



Harmonisation in safety

Autorité de sûreté nucléaire (ASN) – France
Nuclear power plant department

- **Harmonisation ?**

- **Already half a century of efforts**

- **Two powerful driver for harmonisation**
 - ❑ **MDEP**
 - ❑ **European construction**

- **The primary objective of harmonization is to provide a high and comparable level of safety in all countries involved**
 - ❑ **Harmonization doesn't mean standardization**

- **Harmonization is not only the role of safety Authorities, but also of operators and manufacturers**
 - ❑ **The specific choices and practices of operators and manufacturers were taken into account in the drafting of national regulations**

➤ IAEA

- Safety standards
- Review meetings for nuclear-safety and joint conventions (radioactive waste and spent fuel)
- IRRS (peer reviews of safety Authorities)



➤ OECD/NEA

- CNRA and CSNI Working Groups



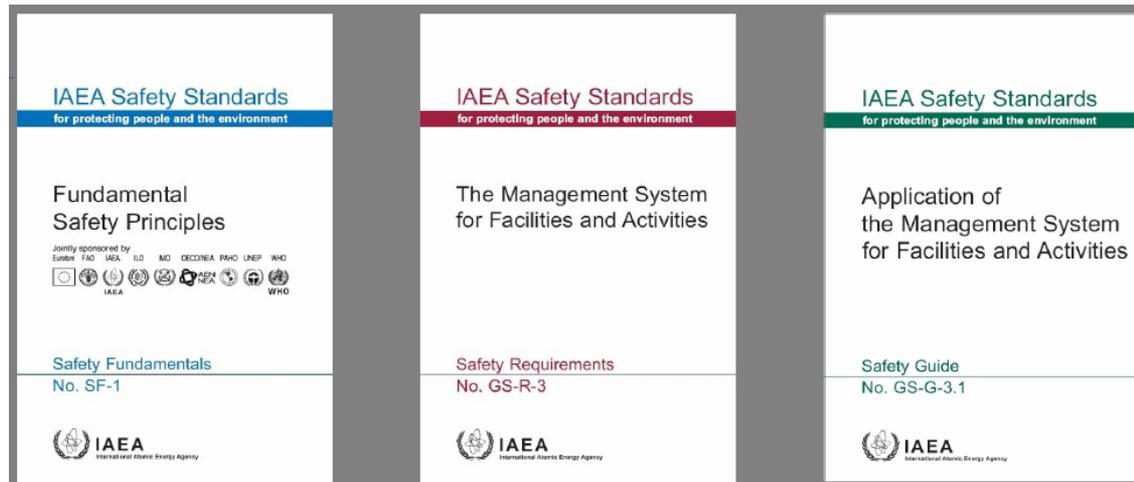
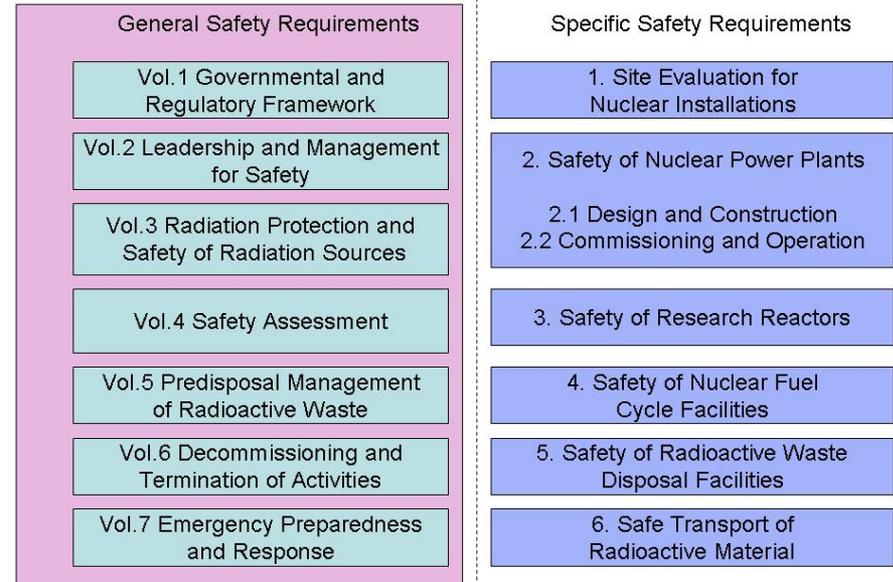
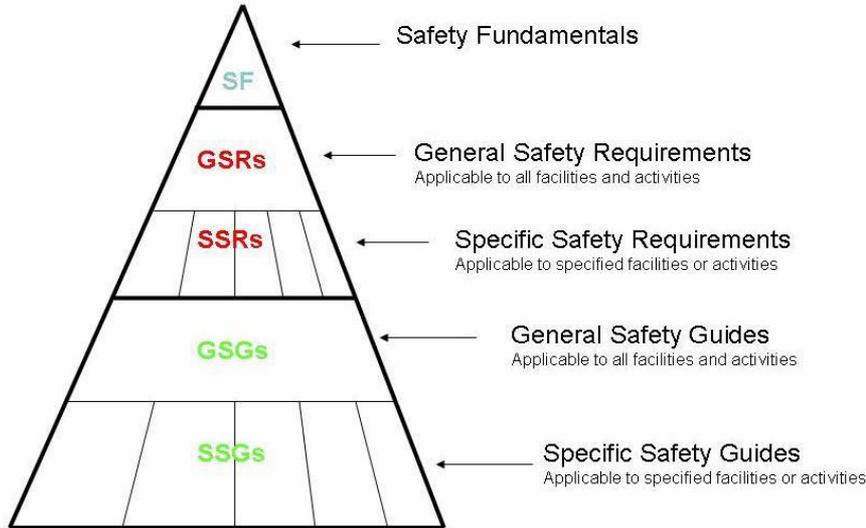
➤ Discussion “clubs” between safety regulators

