

Overview of Renewable Energy Support Policy in Japan

Dr.Hiroshi Asano

Senior Research Scientist

**Central Research Institute of Electric Power Industry
and Research Fellow, Lecturer, the University of Tokyo**

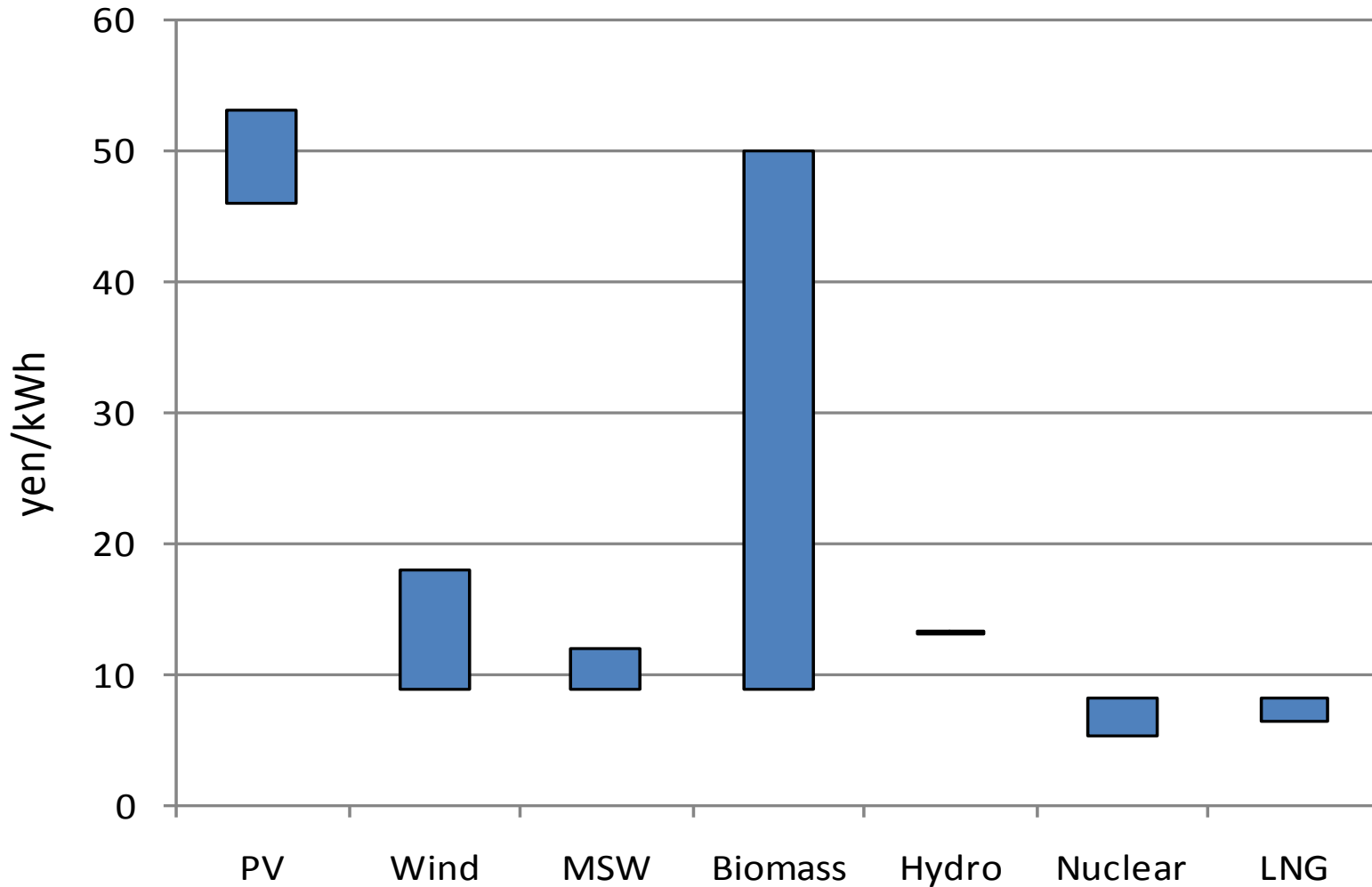
- 1. Current status and future targets of RE in Japan**
- 2. Various Renewable Energy Support Scheme**
- 3. RPS**
- 4. Summary and remaining issues**

Acknowledgement: I appreciate cooperation from Dr.Tagashira and Mr.Nishio, CRIEPI.

