Fukushima Ministerial Conference on Nuclear Safety
15-17 December 2012, Fukushima, Japan

# Fukushima Responses and Recent Safety Issues in Korea

December 17, 2012

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Korea Institute of Nuclear Safety

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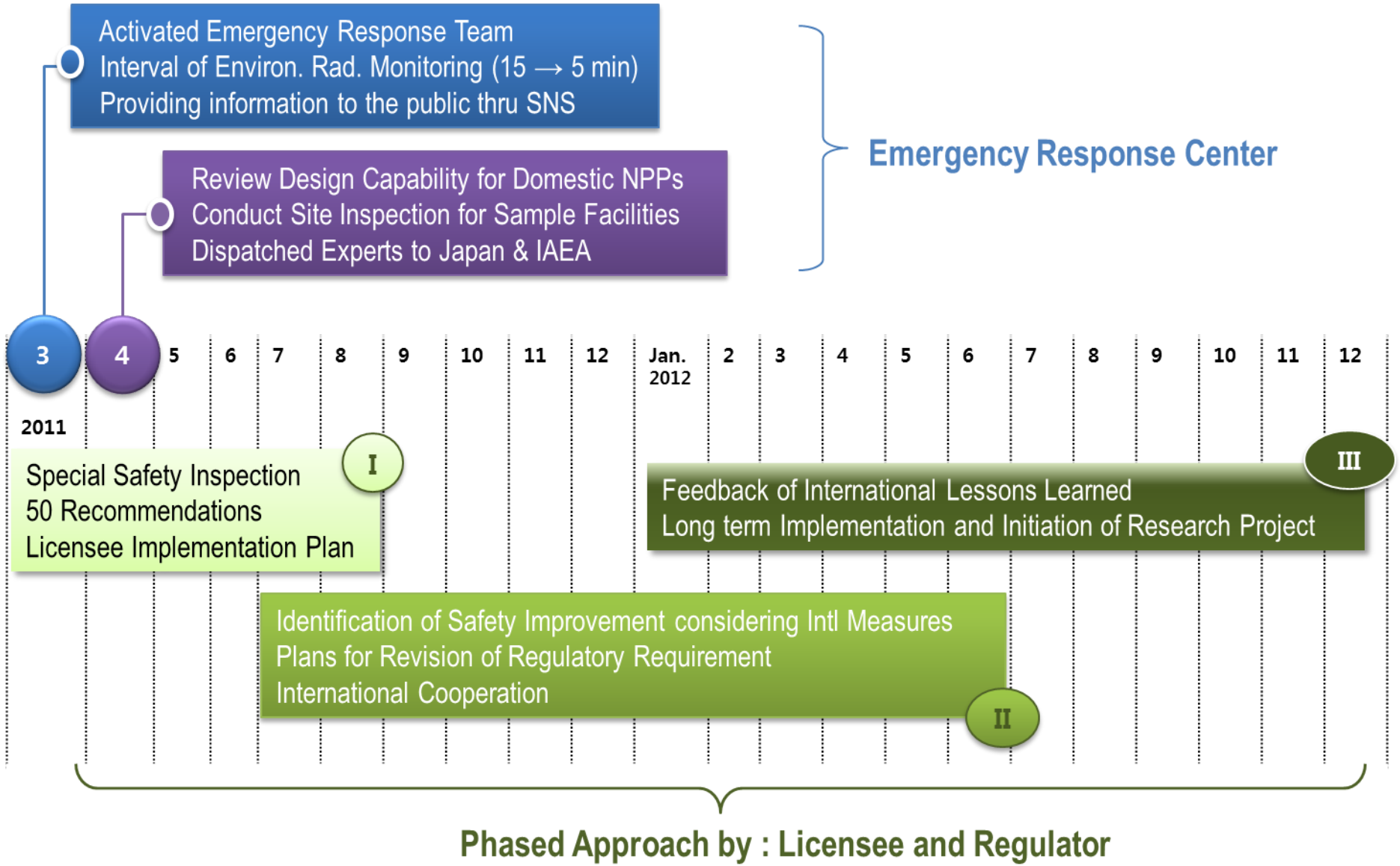
# Milestone of Fukushima Response