- INRA = International Nuclear Regulators’ Association
- WENRA = Western European Nuclear Regulators’ Association

➤ Industry forums

- WNA, WANO
- FORATOM (and ENISS), EUR initiative

STRUCTURE OF THE LONG-TERM SET OF SAFETY REQUIREMENTS



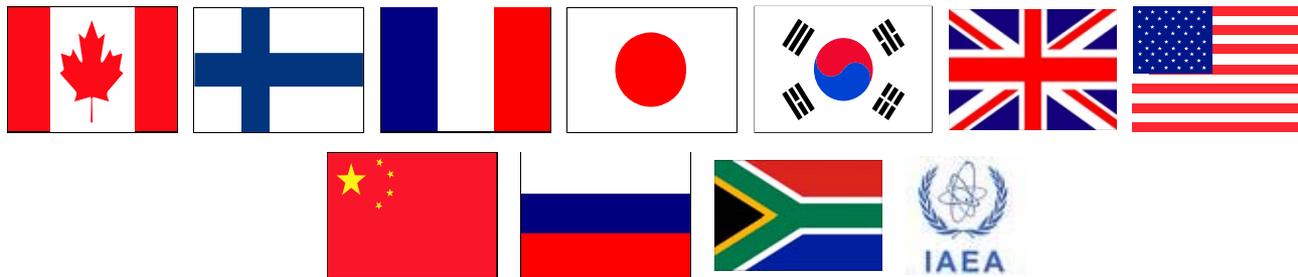
➤ **New reactors**

- ❑ **The “Multinational Design Evaluation Programme” Initiative (MDEP)**
 - secretariat by OECD/NEA
- ❑ **WENRA : proposed safety objectives for new reactors**

