

Impact of Fukushima accident on Nuclear and Energy Policy

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Budapest,

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Vice Chairman, Japan Atomic Energy Commission



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

Issues and Challenges

- Fukushima Daiichi Decommissioning and Restoring life in Fukushima area
- Restoring Public Trust in Nuclear Safety and Energy Policy
- Impact on Global Nuclear Energy Development



Japan Atomic Energy Commission (JAEC)

○The Role of Japan Atomic Energy Commission

The Japan Atomic Energy Commission is set up in the Cabinet Office and has five commissioners. Its mission is *to conduct planning, deliberations, and decision-making* regarding basic policy for research, development, and utilization of nuclear energy, including the formulation of the Framework for Nuclear Energy Policy *except matters related to nuclear safety regulation*. When the JAEC deems it necessary as a part of its assigned mandate, *JAEC can recommend and demand reports of the head of relevant administrative organization through the Prime Minister*.

Members: 5 (appointed by the Prime Minister with the consent of the House of Representatives and House of Councilors)



Chairman
Dr. Shunsuke KONDO



Vice Chairman
Dr. Tatsujiro SUZUKI



Commissioner
Ms. Etsuko AKIBA



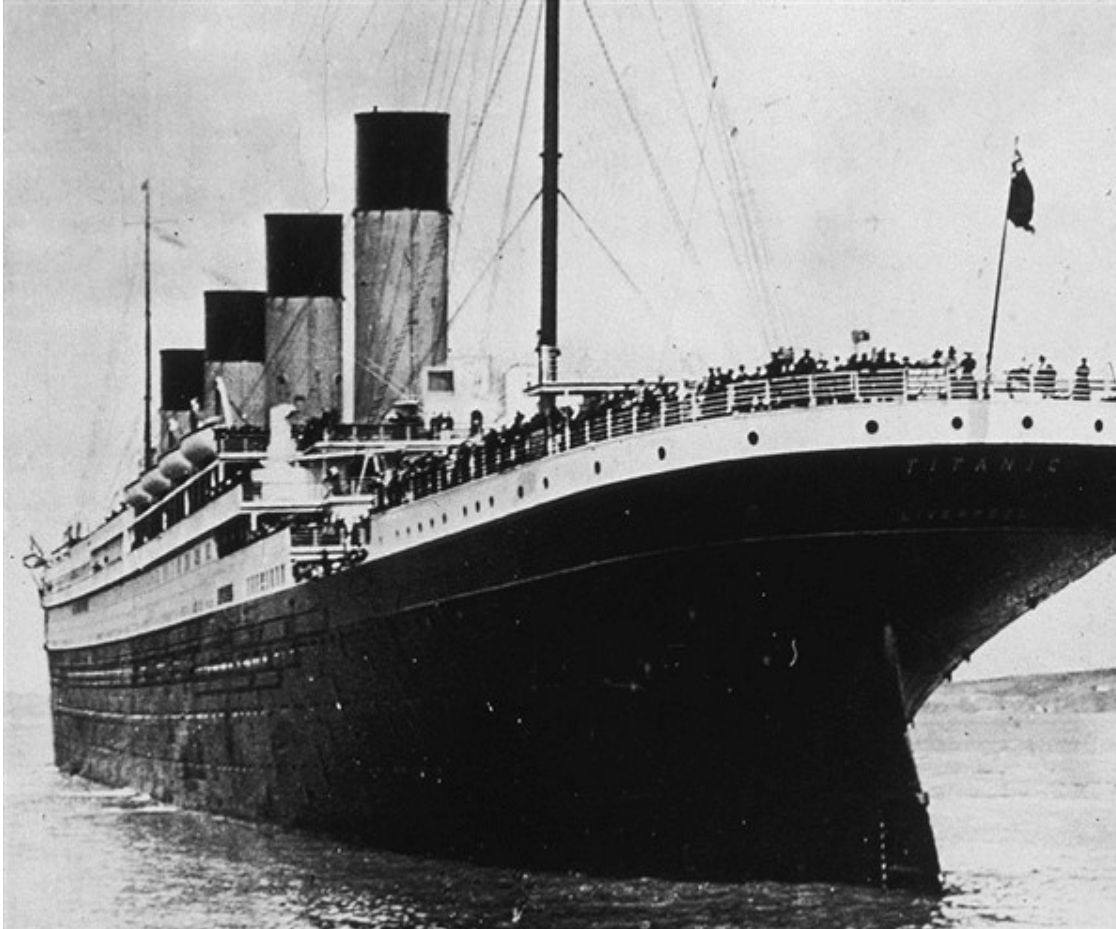
RESIGNED
Commissioner
Dr. Mie OBA



RESIGNED
Commissioner
Dr. Akira OMOTO

Role of JAEC (??)

- A small tag-boat for a giant Titanic? -



Fukushima Daiichi Decommissioning and Restoring life in Fukushima area



PM Abe's assuring speech on Fukushima at the International Olympic Committee

(Sept. 7, 2013)

- *"Let me assure you the situation is under control... It has never done and will never do any damage to Tokyo. There are no health-related problems until now, and nor will there be in the future."*

-From Reuter, "Abe helps secure 2020 Games for Tokyo," Sept. 7, 2013

<http://uk.reuters.com/article/2013/09/07/uk-olympics-idUKBRE9860BO20130907>



http://www.kantei.go.jp/jp/96_abe/actions/201309/07ioc_day2.html

Struggling with contaminated water...during the recent typhoon (Sept. 15, 2013)



http://www.tepco.co.jp/nu/fukushima-np/handouts/2013/images/handouts_130917_01-j.pdf

"I think the current situation is that it is not under control," by a TEPCO official.

-Fukushima 'not under control' – TEPCO official refutes PM's assurances, Reuter, Sept. 13, 2013

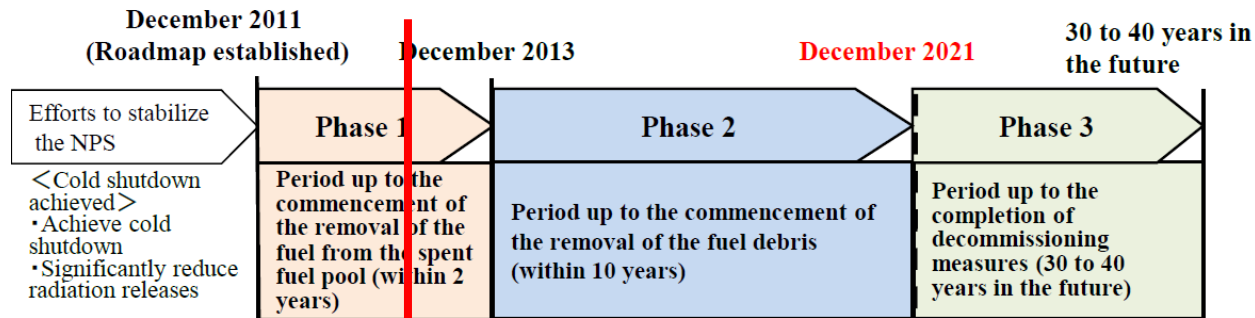
<http://rt.com/news/fukushima-under-control-tepco-819/>



