Lessons from Fukushima

October 11 , 2011

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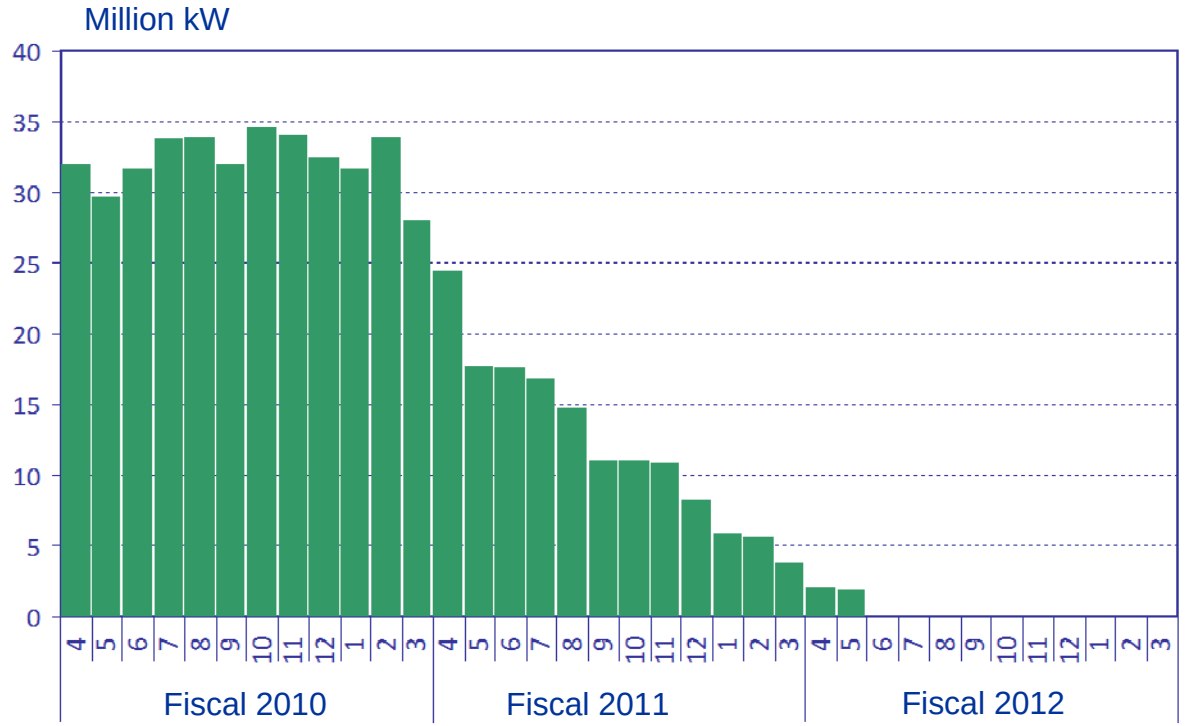
Outline : Lessons from Fukushima

1. One NPP accident could affect the reoperations of other plants
2. Shift to Oil Fired or LNG fired Plant from nuclear would increase generation cost and CO2 emission.
3. Nuclear accident would create harmful rumors beyond reality, damaging wide raging industries.
4. Electricity shortage and generation cost increase would have a negative impact on Macro economy.
5. No energy is perfect in terms of 3E + S+ M
6. Appropriate nuclear safety regulatory scheme as well as adequate balance of responsibility between Gov. and Industries are essential for safety
7. Less nuclear power would slow down Co2 reduction
8. International cooperation centering on IAEA is indispensable to ensure safety of nuclear power in the world.

1. One NPP accident could affect the reoperation of other plants

◆Outlook for the Operation of Nuclear Power Plants in Japan (worst-case scenario)



◎ In the worst-case scenario, supposing long delays in starting up nuclear power plants after scheduled outages, the gradual loss of generation capacity will make it difficult for the utilities to cope with peak electricity demand in the winter of 2011he summer in 2012, seriously affecting industrial activity, etc.

2. Shift to Oil Fired or LNG fired Plant from nuclear would increase generation cost and CO2 emission.

◆ Assuming that the presently shut-down reactors, as well as the reactors which will soon enter scheduled outages, will not resume operation . . .

(1) The supply and demand for electricity will be very tight in the summer of 2012, possibly affecting employment.

•The gross generation capacity of electric utilities in Japan will be at least 7.8% lower than the peak electricity demand. If the utilities are to maintain at least a 5% reserve capacity ratio, it will be necessary to reduce electricity consumption by as much as 12.4%.