➤ **European construction**

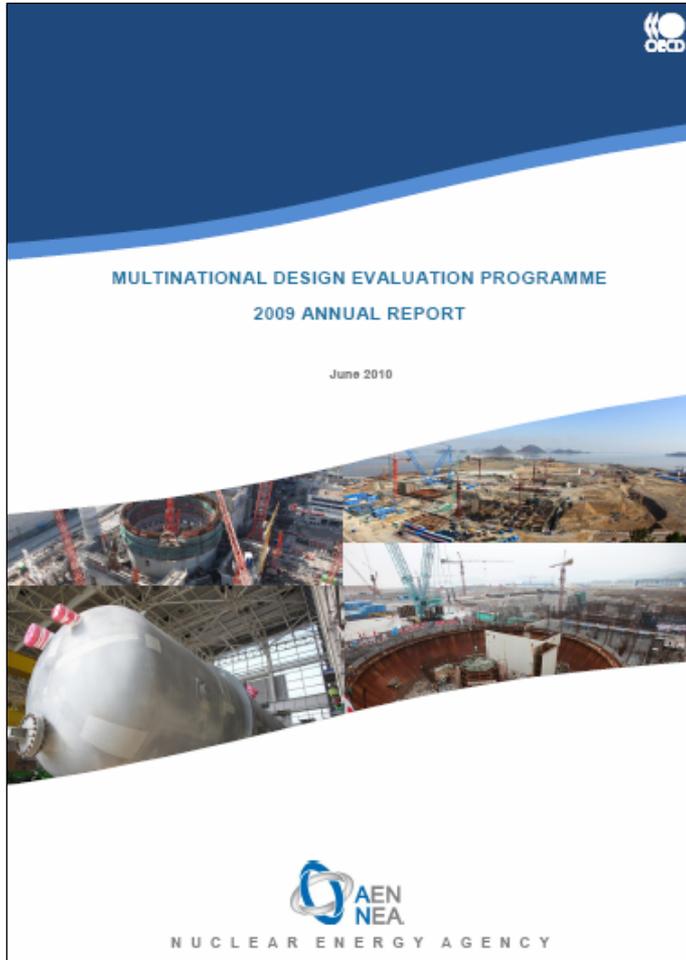
- ❑ **WENRA’s harmonisation work**
- ❑ **European Directive on nuclear safety recently issued**
 - COUNCIL DIRECTIVE 2009/71/EURATOM of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations
- ❑ **ETSON network of European technical support organizations**

M D E P



An initiative taken by national safety authorities to leverage their resources and knowledge for new reactor design reviews