Share of Renewable Energy Generation in Total Generation

Country	% of RES in total generation
Japan	10.0
US	9.3
Germany	11.2
UK	4.6
Italy	16.5
Spain	17.2

Costs of RES-E and electricity from conventional power plants (1 USD=100 yen)

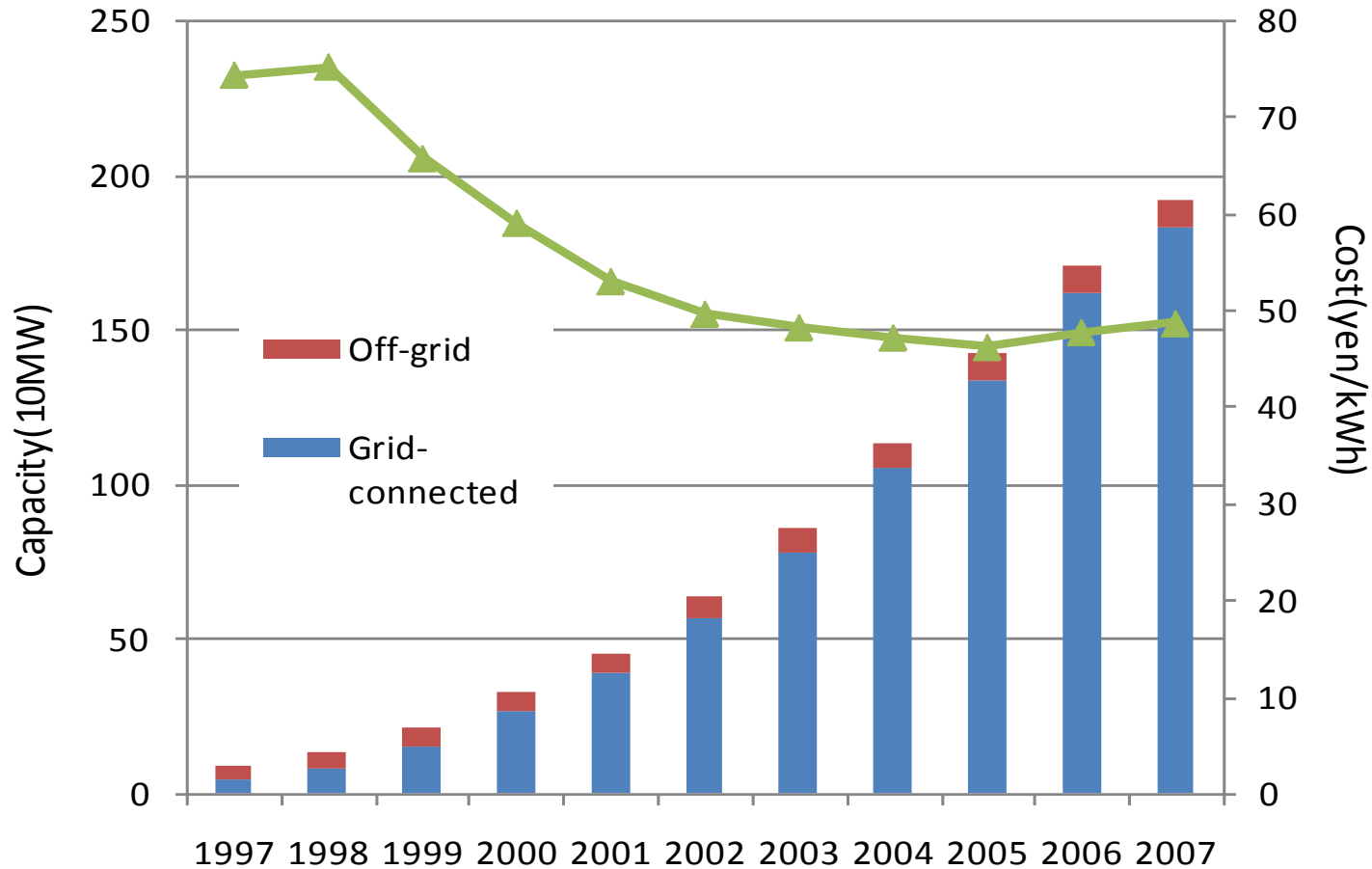


- ◆ Wind power: 1680 MW in December 2007
 - Wind power is favorable in Hokkaido, Tohoku and Kyushu.

