# Session 4. Nuclear Regulation and Safety

## Regulation for New Build and Newcomers International Energy Agency

Paris, France 22-24 January 2014

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# **IAEA and Newcomers**



"The Agency has a key role to play in ensuring that this expansion in nuclear power takes place in an efficient, responsible and sustainable manner."

"Assistance to newcomers, especially those which are most advanced on the road to having operational reactors, will remain a high-priority issue."

> Yukiya Amano IAEA Director General



# **Top Questions Newcomers Ask**

- How do I start the process?
- Is there public support in my country?
- Do I have the right people?
- Where will I find the funding and financing?
- What will I do with the waste?
- Can I find a site?
- Is it safe? Can I manage if there is an accident?



## The Milestones Approach to Nuclear Power



# PhasedComprehensiveIntegrated



## Milestones in the Development of a National Infrastructure for Nuclear Power (NG-G-3.1)



# Milestones in the Development of a National Infrastructure for Nuclear Power (NG-G-3.1)

- National position
- Nuclear safety
- Management
- Funding and financing
- Legislative framework
- Safeguards
- Regulatory framework
- Radiation protection
- Electrical grid
- Human resources development



- Site and supporting facilities
- Environmental protection
- Emergency planning
- Security and physical protection
- Nuclear fuel cycle
- Radioactive waste
- Industrial involvement
- Procurement



# **Common Challenges of Newcomer Countries**

- Areas that Integrated Nuclear Infrastructure Reviews (INIR) missions have identified as common challenges for newcomers:
  - National position development and decisionmaking
  - Legal and regulatory framework
  - Financing
  - Human resource development
  - Management



## **Legislative and Regulatory Framework**

- Legal framework establishes all of the responsibilities for the nuclear power programme
- Legislation should cover:
  - Safety
  - Security
  - Safeguards
  - Liability





Bangladesh passed comprehensive nuclear law in May 2012 and established an independent regulatory body (BAERA).

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## IAEA Nuclear Safety Action Plan International Energy Agency

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# **IAEA Action Plan on Nuclear Safety**

- Safety Vulnerabilities
- Peer Reviews
- Emergency Preparedness and Response
- Regulatory Bodies

- Operating Organisations
- IAEA Safety Standards
- Legal Framework
- Embarking countries

- Capacity Building
- Protection of People and Environment
- Communication
  - Research and Development

#### **<u>12 Point Plan</u>**

- Adopted by Board of Governors
- Endorsed by All Member States

#### **Actions on**

- IAEA Secretariat
- Member States
- Other Relevant Stakeholders



# **IAEA Fukushima Report**

### **Chapter**

- 1. Description and context of the accident
- 2. Safety assessment
- 3. Emergency preparedness and response
- 4. Radiological consequences
- 5. Post-accident recovery
- Lessons learned
- Conclusions





# **Technical Lessons Learned (1)**

- Improved reliability of power supply
- Spend fuel pool cooling
- Independent core cooling
- Handle events with all units affected
- Enhanced protection from Earthquake/Tsunami
- Alternative injection into reactor coolant system & RCS depressurization



# **Technical Lessons Learned (2)**

	Recommendations (SMR CM 30 May – 1 June 2012)
India	<ul> <li>Larger margin in advanced plant irrespective of plant location.</li> <li>Development of accident management skills under extreme conditions.</li> </ul>
Indonesia	<ul> <li>Consideration of volcano eruption and tsunami simultaneously.</li> <li>Protection of system and components from volcanic dust.</li> </ul>
Italy	<ul> <li>Consideration of "plug-in" water and electricity supplies in early design phase.</li> <li>Determination of optimum grace period.</li> </ul>
Japan	<ul><li>Ensure switchboard integrity.</li><li>Location of spent fuel pool should be reconsidered.</li></ul>
Korea	<ul> <li>Passive cooling of spent fuel pool.</li> <li>Periodic inspection and testing of SSCs need to be strengthened.</li> </ul>
Russia	<ul> <li>Scope of probabilistic safety assessment (PSA) needs to be extended to include various external hazards.</li> <li>Off-site resources should be timely with no long delays.</li> </ul>
USA	<ul> <li>Multiple unit threat needs to be considered for SMR deployment.</li> <li>Plans/procedures to bring equipment from the closest adjacent NPP.</li> </ul>

# International experts' meetings

## **1. Reactor and Spent Fuel Safety**

- More attention on Mitigation
- Defence in Depth
- Severe accident management
- Key systems for safe state

## 2. Extreme Earthquakes and Tsunamis

- Dry Site Concept
- Combination of hazards
- Periodic review of external hazards

## **3. Enhancing Communication**

- Public communication should be early, clear and frequent
- Plain language understandable to non-technical audiences
- Clear policies for the use of all media, including new and social media









# International experts' meetings

- 4. Decommissioning and Remediation after a Nuclear Accident
  - Guidance + Sharing of knowledge
  - Review services for planning of decommissioning + remediation
  - Practical definition of 'safe'



## 5. Human and Organizational Factors in Nuclear Safety

- ITO systemic approach to safety
- Impact of National Culture on Safety Culture
- Complacency + Distance by Differentiation
- Organizational Relationships







## Upcoming International Experts' Meeting on Radiation Protection after Fukushima Accident

International Experts Meeting on Radiation Protection after the Fukushima Daiichi Nuclear Power Plant Accident

Promoting confidence and understanding

17-21 February 2014 Vienna



- Identifying the key radiation protection issues to be addressed by the international community;
- Enhancing long-term strategies in response to nuclear or radiological accidents;
- Assisting Member States in reviewing and updating their radiation protection programmes as appropriate; and
- Supporting the IAEA's work in area of radiation protection.

Special Highlight: Intergenerational responsibility for radiation protection.



# How to get more information?

- Action Plan on Nuclear Safety
  - http://www.iaea.org/newscenter/focus/actionplan
- IAEA International PEER Review Mission on Mid-and-Long-Term Roadmap Towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station Units 1-4
  - http://www.iaea.org/newscenter/focus/fukushima/missionrepor t230513.pdf
- Integrated Nuclear Infrastructure Group (INIG)
  - http://www.iaea.org/NuclearPower/Infrastructure/home.html
- IAEA Planning and Economic Studies Section (PESS)
  - http://www.iaea.org/OurWork/ST/NE/Pess/



## Thank you for your attention





...atoms for peace.