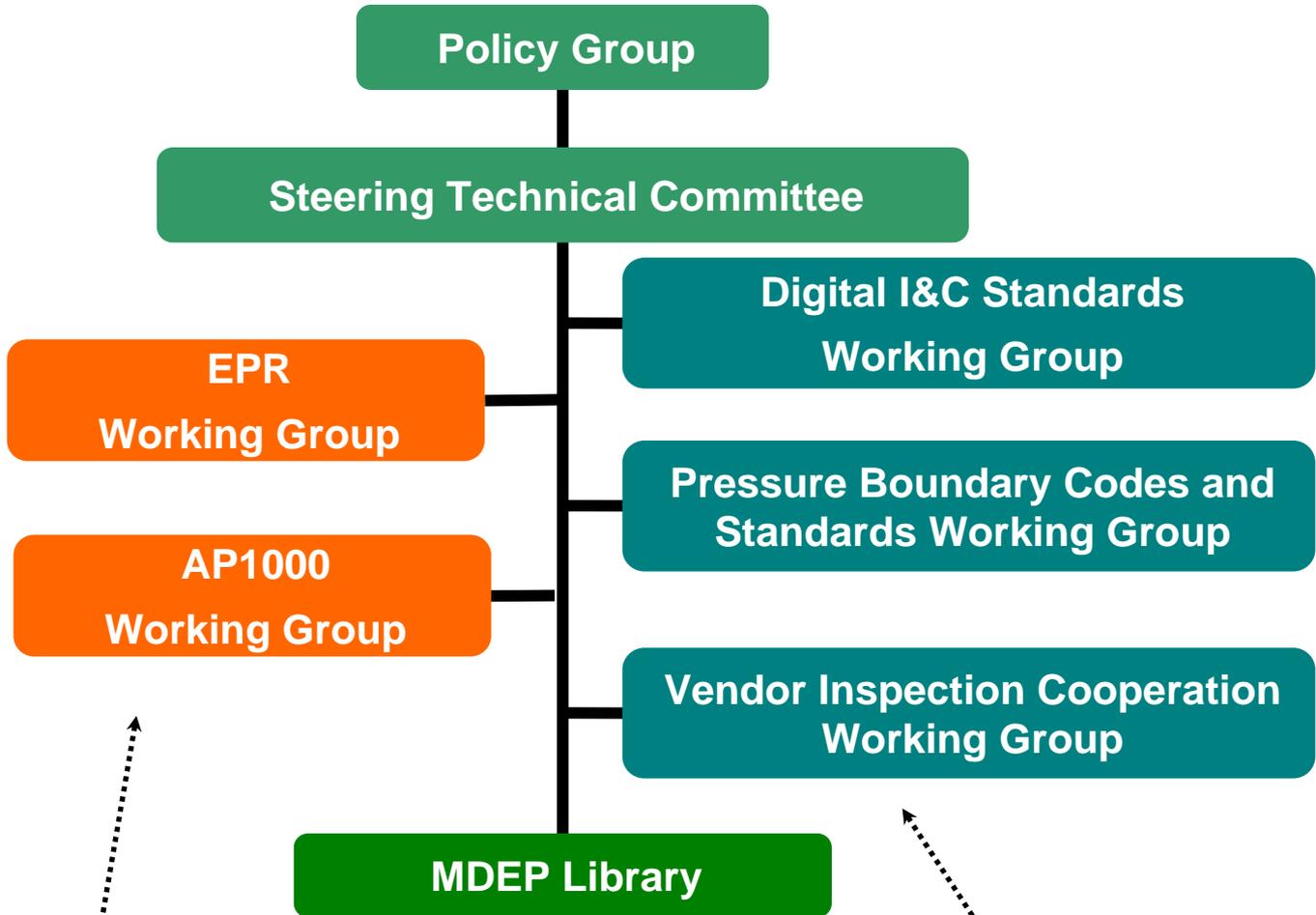
➤ **An initiative undertaken (concept in 2005) by safety Authorities to mutualise their assessment work on new reactors**

- ❑ **Optimizing and sharing the workload**
- ❑ **Ensuring robusiter assessments, hence improving safety**
- ❑ **Reinforcing consistency between regulatory requirements**



- ⊙ **To improve the effectiveness and efficiency of regulatory design reviews**
- ⊙ **To facilitate convergence of regulatory requirements**

MDEP Conference
Paris 10-11 September 2009



Cooperation

Convergence

➤ Vendor inspection cooperation

- ❑ **Goal:** to benefit from other regulators' inspections of vendors to support new reactor reviews, vendor inspections and manufacturing oversight
- ❑ Inspection at equipment manufacturer's premises
- ❑ Joint inspections: drafting of a guide and carrying out of such inspections

➤ Digital I & C codes and standards

- ❑ **Goal:** to achieve convergence of regulatory requirements and practices related to digital I&C standards for reactor safety systems
- ❑ Identification of differences and of suitable means for such codes and standards to converge

➤ Convergence of codes and standards on pressurized equipments

- ❑ **Goal:** to achieve convergence of regulatory requirements and practices related to nuclear component design
- ❑ Work with code writing organisations