# Implementation of Lessons Learned

National & Organizational Culture

## Site Selection to void External Event

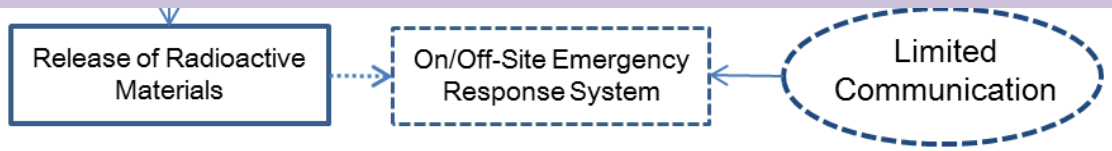
- Measures against tsunami, precipitation, flooding, etc. will be evaluated during safety review process in order to verify sufficient margins

## Design and Operation

- Balanced treatment of rare-yet-credible external events
- Reevaluation of EDG and AAC
- Securing component cooling pump and water injection capability

## Severe Accident Mitigation

- Simultaneous accidents at multiple units
- Regular drills for effectiveness of emergency preparedness



# Challenges on Nuclear Safety

Nuclear Accident In Japan ('11.3)

Concerns on radiation fallout from Japan (~'11)


Public Fear on Radiation in Asphalt-paved Road('11.11)

wnn world nuclear news

**Safety culture questions after loss of power at Kori 1**

22 March 2012

**The manager of the Kori 1 nuclear power reactor in South Korea has been sacked for covering up a safety-related incident at the plant last month. The plant owner now faces prosecution by safety regulators.**

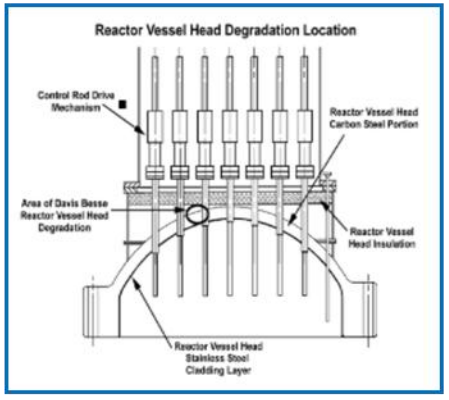
A report yesterday by the Nuclear Safety and Security Commission (NSSC) said the incident came about during Kori 1's month-long maintenance outage in February.

Placed in a cold shutdown state, the reactor had been receiving power from one of its three grid connections while the other two were undergoing maintenance. One of the two diesel generators was also under maintenance while the other was on standby and a third was available for manual start.

Cover-up of SBO at Kori 1('12.3)


Reactor Pressure Vessel Integrity of Kori 1 ('12.5)