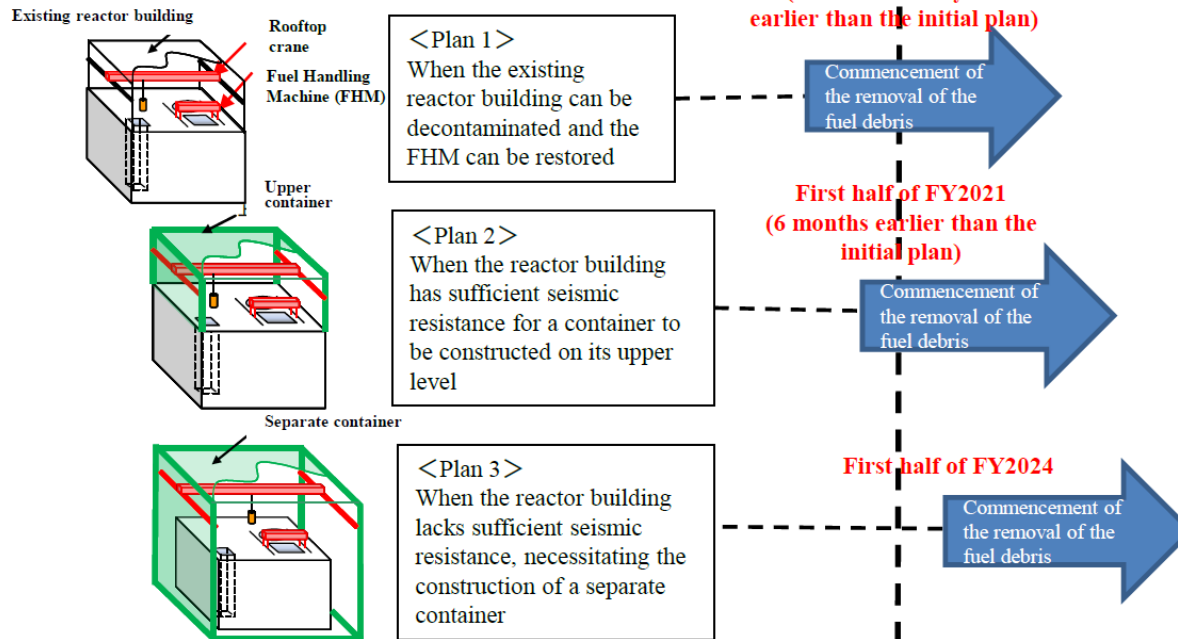
http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20130903_01a.pdf

Mid-Long Term Roadmap for Fukushima Dai-ichi

Targets under the Initial Roadmap



Plan under the Revised Roadmap (example: Unit 2)



Source: Agency for Natural Resources and Energy, Announcement of the Revised Version of the Mid-and-Long-Term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station Units 1-4, June 2013

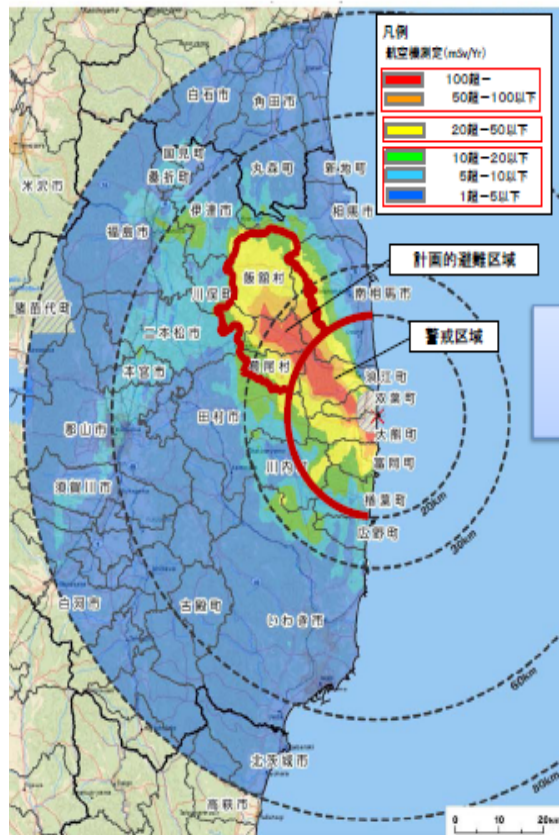
http://www.meti.go.jp/english/press/2013/0627_01.html



Evacuation Area Amended (March 7, 2013)

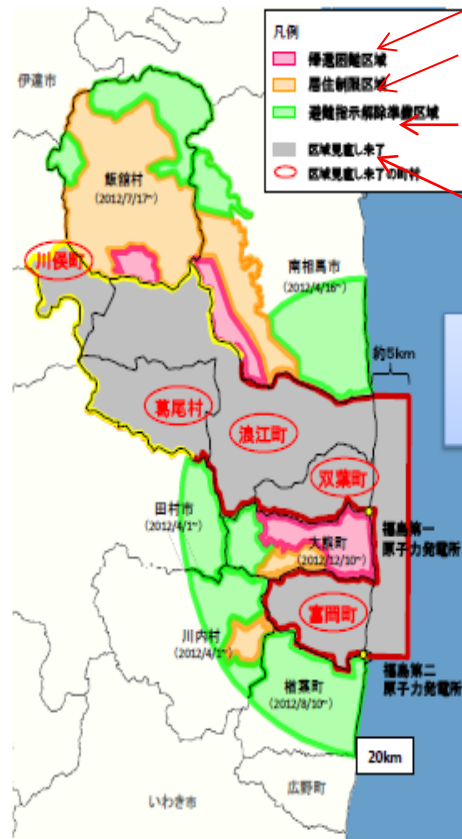
(As of April 29, 2012)

〔平成23年4月29日時点の
線量分布〕



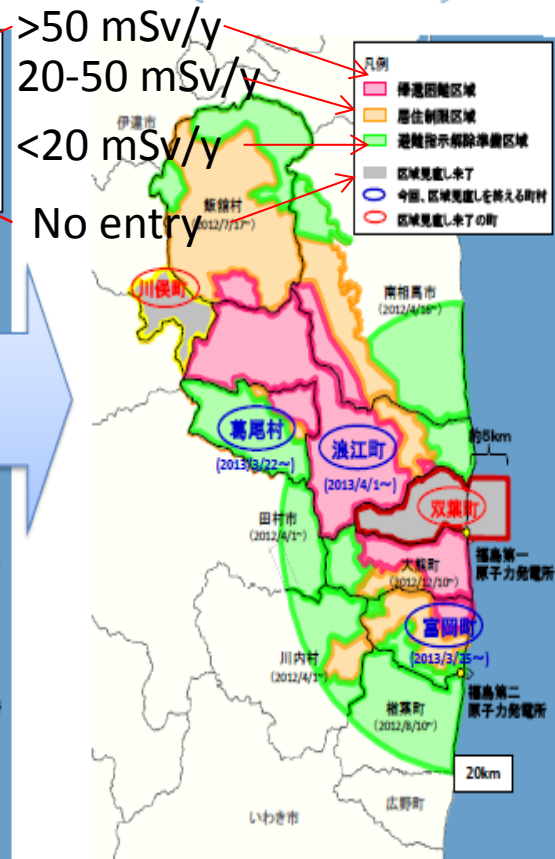
(Dec 10, 2012)

〔平成24年12月10日時点
(今回の区域見直し前)〕



(After April 1, 2013)

〔平成25年4月1日以降
(今回の区域見直し後)〕



Cherry blossom in Tomioka Town (10 km from Fukushima Daiichi)



