

POSSIBLE WAYS FOR STRENGTHENING THE GLOBAL NUCLEAR SAFETY FRAMEWORK

International versus national regulation

There seems to be a large consensus after Fukushima accident that in order to make the nuclear power acceptable to the society we must take a significant new step to strengthen the global nuclear safety framework. Two main alternatives have been proposed:

1. Establishing an international agency with regulatory powers and working on the basis of binding international regulations.
2. Ensuring that national regulatory bodies in every State are provided with the necessary independence, resources and competence, and with support of the global network are able to enforce harmonized application of internationally agreed safety standards.

As the first thing we need to conclude which one of these two alternatives has more potential to effectively ensure avoiding accidents with large offsite radioactive releases.

Based on my experience there can be only one conclusion: an international regulatory agency is not a viable alternative. An international regulatory agency could not be given adequate enforcement powers in sovereign States but it should base its acts and decisions on some kind of internationally managed decision making system. Therefore it could hardly promote a progressive development of nuclear safety. In the worst case the nuclear safety development might stagnate at the current level. Even if the international regulatory system could be perceived by the general public as an effective way of protection, this would be an illusion.

The other alternative, cooperation among strong national regulatory bodies continues to be the right way forward. However, there is still much space for improving the current situation.

National responsibility as basis for worldwide nuclear safety

The principle of national responsibility for nuclear safety and the concept of independent national organizations regulating nuclear safety were made as cornerstones of the Convention on Nuclear Safety (CNS) in 1994. This was considered a right approach on the basis of positive experience in the countries where strong national regulatory system had been in place. The accident in Fukushima gave no reason to question the basic principles agreed in the CNS.

National responsibility should not be understood to mean that each State has a sovereign right to use nuclear energy without observing the Fundamental Safety Principles. It must be clear to each State that for ensuring nuclear safety, the Convention on Nuclear Safety takes a precedence from Article IV of the Non Proliferation Treaty that refers to "...the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without

discrimination...”. Although each State has the right to use nuclear energy, everyone must do it in responsible manner.

Each Government considering nuclear power as an option in meeting its State’s energy needs has to recognize the long-term commitment to the peaceful, safe and secure use of nuclear technology. This has to be based on a sustainable legal, regulatory, social, technological and economic infrastructure.

The main actors in ensuring nuclear safety are the licensees and the regulators. In addition, each State needs an educational system and research infrastructure for building necessary national knowledge base.

The licensees must understand and live up to their primary safety responsibility. Meeting the regulatory requirements should not be taken equal to achieving a high level of nuclear safety. Compliance with the regulatory requirements is only the basic condition for nuclear power plant operation, and the licensees should set their own more ambitious safety targets. Important elements of safety culture are continuous assessment of potential risks and innovative measures for further enhancement of safety.

For the regulatory bodies, it is most important to have professional competence for setting safety requirements, for thorough evaluation of the safety issues and for making informed safety decisions. They also need to have adequate enforcement power for ensuring proper response to any safety concerns they may have.

Need for global support and peer advice to national organizations

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 several international networks but 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.

The Government of each State must provide a strong national legal and regulatory framework for safety and have it adequately benchmarked to assure itself that it is not accepting lower nuclear safety standards than other States. Benchmarking shall cover both nuclear facilities and their operation and regulation. The licensees and the nuclear safety regulators must be open for critical assessments and learn from the recommendations of their peers.

The cooperation between Governmental organizations is not alone adequate for assuring high level of safety in all States. Voluntary co-operation between nuclear power plant vendors and the licensees is another essential part of the Global Nuclear Safety Network. It has a potential to make even stronger contribution to nuclear safety than what can be achieved through the Government controlled part. We have all reasons to believe that the traditional work by the owners groups established by vendors and the work by World Association of Nuclear Operators (WANO) will be strengthened and widened in the aftermath of Fukushima accident, and we have al-

ready heard about plans for enhanced industry co-operation. However, in this presentation I am not going further to the industry side.

In this speech I am emphasizing three elements of the global nuclear safety framework that need to and can be developed to support national organizations.

