

# **Utilization of Nuclear Energy and Nuclear Non-proliferation in Japan**

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# 1 Great East Japan Earthquake and resulting accident at TEPCO Fukushima Daiichi Nuclear Power Station



Onagawa Nuclear Power Station has successfully withstood the earthquake and tsunami

Fukushima Daiichi Nuclear Power Station has barely withstood the earthquake but not tsunami

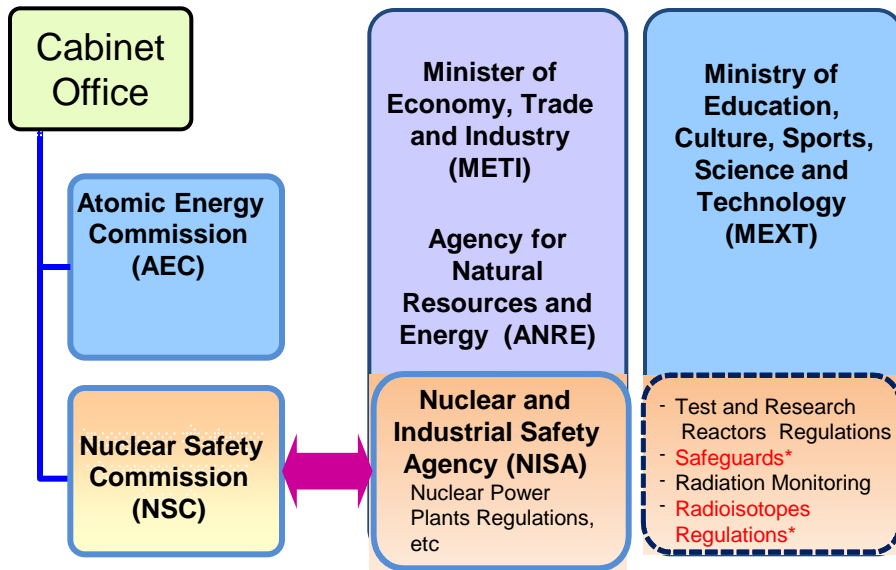
Fukushima Daiichi Nuclear Power Station has successfully withstood the earthquake and tsunami

*It is regrettable that the lessons from JCO accident in 1999 was not learned. It is important to reorganize the safety regime based on this understanding and the lessons from Fukushima Accident.*

# 2 Reform of Nuclear Regulatory Regime

- ✓ **Separation** of “Regulation” and “Utilization”
- ✓ **Unification** of the “Regulations” (Regulatory role of safeguards, safety and security will be integrated into a single organization)
- ✓ Information Disclosure with High Transparency
- ✓ Transformation of Nuclear Regulations
- ✓ Enhancement of the Nuclear Emergency Preparedness System

## Regulatory System Heretofore



Double Checking

\*Regulatory function to be transferred to NRA as of April 1, 2013

## New Regulatory System

### Nuclear Regulation Authority (NRA)

Inaugurated in September 2012

Commission: Chairman and 4 Commissioners

Secretariat of the Nuclear Regulation Authority

Ministry of the Environment (MOE)

### 3 Self-reflective remarks as someone who is involved in nuclear energy as a scholar and as a cabinet minister in charge of science and technology

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#### *3-1 Implications of the reorganization of government ministries and departments in 2001 on nuclear energy policy*

- ✓ *Separation of the promotional role and regulatory role of nuclear energy was not fully realized*
- ✓ *Priority of nuclear energy within the newly established Ministry of Education, Culture, Sports, Science and Technology was reduced due to the abolishment of the Science and Technology Agency*
- ✓ *Priority for the research on nuclear safety conducted by Japan Atomic Energy Research Institute was reduced*

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#### *3-2 Failure to address the back end of the nuclear fuel cycle*

- ✓ *More efforts should have been made to address the back end of the nuclear fuel cycle (final disposal of high-level radioactive waste, decommissioning and reprocessing)*
- ✓ *The Government itself should have taken more responsibility on the back end of the nuclear fuel cycle and should have carried out related R&D as its own responsibility.*  
*(Reprocessing and final disposal of high-level radioactive waste has not necessarily gone well.)*
- ✓ *To address the backend is the responsibility of researchers and engineers in not only Japan but all the states engaged in nuclear energy*