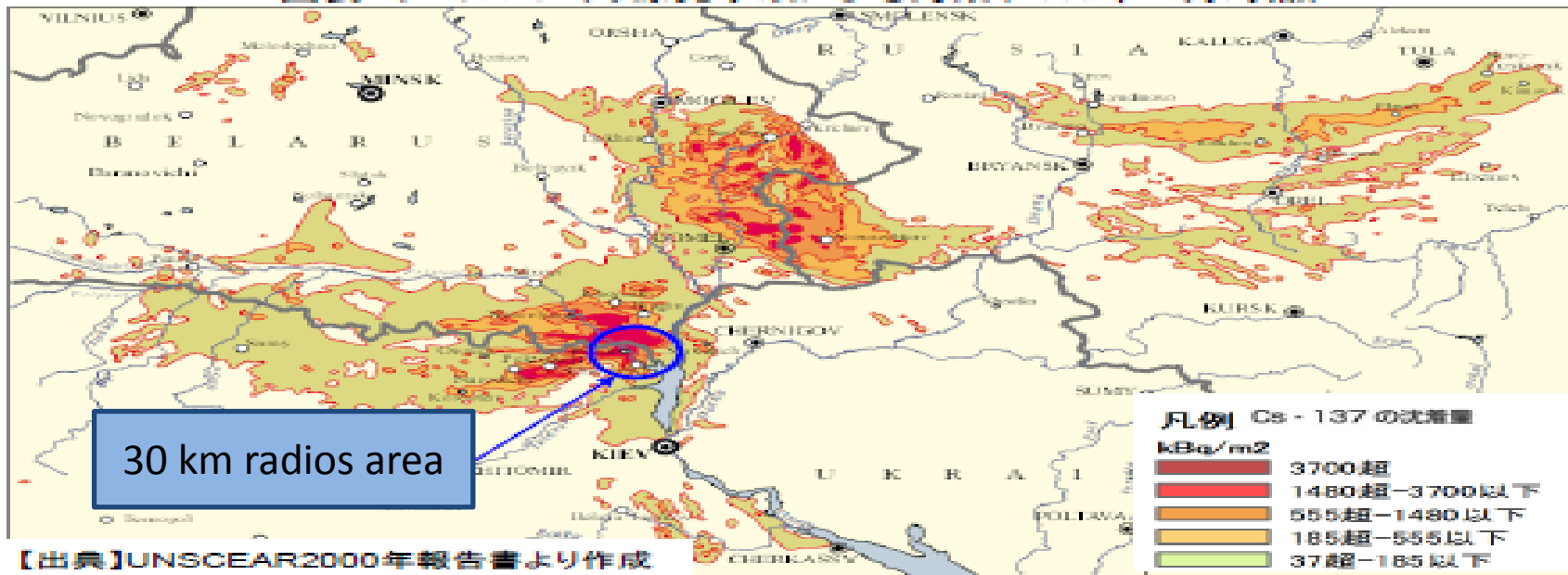
<http://www.asahi.com/special/10005/images/TKY201204190192.jpg>



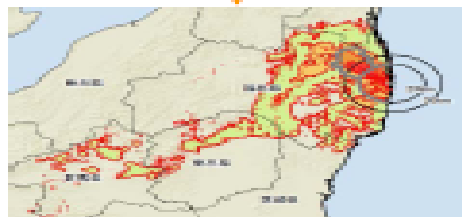
<http://img.47news.jp/PN/201204/PN2012041901001125.-.-.CI0003.jpg>

Compared with the Chernobyl accident

図表 チェルノブイリ原発事故による汚染(1989年12月時点)



両図を同縮尺
で記載



図表 東電福島第一
原発事故による汚染
(2011年11月時点)

【出典】文部科学省発表資料(2011年11月)より作成

図表 汚染地域の面積

汚染濃度 (kBq/m ²)	汚染地域の面積(km ²)		
	Chernobyl	Fukushima	F/C
> 1,480	3,100	200	6 %
555 - 1,480	7,200	400	6 %
185 - 555	18,900	1,400	7 %
37 - 185	116,900	6,900	6 %
合計面積	146,100	8,900	6 %

3



Most Important Lessons Learned from Fukushima:

“Thinking Unthinkable” and “Resilience”

- *“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)
- “**Thinking unthinkable**” is essential in preparing for the emergency and for energy security.
- “**Resilience**” beyond “defense in depth” is needed for preparing “unexpected crisis”.
 - Resilience means a capability to **respond to “unexpected crisis” as well as to restore safe and secure status** of the social system.