- ◆ PV: 1920 MW in March 2008
 - Outcome of various support mechanism

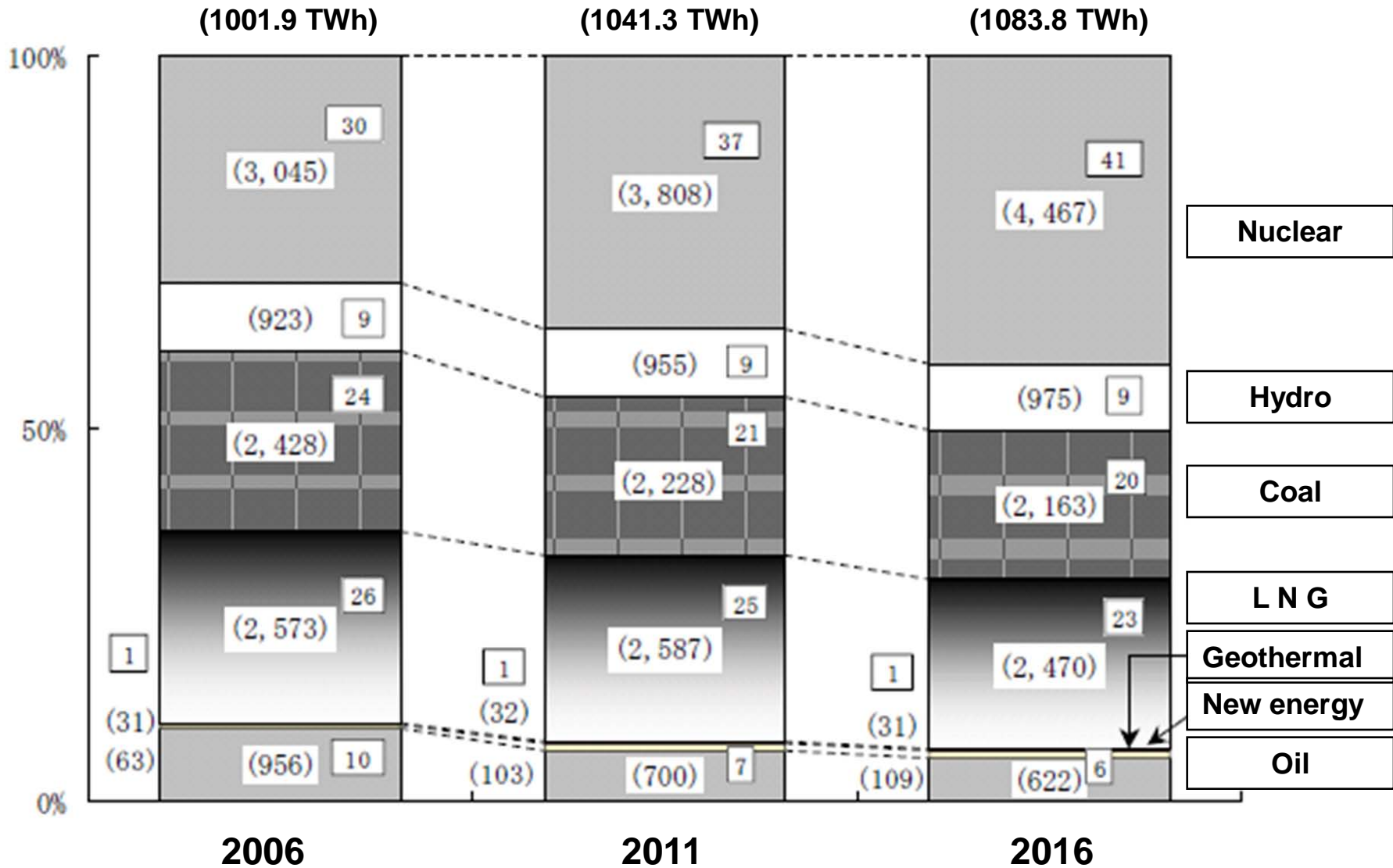


Change in production costs and accumulated capacity of PV



Sources: NEF and IEA-PVPS

Generating output by fuel type in Japan: 10 year supply plan



Electricity production by sources towards 2030

	2005	2010	2020	2030
Total Electricity(TWh)	984.5	1013.1	1005.0	890.8
LNG	233.9	251.2	201.3	146.3
Coal	252.9	221.8	200.6	148.1
Oil	107.2	65.0	56.0	38.9
Nuclear	304.8	366.4	437.4	437.4
Hydro	81.3	95.4	84.6	85.6
Geothermal	3.2	3.2	3.3	3.3
Others(PV,Wind,MSW,etc)	5.6	10.2	21.7	31.2
Unknown	-4.4	0.0	0.0	0.0

Only electricity fed into the grid