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## *3-3 Failure to site the repository of high-level radioactive waste*

- ✓ *I was involved in the establishment of the framework of the interim storage of spent fuel, but more efforts should have been made to site the repository of high-level radioactive waste*
- ✓ *To site the repository of high-level radioactive waste is indispensable in terms of winning the public understanding on the continuation of nuclear energy use while the necessity to site the repository even increases in case we decide to phase out nuclear power generation.*
- ✓ *It is regrettable that only Sweden and Finland have succeeded in siting repositories so far*

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#### *3-4 Over-confidence in the countermeasures against the tsunami*

- ✓ *We have had excessive confidence in the countermeasures against Tsunami despite the earthquake off the Sumatra Island on December 26, 2004, and as shown in the construction in Kamaishi of the breakwater registered in the Guinness Book as the world's deepest one.*

# 4. Responsibility of Japan for nuclear energy use and nuclear non-proliferation

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## *4-1 Nuclear non-proliferation*

✓ *Accountability for the use of increased accumulation of plutonium*

*\*Japan already possessed 9.3 tons of plutonium domestically and 35 tons of plutonium in France and U.K., as of the end of 2011.*

✓ *Maintenance and development of human and technology bases for nuclear non-proliferation and nuclear security*

✓ *Japan has pursued its nuclear energy program based on the confidence of the international community in the peaceful nature of its nuclear energy program. We should not act in a manner in which we lose such confidence*



# 4. Responsibility of Japan for nuclear energy use and nuclear non-proliferation

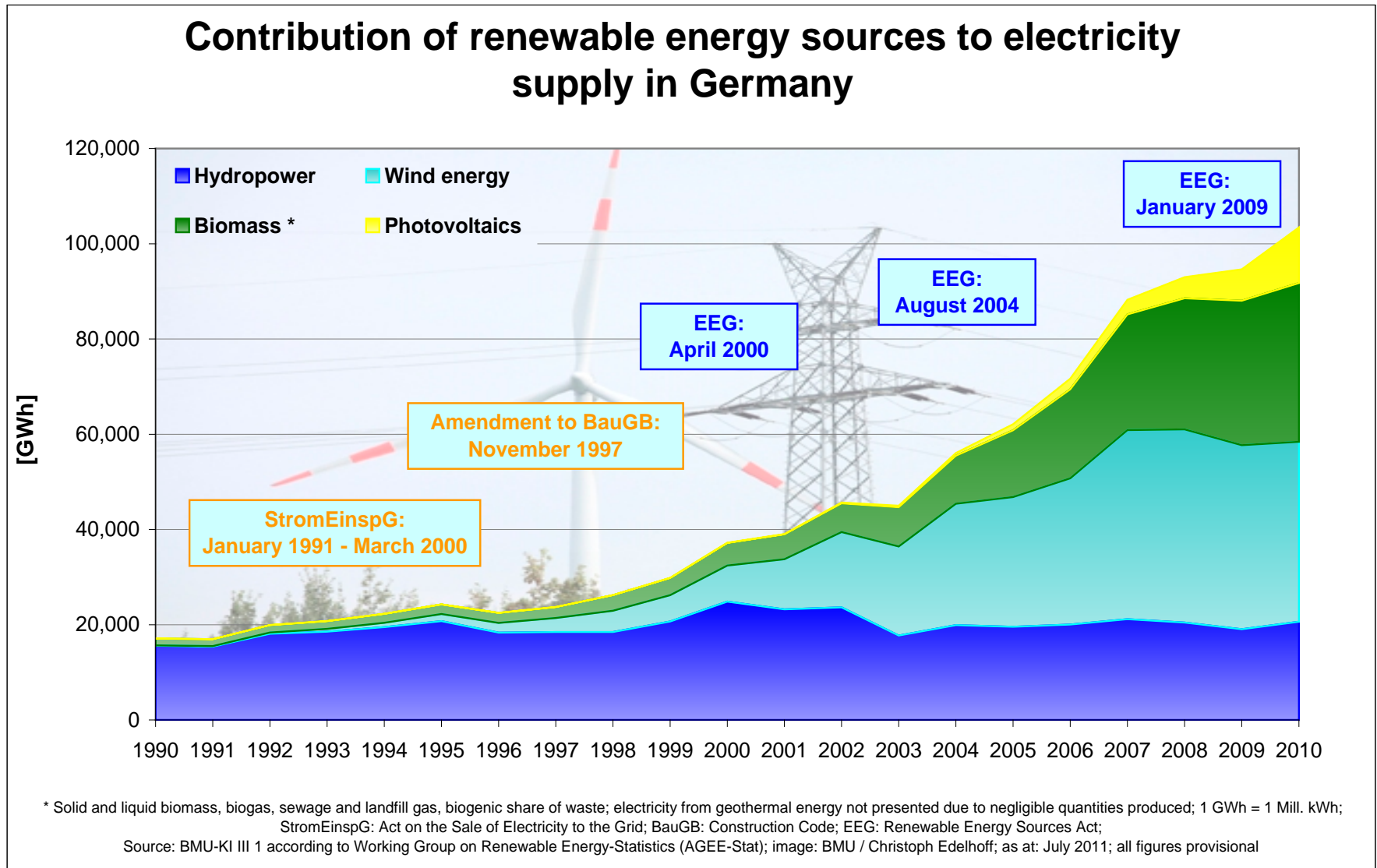
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## *4-2 Nuclear energy*