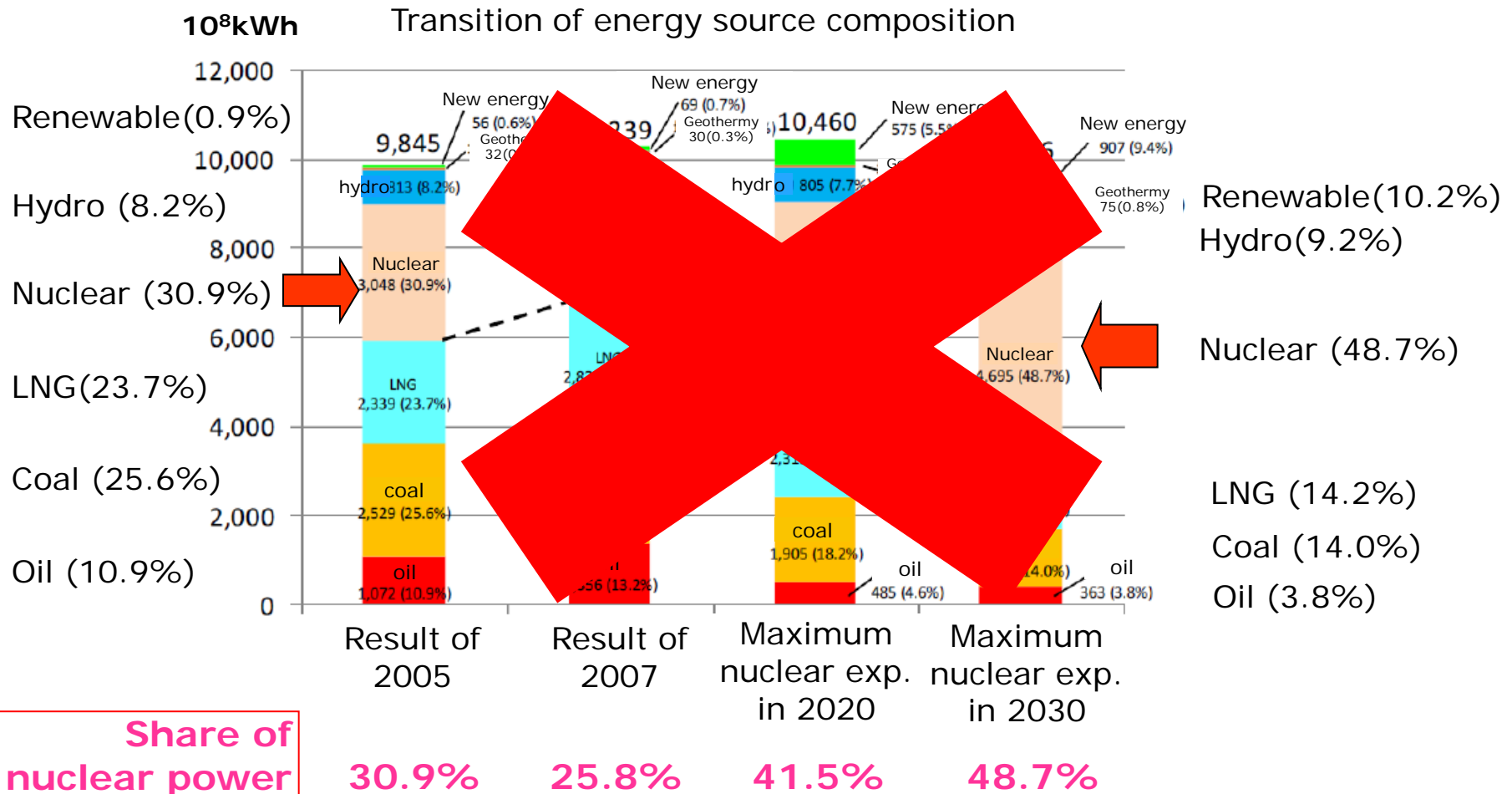


Restoring Public Trust in Nuclear Safety and Energy Policy



Goal of Power Production Mix in 2030

Before 2011/3/11



Source: Institute of Energy Economics, March 2010

~80-85%

原子力発電は直ちにやめるべき
Immediately shutdown

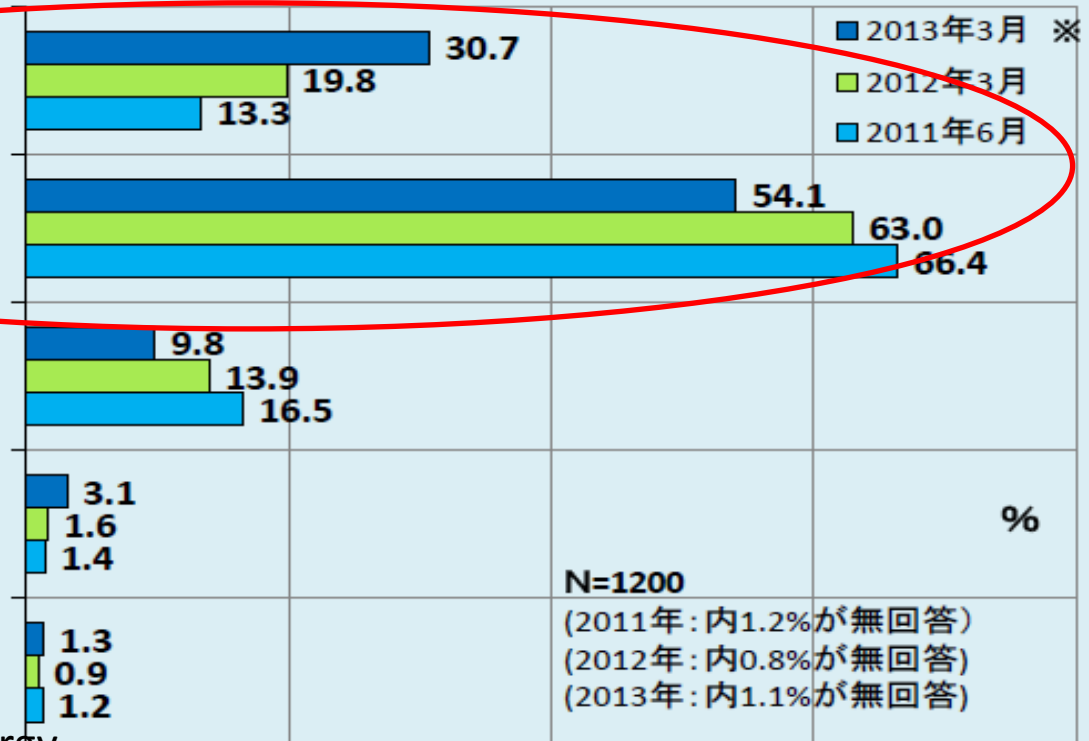
段階的に縮小すべき
Gradually phase-out

現状を維持すべき
Status quo

段階的に増やすべき
Gradually increase

全面的に原子力発電に依存すべき

Total Dependence on Nuclear Energy



What is your opinion about nuclear power in Japan?

日本の原子力発電はどうあるべきか

※2013年の調査では、回答項目は「再稼働を認めず、直ちにやめるべき」「再稼働を認めて段階的に縮小すべき」「再稼働を認めて現状を維持すべき」「再稼働を認めて段階的に増やすべき」であった。

Source: Prof. Hirotada Hirose, "Changes of Public Opinion about Nuclear Power,"

Presented at Japan Atomic Energy Commission, July 17, 2013

<http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2013/siryo27/siryo2.pdf>



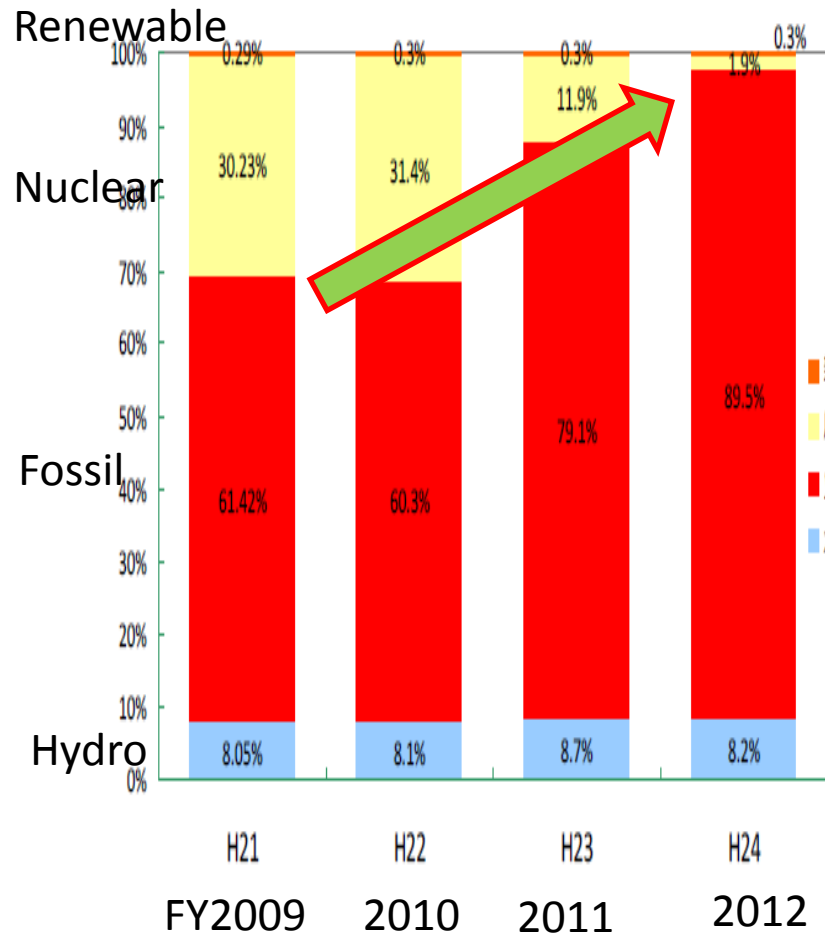
PM Abe's Statement at Diet on Energy Policy (2013/02/28)

