European Utility Requirements
for future LWR plants
actions in progress and next steps

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foreword

A presentation was given last June during the ANS summer meeting, that outlined the EUR status of work and the newly adopted EUR action plan.

In this paper I would like to focus more on European harmonisation of safety rules and regulations and on requirements related to the high voltage (HV) Grid, paving the way to an open electricity market during the current decade.
overview of the presentation

European background

EUR organisation & EUR document status

European harmonisation of the safety rules

European harmonisation of the high voltage grid requirements

European Utility Requirements

for future LWR plants
1- European background
Europe is getting unified ... slowly political organisation

EU member states as of Nov 2003

Next 10 EU member states
The starting point: nuclear Europe in the 90's … a contrasted picture

◆ Little common ground in regulations & licensing
  ◆ national regulations and national regulatory bodies
  ◆ slow emergence of European codes & standards

◆ EU electricity markets aiming at unification
  ◆ open market for procurement, construction and studies
  ◆ open market for electricity generation & trading

◆ Slow growth foreseen
  ◆ only a few new NPP orders foreseen
  ◆ enough time to develop next generation LWR plants

◆ Contrasted acceptance by the public
  ◆ Large NPP programmes
  ◆ Moratorium to plant construction
The European electricity market in 2003

- electricity market has become a reality
  - competition between the electricity producers
  - competition between the equipment suppliers
- the HV transmission grid is not yet managed as a single system
- discrepancies in regulatory approaches lead to high investment costs: duplicated development work, duplicated licensing effort, envelope design basis
- common "rules of the game" are necessary
A new will to get harmonised rules for nuclear safety at European Union level

- need for a reference in nuclear safety detected in the perspective of the next enlargement of EU to 25 member states.
- EC directive being drafted on “imposition of common standards in the field of safety of the nuclear installations”
- meanwhile WENRA works on the “definition of reference safety approaches”

Construction of a few new LWR NPPs may resume soon:
Finland, France, UK, ...
2- The EUR organisation & the EUR document
The EUR organisation

A group of the major European electricity producers:

- operating 119 LWR nuclear units + others
- committed to keeping the nuclear option open in Europe
- in competition with each others
- sharing specification and development works for future LWR plants
The EUR organisation: nuclear electricity producers from 11 European countries
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
A long and fruitful history, a living document

- **Volume 1**: Revision A: 03/1994
  - Revision B: 11/1995
  - Revision C: 04/2001

- **Volume 2**

- **Volume 3**: Revision A: 11/1996
  - Revision B: 03/2000

- **Volume 4**: Revision A: 11/1996
  - Revision B: 03/2000

- BWR 90 subset: 06/1999
- EPR subset: 12/1999
- EPP subset: 12/1999
- ABWR subset: 12/2001
- SWR 1000 subset: 02/2002
3- European harmonisation of the safety rules
The EUR safety requirements are in the mainstream: extensive testing & benchmarking

- Have actually been tested vs. the advanced LWR designs proposed for the European market.
  - Assessment of compliance in EUR volume 3
  - Call for bids for Finland-5

- Have been or are being benchmarked vs. other sets of safety requirements
  - EPRI-URD
  - US regulatory requirements
  - IAEA requirements & guides
  - First WENRA reference levels
Nuclear safety regulators

WENRA: Western Europe Nuclear Regulator Association

countries involved in WENRA as of 11/2003
Areas being considered in the WENRA works (five main areas)

- Safety Management
- Design
- Operation
- Safety Verification
- Emergency preparedness
European harmonisation of the safety requirements
what is going on

- WENRA works on harmonisation of the regulatory requirements:
  - Pilot Study on harmonisation of safety in WENRA countries
    6 topics in 2003  14 topics in 2004
  - Dialogue between WENRA & the main stakeholders

- European Commission directive on safety harmonisation
  (all kinds of nuclear facilities) in EU countries

- Revision D of the EUR document (design of future plants)
  according to the progress of these actions
4- European harmonisation of the high voltage grid requirements
Synchronised high voltage transmission networks in Europe as of 11/2003

UCTE area 1

UCTE area 2 (being synchronised to area 1)

Nordel

IPS/UPS/Centrel

Isolated HV grids
# Harmonisation of HV Grid Requirements

## the actors

<table>
<thead>
<tr>
<th>At each national level</th>
<th>At the European Union level</th>
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<tbody>
<tr>
<td>◆ the regulator (if any)</td>
<td>◆ the European Commission</td>
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<td>◆ the HV grid operators</td>
<td>◆ the CEER</td>
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<tr>
<td>◆ the electricity producers</td>
<td>◆ the ETSO /UCTE/NORDEL</td>
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<td>◆ the traders</td>
<td>◆ the electricity producers, the EUR organisation</td>
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<td>◆ the consumers</td>
<td>◆ the traders</td>
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Longer term perspective
synchronisation of UCTE with Eastern HV grids?

UCTE synchronously interconnected with

IPS/UPS+
synchronously interconnected countries:
Baltic countries, Belarus, Ukraine, Moldova, Russia, Georgia, Azerbaijan, Armenia, Iran, Kazakhstan, Turkmenistan, Uzbekistan, Kyrgyz, Tajikistan, Mongolia
interface with high voltage transmission grid

- Producers’ position vs. grid managers’
- example: voltage vs. frequency diagrams

![Voltage vs. frequency in EUR 2.3 rev. B](image)
![Voltage vs. frequency in EUR 2.3 rev. C](image)
Towards HV Grid Requirements harmonisation
the EUR review & benchmarking programme

◆ compare the existing national regulations and rules vs. each other
◆ review the papers about harmonisation being produced by:
  ◆ CEER,
  ◆ ETSO, UCTE & Nordel,
  ◆ EC DG TREN, the Electricity Regulatory Forum of Florence, etc…
◆ open the necessary dialogues between EUR and these organisations
◆ work with the designers (NSSS, turbine, generator, etc…) assess the costs of the provisions requested to meet the requirements
Towards HV Grid Requirements harmonisation
the EUR action plan (continued)

- negotiate with the HV grid operators and the regulators to make sure the costs are fairly distributed amongst the actors. *future nuclear and non-nuclear plants, existing plants, HV grid facilities, etc…*

- assess which HV grid services can be sold and which ones deserve to be required for the future standard LWR designs

  *At stake 5 to 10 % of rated power for a PWR*

- identify what should be changed for the revision D of the EUR chapter 2.3
As a conclusion

- The EUR works started in 1991 to prepare harmonised specifications for next generation LWR plants in Europe.
- No new construction launched since that time.
- An open European electricity market is practically set up, but many rules are still national.
- Today, positive signals for new construction.
As a conclusion

The EUR organisation keeps, more than ever, central to harmonising the rules of the game at European level:
- main stakeholders,
- experience in producing harmonised requirements,
- relation with all the actors,
- etc…
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