Targets of RES in Governmental Energy Outlook in 2008

Fiscal Year	2005		2010		2020	2030	remarks
	10 ⁴ kl of crude oil equivalent	MW	10 ⁴ kl of crude oil equivalent	MW	10 ⁴ kl of crude oil equivalent	10 ⁴ kl of crude oil equivalent	
PV	35	1422	118	4820	350	1300	2007:1919(MW)
Wind power	44	1078	134	3000	200	269	2007:1675(MW)
Biomass (+ Waste) power	252	2100	586	4500	393	494	
Biomass heat	142		308		330	423	
Others	687		764		763	716	
Total	1160		1910		2036	3202	

Others include solar thermal, black liquel, waste heat, etc.

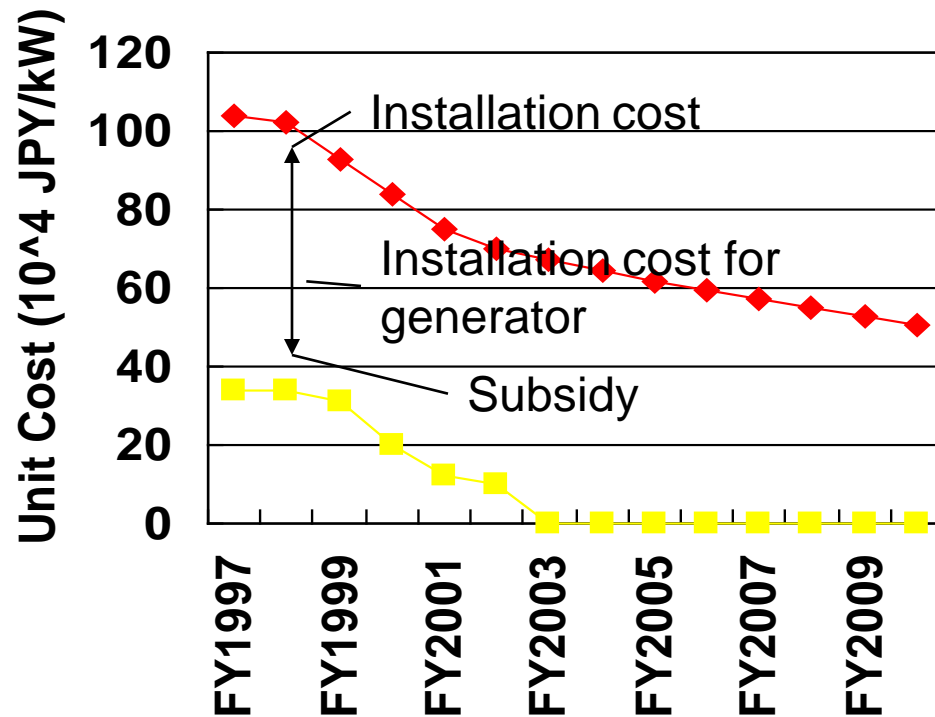
Overview of Utility Based Financial Mechanisms that Support Renewable Energy in Japan