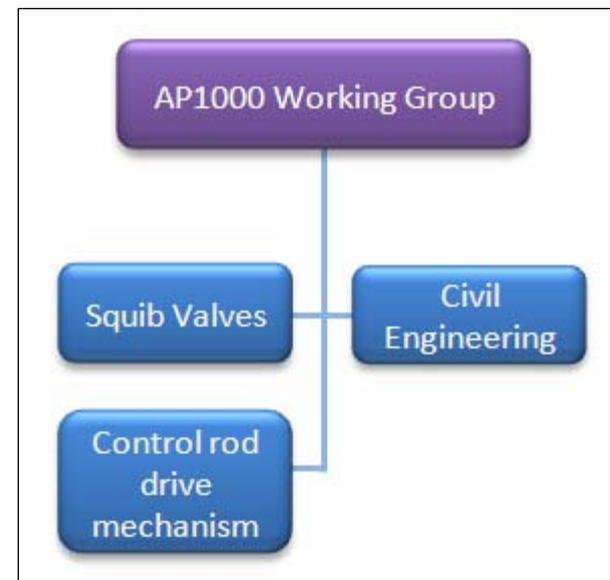
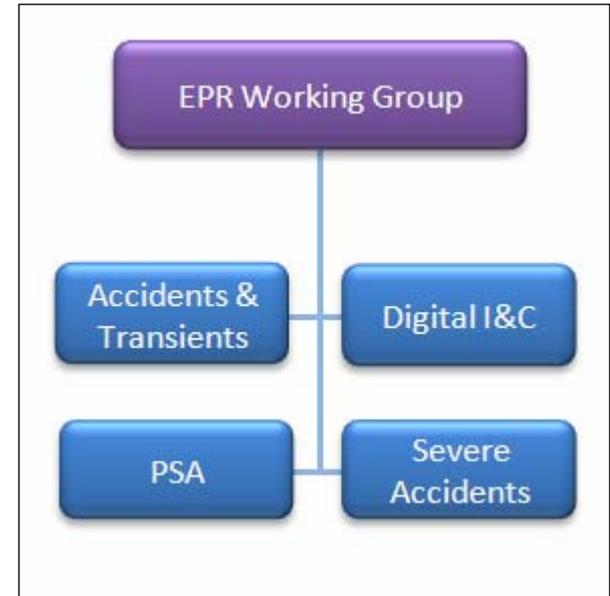
➤ EPR

- ❑ Finland, France, United States, United Kingdom, China,
- ❑ Canada (observer)

➤ AP1000

- ❑ United States, China, United Kingdom
- ❑ Canada (observer)

- Exchange of information and co-operation for assessing reports on various technical topics



- **MDEP is a mid and long-term programme, but short-term concrete results are necessary**
 - ❑ **Expected practical results in the forthcoming years**
 - Inspection of large components
 - Convergence of codes
 - Assessment of reactor designs
- **MDEP needs the active involvement of all stakeholders (Regulatory Bodies, Vendors and Operators)**
- **In addition to on-going working group, potential new task related to safety goals for new reactors**
 - A subgroup of technical experts further explores the issue and works towards establishment of programme plans and goals for a potential working group.

W E N R A



The main objectives of WENRA are to develop a harmonised approach to nuclear safety and regulation, to provide an independent capability to examine nuclear safety in applicant countries and to be a network for chief nuclear safety regulators in Europe exchanging experience and discussing significant safety issues

➤ WENRA

- ❑ **Initially 10, and then 17 Heads of safety Authorities in EU nuclearised countries + Switzerland, from 2009 non-nuclear countries as observers**
 - Since 2010 : additional observers (Russian federation, Ukraine, Armenia)
- ❑ **Policy statement issued in December 2005 and updated in 2010**

➤ 2000: Report on the safety state of candidate countries to the EU

➤ Two working groups on harmonization

- ❑ **Reactors (RHWG)**
- ❑ **Decommissioning and waste (WGWD)**

Western European
WENRA
Nuclear Regulators' Association



Western European Nuclear Regulators' Association (WENRA)

➤ Harmonization according to WENRA



Absence of substantial difference from safety point of view

- in regulatory or para-regulatory requirements
- in the resulting application to facilities

➤ Two “easy” ways to avoid:

- Adding together all national safety requirements
- To agree on the minimum common denominator

➤ Example of the study on existing reactors

Methodology for existing reactors

➤ **Development of safety “reference levels”**

- ❑ on the basis not only of AIEA’s standards...
- ❑ ... but also of national regulations

