# Net billing schemes, Experience from Japan - Evolution to Net-export FIT -



"Assigning a fair price to photovoltaic electricity", PVPS workshop, Frunkfult September 4, 2012

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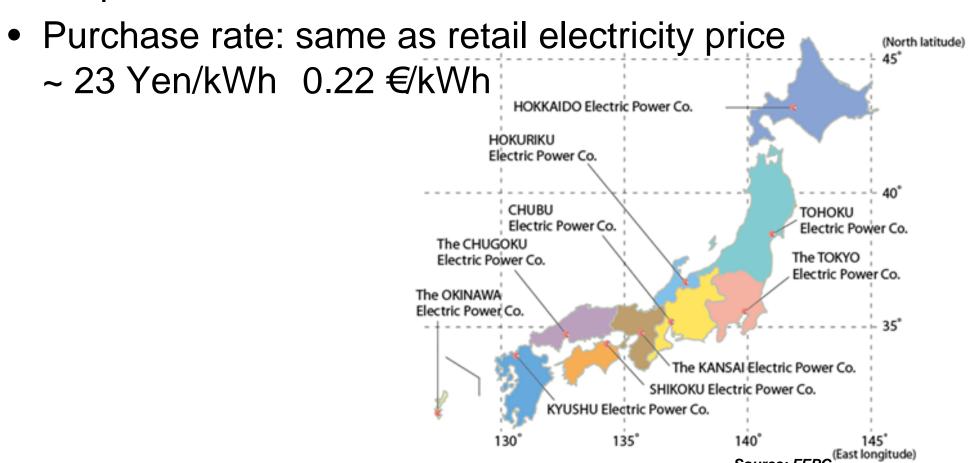
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- Voluntary program by utilities (1992 Oct 2009)
- FIT for surplus PV power (Nov 2009 June 2012)
- New FIT program from July 2012
- Summary



### Original scheme: Net billing (1992 – Oct. 2009)

- 10 Electric utilities started
   voluntary surplus PV power purchase program in 1992
- Purpose: Dissemination of renewables



### Key measures started in 90s

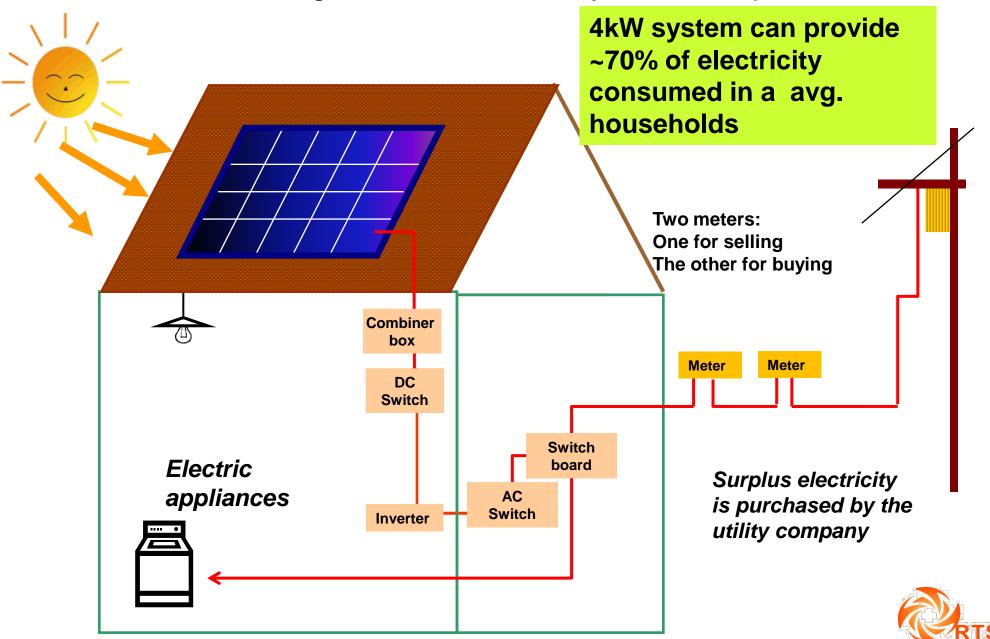
1992 : Net billing program
 (surplus PV power purchase program, incentive for kWh)