- **Utility based voluntary buy-back rate scheme from 1992: surplus electricity generated at end-users.**
- **standard offer contracts: historically for large wind power generators**
- **RPS (Renewables Portfolio Standard)**
- **Green power fund from 2000**
- **Green certificates from 2001; Japan Natural Energy Company Limited.**

- **Complimentary with the governmental support schemes**
 - **Subsidy for installation**
 - **RPS**
 - **Investment tax credits**
 - **Low rate loan**



Installation Cost Reduction and Subsidy for PV



- ◆ Revival of subsidy from FY2008 (Jan. 2009)
- ◆ 70 thousand JPY/kW by the METI
- ◆ Additional subsidy by local government: e.g. Tokyo

Support Policy (1)

- **New energy is promoted by the government; by definition. Not competitive with conventional energy technologies.**
- **Support for R&D : the “Sunshine Project” of New Energy Development Organization (NEDO) from 1985.**
- **Subsidy, Low rate loan, tax credits for installation of RE**
 - **PV: New Energy Fund(NEF)’s subsidy program for residential PV until FY 2005.**
 - **Some local governments provide subsidy to PV and EE appliance such as HP water heater.**

Support Policy (2)

- **Voluntary buy back rate for green power**
 - **By technology: for PV the same rate with the purchased power from the local utility**
 - **optional TOU rate: peak , off-peak period**
 - **PV: 23 JPY/kWh for standard flat rate, 31 JPY/kWh for TOD rate**
- **RPS (Renewables Portfolio Standard)**
- **Voluntary green power programs**
 - **Utility base green fund**
 - **Green Power Fund: local NPO, wind in Hokkaido, PV in Yokohama**

Proposed new regulatory buy-back tariffs for PV

- **Transform the current voluntary buy-back rate scheme to regulatory buy-back tariffs regulated by the Ministry of Economy, Trade and Industry (METI) under discussion.**
- **METI will submit a new law called by “Law on promoting non-fossil energy sources and efficient use of fossil energy sources by energy suppliers” to the Diet.**
- **Not feed-in tariff. Only surplus electricity is qualified.**
- **with favorable rate, say, 0.5\$/kWh.**
- **Additional cost for customers : Less than US\$1 per month estimated**
- **Decreasing rate level in years**