These elements are:

1. International safety regulations,
2. International peers reviews, and
3. Convention on Nuclear Safety.

Each of these elements needs to be improved and at the same time the proper use of each element by the States has to be enhanced.

International safety regulations

The international safety regulations are generally considered to be equal to the IAEA Safety Standards. Their main purpose until now has been to provide guidance for national rulemaking and to serve as a basis for the IAEA peer reviews. This is still a valid objective when making and revising these standards. All of the IAEA Member States must be committed to make their national regulations harmonized with the IAEA model, no matter whether the standards are binding or not.

For strengthening the global nuclear safety network, especially three things have to be addressed:

1. question on binding international safety regulations,
2. enhancing use of the current IAEA Safety Standards, and
3. enhancing the clarity, consistency, and usefulness of the IAEA Safety Standards.

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. They should thus remain as a model for national rulemaking and provide examples of good safety practices for consideration of nuclear industry. They should also provide a sound basis for discussions to be conducted during international peer reviews.

As concerns the binding requirements, 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". That was a successful exercise that benefitted a lot from the IAEA model. The future requirements to be complied with by all users of nuclear energy

on the global scene could go somewhat longer to the substance than the EU directive, which is mostly addressing the legislative, regulatory and organizational aspects as well as human resources and expertise.

Enhancing the use and status of current IAEA Safety Standards

Concerning the existing set of the IAEA Safety Standards, it would be worthwhile to explain all experts participating their drafting and to all of the users more clearly what is their strategic aim and status. As far as I see it, the requirements have to be written to serve as models of mandatory requirements for new plants or practices when issuing new or revised national regulations. They thus explain the global consensus on what is the expected level of nuclear safety at the time of issuing a new requirement-type standard. Older facilities should have a general goal to strive to the same level, as far as reasonable and feasible. The guides included into the IAEA Safety Standards should have different objectives and status. In addition to giving more detailed guidance for application of the respective requirements, they are needed to drive safety developments worldwide by setting challenging targets or by providing examples of best available safety approaches.

It would also be worthwhile to promote the use of the IAEA Safety Standards in Member States. This could be done by obligating each Member State to report how certain new standards have been taken into account in national regulation. This report could then be reviewed, for instance, as part of the respective module of the IRRS review mission. Alternatively, there could be a dedicated new IAEA review mission to address only the national implementation of the IAEA Safety Standards. The experience of the EU on implementing binding directives to national legislation, and making reviews on the national practices in the application, could serve as a good model on how to do this.

Enhancing the clarity, consistency and usefulness of the IAEA Safety Standards

The IAEA Safety Standards enjoy today much respect and they are most helpful for those who are drafting national safety regulations. However, the process of producing safety standards could be further improved to enhance the clarity and usefulness of the standards.

The first prerequisite for an improved standards process would be to add more IAEA secretarial resources to the Safety Standard work, in order to provide more coordination and more thorough review of consecutive drafts.

An important improvement to the standards program was already made some years ago by establishing a group of senior experts from the secretariat to look for the internal consistency of the standards and to make reviews after having received Member State comments.

In addition to improving the overall coordination, there should also be improvement in the process for making a certain standard. The first thing would be to appoint for each separate standard a dedicated “owner” who is an experienced expert in the respective area. If such experts are not found from inside the IAEA staff, the owner could also be a cost free expert from a Member State, assigned especially for this purpose. The “owner” should coordinate production of the standard from the very beginning to the end and prepare the consecutive

new draft texts as well as responses to Member State comments. Another important component for producing a certain standard is the group of experts coming from Member States to draft the first version. These experts should also remain the same for the entire process, and they should together with the “owner” be accountable for first responses to the comments sent by Member States.

The external experts should not represent only the national regulatory bodies but the IAEA should also invite experts from the vendors, manufacturers, licensees, and research organizations, as appropriate to ensure adequate competence and experience for each specific standard.

International peer reviews

Commitment to peer reviews

In addition to developing safety standards, the IAEA needs to ensure that these are applied in a consistent manner in all Member States. This requires that the IAEA provides practical guidance and arranges peer reviews where experts coming from different countries assess the practices in the receiving country.

