

Photovoltaics in Japan - towards a massive market

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- Promotion Policies
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History of National Projects for RE

'74

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'89

'93

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**New Energy Technology R&D
("Sunshine Project")**

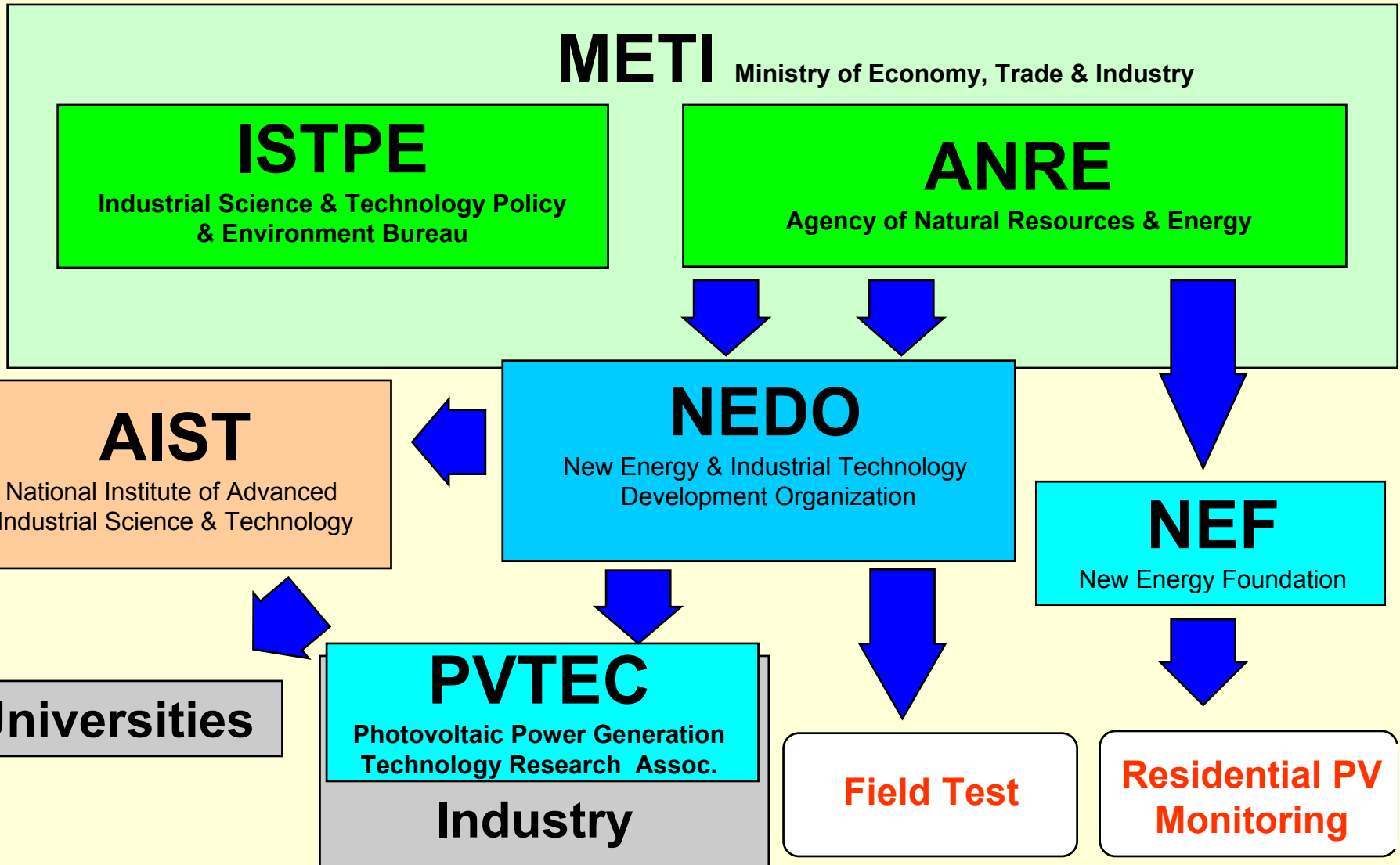
**Energy Conservation
Technology R&D
("Moonlight Project")**

**Environmental
Technology
Development**

**New Sunshine
Program**

- Energy Technology
- Environmental
Technology

Organizations in National PV Projects (2001 -)



R&D on PV Technology (2001-5, NEDO)

1. R&D on Photovoltaic Cells

- Advanced PV cells
 - Thin-film c-Si / CIS / high eff. compounds
- Innovative technologies for next generation PV
 - SiGe / FeSi₂ / TiO₂-dye cell / Spherical Si cell / etc.

2. R&D on Basic Technologies for PV

- Evaluation of PV cells
- Evaluation of PV systems
- PV system recycling & reusing
- Electro-magnetic immunity for PV systems

3. Acceleration R&D for PV Introduction (2000 - 4)

- a-Si cells on film / Mass production of Si materials

4. Demonstration of Concentrated GCS (2002 - 6)

National Goals/Policies for PV Introdunct.

