

# Impact of Fukushima Dai-ichi nuclear accident on global and Japan's nuclear energy policy

**The University of Tokyo Workshop**

What Fukushima nuclear disaster brought about in Asia?

- Emerging risks in social, political, and economic domains -

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*Note: The views expressed here are of my own and do not necessarily reflect those of the JAEC nor the government.*

# Summary

- Fukushima Dai-ichi nuclear power accident has become one of the worst accidents in nuclear history and it is not completely over yet. This has **serious implications for not only Japan but also global nuclear energy development including Asia** where fastest growth of nuclear power is expected in the next decades.
- Lessons from the Fukushima accident on **risk management** should be shared among regional and global players. Enhancing safety and security culture is not enough. Enhancing **“resilience”** of nuclear energy system is also an essential.
- The most serious impact is **loss of public trust** which has been affecting national policy debate on overall energy policy. Japan needs to **improve “transparency”** in policy making process to restore public trust both domestically and internationally.



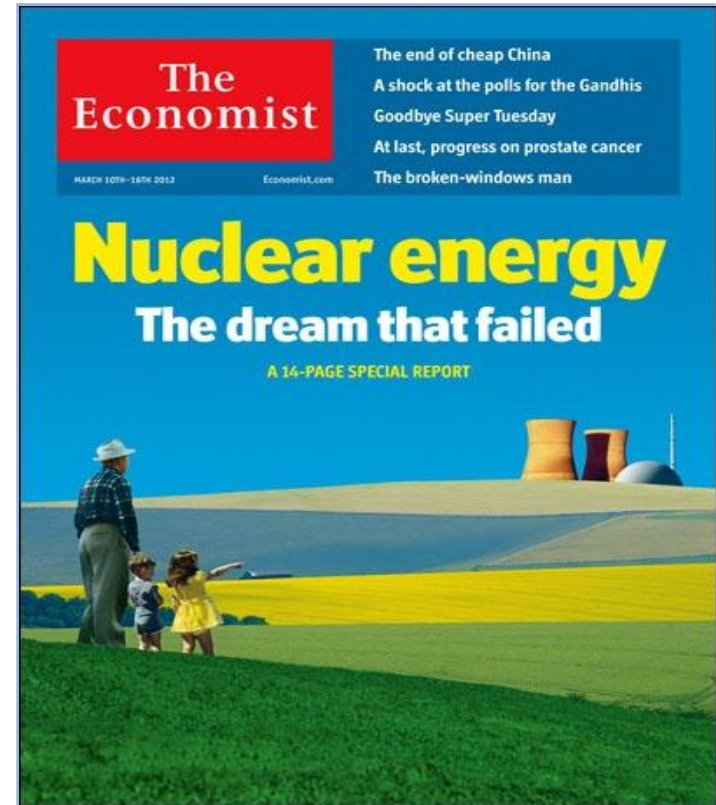
# Global Energy/Nuclear Energy Policy

# From “Nuclear Renaissance” to “Failed Dream”? by “The Economist”



*“A nuclear revival is welcome so long as the industry does not repeat its old mistakes”*

*-- The Economist, September 8, 2007*

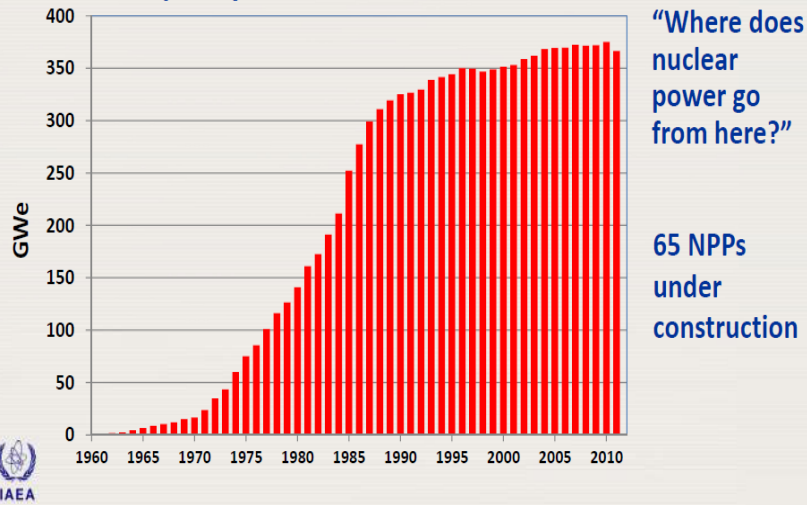


*“For nuclear to play a greater role, either it must get cheaper or other ways of generating electricity must get more expensive.”– The Economist, March 10, 2012*