- Reflecting on the accident at Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Station, under the Nuclear Regulation Authority, **we will foster a new culture of safety that will uncompromisingly enhance the degree of safety.** After doing so **we will restart nuclear power plants where safety has been confirmed.**
- **We will promote the introduction of energy conservation and renewable energies to the greatest possible extent to reduce our degree of dependency on nuclear power as much as possible.** At the same time, we will begin **a fundamental reform of the electric system.**

http://www.kantei.go.jp/foreign/96_abe/statement/201302/28siseuhousin_e.html

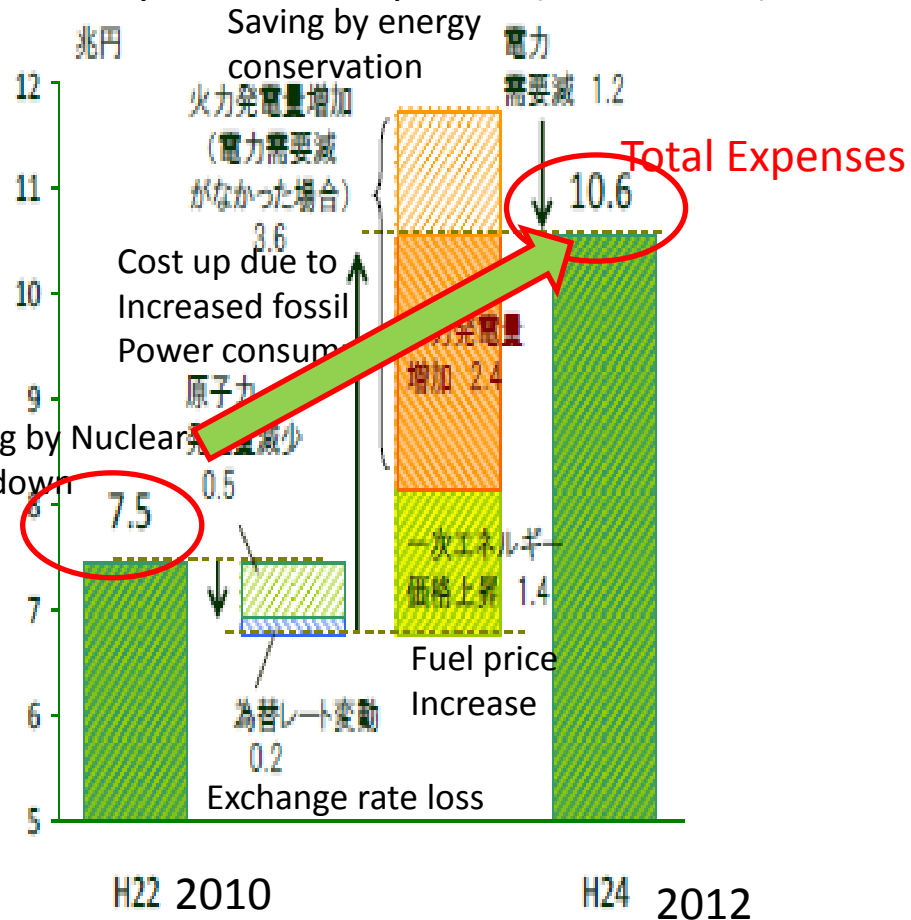


Impact of Shutdown of Nuclear Power from FY 2010 to FY 2012



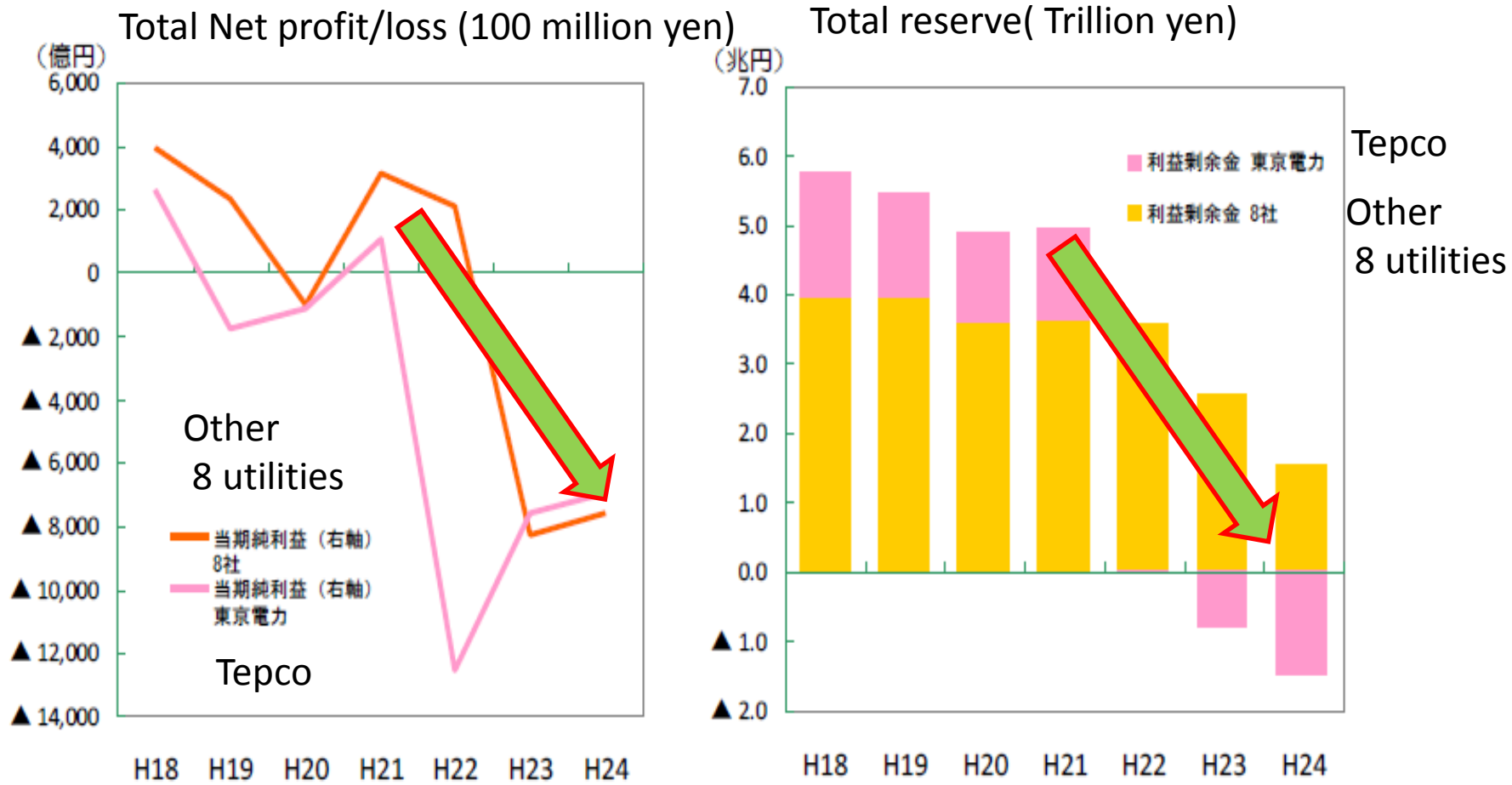
Share of nuclear power down from 31% to 2%

Expenses by Power Companies (Trillion Yen)



3.1 trillion yen extra expenses due to loss of nuclear power

All nuclear utilities reported total of 1.5 trillion yen loss in FY 2012 (including Tepco's 0.8 trillion yen loss)