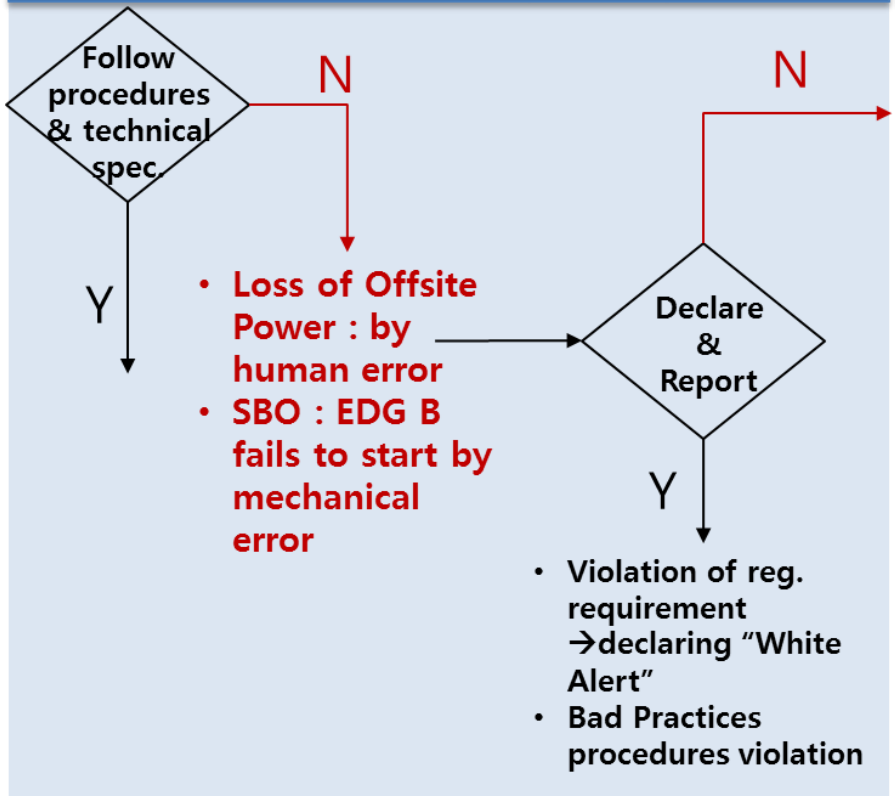
Use of Unapproved Parts by Forged Certificates ('12.11)



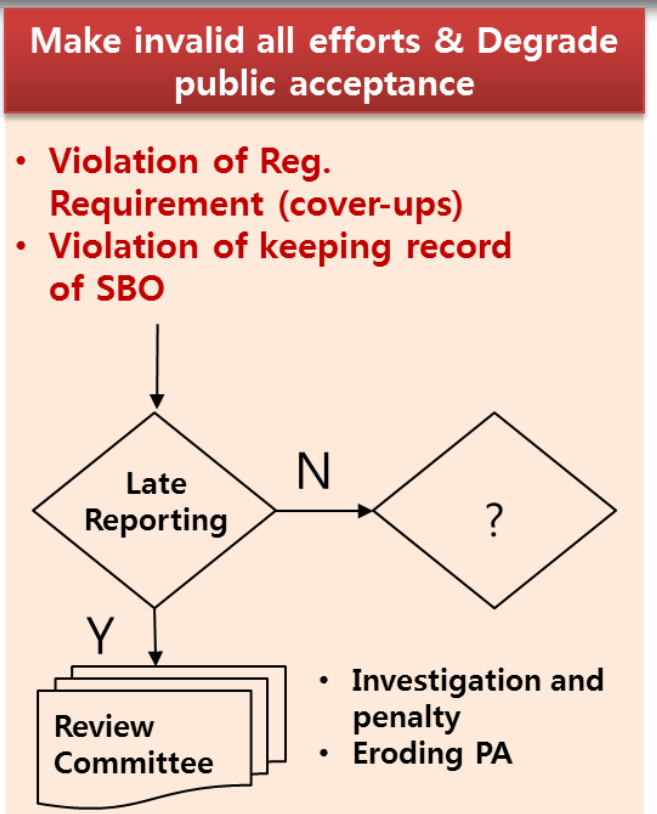

SCC of CRDM at YGN 3 ('12.11)

# Cover-up of SBO Event & Review of RPV Integrity at Kori 1

## Violation of procedure and work order can be described w/ engineering facts




## Make invalid all efforts & Degrade public acceptance




## Reconfirmation of RPV Integrity & Restart

- Reviewing the results of the surveillance capsule in RV
- Inspection for all safety-class components replaced after 2008
- Verifying the fatigue in long-term operation (CV, RPV, etc…)

→ NSSC approved the restart of Kori 1

## Need time to gain support of local resident and NGO

# Unapproved Items with Forged Certificates

## Self-investigation by Licensee (1 Nov.)

- After informed by outside (21 Sep.)
- 60 forged certificates by Involvement of 8 suppliers and a broker

## Report to NSSC & Open to the public (5 Nov.)

- 5 NPPs with falsely-certified items
- 136 types (5,233 items) with forged Certificates were installed

