Objectives of the course

- The EUR Document: Origin and evolutions
- Content of the EUR Document
- What’s new in Revision E?
- The EUR Document Revision E:
  - How to use it?
  - How to get it?
The EUR Document: Origin and evolutions

- In 1991, 5 European operators decided to create the EUR organisation:
  - EDF
  - NUCLEAR ELECTRIC
  - PREUSSEN ELEKTRA
  - TRACTEBEL
  - UNESA

- The main goal was to harness its forces to write a generic GEN III LWR specifications document for the European market.

The EUR organisation over time:

**The EUR Document: Origin and evolutions**

The EUR Document over time

- Revision A (Volume 1&2) 1994
- Revision B (Volume 1&2) 1995
- Revision B (Volume 4) 1996
- Revision B (Volume 4) 2000
- Revision C (Volume 1&2) 2001
- Revision C (Volume 4) 2007
- Revision D (Full revision) 2012
- Revision E (Full revision) Dec. 2016

**Content of the EUR Document (Rev.E)**

- The EUR Document is composed of 4 Volumes

**Volume 1**
- Main Objectives and Policies

**Volume 2**
- Generic and Nuclear Island requirements

**Volume 3**
- Application of EUR to specific Gen3 LWRs designs

**Volume 4**
- Specific Power Generation Plant requirements
Content of the EUR Document (Rev.E)

Volume 1

- General information about the EUR Organisation, Main objectives and EUR policies
- No EUR requirements in Volume 1

Chapter 1.1: «Introduction to EUR»
  - General information about the EUR organisation

Chapter 1.2: «EUR policies»
  - 5 Policies aiming at summarise the EUR Organisation policy to reach safety and competitiveness objectives for new designs

Chapter 1.3: «EUR synopsis»
  - Presentation of the EUR document and user manual

Chapter 1.4: «EUR key issues»
  - List of the 53 key issues to be used for design assessments versus EUR

Appendix A: Acronyms
Appendix B: Definitions

Volume 2

- Volume 2 is a set of Generic and Nuclear Island requirements. The scope covers 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.
- 20 chapters
- ~ 1500 pages
- ~ 4500 requirements
- Basis for EUR Assessments of new Designs
Volume 2: Generic and NI requirements

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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 design, produced with contribution of the corresponding vendor.

- No EUR requirement in Volume 3
- Contains the highlights of the EUR assessment
- Not a « public » document!
- Limited access to:
  - EUR members and assessed designer
  - Other recipient with the autorisation of the designer and the signature of a Non Disclosure Agreement
Since 1990, nine design assessments (EUR volume 3 subsets) of various designs have been performed against the EUR requirements:

- 5 designs assessed against rev B: BWR90, EPP, EPR, ABWR, SWR1000
- 3 designs assessed against rev C: AP1000, Aes-92, STD EPR
- 1 design assessed against rev D: EU-APWR

Volume 4 is a set of generic requirements for the Power Generation Plant (PGP) organised by chapters that deal with the specific systems.

- Turbine Island EUR requirements
- ~ 300 pages
- ~ 1000 requirements
Content of the EUR Document (Rev.E)

Volume 4: Specific PGP requirements

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What is an EUR requirement?

Each of the 5500 EUR Requirements is written as a:

«SHALL» requirement

- Any design that does not fulfil these requirements will be deemed non-compliant

«SHOULD» requirement

- Other solutions can be accepted, but the Plant Designer will have to demonstrate that they are equivalent or better

Additional comment

Applicability Identification (TAGGING)
Content of the EUR Document (Rev.E)

Example of EUR requirement:

2.4.1.2.2 External air temperatures and humidity conditions

A The Design Basis External Hazards® (DBEH) values of external air temperatures to be considered in the Standard Design shall be as follows:

- long-term base temperature: -29°C to +36°C (extreme temperature for periods > 7 days);
- short-term daily temperature: -34°C to +41°C (extreme temperature for periods of between 6 hours and 7 days); and
- instantaneous temperature: -39°C to +46°C (extreme temperature for a 6 hour period).