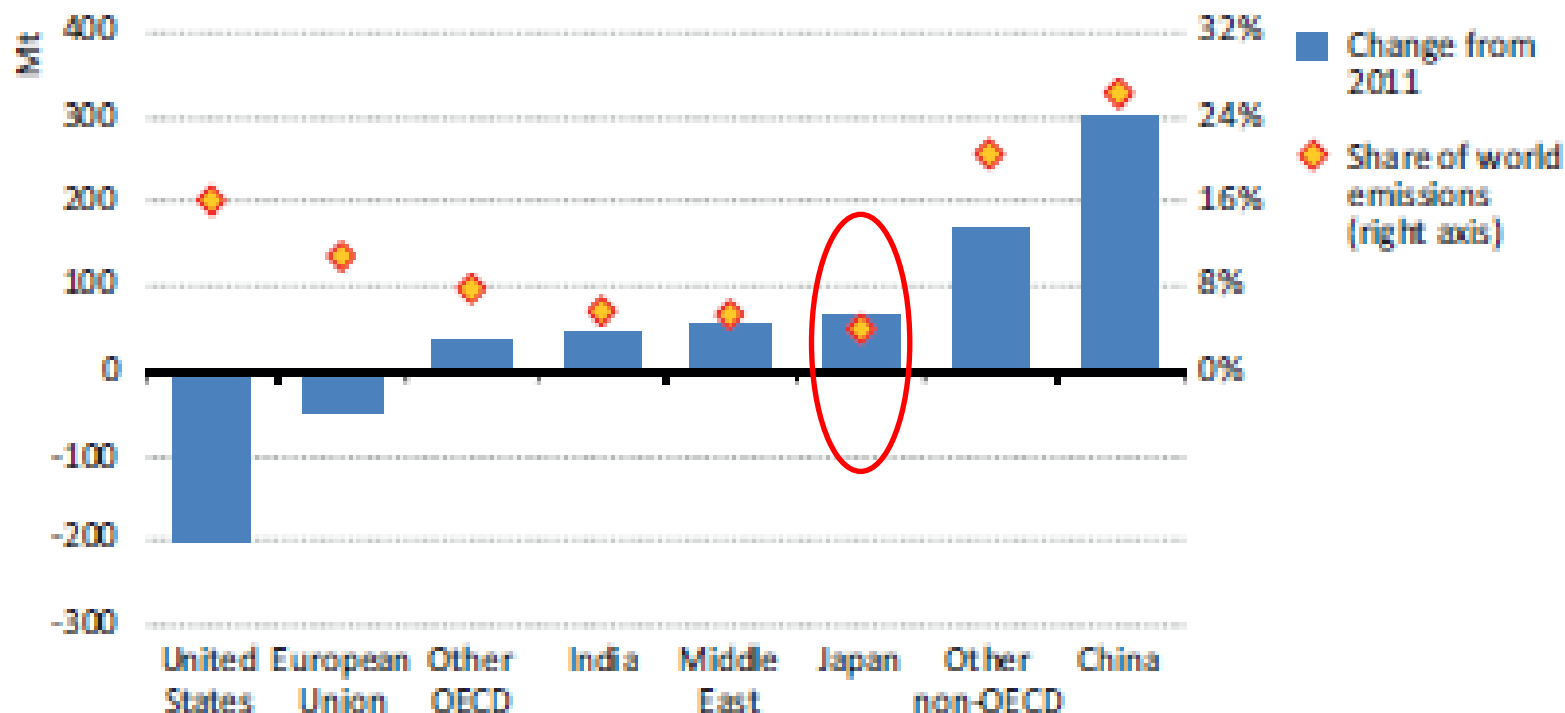


Source: Yuji Yamaguchi, The Institute of Energy Economics, Japan, 2013.
<http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2013/siryo31/siryo3.pdf>



Japan's CO₂ emission increased by 70 MT or 5.8% from 2011

Figure 1.8 CO₂ emissions trends in 2012



Source: International Energy Agency (IEA), "Redrawing Energy Climate Map," 10 June 2013,
<http://www.worldenergyoutlook.org/media/weowebiste/2013/energyclimatemap/RedrawingEnergyClimateMap.pdf>



Impact on Global Nuclear Energy Development

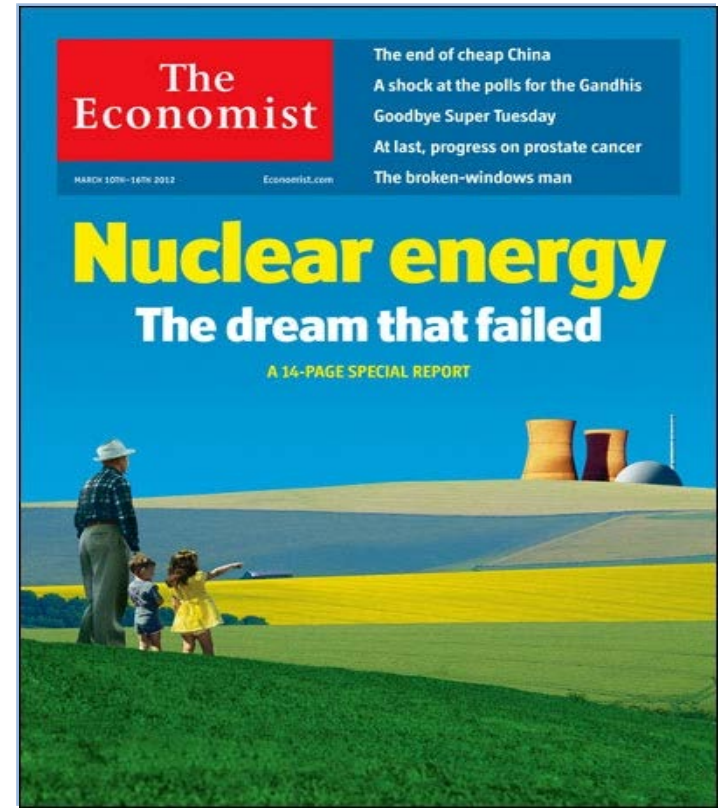


From “Nuclear Renaissance” to “Failed Dream”? by “The Economist”



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

-- The Economist, September 8, 2007

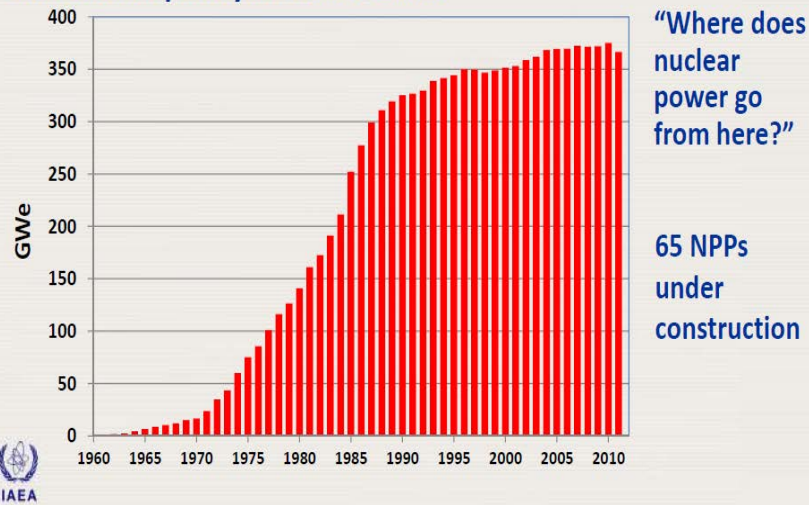


“For nuclear to play a greater role, either it must get cheaper or other ways of generating electricity must get more expensive.”— The Economist, March 10, 2012