➤ **Each country examines its own situation...**

- ❑ regulations and generic recommendations
- ❑ application on reactors

.... and deduces from this review which items to be
“harmonized”

➤ **The result of each country is validated in common**

Scope of the study on existing reactors

➤ Safety management

- ❑ safety policy, operator's organization,
- ❑ quality management, training and certification

➤ Design

- ❑ design check and improvement, safety classification, design envelope of light-water reactors

➤ Operation

- ❑ operating limits and conditions, ageing management
- ❑ experience feedback, maintenance, accident procedures, accidents beyond the design basis

➤ Safety verification

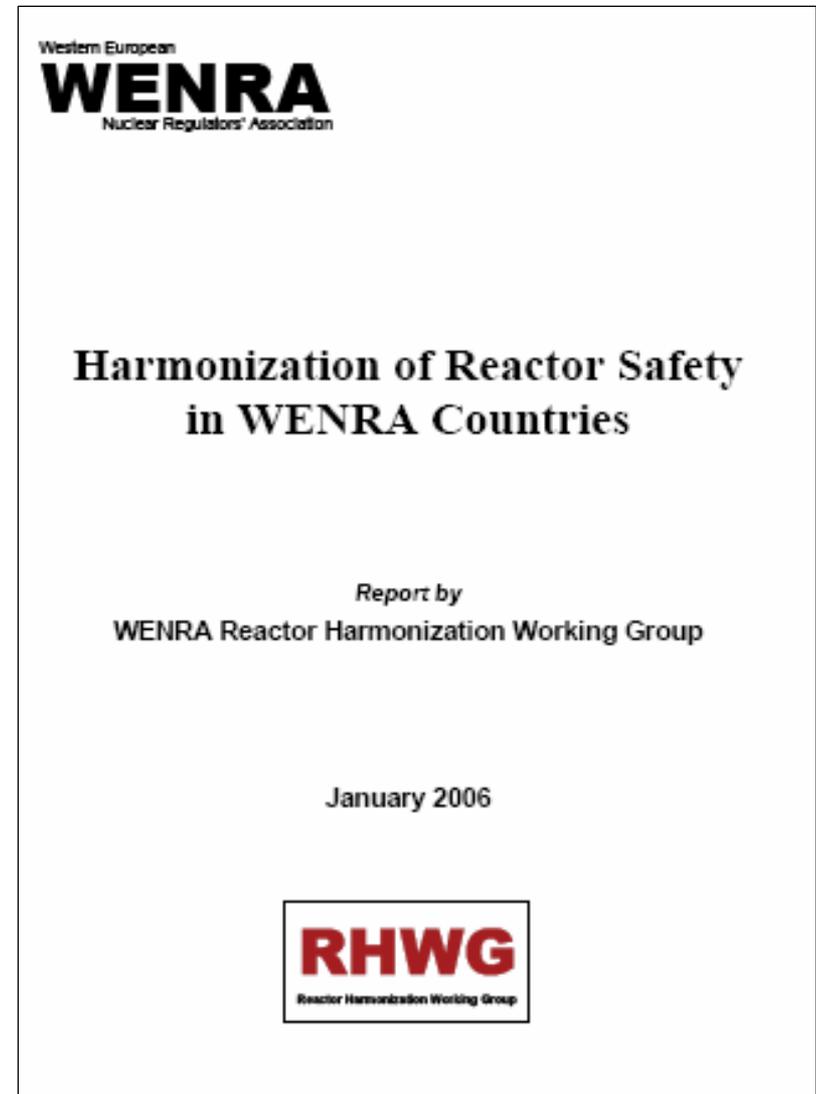
- ❑ contents of the safety report, PSA, re-examinations, changes

➤ Emergency situations

- ❑ on-site emergency preparedness, internal fires

Results of the study on existing reactors (1/2)

- **Set of 300 consensual reference levels (RLs) throughout WENRA countries**
 - Issued in 2006
 - Latest version : January 2008
- **Two-dimensional rating for each country and reference level**
 - Regulations**
 - Implementation**
- **Rating scheme**
 - A = harmonized in substance**
 - B = a difference exists, but is justified**
 - C = non-harmonized**