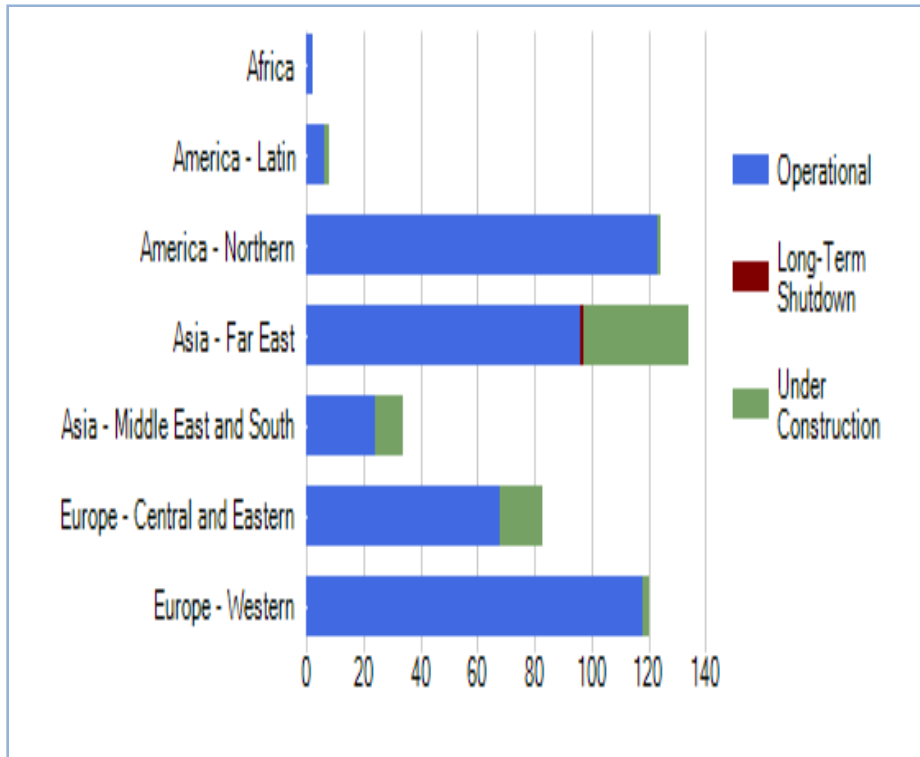
# Global Nuclear Power Development Current Status (IAEA)

## Nuclear power today

On 21 November 2011, 443 nuclear power plants (NPPs) operated in 30 countries worldwide, with a total installed capacity of 366.6 GWe.