## Investigation Results and Follow-up Measures

- 2 units had been shut down for replacement (YGN5&6) by licensee's voluntary action & one for overhaul (YGN3)
- All the falsely-certified items of 2 units are planned to be replaced in on-line because most of them are non-critical to the safe operation(YGN4 & UCN3)

## Special Investigation Team by Regulator(8 Nov.)

- Review of certificates for all dedicated items during 2003~2012
- To check the existence of additional ones
- To verify overall effectiveness of licensee's purchasing system

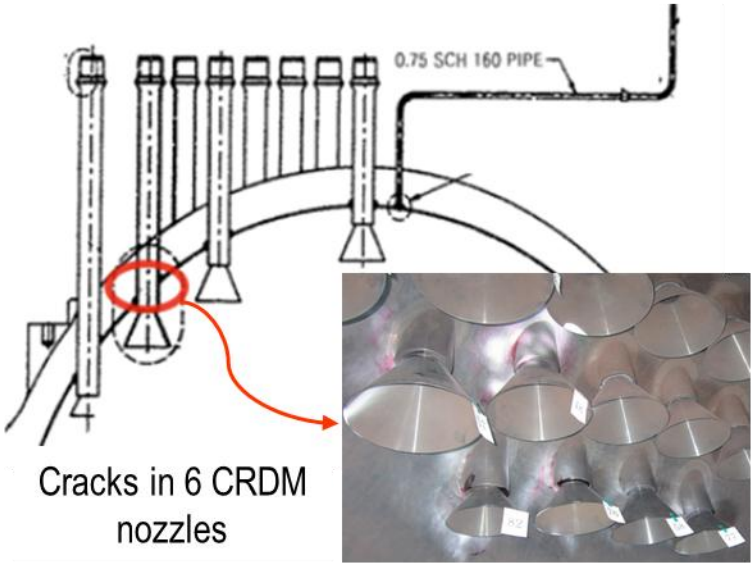
## Interim Results (as of 10 Dec.)

- Additional 53 types (919 items) with forged certificates
- 34 types (among 53) were installed in operating NPP
- UCN 4 is added to the list
- One more company was engaged
- One item of SKR ¾ (fire P/P control pannel) was forged

## Improvement of QA and QM system including procurement & (sub) contract

KINS

# Crack on Control Rod Driving Mechanism at YGN3




Cracks in 6 CRDM nozzles

## Safety Issues

Cracks in 6 CRDM nozzles out 84 nozzles during overhaul of YGN

## Estimated Causes of Cracks

PWSCC (Primary Water Stress Corrosion Cracking) & Alloy 600 material characteristics