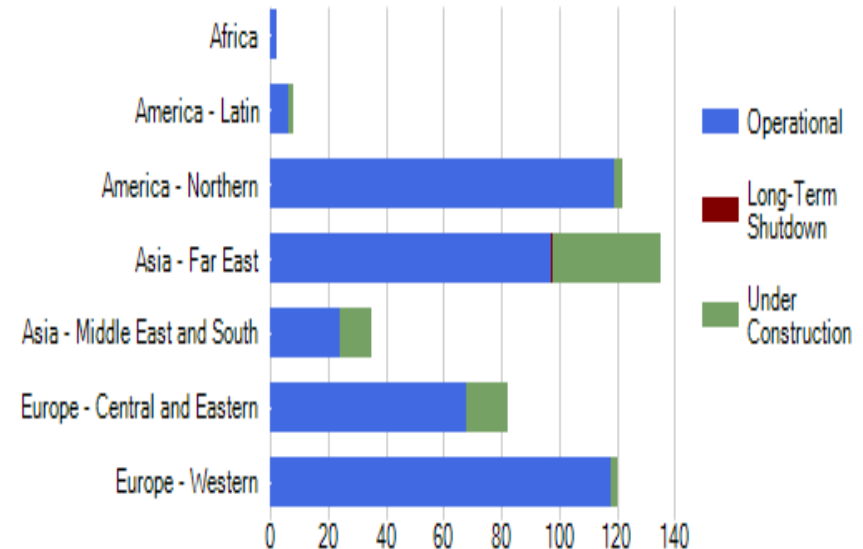
Global Nuclear Power Development Current Status (IAEA)

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



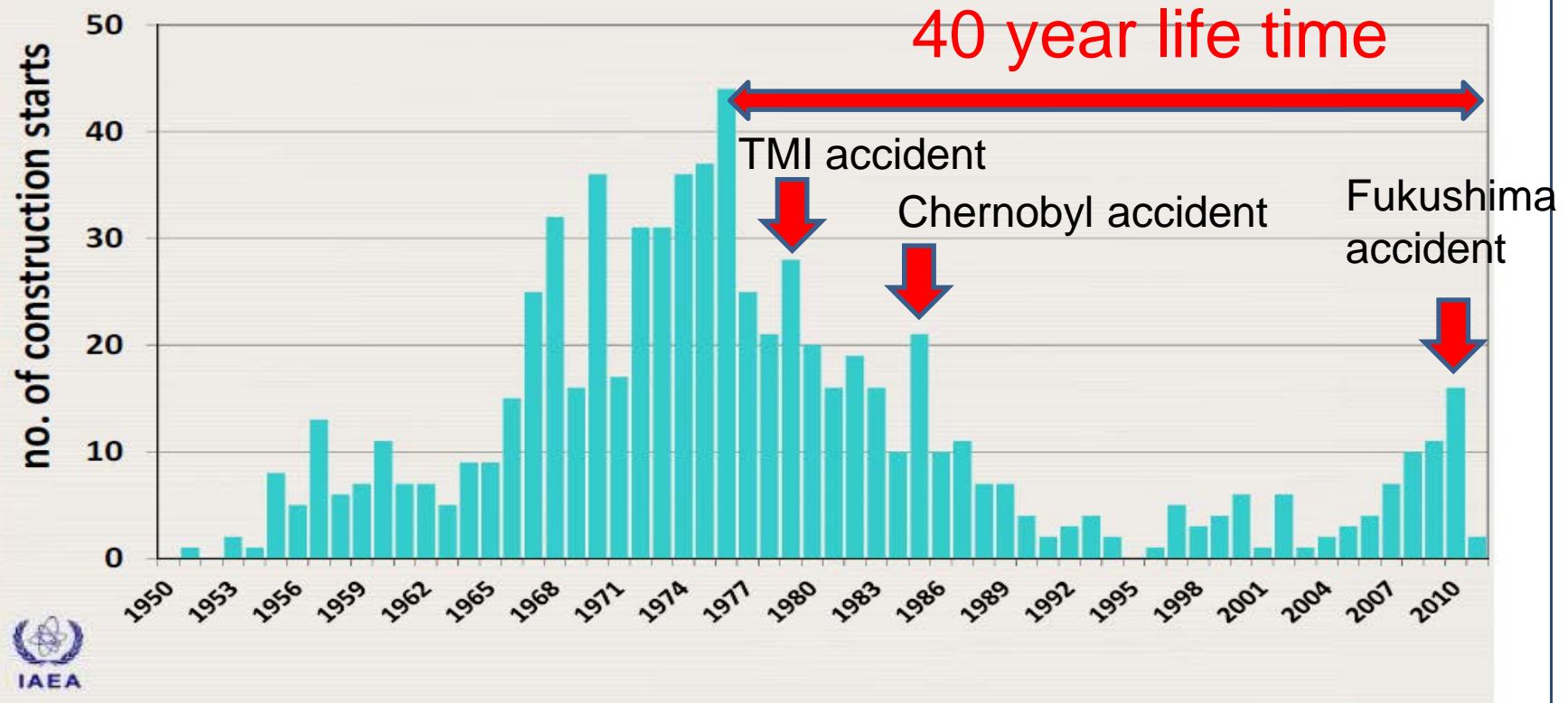
Source: H-HolgerRogner, Head, Planning & Economic Studies Section (PESS)Department of Nuclear Energy, International Atomic Energy Agency, "Energy, Electricity and Nuclear Power Estimates for the Period up to 2030," November 2011.

As of July 31, 2013, 434 nuclear power plants (370.5 GWe) are operating and 69 units are under construction, one unit in long term shutdown. <http://www.iaea.org/pris/>

Global Nuclear Power Plant Construction (IAEA)