A1 The envelope defined by the maximum and minimum temperatures is based on typical conditions in Europe.

See Chapter 2.4 Section 2.4.1.2.2.1
See Chapter 2.4 Section 2.4.1.2.2.2
See Chapter 2.1 Section 2.1.5

Content of the EUR Document (Rev.E)

Requirement column

Comment column
What’s new in Revision E?

Overview

- Revision E project in a few figures:
  - 3 years duration (January 2014 – December 2016)
  - 16 EUR utilities involved
  - 98 EUR Experts (Safety, I&C, Systems, Layout, Grid, Material,...)
  - ~ 1800 pages and 5500 requirements revised
  - 2 additional chapters (Volume 1) compared to Revision D
What’s new in Revision E?
Main revised chapters

**Volume 2: Generic and NI requirements**

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**Volume 1: Main Policies and Objectives**

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<td>EUR 53 key issues</td>
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<td>App A</td>
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**Volume 4: Specific PGP requirements**

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What’s new in Revision E?
Overview of the main developments

- **New structure of the EUR document:**
  - More suited to « licensing » & « bidding » processes
  - Avoid redundant requirements & Improved readability of the Document

**Volume 4: Specific PGP requirements**

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**Volume 2: Generic and NI requirements**

About 1000 requirements

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What’s new in Revision E?
Overview of the main developments

Volume 1 (Main Policies and objectives):

- Introduction of 5 EUR Policies (Chap 1.3):
  - Safety
  - Economics
  - Environmental protection
  - Operational performance
  - Human factors

- Introduction of the EUR Key issues in Volume 1 (Chap 1.4):
  - 55 key issues for Revision D
  - 53 key issues for revision E (75% are new)
  - Regrouping the most important requirements (~190) to be used for a new design pre-assessment
  - Objective of the Key issues is to evaluate the new design against 53 important issues before launching the full EUR Assessment (4000 requirements)

What’s new in Revision E?
Overview of the main developments

Example of key issues

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<table>
<thead>
<tr>
<th>N°</th>
<th>Topic</th>
<th>Section Requirement</th>
<th>Test of the key issue</th>
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<tr>
<td>3</td>
<td>Severe Accidents</td>
<td>3.1.1.4.1 A B C D E</td>
<td>At least one representative accident sequence involving significant Core Damage* shall be identified and considered in the design as a Severe Accident* sequence. Additional accident sequences should be identified as Severe Accident* in order to ensure that the overall probabilistic safety objectives are met. In Severe accidents*, the containment structure is the main Physical Containment* for protecting the environment from the radioactive materials. Maintaining the integrity of the Physical Containment* for the long term shall be the main objective. In addition to the containment structure, there shall be Safety Features for Design Extension Conditions* included in the design of the plant and procedures implemented to mitigate the consequences of core melt accidents. The selected accident sequence shall be sufficient to form an adequate design basis for the Component System* and for any Safety Features for Design Extension Conditions* implemented to mitigate the consequences of core melt accidents. Safety Features for Design Extension Conditions* used in Severe Accident* shall be at least reasonably practicable independent of Safety System* and Safety Features for Design Extension Conditions* used as Complete Sequence*.</td>
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<td>4</td>
<td>Reference Source Term and PSA Evaluation of Source Term</td>
<td>3.2.1.4.1 A B C</td>
<td>The reference Severe Accident* for the quantification of the KRT shall be determined by the Designers* on the basis of the specific characteristics of the design. The reference Severe Accident* should be included in Volume 3. The reference Severe Accident* shall be design-specific, since it is required to be a stochastic sequence which is not used explicitly. Therefore, the system analysis* shall be considered for KRT definition. One reference Severe Accident* shall be selected in that sequence which leads to the most representative In-Component Source Term* among the Severe Accident* sequences considered in DDC. Below PSA is defined, the analysis may be used to identify the adequate reference sequence, even if the overall probabilistic target constraint of frequency of exceeding the CUL would be satisfied with previous analyses.</td>
</tr>
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* CUL = Core Ultimate Limit
What’s new in Revision E?
Overview of the main developments