## Total Number of Reactors

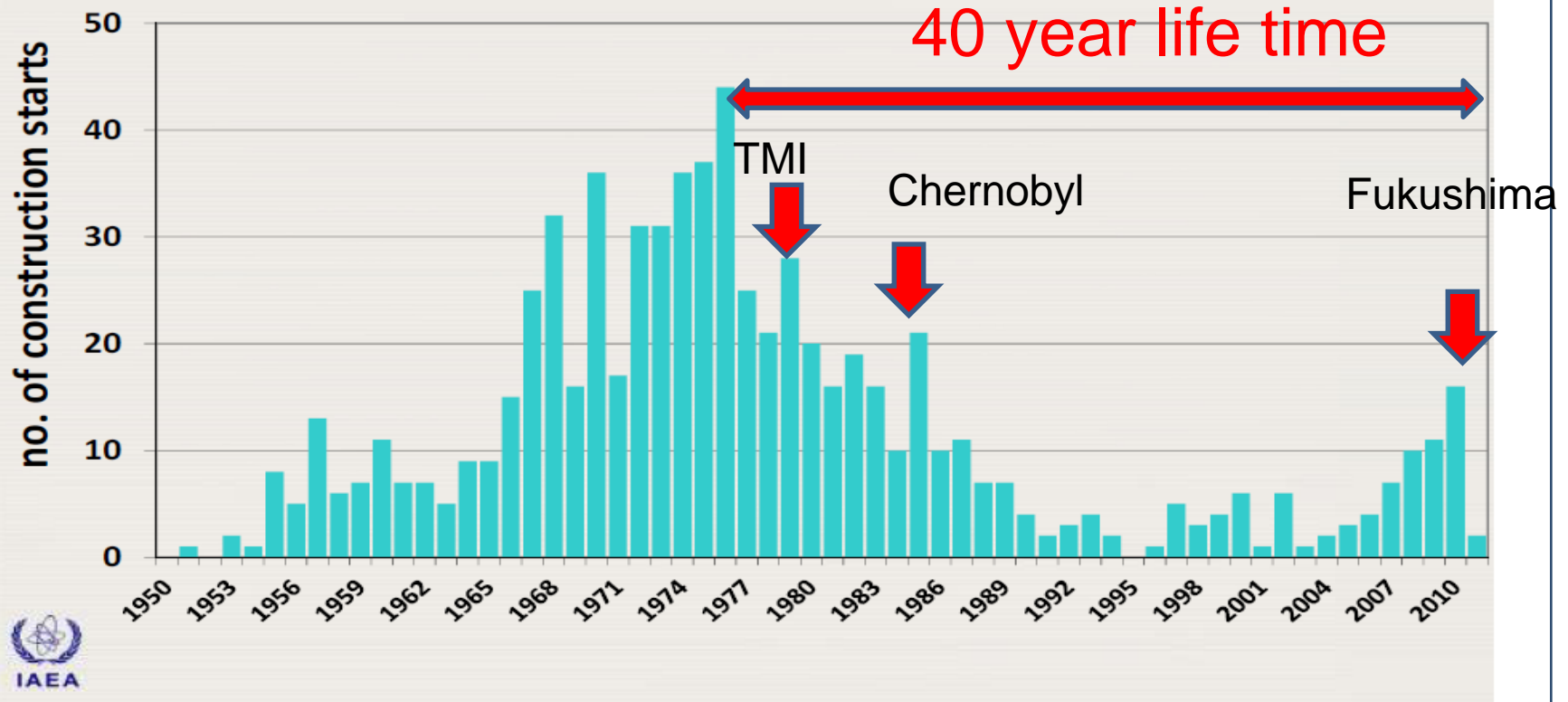


Source: H-HolgerRogner, Head, Planning & Economic Studies Section (PESS)Department of Nuclear Energy, International Atomic Energy Agency, “Energy, Electricity and Nuclear Power Estimates for the Period up to 2030,” November 2011.

As of Feb. 4, 2013, 437 nuclear power plants (372.6 GWe) are operating and 67 units are under construction. <http://www.iaea.org/pris/>

# Global Nuclear Power Plant Construction (IAEA) : Replacement of old reactors are coming....

## Construction starts



Source: H-Holger Rogner, Head, Planning & Economic Studies Section (PESS) Department of Nuclear Energy, International Atomic Energy Agency, "Energy, Electricity and Nuclear Power Estimates for the Period up to 2030," November 2011.

# Impact on Asia: No major policy changes

**Bangladesh:** There is **no change** in plans to promote nuclear policy. Bangladesh signs with agreement between Russia about the construction of Rooppur NPP in November 2011.

**China:** Important role of nuclear power in China **is not changed**. China has temporarily stopped the authorization of new projects after the accident, but the construction of NPP has restarted now.

**India:** Domestic energy demand is increasing, and nuclear power is considered to be an important option as a clean energy source (**no change**). Construction of new NPPs are progressing according to the existing plan.

**Indonesia:** 49.5% of the population is **in favor (35.5% opposition)** for against nation's nuclear policy. Nuclear power is considered as one of the main power source to support energy security.