(2) Major increase of fuel cost

* If the reduction in output is to be compensated by thermal power plants, the fuel costs including coal, LNG and petroleum, will increase from the 2010 level by 3.5 trillion yen. If this is directly charged to power consumers, the electricity price will increase by 3.7 yen/kWh. For an average household, the electricity bill will rise by 1,049 yen (18%) per month, and the rate for industrial consumers by 36%.

(3) Major increase of energy-derived CO_2 emissions

* The increased use of fossil fuel will cause the CO_2 emissions in 2012 to rise to 1.26 billion tons, up 18.7% from the 1990 level.

3. Nuclear accident would create harmful rumors beyond reality, damaging wide ranging industries.

◆ Effect of harmful rumors

(1) Import restrictions on Japanese products (agricultural, fishery and industrial products), and drastic decline of foreign tourists to Japan

Note : The statistics for the April-to-June period of 2011 reported a 50% drop, and that for July reported a 35% drop from the same period of the previous year.).

(2) At least the following measures are necessary:

a. Provision of detailed information
b. Issuance of product safety certificates by the Japanese Government, etc. ,whenever necessary
c. Explanation of the current situation by the Japanese Government
d. Giving publicity the safety of Japan by visiting foreigners

4. Electricity shortage and generation cost increase would have a negative impact on Macro economy.

◆Macro-economic impact of the shut-down of all nuclear reactors

(1)Impact on GDP
- July-Sept.2012 : ▲5.6%
- Fy.2012 : ▲1.6% (If NPPs resume their operation by summer)
: ▲3.6% (If NPPs continue to stop operation)

(2)Impact on employment
- July-Sept.2012 : +49 thousands
- Fy.2012 : +98 thousands(If NPPs resume..)
: +197 thousands(If continue to stop..)

5. No energy is perfect in terms of 3E+ S + M

◆**No energy is perfect in terms of the best energy mix, When the following factors are taken into consideration:**

a. **3E // Energy security, Economic efficiency and Environmental effect**

b. **S // Safety**

c. **M // Macroeconomic impact , such as that on GDP and employment**

4 Pillars for Possible Japan's New Energy Policy

1. More Efficient Energy Use
2. Lower Cost Renewable Energ
3. Cleaner Use of Fossil Fuels
4. Safer Nuclear Energy

Exact balance among the 4 pillars will be decided by Spring 2012

6. Appropriate safety regulatory scheme and adequate balance of responsibility between Gov. and Industries are essential

In most countries including the US, UK and France, nuclear power utilities have only limited liability for damages. Japan is one of the very few countries, together with Germany and Switzerland, where the liabilities to be borne by nuclear power utilities

The maximum liability of power utilities is less than 300 billion Japanese Yen (bil. yen) in most countries in Europe and Asia: 91.5 million euros for France (10.2 bil. yen), 140 million sterling pounds for the UK (17.6 bil. yen) and 2.5 billion euros for

		Regulatory Scheme in Place?	Amount of Compensation	Type of Liability of Utilities	Maximum Liability of Utilities	Reasons for Exemption of Liability	Compensation by the Government
Western countries	US	Yes	12.5945 billion USD (~966.5 bil. yen)	Limited	12.5945 billion USD (~966.5 bil. yen)	War	If the damages exceed the maximum liability, Congress takes all measures deemed necessary to provide complete and prompt compensation (including approving an appropriate compensation plan and funds).
	UK	Yes	140 million GBP (~17.6 bil. yen)	Limited	140 million GBP (~17.6 bil. yen)	Armed conflict	300 million SDR (approx. 37.4 bil. yen) (including contributions from various countries based on the Brussels Supplemetary Convention)
	France	Yes	91.5 million EUR (~10.2 bil. yen)	Limited	91.5 million EUR (~10.2 bil. yen)	War or abnormally large natural disaster	300 million SDR (approx. 37.4 bil. yen) (including contributions from various countries based on the Brussels Supplemetary Convention)
	Germany	Yes	2.5 billion EUR (~277.6 bil. yen)	Unlimited	N/A	Not specified	Compensation of up to 2.5 billion euros if the measures by the utility do not work
	Russia	Yes	5 million USD (~380 mil. yen)	Limited	5 million USD (~0.38 mil. yen)		If the maximum liability is exceeded, the government provides the amount necessary.
	Switzerland	Yes	1.1 billion Swiss francs (~104.3 bil. yen)	Unlimited	N/A	Willful intention or gross negligence by the victim	
Asia	S. Korea	Yes	50 billion S. Korean won (~3.6 bil. yen)	Limited	50 billion SDR (~37.4 bil. yen)	Exceptionally large natural disaster, terrestrial disaster, war or equivalent incident	If the damages exceed the amount of compensation, the government provides the assistance it considers necessary.
	China	No*	300 million Chinese yuan (~3.6 bil. yen)	Limited	300 million Chinese yuan (~3.6 bil. yen)	War, hostile activities, severe natural disaster	When the damages exceed the amount of compensation, the government provides an assistance of up to 800 million yuan (approx. 9.6 bil. yen).
	Taiwan	Yes	4.2 billion Taiwanese dollars (~11.1 bil. yen)	Limited	4.2 billion Taiwanese dollars (~11.1 bil. yen)	International armed conflict, hostile activities, civil war, riot or a severe natural disaster	A loan is provided if the damages exceed the amount of compensation.
	Japan	Yes	120 bil. yen	Unlimited	N/A	Abnormally large natural disaster or civil commotion	For damages exceeding the amount of compensation, the government, if needed, provides assistance based on the decision of the Diet.