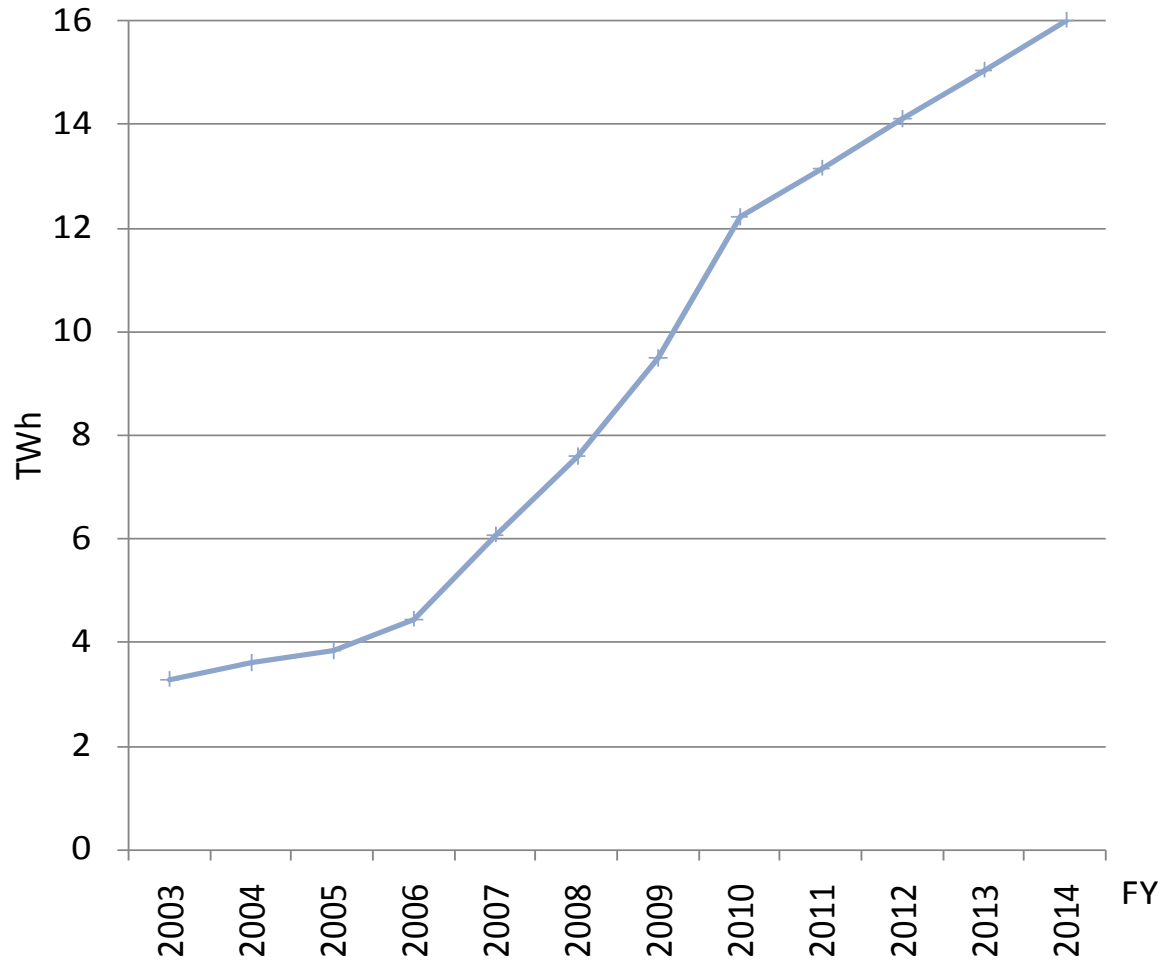
Renewables portfolio standard in Japan

- Electricity retailers are required to source a certain percentage of their total electricity from eligible RES every fiscal year.
- Trade of RES-E certificates
- Banking and borrowing. Maximum certificate price = 11 JPY/kWh.
- It has been implemented since April 2003
- Liable electricity retailers
 - Thirty retailers must meet targets in 2008
 - Ten utilities incur the most of total amount of obligation.