**Kazakhstan:** There is **no change** in plans to promote nuclear power. many people are aware that there is no other option to incorporate nuclear power for the realization of nation's policy.

**South Korea:** There is **no change** in nuclear policy. Based on the "4th Comprehensive Nuclear Energy Promotion Plan", South Korea continues to build NPPs in six locations from 2012 to 2017.

**Malaysia:** There is **no change** in plans to begin the operation of Malaysia's first nuclear reactor in 2021.

**Vietnam:** There is **no change** in plans to promote nuclear power. Vietnam plans to build high safety NPPs learned from Fukushima accident with Japan and Russia in cooperation.

**Taiwan:** Announced an energy policy to **reduce the dependence** on nuclear power.

**Thailand:** **Decided the postponement** of the plan to build five NPPs for 3 years.

# Estimates of Nuclear Electrical Generating Capacity : Comparison of estimates in 2012 and 2011

	Actual in 2011	Estimates for 2030		Estimates for 2050	
		Estimated in 2011	Estimated in 2012	Estimated in 2011	Estimated in 2012
<b><u>World Total</u></b>					
Nucl. Capacity (GWe)			-9%		-16%
Low Estimate	368.8	501	456	560	469
High Estimate		746	740	1228	1137
Share (%)			-1%		-7%
Low Estimate	7.1	5.2	4.7	2.7	2.3
High Estimate		6.2	6.2	6.0	5.7
<b><u>Far East</u></b>					
Nucl. Capacity (GWe)			-15%		-13%
Low Estimate	79.8	180	153	220	191
High Estimate		255	274	450	417
Share (%)			+7%		-7%
Low Estimate	5.0	6.4	5.5	4.2	3.7
High Estimate		7.5	8.2	8.6	8.1

Source: International Atomic Energy Agency, "Energy, Electricity and Nuclear Power Estimates for the Period up to 2050," 2011 Edition [http://www-pub.iaea.org/MTCD/Publications/PDF/RDS1\\_31.pdf](http://www-pub.iaea.org/MTCD/Publications/PDF/RDS1_31.pdf)  
2012 Edition [http://www-pub.iaea.org/MTCD/Publications/PDF/IAEA-RDS-1-32\\_web.pdf](http://www-pub.iaea.org/MTCD/Publications/PDF/IAEA-RDS-1-32_web.pdf)



# The Fukushima accident and Lessons learned on risk management

# A Lesson learned from Fukushima: Thinking Unthinkable

- *“The Investigation Committee is convinced of the **need of a paradigm shift** in the basic principles of disaster prevention programs for such a huge system, whose failure may cause enormous damage.”* - from the Interim Report by the Gov’t investigation committee (Dec. 2011)
- One specific issue is “spent fuel storage.” **“Thinking unthinkable”** is essential in preparing for the emergency.
- Example of good practice: **“Rapid Reflection Forces”** set up by EDF in 2006.
  - RRF is a group to help EDF’s top management to grasp and confront issues raised by unconventional situations.  
[http://hal.inria.fr/docs/00/33/84/51/PDF/Rapid\\_Reflexion\\_Forces.pdf](http://hal.inria.fr/docs/00/33/84/51/PDF/Rapid_Reflexion_Forces.pdf)

# Dry Cask Storage at Fukushima Dai-ichi (after 3/11)



[http://photo.tepco.co.jp/library/110909\\_2/110909\\_69.jpg](http://photo.tepco.co.jp/library/110909_2/110909_69.jpg)

# Lessons from Fukushima: Ensuring “Resilience”

- “ There are many other kinds of risks and dangers. *It is an imperative to anticipate them, prepare for them, and ensure the resilience to respond* – so as to have to conclude after the fact, in the stark words of a Japanese government report on the Fukushima Daiichi disaster, that *“consistent preparation” was “insufficient”*.  
-- Daniel Yergin, *“The Quest: Energy, Security, and the Remaking of the Modern World,”* 2011