- Volume 2 (Generic and Nuclear Island requirements):
  - Safety (Chap 2.1): New structure, based on IAEA SSR 2/1 structure:
    - Safety requirements: improved coherence with international standards such as EURATOM Directives, WENRA Standards, IAEA Standards and guides, ..
    - Safety classification: new approach in line with IAEA SSG-30
    - Radiological impact: new safety objectives in line with WENRA definitions
  - External Natural Hazards (Chapters 2.1 and 2.4):
    - New approach based on 2 levels of magnitude: Design Basis (DBEH) and Rare and Severe External Hazards (RSEH)
    - SEISMIC: fully revised sections
  - I&C (chap 2.10): update fully in line with IEC standards (61513, 60880, 62138, 61226)
  - PSA (chap 2.17): update of EUR chapter in line with IAEA SSG-3 and SSG-4
  - Grid Connection (chap 2.3): update in line with the new ENTSO-E Grid Code (06/2015)
  - Pipe Break (chap 2.4): update of Break Preclusion and Leak Before Break concepts
  - Layout (chap 2.9): update based on up-to-date international standards and standards

The EUR Document Revision E
How to use it?
The EUR Document Revision E
How to get it? (1/3)

Distribution rules have changed for Revision E Document!

✓ Public access:
  - Free public access to the EUR Document Volume 1,
  - To any requester through the EUR public website.

✓ EUR “members” access:
  - Free access to the full package (Volumes 1, 2 and 4),
  - For the “EUR members” (full and associated members), without changes of existing rules,
  - Through the EUR website with individual password or through the internal utilities website (with Control of access Rules to be ensured inside each EUR utility).

✓ Contractors of EUR “members”:
  - Contractors will be provided with access to the EUR Document by the contracting EUR member, but access only for the contract purpose and its duration.
  - A NDA (Non-Disclosure Agreement) is to be included inside the contract and will have to be signed between the contracting EUR member and the contractor.

The EUR Document Revision E
How to get it? (2/3)

Distribution rules have changed for Revision E Document! (ctn’d):

✓ Stakeholders “without commercial objectives”:
  - Examples of such Stakeholders: Nuclear Safety Authorities, Governmental and International Organisations, Research Centres and Universities, etc.
    - Controlled free access to the EUR Document (Volumes 1, 2 and 4), after:
      - justification of the request and,
      - signature of a NDA (Non Disclosure Agreement) for “non commercial use”.
    - The NDA has to be signed by a representative of the organisation and will be valid for all organisation employees, in the frame of the use approved by EUR. No transmission allowed to any third party.

✓ Vendors in the frame of assessment purposes:
  - Controlled free access to the EUR Document (Volumes 1, 2 and 4) is provided:
    - only for use of design assessment against the EUR requirements,
    - the vendor shall give within one year to the EUR a technical feed-back of their use, at least on the pre-self assessment of the 53 key issues.
  - A Non Disclosure Agreement (NDA) is to be signed by a representative of the Vendor and will be valid for all vendor employees for the design assessment use only. No transmission allowed to any third party.
The EUR Document Revision E
How to get it? (3/3)

- Distribution rules have changed for Revision E Document! (ctn’d):
  - Stakeholders with “commercial objectives”:
    - Rules for all Stakeholders with “commercial objectives” (in the frame of the Nuclear Industry market) are under definition. Examples of such Stakeholders are the following:
      - Non EUR members utilities (Europe or Worldwide),
      - Vendors for other uses than design assessments,
      - Suppliers of technologies for NPPs
      - TSO (Technical Support Organisation) or/and Engineering Service Providers,
      - Etc.
    - A fee will be requested for such stakeholders, when asking to access to the EUR Document Volumes 2 and 4.

Conclusion

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