### *✓ Maintenance of human and technology bases in the nuclear field*

- It is not realistic to expect increased use of alternative energy to be sufficient to tackle global warming*
- Japan ranks among the highest in the technology level as a result of long-term R&D efforts*
- From the above understanding, it is our responsibility to maintain and even improve our human and technology bases from the international perspective*
- It is also our responsibility to cooperate with Asian states that plan to introduce nuclear power in the area of nuclear technology as well as nuclear non-proliferation and nuclear security.*

# How difficult it is to increase the electricity from renewable energy (Germany's case)



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*Electricity in Germany and Japan in 2009*

Source: International Energy Agency

Production from :	GWh	Ratio (%)		GWh	Ratio (%)		
	Germany			Japan			
Coal and Peat	257,137	43.4		279,450	26.7		
Oil	9,639	1.6		91,616	8.7		
Gas	78,884	13.3		284,949	27.2		
Nuclear	134,932	22.8		279,750	26.7		
Hydro*	24,710	4.1	Renewable Energy	82,129	7.8	Renewable Energy	
Biofuels	25,928	4.4		13,990	1.3		10.7
Waste	9,634	1.6	Renewable Energy (excluding hydro)	7,439	0.7	Renewable Energy (excluding hydro)	
Geothermal	19	0		2,889	0.3		2.9
Solar PV	6,579	1.1		2,758	0.3		
Wind	38,639	6.5	13.6	2,949	0.3		
Other sources	6,363	1.1		0	0		
Total Production	592,464			1,047,919			