Eligible sources of the RPS

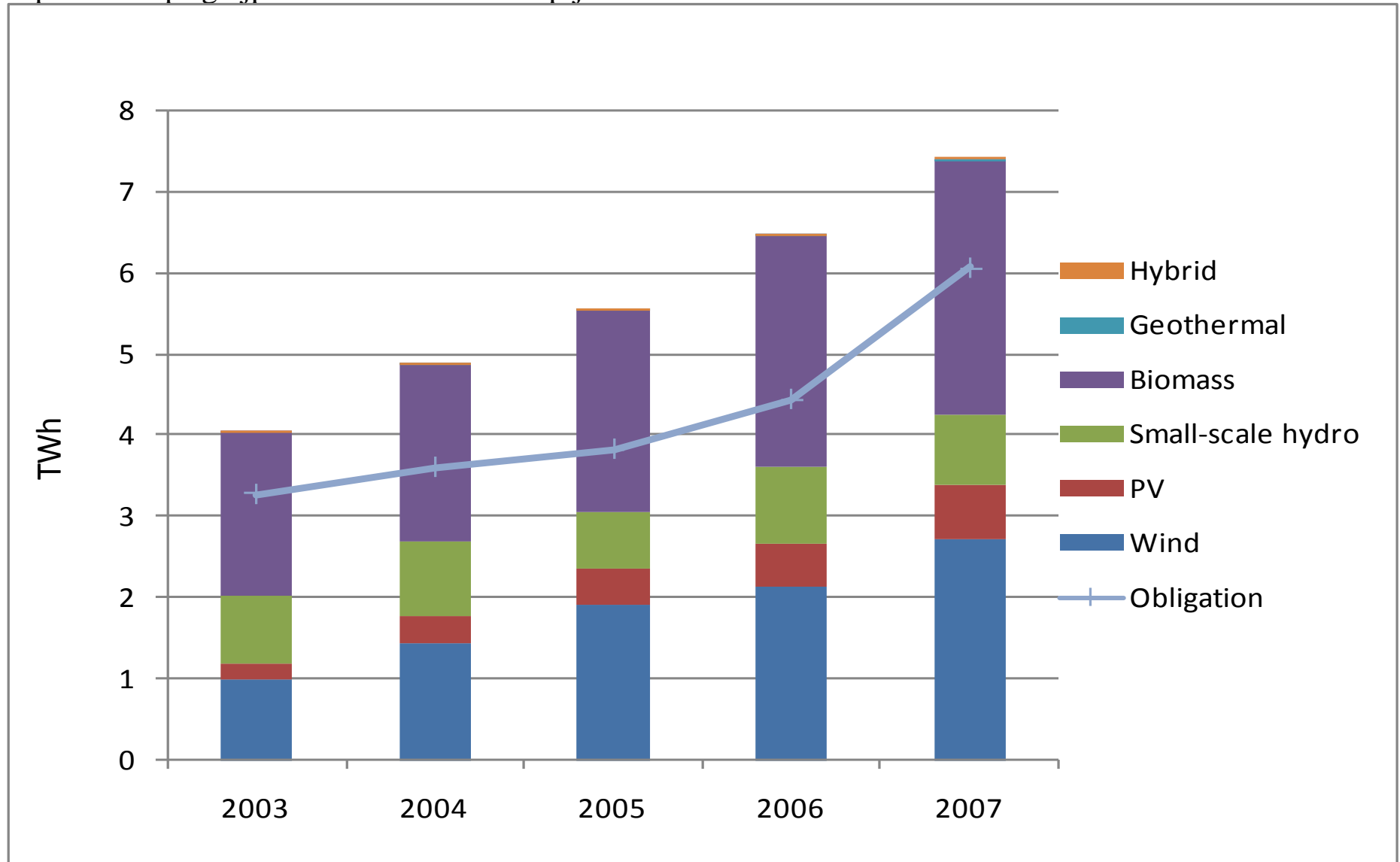
- Eligible sources:
 - PV
 - wind
 - biomass including municipal solid waste combustion (estimated electricity only from biomass components)
 - small-scale hydro(<1MW)
 - geothermal(only advanced technologies)
- All existing facilities are included.
- Self consumption is ineligible.
- Issuing unit of credits= 1MWh

Changes in obligation levels of RPS



Achievements to date

<http://www.rps.go.jp/RPS/new-contents/top/joholink-kiroku.html>



Issues of RES-E in Japan -PV-

- Japan had been a leader in the world in terms of PV manufacturing and installation.
- Who bears following costs related to the installation of PV facilities?
 - Balancing cost caused by intermittent generation
 - Cost of reinforcing the additional capacity of the grid
- Continuation of voluntary net metering system by utilities
 - Utilities have a right to stop purchasing electricity from PV at any time.
- So regulatory buy-back rate systems?

Summary

- **Feed in tariff should be evaluated from the cost-effectiveness including incentives for large cost reduction.**
- **Japan has adapted policy mix for RE historically.**
- **Wind power and biomass energy have technical constraints to supply energy. Not good natural conditions. Environmental regulation of land use, e.g. National Parks**
- **Coordination among manufactures, housing makers, builders, utilities , financial institutes and government is key.**

Next Step

- **Long-run priority is on PV in Japan.**
- **Council on Economic and Fiscal Policy, March 2009: 1 trillion JPY market and 110 thousand of employment in solar industry in 2020**
- **In addition to utility-based support programs, Mega Solar power plants are planned. 140 MW towards 2020**
- **Japanese intelligent grid technology:**
- **TIPS: Triple I (Intelligent, Interactive and Integrated) Power Systems support large penetration of intermittent RE generation smoothly.**



TIPS core technologies

in Jap

Over 50% penetration of renewable energy(PV) in distribution system.