1993: Guideline of PV grid connection

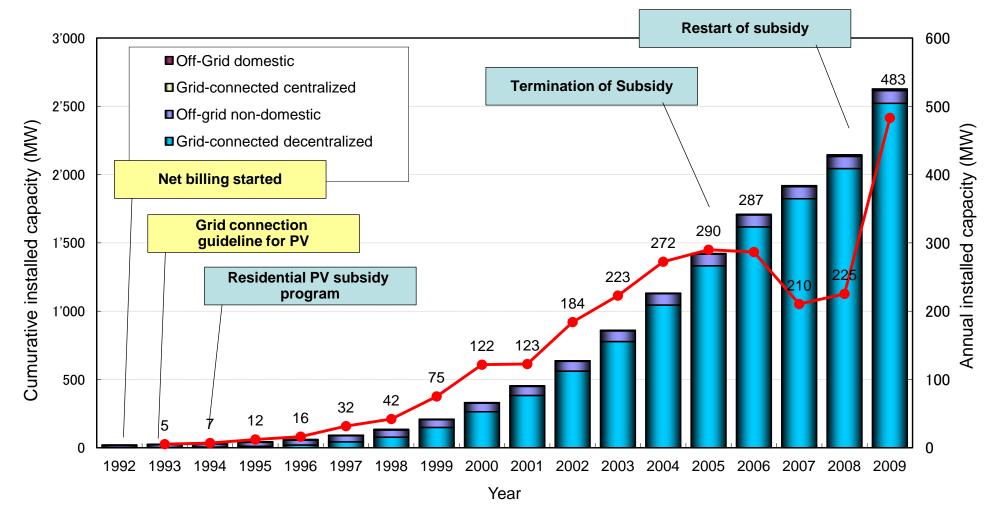
 1994 Subsidy for residential program (incentive for kW)



### Net billing: Residential PV system in Japan



# Net billing + subsidy program contributed the growth of the PV market

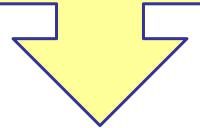




### Issues raised

### Voluntary program by electric utilities

- Burden on electric utilities increased with the market growth
- Possibility of termination



Should we leave the promotion of renewables to private companies? (all the electric utilities are IOU)



### FIT for surplus PV Power (Net-export FIT)

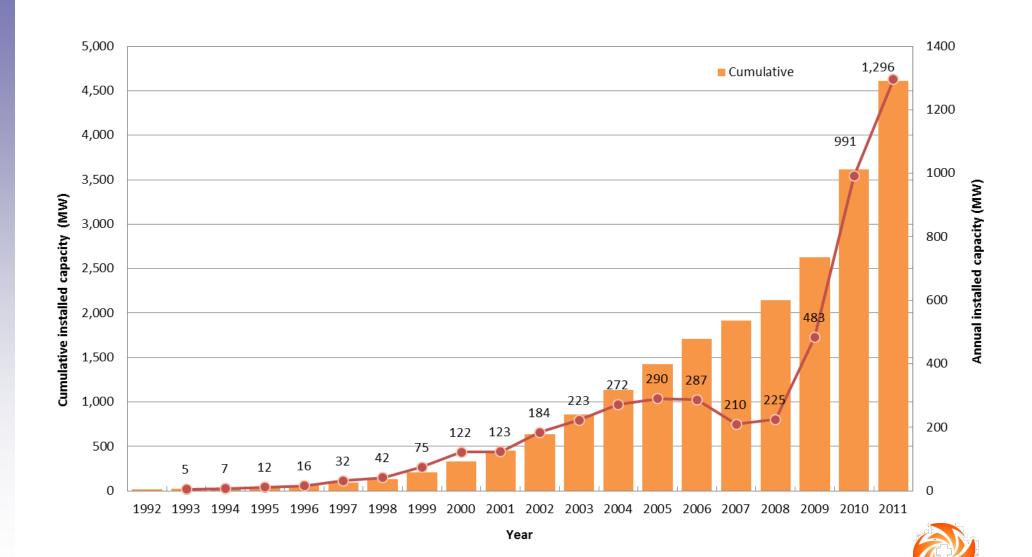
- Law for Utilization of PV power was passed in July 1st 2009
- Surplus PV power purchase became compulsory for utilities
- Funding from surcharge of rate payers
- Higher purchase price was introduced:
- aiming at decerease the pay back period from > 20 years to 10 years in a several years