Until now the peer reviews have been based on voluntary invitations by the States. It has also been under discretion of each State whether they want to make the review results publicly available and whether they want to take actions recommended by the international peers.

From now on, it would be worthwhile to increase the obligations related to the peer reviews. Each IAEA Member State should be committed to invite certain reviews with regular intervals.

The review reports should be open to the international community, and the recipient facilities/countries should after each mission within a given time give their written response to recommendations. The response could be either a plan for implementing recommended actions or presentation of solid arguments that explain why the actions are not taken. There should also be a commitment to receive a follow-up mission that verifies the implementation of the action plan.

However, the review groups should not have a formal authority to give binding recommendations. Final decisions on safety measures should be left to the licensees and the regulators of each Member State because we should assume that they have the widest knowledge on the relevant influencing factors.

IRRS missions

An IAEA coordinated peer review focusing on the Governmental, Legal and Regulatory Framework for Safety is the IRRS mission. All countries with nuclear power plants should be committed to receive an IRRS missions as a minimum every ten years. 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. These reviews are implemented applying the normal IRRS procedures of the IAEA.

OSART missions

Another well established program offered by the IAEA consists of the OSART missions looking at the operational practices of nuclear power plants. Each Member State should be committed to invite an OSART mission with intervals taking into account the number of operating plants in the State. As a minimum,

one NPP in each IAEA Member State should receive every five years an IAEA OSART, or a similar WANO peer review. Member States with large number of plants should be committed to invite at least one IAEA OSART or WANO mission every year.

Design safety reviews

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

Twenty years ago such reviews were made on the old Soviet Union designed reactors, and this work was a good example of cooperation between the national experts and the international team of experts coming under the IAEA hat. The preliminary review was first conducted by the national experts and the results were then discussed during the international review mission. The joint recommendations led to safety enhancement programs that were carefully 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.

Design safety reviews conducted by an IAEA or WANO team should be made as a normal practice. At least one review should be conducted as soon as practicable in each IAEA Member State operating nuclear power plants. These 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.

Convention on Nuclear Safety

The most practical way to implement the binding safety regulations and to agree on the obligations with respect to peer reviews would be to incorporate them into the Convention on Nuclear Safety (CNS).

It is now the right time to start reviewing the text of the CNS and to update it as necessary based on lessons learned from Fukushima accident and from other sources since 1994 when the CNS was signed. The question on binding international safety regulations should be discussed and decided as part of this process.

Also the review mechanism, i.e. the large review meetings every three years should be significantly changed based on experience. The first and second review meetings were evidently most useful for contributing enhanced global nuclear safety and gave many insights to the participants. However, the two latest review meetings have been more or less repeating of what has been said before and I consider their importance to safety almost negligible.

It is especially unfortunate that almost all Parties of the Convention have both in the reports and in the review meeting presentations highlighted the best parts of their performance. This has not contributed much to the nuclear safety enhancement because the experts of other Parties seem not to get a clear picture of the declared excellence. More important had been to focus the information on

problem areas where the performance needs to be improved. This has not happened although several proposals to such direction have been made.

One possibility for a new review approach would be to stop the large meetings and replace them with peer review missions. An international expert group could visit separately, according to a fixed schedule, all Parties operating nuclear power plants and review a similar report as the one now written for the review meeting. This would give a much more comprehensive review than a few hours discussion in a large meeting. The conclusions of the expert group could be recorded and published in a transparent manner. Such approach would put more peer pressure to each Party and motivate strive for excellence in safety.

Increasing the IAEA resources on nuclear safety

The Member States have to recognize that they cannot expect IAEA to increase its services in the nuclear safety area unless its resources are significantly increased. Producing new safety standards and organizing safety missions is very work intensive, and the current staff cannot run larger programmes than they are already doing today.

The cost increase of the IAEA safety work, to be paid jointly by all Member States, is only a small fracture of costs of a severe accident. The Member States need to make a clear commitment to increase the IAEA resources if they want to get better service.