Results of the study on existing reactors (2/2)

- **Most “reference levels” are already implemented**
 - ❑ a rather homogeneous situation between countries

- **However many reference levels are not formally required**
 - ❑ a rather contrasted situation between countries

- ↪ **Need for national action plans, taking into account benchmarking results, to get national legal systems and practices in line with the reference levels**

- **“Report on Harmonization of Reactor Safety in WENRA Countries” issued in early 2006 for comments**
 - ❑ **Large interest of stakeholders**
 - ❑ **Comprehensive discussions with ENISS**

- **Heads of safety Authorities exchanged their national action plans**
 - ❑ **Implementation under way: target ⇒ 2010**

- **Launching of a study on new reactors**
 - ❑ **Common point of view on the safety objectives for new reactors**

Safety objectives for new reactors

➤ “New” reactors

❑ What are “new reactors”

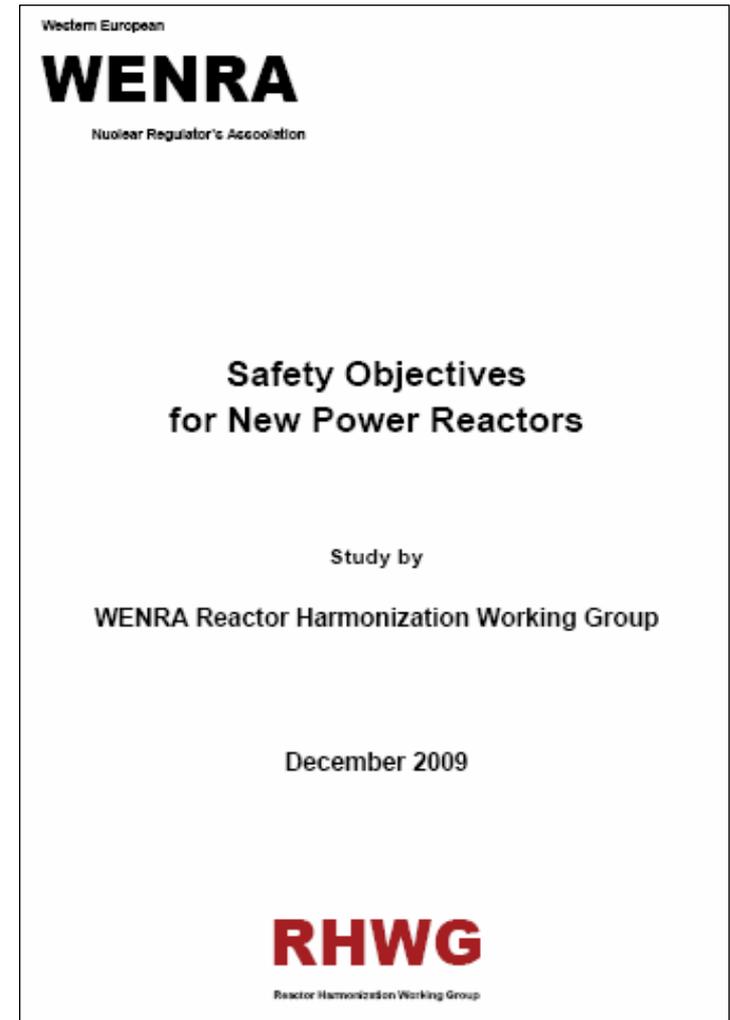
- projects that are under way or planned in the short term
- “deferred plants” (construction stopped before full completion) are not addressed

❑ New task started in 2008:

- To identify safety goals and a limited test of the proposed methodology”.
- To consider potential quantitative safety goals
- 2 phases: limited test study then “full” study.

