

Nuclear Safety in Europe
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Opening remarks on behalf of WENRA

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The accident in Fukushima has shaken the trust on nuclear safety

Can we regain society confidence on our ability to make safe nuclear power plants?

- **Trust** is gone – **Doubts** are very high!
- Some experts have referred to PSA studies, which say consistently that the frequency of severe accidents at older NPP's is in the range 10^{-4} ... 10^{-5} /year, or even less.
- The experience indicates a frequency of more than 3×10^{-4} /y.
- Can we believe in any quantitative predictions on nuclear safety ?

What is the message of PSA results?

PSA gives us information only on scenarios that we can model, and it is definitely a good tool for its purpose when it is used right !

but

None of the severe accident scenarios we have seen,

TMI – Chernobyl – 3 x Fukushima

was modelled and studied with PSA !

TMI – 1979

Immediate cause: Operators did not handle right a relatively simple incident scenario.

Root cause: **Lack of knowledge**. Inadequate understanding of reactor systems behaviour in transient conditions.

- Until 1979, the safety research had been focusing mostly on large break loss of coolant accident .
- The behaviour of a PWR primary circuit had not been thoroughly studied and was not understood.
- The operators had no instructions for the event they met.

Chernobyl – 1986

Immediate cause: The reactor was not made inherently safe as was required in the countries following US regulations developed in 1960's.

Root cause: **Lack of safety culture**. Inadequate attention to inherent reactor safety and safety in general.

- The designers were aware of the possibility of explosive reactivity increase, and this had been seen in precursory events. Operators were not clearly warned of the danger.
- Operators did not follow the instructions written by reactor designers. Instead they took orders from the grid control centre.

Fukushima – 2011

Immediate cause: Large earthquake followed by tsunami.

Root cause: **Lack of adequate regulations.** Not enough attention to site specific hazards.

- Tsunamis are well known in the Japanese history – large tsunamis have been recorded typically three times in each century.
- Tsunamis were not used as a design basis for Fukushima plants – they were brought to the Japanese nuclear safety regulations less than ten years ago but only modest protection was enforced.

Next accident – ???

Immediate cause: surprise again ???

Root cause: not address in design, operation, regulation ???

- We must not tolerate any more accidents.
- It is time to take strong actions to eliminate severe nuclear accidents in the foreseeable future.

Safe plants – towards perfection

We must provide designs that are able to withstand new surprises.

Encouraging lesson from Japan:

plants designed for postulated seismic hazards by competent engineers did not suffer damages although they were hit by one of the largest earthquake known in history (much larger than design target)

Questions on safety

- The question we must make is not:

“are our plants safe enough?”

- The right question is:

“how can we make our plants more safe?”

WENRA – seeking for answers to the relevant safety questions

WENRA was established in 1999 to promote nuclear safety in Europe:

1. Assessment of nuclear safety and safety infrastructure in candidate EU Member States
2. Harmonization of safety regulations for currently operating nuclear power plants, and joint commitment to enforce these regulations
3. Harmonization of safety regulations and practices in the area of nuclear waste management
4. Safety objectives for new reactors
5. Harmonization of inspection practices of nuclear facility structures and components
6. Targeted safety reassessment after Fukushima accident
7. Harmonization of safety practices at research reactors

WENRA's policy

WENRA works in the spirit of a policy statement which was signed in December 2005 by all of the WENRA member states:

“We, the heads of the national Nuclear Safety Authorities, members of WENRA, commit ourselves to a continuous improvement of nuclear safety in our respective countries.”

International or national regulation?

Consensus after Fukushima accident : we must take a significant new step to strengthen the global nuclear safety framework.

Two main alternatives :

1. An international agency with regulatory powers and binding international regulations.
2. National regulatory bodies provided with the necessary independence, resources and competence
 - support of the global network
 - harmonized internationally agreed safety standards.

International or national regulation?

An international regulatory agency is not a viable alternative !

- could hardly promote a progressive development of nuclear safety
- could be perceived as an effective protection, but this would be an illusion

Cooperation among strong national regulatory bodies continues to be the right way forward – but there is much space for improving the current situation.

National responsibility – necessary basis for worldwide nuclear safety

The licensees must understand and live up to their primary safety responsibility.

- meeting the regulatory requirements is not equal to achieving a high level of nuclear safety
- licensees should set their own more ambitious safety targets
- continuous assessment of potential risks and innovative measures for further enhancement of safety

The regulatory bodies must have professional competence and adequate enforcement power for ensuring proper response to any safety concerns they may have.

National actors need advice from peers

No organization licensed to operate a nuclear power plant and no national nuclear regulatory organization should assume that it is able to achieve excellence in safety without benchmarking its performance regularly with other similar organizations.

Opportunities for benchmarking are being offered by international networks

- these opportunities should be used more efficiently than today.

Any benchmark should be conducted with the main **objective to find opportunities for further safety enhancement.**

The international networks should provide assessments, guidance, and peer pressure to **ensure that each licensee and each regulatory body in every State is able and committed to meet safety expectations of its counterparts in other States.**

International safety regulations

Binding international safety regulations ?

Establishment of binding international nuclear safety standards has got growing support after Fukushima accident but the optimum strategy of setting such standards must be clearly defined and decided before going to that direction.

Based on my experience, I support a well considered set of binding international safety requirements but recommend these to be limited to general principles and qualitative objectives.

Bulk of the existing IAEA Safety Standards, both the Requirements and the Guides should keep their current status.

International safety regulations (cont.)

Binding international safety regulations

We have no reason to invent new requirements.

An optimum set of binding safety requirements could be made from the Articles of the Convention on Nuclear Safety, completed with some principles and objectives found in Safety Fundamentals and some Requirements documents.

A step to this direction was taken at the regional level in Europe about two years ago when the Council of the European Union issued its directive “Establishing a Community Framework for the Nuclear Safety of Nuclear Installations”.

International peer reviews

IRRS missions

IRRS mission is an IAEA coordinated peer review focusing on the Governmental, Legal and Regulatory Framework for Safety.

Mandatory peer review missions, to be conducted every ten years, to regulatory bodies of Member States are already required in the EU countries by the European Council directive.

- The European reviews are implemented applying the normal IRRS procedures of the IAEA.

Also countries outside Europe should be committed to receive an IRRS missions as a minimum every ten years.

International peer reviews (cont.)

Design safety reviews

Design safety reviews are not a standard service offered by the IAEA but such missions should be strongly increased.

Twenty years ago such reviews were made on the old Soviet Union designed reactors

- this work was a good example of cooperation between the national experts and the international team of experts under the IAEA hat.
- a preliminary review was conducted by the national experts and the results were then discussed during the international review mission.
- joint recommendations led to safety enhancement programs at each plant type
- the recommendations were implemented over a time of many years and evidently much strengthened the safety of all concerned plants.

Similar joint reviews should now be started in all Member States and be conducted at all older facilities.

International peer reviews (cont.)

Design safety reviews

Design safety reviews conducted by an IAEA team should be made as a normal practice.

The reviews should focus on certain topical areas agreed in advance, such as protection from external hazards, diversity of means to transfer decay heat to ultimate heat sink, or provision of means to protect reactor containment after a reactor core meltdown.

The targeted safety assessments that are now underway in the Europe, including the aspect of international peer review, would be a good pilot project for a global IAEA managed review program.

Conclusion

Wenra can make important input to global nuclear safety.

WENRA has already develop good safety approaches for European conditions.

European models can be and have already been transferred to global level through the IAEA.

- IAEA Safety Standards
- Peer reviews