Operation/control under demand/supply integration

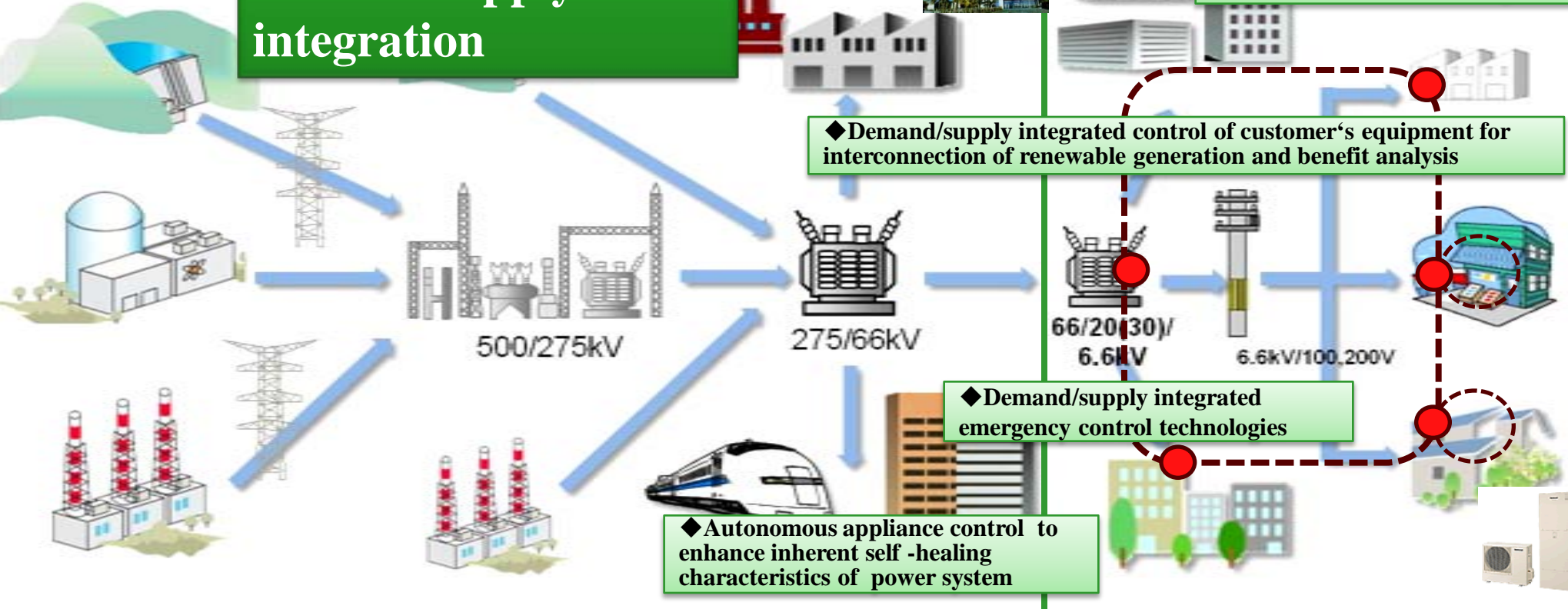


◆ Efficient practical application of DG and ADAPS technologies

◆ Demand/supply integrated control of customer's equipment for interconnection of renewable generation and benefit analysis

◆ Demand/supply integrated emergency control technologies

◆ Autonomous appliance control to enhance inherent self-healing characteristics of power system



➤ Development of operation and control technologies to realize demand/supply integration in TIPS. Evaluation of its benefit from customer's viewpoint.

References

- **Nishio and H.Asano(2006), Supply Amount and Marginal Price of Renewable Electricity under the Renewables Portfolio Standard in Japan, Energy Policy, 34, pp.2373-2387**
- **H.Asano, Supply potential of electricity from renewable energy sources through 2014 under the Renewables Portfolio Standard in Japan, RPS Subcommittee, the Advisory Committee for Natural Resources and Energy, Dec.2006(in Japanese)**

Mahalo!
Thank you!



Hiroshi Asano

<http://criepi.denken.or.jp/>

<http://www.hes.t.u-tokyo.ac.jp/>