Safety objectives for new reactors

- Report published, for stakeholder comment, at the beginning of 2010: “Safety objective for new power reactors”
 - ❑ 7 high level qualitative objectives, consisting of safety improvements compared to existing reactors
 - The result of 5 RHWG meetings (3 to 4 days for each meeting + homeworks)
- The improvements called by these safety objectives are demanding and reachable
 - ❑ Improvements of two kinds:
 - in continuity with existing reactors
 - based on innovative features



Safety objectives for new reactors

➤ Methodology to develop these safety objectives

Review of the national and international documentation

High level qualitative safety objectives

In line with IAEA SF-1 principles

Investigation of Quantitative safety targets

Pilot exercises

Examples of areas of improvements

Review of the RLs

Safety objectives for new reactors

➤ O1. Normal operation and abnormal events

- Reducing the frequency of abnormal events
- Better controlling abnormal events

➤ O2. Accidents without core melt

- No or only minor off-site radiological impact
- Reducing, as far as reasonably achievable, the core damage frequency
- Reducing, as far as reasonably achievable, the radioactive releases from all sources
- Reducing the impact of external hazards and malevolent acts

➤ O3. Accidents with core melt

- Reduce potential releases, also in the long term
 - Accidents leading to large or early releases: practically eliminated
 - Other core melt accidents: only limited protective measures in area and time

This implies that the confinement features are designed to cope with core melt situations: a major step in safety compared to existing reactors

➤ O4. Independence between all levels of defence

- Enhancing their independence

➤ O5. Safety and security interfaces

- Reducing the impact of external hazards and malevolent acts
- Seeking synergies between safety and security

➤ O6. Radiation protection and waste management

- Reducing as far as reasonably achievable
 - Individual and collective doses
 - Discharges to the environment
 - Quantity and activity of radioactive waste

➤ O7. Management of safety, from the design stage

- The licensee shall have sufficient in house technical and financial capabilities
- All organisations

Safety objectives for new reactors

- Link with IAEA Safety Fundamentals (SF-1) document and its ten safety principles (SP)



IAEA SF-1 safety principles		WENRA proposed safety objectives						
		O1	O2	O3	O4	O5	O6	O7
SP 3	Leadership and management for safety					✓		✓
SP 5	Optimization of protection	✓	✓	✓	✓		✓	
SP 6	Limitation of risks to individuals		✓	✓			✓	
SP 7	Protection of present and future generations							
SP 8	Prevention of accidents	✓	✓	✓	✓	✓		

Safety objectives for new reactors

➤ Why no quantitative value in the proposed safety objectives

Targets and not acceptance criteria

Systematic search for such targets

Quantitative targets are used in many countries

- CDF: need to be aware of the differences in methodologies when making comparisons, no common value
- Dose targets for radiological impact: set design targets below intervention levels, no common value
- Practical elimination: no general cut-off value
- Targets related to radiation protection and waste are very much technology-dependant

↪ **Conclusion: no common value retained**

- **Follow-up study on harmonisation for existing reactors**
 - ❑ **Status in 2010 (task almost completed)**
 - ❑ **Further discussion on the implementation of some selected reference levels**

- **Safety objectives for new reactors**
 - ❑ **Developing common views/safety expectations on key issues**

- **Long term operation of currently operating reactors**



Other initiatives to build nuclear safety in Europe

- **Creation of a European high-level group (ENSREG)**

- **European Directive on nuclear safety issued in June 2009**
 - ❑ **A legal framework to WENRA's technical approach**
 - ❑ **Innovative requirements (education and training to maintain a highly qualified and skilled staff, actions for public information, reception of peer reviews)**

- **WENRA, ETSON, ENSREG, EU directive: a common objective to promote a high level of safety in Europe**

- **Harmonization: a reality in Europe**
 - ❑ Consensus reached through balanced exchanges
 - ❑ strong will, continuous efforts and sturdy commitment from each participant

- **Another challenge: MDEP**
 - ❑ Great expectations from all stakeholders

- **Benefit from expert involvement in international activities**
 - ❑ Creation of regulator staff network where each participant knows and trusts each other

- **Staff exchanges need to be promoted**

- **Success of harmonization relies on regulators' openness to other countries' practices**