STRESS TESTS and PEER REVIEW PROCESS

Preparatory Meeting

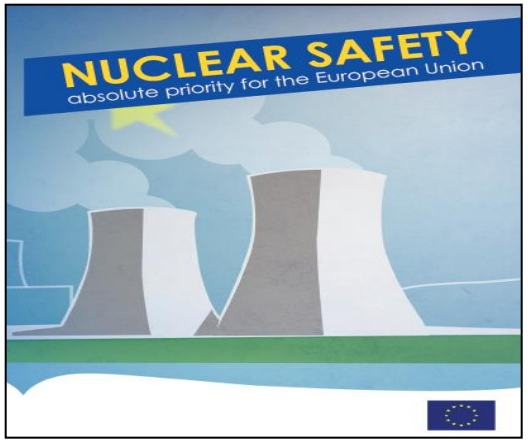
Brussels July 9th 2013

Contents

- Situation and Procedure in Europe
- Nuclear Stress Tests Taiwan

EU Nuclear *Safety* Directive (*2009*)

- EU-wide legally binding framework
- Reflects international instruments:
  - Convention on Nuclear Safety
  - IAEA Safety Fundamentals
- Content features:
  - Establishes national responsibility for nuclear safety
  - Reinforces regulatory authorities
  - Transparency (principles)



General Remarks

- The licensee has the prime responsibility for the safety of its nuclear power plants

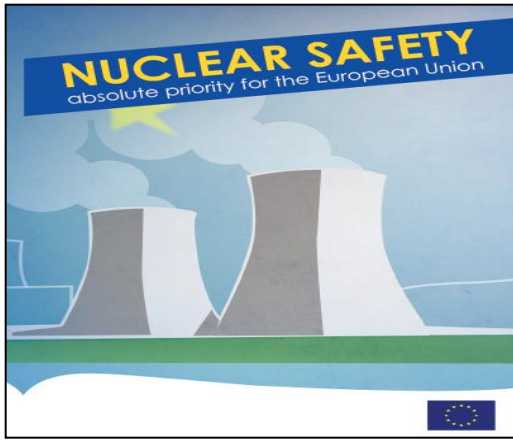
- Nuclear safety is a national responsibility
- National Regulatory Framework has to comply with common international Safety Requirements and Guidelines e.g.
  - Global: IAEA Safety Fundamentals, CNS
  - EU: Current/revised EU Nuclear Safety Directive

Stress Tests: Mandate

- 11 March 2011 Fukushima accident

European Commission Mandate:

- 15 March 2011: EU High Level Conference
- 24-25 March 2011: European Council:
  - comprehensive and transparent risk and safety assessments ("Stress Tests")
  - similar stress tests should be carried out in the neighbouring countries and worldwide
  - revision of the legal and regulatory framework



Stress Tests: Methodology

- Common EU-wide methodology:
  - main lines drafted by WENRA in April 2011
  - agreed to by ENSREG in May 2011
  - published on 25 May 2011 by ENSREG and the European Commission

Note:
ENSREG is a nuclear safety advisory group of the European Commission

Stress Tests: Features

- They go beyond safety evaluations during the licensing process and periodic reviews
- The aim: to assess whether safety margins are sufficient to cover various unexpected events (extreme external impact)
- Conducted on a voluntary basis
- Transparency:
  - All reports have been published (www.ensreg.eu)
  - Stakeholders were closely involved (public meetings, web-consultation)

Stress Tests – Steps in Europe (1)

A Nuclear stress tests – June 2011 to April 2012

1. reassessments of all nuclear power plants by the licensees
   - ➢ licensee reports
2. assessment of the reports of the licensees by the national regulator
   - ➢ national report
3. peer review of the national reports and visit of each country with NPPs and hereby visiting of one site by the peer review team
   - ➢ country report for each country and
   - ➢ one summary report.

Stress Tests: Follow-up (1)

- Stress tests are an essential stage of the process of improving European nuclear safety, which is due to continue.
- Implementation of recommendations and concrete measures are a national responsibility:
  - *National action plans in all participating countries*
- Based on lessons learned from Fukushima, EU institutions will take decisions on common safety policy and legislative or non-legislative initiatives:
  - ***Commission Communication to the European Council on the results of the stress tests (4.10.2012)***

ENSREG
European Nuclear Safety Regulators Group

Commission Communication, published on 4th October 2012

EUROPEAN COMMISSION

Brussels, 4.10.2012
COM(2012) 571 final

COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

on the comprehensive risk and safety assessments ("stress tests") of nuclear power plants in the European Union and related activities

Stress Tests: Follow-up (2)

B Follow-up fact finding site visits - September 2012

4. Visit of a second site in several countries by peer review teams,
   to gather information about the measures, which have already been taken.
   - ➢ fact finding site visit report

C National action plans workshop – April 2013

5. Peer review of national action plans by peers via a common discussion during a one week workshop in Brussels
   - ➢ Rapporteurs reports for each country and
   - ➢ one summary report

Contents

- Situation and Proceeding in Europe
- **Nuclear Stress Tests Taiwan**

Stress Tests Taiwan

Taiwan declared

- to conduct Comprehensive Risk and Safety Assessments (**Stress Tests**) of all of its NPPs as follow-up to the Fukushima accident,
- that these stress tests shall be carried out analogue to the stress tests done in Europa
- invited the European Commission to organise a peer review of its Stress Tests