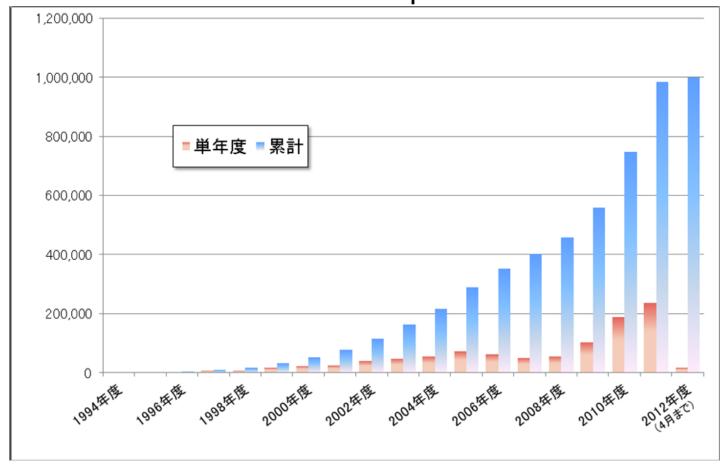
### **Net billing and FIT for surplus PV power**

	Net billing	FIT for surplus PV power
Enforcement	- 1994 to Oct. 31, 2009	- Nov. 1, 2009 to June 30 2012
Legislation	<ul><li>No</li><li>Voluntary scheme by utilities</li></ul>	<ul><li>Yes</li><li>Obligation to utilities</li></ul>
Capacity		500 kW
Purchase Rate	<ul><li>Same as the electricity rate</li><li>ex. Residential : 24 Yen/kWh</li></ul>	For < 10 kW: 2009 : 48 Yen/kWh, 24 Yen/kWh 2010 : 48 Yen/kWh, 24 Yen/kWh 2011 : 42 Yen/kWh, 40 Yen/kWh
Purchase term	- Not defined	- 10 years
Financial Resources	- Utilities	- All the electric consumers

### Achievement: Newly installed capacity 2011 reached 1.3GW



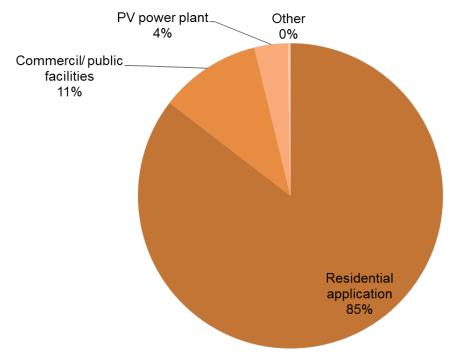
# Achievement: Cumulative number of residential PV system reached 1 million in April 2012





### Issues raised

- Eligible technology: only for PV power
- The capacity of PV limited: upto 500 kW
- Needs for incentives for non-residential segment



Market segment of newly installed PV system in 2011



### Discussion for new FiT program started

- Nov. 2009:
  - A project team on FIT formulated
- March to April 2010:
  - Public opinions collected (318) and regional forums (21 places)
- July to Oct.2010:
  - Framework announced and program design started
- Nov to Dec 2011:
  - Draft design announced and public opinions (8840) collected
- Feb. 2011:
  - Compilation of FIT Scheam
- March 2011:
  - Cabinet decision of the bill
- August 28 2011:
  - "Renewable Energy Law" passed