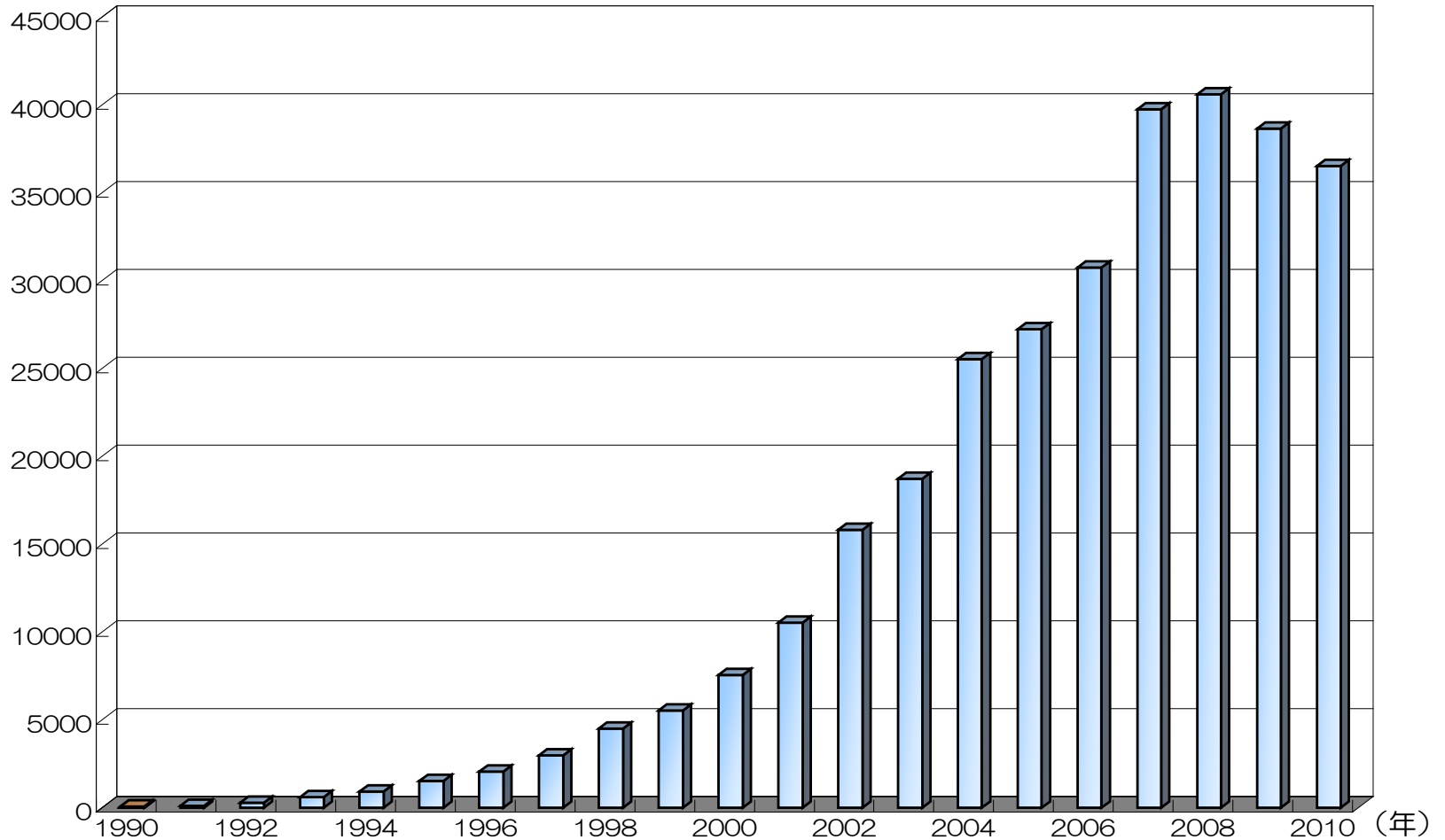
# How difficult it is to increase the electricity from renewable energy (Germany's case)

- Total Power Generation in Japan: 1,047,919 GWh
- Total Nuclear Power Generation: 279,750 GWh (2009)
- Renewable Energy in Germany: 105,509 GWh
- Renewable Energy excluding Hydro Power in Germany: 80,799 GWh (2009)
  - =  $80,799/1,047,919=7.7\%$ (approximately)
  - =  $80,799/279,750=28.9\%$  (approximately)

# ドイツにおける発電電力量(風力)

＜ドイツにおける風力発電の発電電力量＞

(百万kWh)



# 5. Recommendations for the future

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- ✓ *Japan should play an active role in the field of decommissioning, accident management, final disposal of high-level radioactive waste, nuclear non-proliferation and nuclear security as well as R&D on next-generation nuclear reactors including fast reactors and nuclear fuel cycle technologies.*
- ✓ *Japan should establish an international nuclear laboratory in the area damaged by the Accident at TEPCO's Fukushima Daiichi Nuclear Power Station*
- ✓ *Japan should make a contribution through the joint collaboration with other states*
- ✓ *Japan should strengthen the research bases of universities and R&D organizations in the nuclear field including JAEA*

## 5. Recommendations for the future

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- ✓ *Regulation of nuclear energy and R&D necessary for the improvement of regulation should be pursued in a single entity in terms of the necessity to keep close coordination*
- ✓ *The role of the Atomic Energy Commission as an entity that discusses nuclear energy policy within an overall energy mix from the perspective of long-term energy security of Japan should be preserved.*

