EUR utilities**
 - several man.years per project evaluation
- **A cooperative work**
 - the utilities and the vendors work together to come to common positions.
 - The level of detail of the assessment makes all the parties aware of the strong points as well as of the weak points
- **High value**

Outcome of the EUR Gen 3 projects evaluations

- **A powerful tool to make the designs fit the utility requirements:**
 - benefit for the utilities and the owners
 - certificates granted to the designers to recognise that
- **A powerful tool to promote the designs:**
 - benefit for the vendors
 - a design that has a good record of compliance vs. the EUR can be promoted as a real Gen 3 project that meet the owner expectations.
- **A will to go on by the EUR organisation and the main vendors**
 - short list of the projects that are ready to be proposed in a bid
 - need to keep the list and the evaluations updated

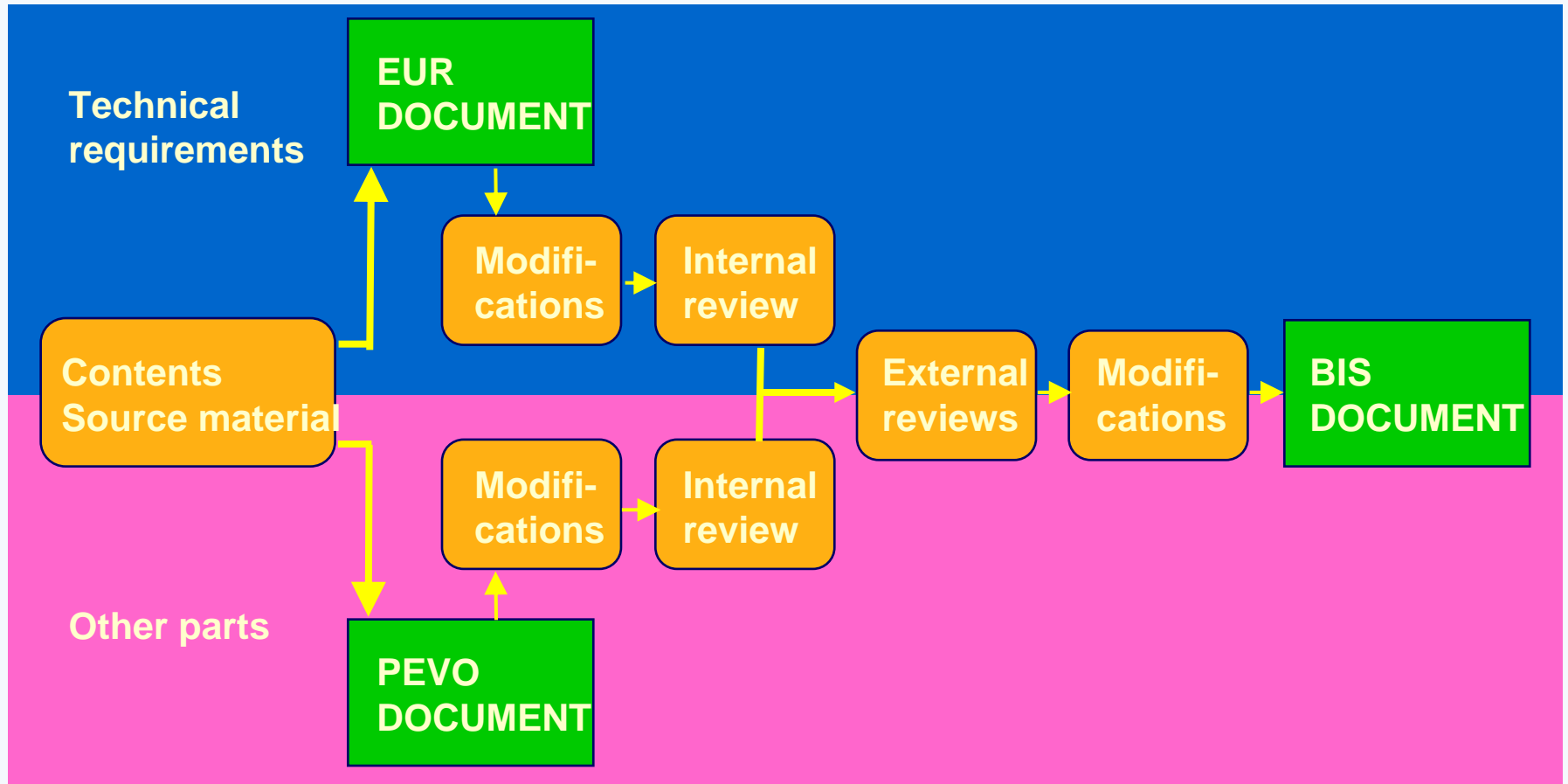


How other organisations can use EUR to formulate their requirement?

- **Several examples of use of the EUR document to prepare a call for bid**
 - By utilities participating to EUR
 - By utilities that did not participate to the making of EUR
- **Same principles**
 - **Short list of projects** taken from EUR volume 3
 - Bid **technical specifications** taken from the EUR volumes 1, 2 and 4
 - **Legal and commercial specifications** taken from other sources
- **A proven approach**



Example of the making of the TVO bid inquiry specification



EUR organisation policy

- **Harmonisation of the design requirements worldwide has a high value**
 - Wide harmonisation sought
 - A prerequisite to design standardisation and licensing stability
 - Standardised products usable in large areas
 - High potential benefits on investment and operation
- **Open access policy to utilities that are potential users**
 - Whole EUR document
 - Copyrights, specific conditions of use
- **Restricted access to volume 3**
 - The vendors have access to what deals with their own projects
 - A vendor can deny access to any external party



In case of need ...



European Utility Requirements for future LWR plants
<http://www.europeanutilityrequirements.org>