(Reference) "Nuclear Power Pocket Book 2010" (Newspaper Division, The Japan Electric Association), NRC HP, Japan Atomic Industrial Forum HP

* In China, the direction of the nuclear damages compensation scheme is determined based on the State Council's opinion on the scheme.

(Note) 1. "Amount of Compensation" is the amount required on a mandatory basis to secure sufficient funds to enable the nuclear utility to fulfill its liability for compensation.

2. "Maximum Liability" is the upper limit of liability of the nuclear utilities.

3. Exchange rate: TTM of the Bank of Tokyo-Mitsubishi UFJ as of August 29, 2011; the rate of SDR is as of August 26, 2011.

7. Less nuclear power would slow down Co2 reduction

○ The targets of each major country are based on the Copenhagen Accord.
○ Advanced countries have promised gross reductions in GHG emissions; developing countries have promised reductions based on Business-as-Usual (BaU) ratio or emission intensity.

	Reference year	Mid-term target	Reduction from 1990	Reduction from 2005	IEA suggestion (reduction from 1990)	Marginal cost for reduction ($)
Japan	1990	-25% (※1)	-25%	-30%	-10%	476
EU	1990	-20%～-30% (※1)	-20%～-30%	-13%～-24%	-23%	48～135
US	2005	-17% (※2)	-4% (claimed by US)	-17%	-3%	60
Canada	2005	-17% (※2)	+3%	-17%	—	92
Australia	2000	-5%～-25% (※1)	+13%～-11%	-10%～-29%	—	46～92
New Zealand	1990	-10%～-20% (※1)	-10%～-20%	-28%～-36%	—	n.a.
Russia	1990	-15%～-25% (※1)	-15%～-25%	+18%～+33%	-27%	0
Brazil	-	-36.1%～-38.9% (reduction from BaU in 2020)	—	-23%	—	n.a.
South Korea	-	-30% (reduction from BaU in 2020)	—	-4%	—	21
China	2005	-40%～-45% (reduction in GDP-based emission intensity)	Assuming 8% economic growth up to 2020: emissions to increase by 1.9 times from 2005 level Assuming 6% economic growth from 2015: emissions to increase by 1.7 times from 2005 level		-47% (from 2005 level)	0
India	2005	-20%～-25% (reduction in GDP-based emission intensity)	Assuming 7% economic growth up to 2015 and 6% thereafter: emissions to increase by 2.1 times from 2005 level		-40% (from 2005 level)	Less than zero

Note 1: Targets marked *1 are accepted with preconditions concerning scenarios, etc. Targets marked *2 are accepted with preconditions about assumed scenarios concerning passage of bills, etc.
Note 2: Marginal cost for reduction was estimated by Research Institute of Innovative Technology for Earth (RITE).
Note 3: “BaU ratio” refers to reduction from the Business-as-Usual case that assumes no special measures are taken.(Business As Usual)

Source: RITE, etc.

8. International cooperation centering on IAEA is needed to ensure nuclear power safety in the world.

◆ Asian countries with nuclear power plants today are: Japan, South Korea, China, Taiwan, India and Pakistan, while Vietnam, Indonesia and Thailand are considering constructing NPP

Installed capacity of nuclear power generation in Asian countries (Unit: GW)

	2009	2020		2030	
		Reference case	Technology development	Reference case	Technology development
China	9	48	80	90	130
Japan	49	62	62	68	68
Taiwan	8	8	8	6	8
South Korea	18	27	32	30	46
ASEAN	0	0	0	4	18
India	4	20	26	33	85
Asia	85	165	210	224	366

Thank you for your attention!

See you in KYOTO.

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