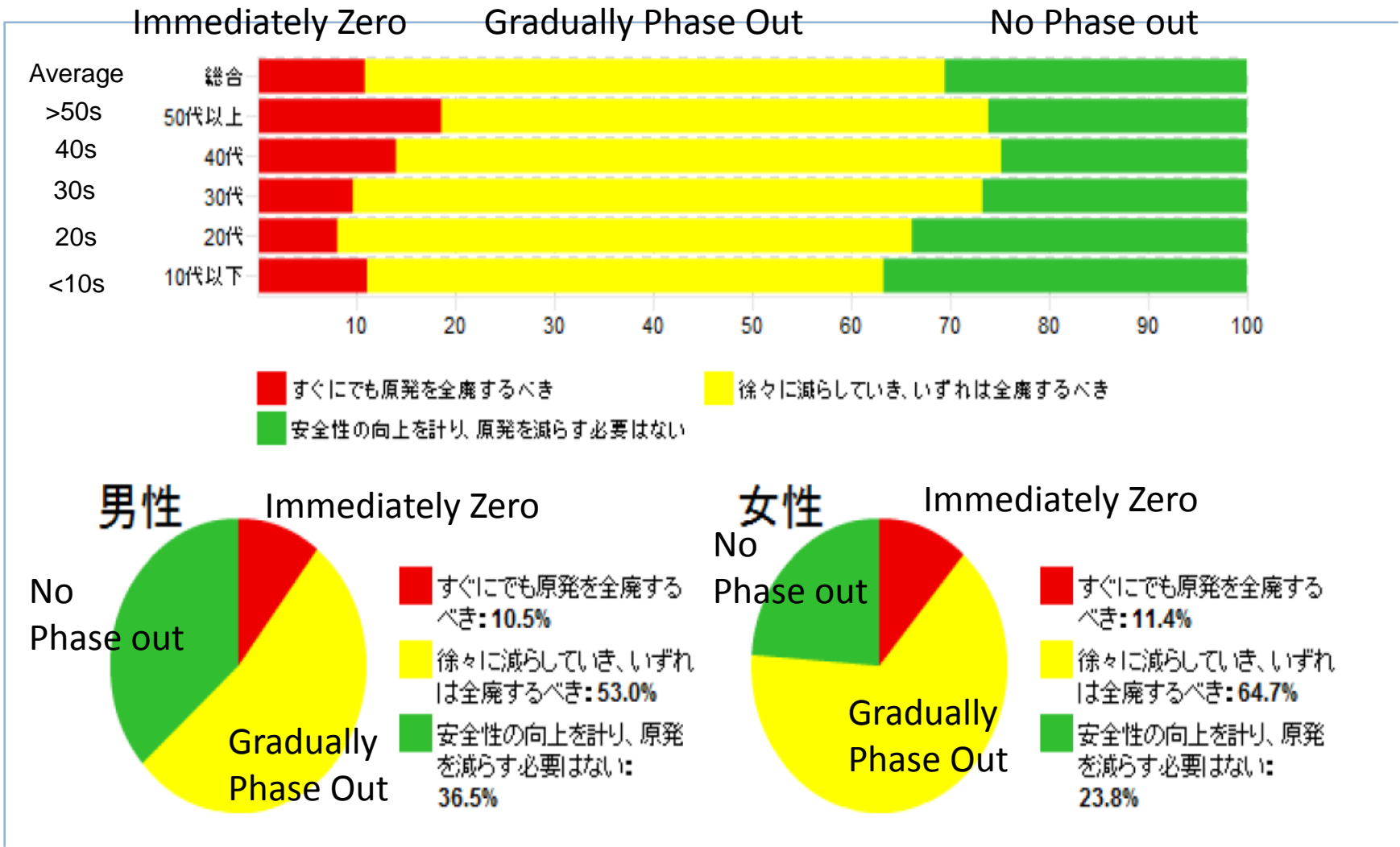
## International cooperation: Meeting global standards and sharing best practice

- Lack of adequate regulatory governance resulted in the fact that the Japanese nuclear industry has fallen behind international standards in meeting the challenges of a tsunami and severe accident.
  - One good example was what to do with the US Nuclear Regulatory Commission(NRC) order for safeguards against nuclear terrorism issued in 2002 (so-called B.5.b).
- De-facto international standards can be achieved through sharing the best practices by non-governmental approach.
  - “Nuclear Power Exporters’ Principles of Conduct”  
<http://www.carnegieendowment.org/publications/special/misc/nppe/principles-of-conduct.pdf>
  - WINS (World Institute for Nuclear Security)  
[http://www.wins.org/index.php?article\\_id=52](http://www.wins.org/index.php?article_id=52)