Bases

Bases for the whole process and especially the peer review are:

- the ENSREG Specification and
- the conclusions of the conducted European peer reviews published in
  - Communication from the European Commission to the Council and the European Parliament on the Stress Tests of NPPs in the European Union (COM(2012)571, October 2012), taking into account e.g.:
    - ENSREG Peer Review Report of 25 April 2012
    - Compilation of Recommendations and Suggestions from the Peer Review of the European Stress Tests of 26 April 2012
  - National Action Plans Workshop of 22-26 April 2013, Brussels

Objective of Stress Tests

- Targeted reassessment of safety margins and robustness of plants, in light of the Fukushima accident:
  - Natural Hazards
  - Loss of Safety Systems
  - Severe Accident Management
- Improvement of Plant Safety taking into account the lessons learned from Fukushima
- Stress test is **not** an in-detail assessment of all safety issues of the NPPs
- Mandate does **not** include security issues.

General Approach (1)

- Assessment of the current situation
  - Current Safety Requirements (Design Basis) in particular for earthquake and flooding (and additional volcanism)
  - Compliance with current Safety Requirements
  - Regulatory oversight, Periodic Safety Reviews, evidence of improvements

General Approach (2)

- Robustness of Plants
  - Assessment of robustness beyond Design Basis: identification of margins and cliff edge effects
  - Strong features and possible improvements
  - Further actions and requests from Regulator

Natural Hazards Margin Assessment

- Continuous increase of severity of External Hazards (Earthquake, Flood,…)
- Corresponding destruction or unavailability of Systems, Structures and Components up to core melt (e.g. including link to PSA)
- Identification of cliff edge effects and margins
- Identification of strong features and weaknesses
- Possible improvements

Loss of Safety Systems
Cliff Edge Effects

- Assumption that more and more electrical systems are lost
- Assumption that heat sink is lost
- Combination of both
- Assessment of time before core damage
- Identification of strong features and weaknesses
- Possible improvements

Severe Accident Management Robustness (1)

- Assessment of the accident management organization and equipment in case of extreme conditions
  - Destruction of infrastructure
  - Isolation of site
  - Devastation of site
  - Accident affecting multiple units
  - Radioactive releases and high dose rates
  - Unavailability of instrumentation and communications

Severe Accident Management Robustness (2)

- Protection of containment integrity
  - Hydrogen explosion
  - Pressurization
  - Vessel melt through
- Cooling of core and spent fuel pool
- Necessary conditions to allow accident management by Operators (radiation protection, equipment, outside support, procedures, training)
- Identification of strong features and weaknesses
- Possible improvements

Conduct of the Peer Review (1)

The review process will be conducted as far as possible in the same way as it was done in Europa:

- Same objectives, scope and approach
- As a review of experts of European regulators reviewing the special actions of the Taiwanese regulator in the aftermath of the Fukushima Daiichi accident
- Independent of interests of concerned or interested parties or stakeholders, but taking into account broad scope of views (utility, regulator, NGOs, RTD)
  - Participation of the public by public consultation
  - Transparent

Conduct of the Peer Review (2)

Peer Review Team

The peer review of the National Report will be conducted by a team of experts selected by the European Commission (EC) taking into account proposals from ENSREG member institutions.

Peer Review Team Members

Team Leader	Groezinger, Oskar	Germany
Rapporteur	Kirchsteiger, Christian	Europ. Com.
Topic 1 - Expert	Foucher, Laurent	France
Topic 1 - Expert	Decker, Kurt	Austria
Topic 2 - Expert	Sardella, Rosa	Switzerland
Topic 2 - Expert	Lorand, Ferenc	Hungary
Topic 2 - Expert	Kimtys, Evaldas	Lithuania
Topic 3 - Expert	Munuera-Bassols, Antonio	Spain
Topic 3 - Expert	Koehne, Wilhelm	Europ. Com.

Conduct of the Peer Review (3)

The peer review is carried out in two steps:

1. Desktop review

Starting June 1st and working separated in the three topics

- Natural Hazards
- Loss of Safety Systems
- Severe Accident Management

Main inputs: National report and answers to questions of reviewers and the public during public consultation.

Output: Drafts of topical review reports, which are compiled to a first draft of the Country Report.

Conduct of the Peer Review (4)

2. Country review

Starting September 23th and ending October 3rd

Main input:

- Draft of the Country Report
- Discussions with the regulator, NGOs and the licensee
- Site visits to Maanshan and Lungmen

Output: Final Country Report.

Transparency - General

To enhance the credibility of and the confidence in the nuclear regulatory bodies and to strengthen their independence from political and economic influence nuclear regulation has to be as transparent as possible.

- High transparency vis-à-vis the public was a key principle when performing the stress tests and peer reviews in Europe.

<u>The transparency activities are based on</u>:

1. Activities by the national regulator (AEC) and
2. European Commission and Peer activities

Transparency – EC and Peer

The European Commission and its review team

- informed beforehand interested groups and organizations about the public consultation via internet
- offered a 2 months public consultation and gave to all interested parties/individuals the possibility to post comments/questions in English
- posted on an additional ENSREG website interesting documents and information
- had continuously contact to interested groups and stakeholders and
- has a meeting in Taiwan with interested groups and stakeholders

Thank you for your attention