# 參考資料



It is ideal to increase the ratio of new types of energy source\*, but is not realistic to expect too much from it

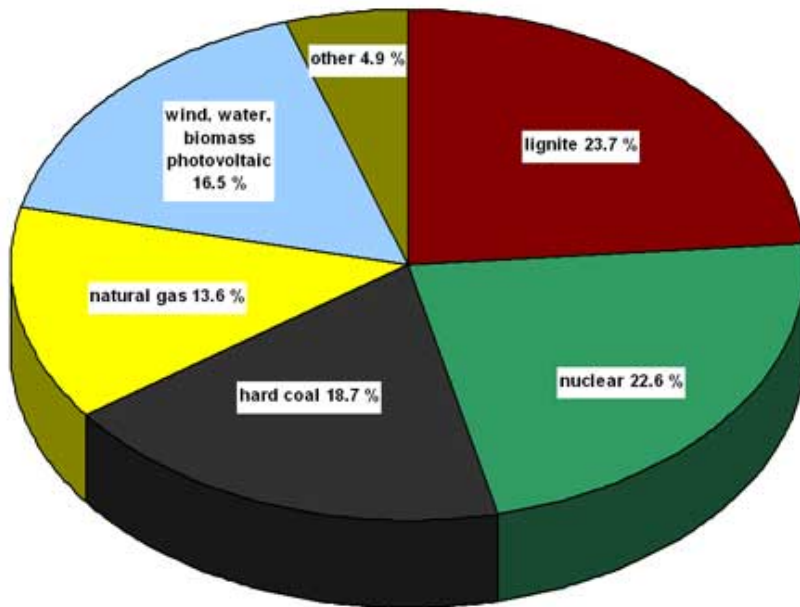
### Ratio of electricity from new types of energy source (2008)

Country	Ratio of electricity from new types of energy source
Japan	2.4
U.S	3.1
U.K	4.3
France	1.8
Germany	11.0
Italy	5.3
Spain	12.2
Sweden	8.2

\* New types of energy source means the renewable energy excluding hydro power

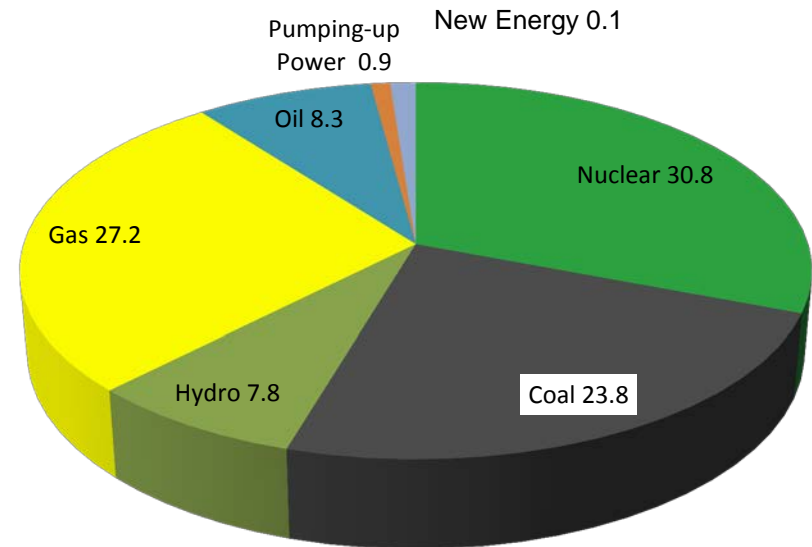
# How difficult it is to increase the electricity from renewable energy (Germany's case)

In 2010 the gross electric power generation in Germany totalled 621 billion kWh. A major proportion of the electricity supply is based on lignite (23.7 %), nuclear energy (22.6 %) and hard coal (18.7 %). Natural gas has a share of 13.6 %. Renewables (wind, water, biomass, photovoltaic) account for 16.5 %.



Germany

Source: European Nuclear Society



Japan

Source: 2011 Energy White Paper