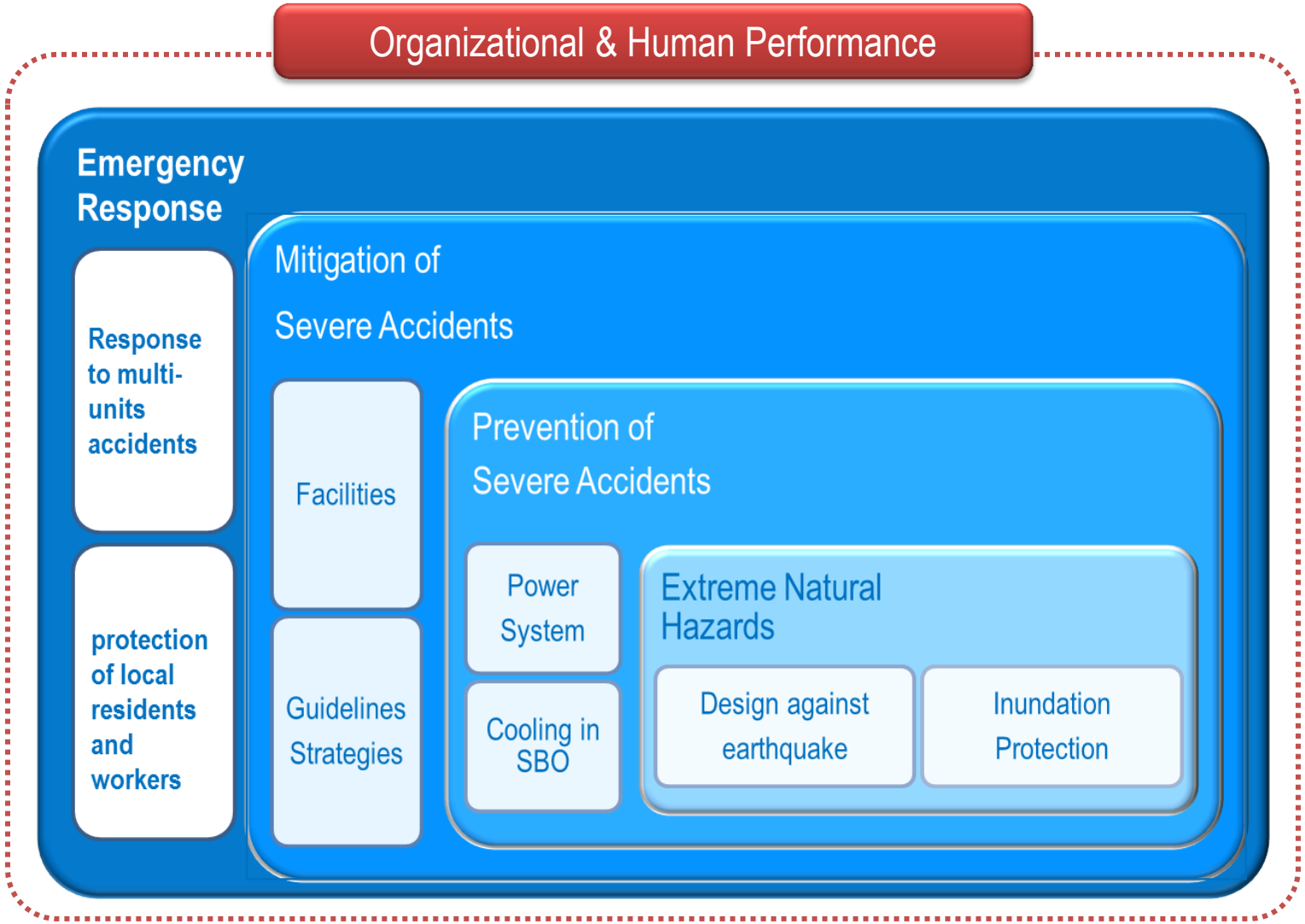
## Public Concerns and Issues


*"why doesn't utility open it to the public ?"*

## Recommendations by Regulatory Body

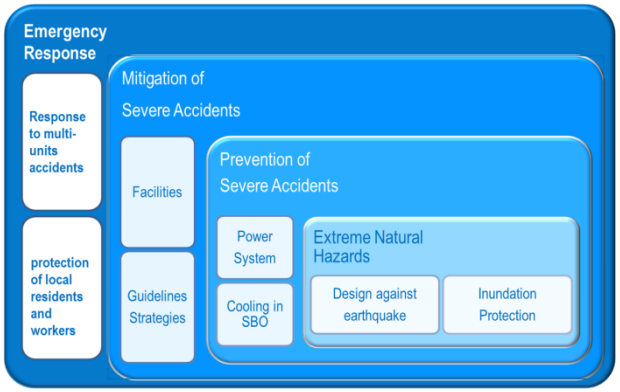
- Repair all the cracked penetration tube
- Check integrity of all penetration tubes and welds
- Plan the reactor head replacement
- Change the material Alloy 600 to Alloy 690 for high resistant to PWSCC

# Safety Improvement in DiD Perspectives



# Role of Trusted Regulator

## Engineering Safety




Safety….
as it is ?