# Loss of Public Trust and Importance of Transparency

# Internet Polling Results (2012/08)

- Sample of more than 1 million people -



<http://info.nicovideo.jp/enquete/special/genpatsu/201208/index.html>

# Transparency: Assuring public trust

- **Lack of transparency** has resulted in loss of public trust not only in nuclear safety but, more importantly, in overall nuclear governance in Japan.
  - Ex. “Closed meetings” at the JAEC Technical Subcommittee on Nuclear Power and Nuclear Fuel Cycle triggered the issue of “transparency and fair policy making process”
- **Public trust** is also important for nuclear security.
  - *“Moreover, public understanding and cooperation are vital to improve the effectiveness of nuclear security. It should be emphasized that related organizations strive to inform the public of the objectives of nuclear security at every opportunity.”* – Report by the JAEC Advisory Committee on Nuclear Security



# Reform of JAEC Operations for better transparency (Aug. 30, 2012)

- For “Preparatory Sessions”
  1. “**3-men Rule**”: If more than 3 commissioners (out of 5) have “preparatory sessions”, a staff must attend and keep the summary of the session for the record
  2. “**Meeting with outside parties**”: Any unofficial meeting with parties outside the government agencies (stakeholders, experts, NGOs, media, etc.) , summary of the meetings should be kept as record
- For “Preparing the policy documents” (for **traceability**)
  1. Procedures for preparing the policy documents are now clarified
  2. Responsible person (designated by the Commissioners or Chairperson) must keep all the tracking records for changes made for drafts prepared for the final document

## “Toward Public Confidence Building Measures ” (by JAEC, Dec. 25, 2012)

- 4 important principles for improving public trust:
  - (1) Accountability of policy decision
  - (2) Disclosure of accurate information
  - (3) Transparency and Fairness and public participation in policy making process
  - (4) Clear and understandable communication (for the general public)
- The government, with collaboration with local governments and utilities, need to establish a forum where local public and stakeholders can share the information to improve transparency of policy making process and public confidence.
  - Good examples can be seen in Kashiwazaki-Kariwa Citizen Forum and CLI in France

[http://www.aec.go.jp/jicst/NC/about/kettei/121225\\_1.pdf](http://www.aec.go.jp/jicst/NC/about/kettei/121225_1.pdf) (in Japanese)

# Increasing international concern over Pu stockpile and reprocessing

- In 2013, the United States should discourage Japan from commissioning its Rokkasho plant and encourage South Korea to reconsider its reprocessing plans.
  - “An open letter to the President Obama”, by Board Members of the Bulletin of Atomic Scientists, Jan. 14, 2013.  
<http://thebulletin.org/web-edition/features/open-letter-to-president-obama-the-time-the-doomsday-clock-five-minutes-to-midn>
- With no clear prospect of using MOX fuel, there is no justification to continue reprocessing spent fuel. This simply accumulates more separated plutonium, which clearly contradicts Japan’s stated policy of avoiding surplus plutonium.
  - M. Toki and M. Pomper, “Time to stop Reprocessing in Japan,” Arms Control Today, Jan/Feb 2013,  
[http://www.armscontrol.org/act/2013\\_01-02/Time-to-Stop-Reprocessing-in-Japan](http://www.armscontrol.org/act/2013_01-02/Time-to-Stop-Reprocessing-in-Japan)

# Role of JAEC and No-plutonium surplus policy

- In August 2003, JAEC announced its new guideline for plutonium management for better transparency of Japan's plutonium programs.
- Utilities are expected to **disclose its plutonium usage plan annually *before* separation of plutonium**, so that Japan will not have any plutonium without specific plan to use it.
- As the role of JAEC will be examined, including its abolishment, **assuring peaceful use of nuclear power** should remain as an important function and this **"no-surplus policy"** need to be **strictly followed** and possibly enhanced.