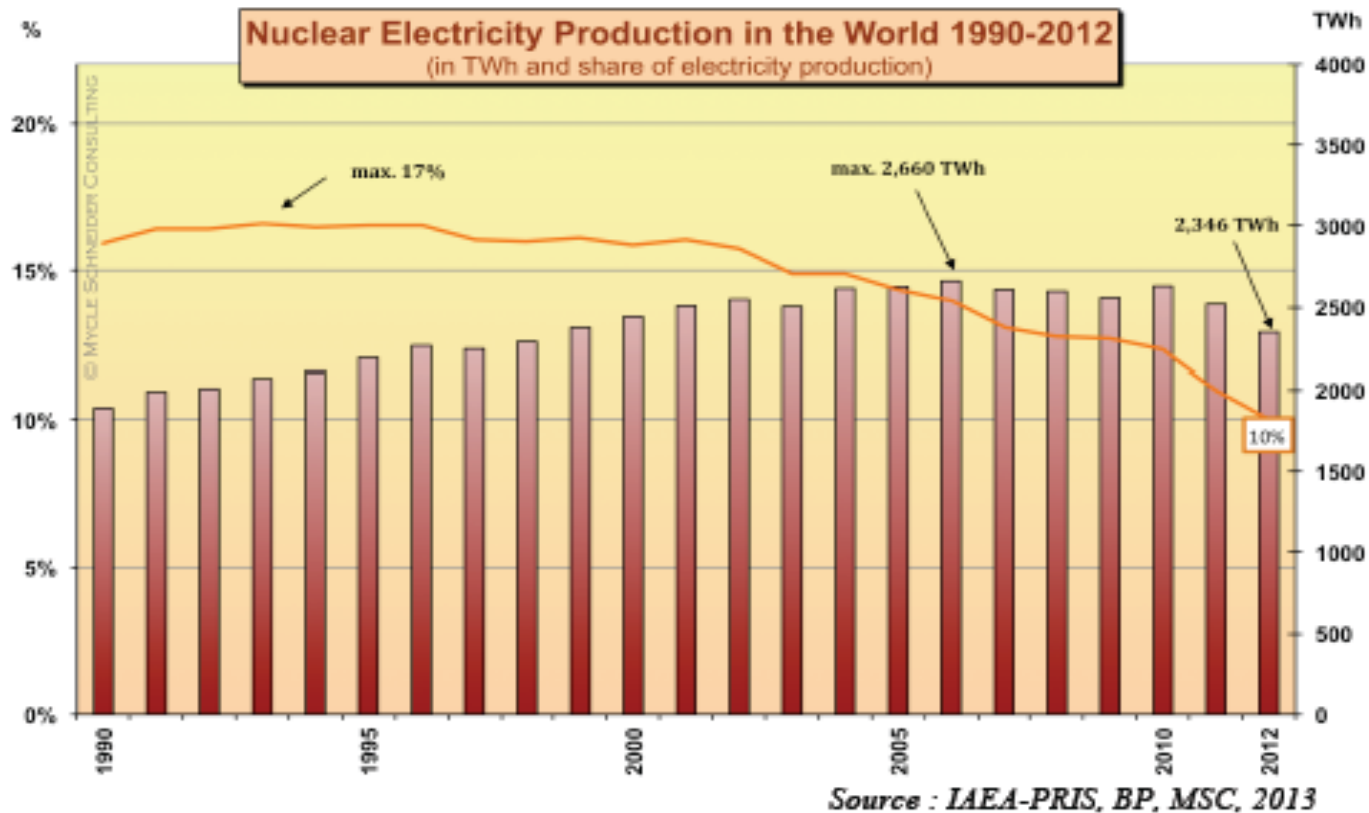
: Replacement of old reactors are coming....

Construction starts



Global Nuclear power production is in decline

Figure 1: Nuclear Electricity Generation in the World



Asia: No major policy changes, still committed to nuclear power

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 2013 and 2011

	Actual in 2011	Estimates for 2030		Estimates for 2050	
		Estimated in 2011	Estimated in 2013	Estimated in 2011	Estimated in 2013
<u>World Total</u>					
Nucl. Capacity (GWe)			-13%		-21%
Low Estimate	368.8	501	435	560	440
High Estimate		746	722	1228	1113
Share (%)			-3%		-9%
Low Estimate	7.1	5.2	4.5	2.7	2.2
High Estimate		6.2	6.2	6.0	5.6
<u>Far East</u>					
Nucl. Capacity (GWe)			-18%		-14%
Low Estimate	79.8	180	147	220	189
High Estimate		255	268	450	412
Share (%)			+5%		-8%
Low Estimate	5.0	6.4	5.3	4.2	3.7
High Estimate		7.5	8.1	8.6	8.0

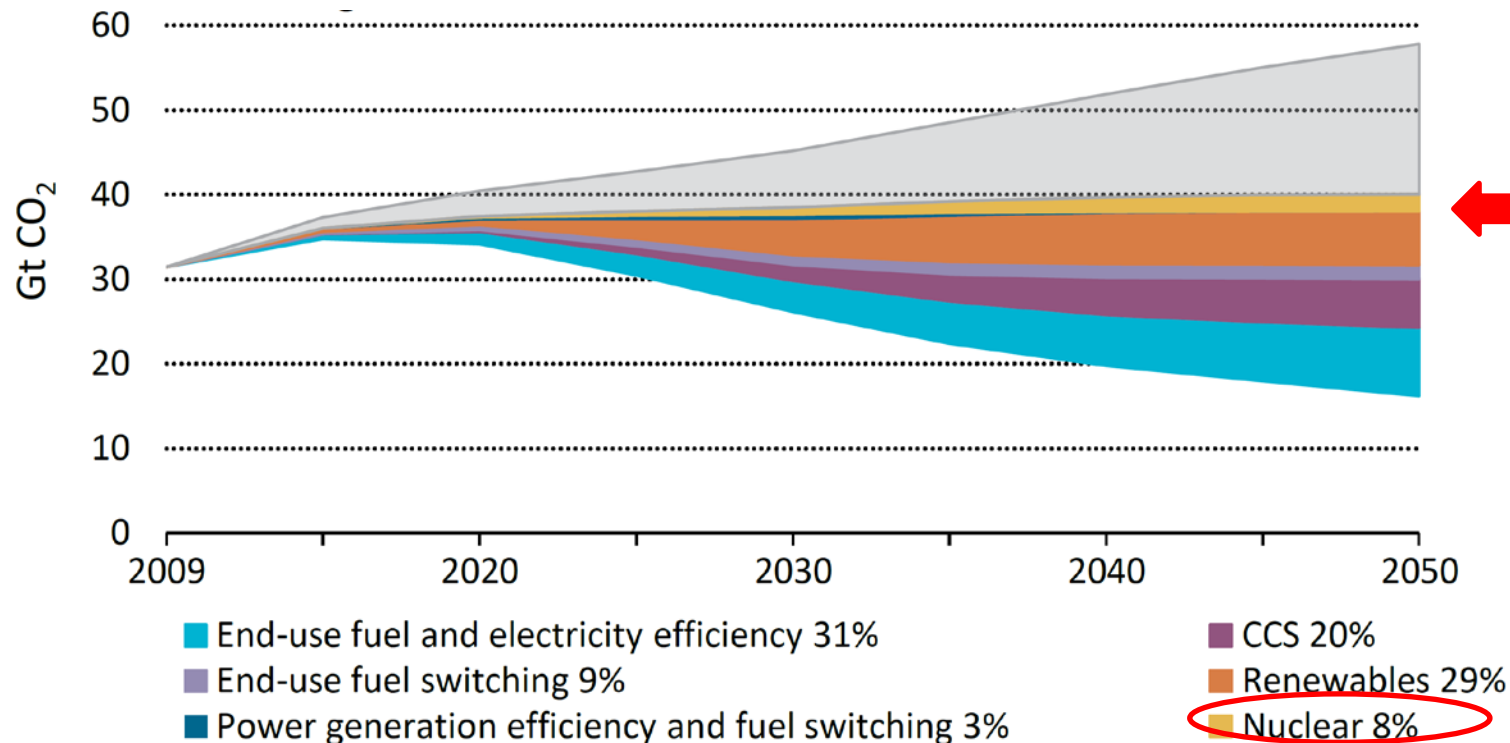
Source: International Atomic Energy Agency, "Energy, Electricity and Nuclear Power Estimates for the Period up to 2050,"

2011 Edition http://www-pub.iaea.org/MTCD/Publications/PDF/RDS1_31.pdf

2013 Edition http://www-pub.iaea.org/MTCD/publications/PDF/RDS-1-33_web.pdf

A portfolio of technologies is needed

Technology contributions to reaching the 2DS vs 4DS



Energy efficiency is the hidden fuel that increases energy security and mitigates climate change.