## Social / Communication Barrier


*Independent regulators as trusted, authoritative and impartial source of information*

*<By UK STC>*

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Energy & Environment | New Nuclear | Regulation & Safety | Nuclear Policies

**Public trust rests with regulators**

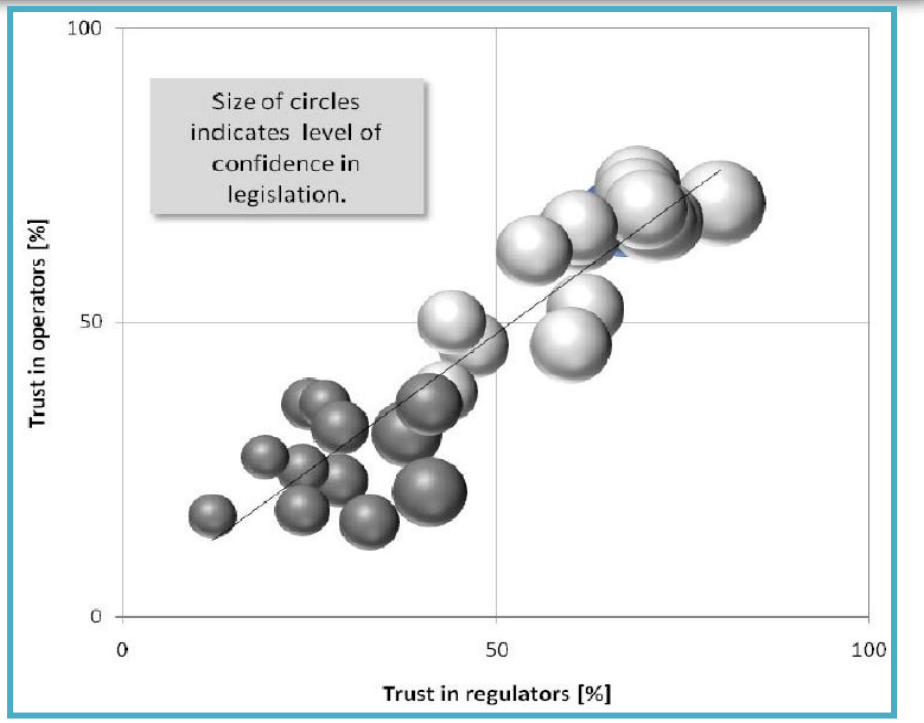
09 July 2012

**Independent regulators should play a greater role in communicating the risks associated with energy generation and distribution because the government is not considered as an impartial source of information, according to a report from the UK parliament's Science and Technology Committee.**

*"Expertise's good, Empathy's better" in Public Communication*

# Role of Trusted Regulator


Correlation between trust in regulators and belief in NPP's safety




Relationship between trust in operators, regulators and legislation

- Strong correlation between trust in regulators and trust that nuclear plants can be safe
- Trust in the regulators is crucial to gaining support for nuclear.
- Trust in regulators and operators rises as confidence in legislation improves

**A strong independent regulator leads to greater public acceptance**



<Source : OECD/NEA, Comparing nuclear accident risks with those from other energy sources (2010) using Eurobarometer(2007)>

# Lessons Learned from Fukushima Accident

**TECHNICAL ISSUES**

- Although addressing low-probability events is very difficult, a treatment for natural-phenomenon hazards is necessary
- The appropriate regulatory bodies should conduct a multiple-unit risk assessment
- It needs to improve a severe accident management and mitigation guideline and emergency operating procedures
- Regional safety network should be strengthened to minimize the impact of the severe accident from neighboring countries
- Risk communication with domestic stakeholders should be more emphasized
- Role of robust, independent, impartial, technical excellent and trusted regulator should be recognized as a key subject

# Lessons Learned from Recent Safety Issues in Korea

## Negative Movement on Nuclear

- Legislation on “Nuclear Phase-out” by Members of the National Assembly
- Risk Simulation on Severe Accident by NGO
- Strong Objection to Nuclear by Local Residents
- Attitudes raising **Suspicion** by the Mass Media

***Trapped by the chain of Suspicion and mistrust***

## How to Build up Trust

**Regulatory actions based on**

**Independence / Technical Competency / Transparency**

# Thank you