### **FIT** for PV power

Category			Capacity: 10 kW or larger (non-residential)	Capacity: below 10 kW (residential)
Electricity to be purchased			100 % of generated electricity	Surplus electricity
Feed-in tariffs per kWh			40 Yen/kWh +Tax *1 (0.39 €/kWh)	42 Yen/kWh *² (0.41 €kWh) (Include Tax)
Purchase period		20 years	10 years	
Assumption for calculation	Costs	Construction cost	325,000 Yen/kW (3,199 €/kW)	466,000 Yen/kW (4,587 €/kW)
		Annual operation/ maintenance cost	10,000 Yen/kW (98.4 €/kW)	4,700 Yen/kW (46.2 €/kW)
	Internal Rate of Return (IRR)		6 % before tax	3.2 % before tax

More details of the new FIT will be presented on Friday: 6EO.1.3

1 JPY = 0.009843 Euro

<sup>\*2:</sup> As general consumers are not obliged to pay consumption tax for the installation of PV, feed-in tariffs are the same both for tax-included and tax-excluded tariffs. For residential PV systems, actual feed-in tariff is equivalent to 48 Yen/kWh (60 cents/kWh) if the subsidy of 35,000 Yen/kW (\$ 437 /kW) is taken into account.

Source: METI's materials for the "Purchase Price Calculation Committee", arranged by RTS Corporation



Source: RTS Corporation, PV Activities in Japan and Global Highlights, Vol.18, No. 5, May 2012

<sup>\*1:</sup> Consumption tax is excluded with the assumption of possible changes in the consumption tax rate in the future.

### The reason for net export FIT for < 10kW system

- Effective for energy conservation for house holds (owners increase selling electricity by reducing power consumption)
- Burden of surcharge will increase
- Assumed FIT for gross FIT (100% selling)
  - → 34 Yen/kWh (Significantly lower than the previous FIT) Disincentive for individuals
- Net export FIT
  - → 42 Yen/kWh based on self consumption 40%/ selling 60% (same as the previous FIT)



## Key Drivers : Incentives (FY 2011 and FY 2012) Residential PV system (<10kW)

Term	April 2011- March 2012		April 2012 - June 2012	July 2012 - March 2013
Subsidy Budget	34.9 Bil. Yen (318 mill. €)	· ·		
Subsidy	48,000 Yen/k\ (437 €/kW)	<b>/\</b> *1	35,000 Yen/ 30,000 Yei (318€/kW / 2	n/kW* <sup>3</sup>
FIT for surplus PV power	42 Yen/kWh (0.38 €/kWh)			
New FIT program				42 Yen/kWh (0.38 €/kWh)

#### 1 JPY = 0.0091 Euro

\*1: System cost: under 600,000 Yen/kW

\*2: System cost: upto 475,000 Yen/kW

\*3: System cost: < 475,000 ~ 550,000 Yen/kW

In addition to national subsidy, >800 local governments offer subsidy for residential PV systems



### Issues under discussion

- Surplus PV power after 10 years purchase period
  - Compensation of the surplus PV power?
    - Net billing? (compensation of the power at retail price or generation cost of conventional power?
- Phase out of subsidy program ?
  - Impact on the market ? ?

- Further cost reduction
  - 2011 avg. residential PV system price:~4.7€/W



### Issues under discussion

- Generous FIT may increase surplus PV power injected in to the grid ???
  - Simple solutions:
    - PV with heat pumps,
    - PV with home storage batteries
    - PV with EV

- Output control for specific holidays??
- Community scale levelization





## Summary

- Net billing plus subsidy program contributed in creation of residential PV market
- FIT will change the market segment and players
  - growth of large-scale, commercial market
  - continuous growth of residential market
- Issues remain
  - Incentives after 10 year purchase period
  - Impact on the grid

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