- Goals for cumulative PV installation by 2010
 - 4,600MW : Outline of RE introduction 1994.12
 - 5,000MW : Long-term outlook for Energy 1998. 6
 - 4,820MW : Advisory Committee for Natural Resources and Energy 2001. 7

- Policies for PV promotion
 - Deregulation in grid-connection guidelines 1990 -
 - Field test program (NEDO) 1992 -
 - Monitoring program for residential PV (NEF) 1994 -

National Goals for RE introduction

Year:	1999	2010	2010/ 1999
● Photovoltaics (MW)	53 (209)	1,180 (4,82)	23
● Solar thermal applications	980	4,390	4
● Wind generation	35	1,340	38
● Waste generation	1,150	5,520	5
● Biomass generation	54	340	6
● Other thermal applications	85	1,390	16
● Other wood wastes	4,570	4,940	1.1
	6,930	19,100	3
□ Unit : Oil equivalent □ 10³ kl			

New and Renewable Energy Division, Advisory Committee for Natural Resources and Energy (June 2001)

Field Test Program (NEDO)

- PV introduction for public(92-97)/ industrial(98-) buildings
- Joint research with NEDO, 2/3 -1/2 subsidy

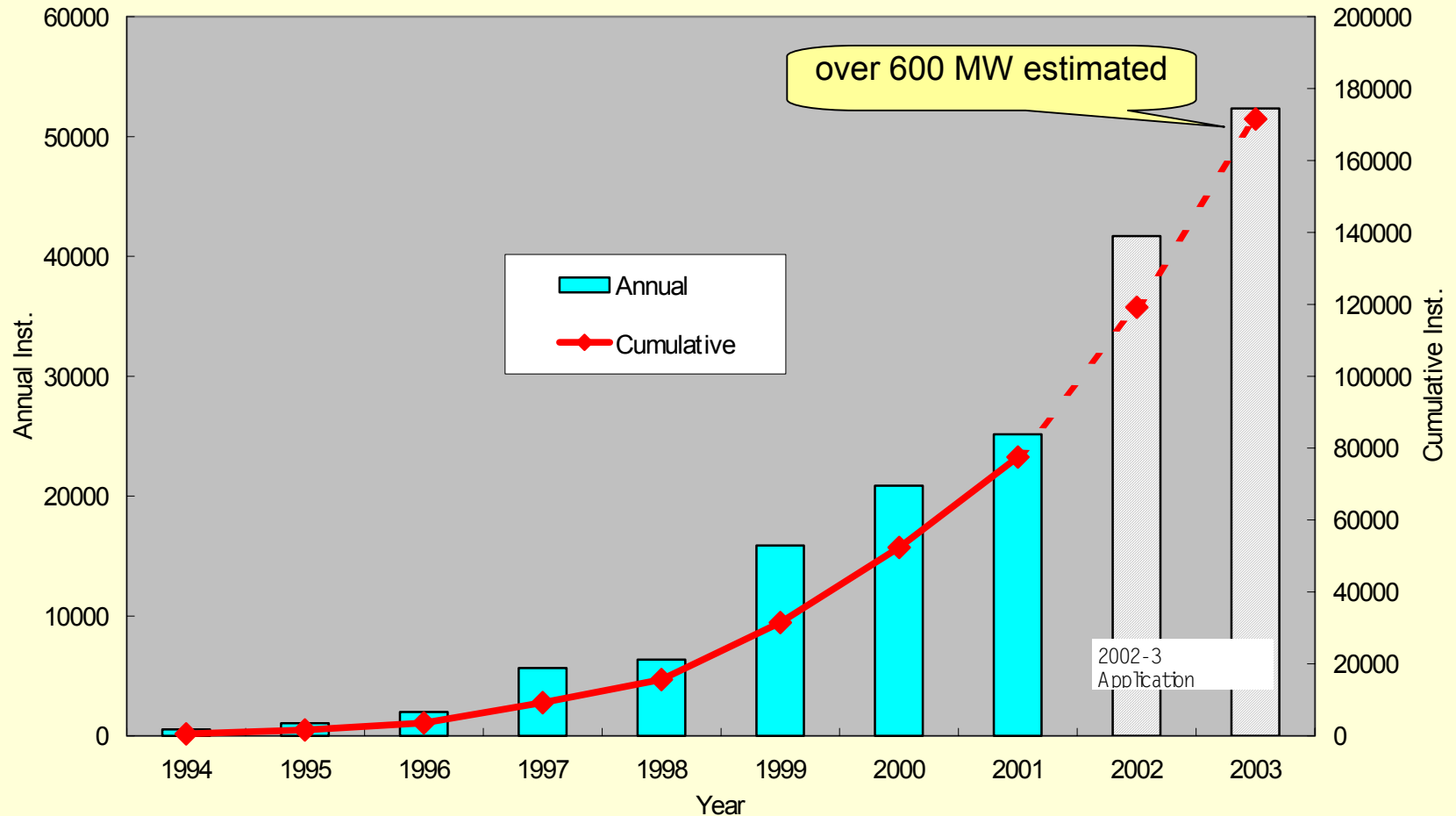
FY	□ No. Systems	Total Cap.(kW)
1992	11	235
1993	19	476
1994	11	370
1995	31	719
1996	42	1,270
1997	70	1,830
1998	73	1,940
1999	97	2,920
2000	151	3,710
Total	507	13,470

Monitoring Program for Res. PV (NEF)

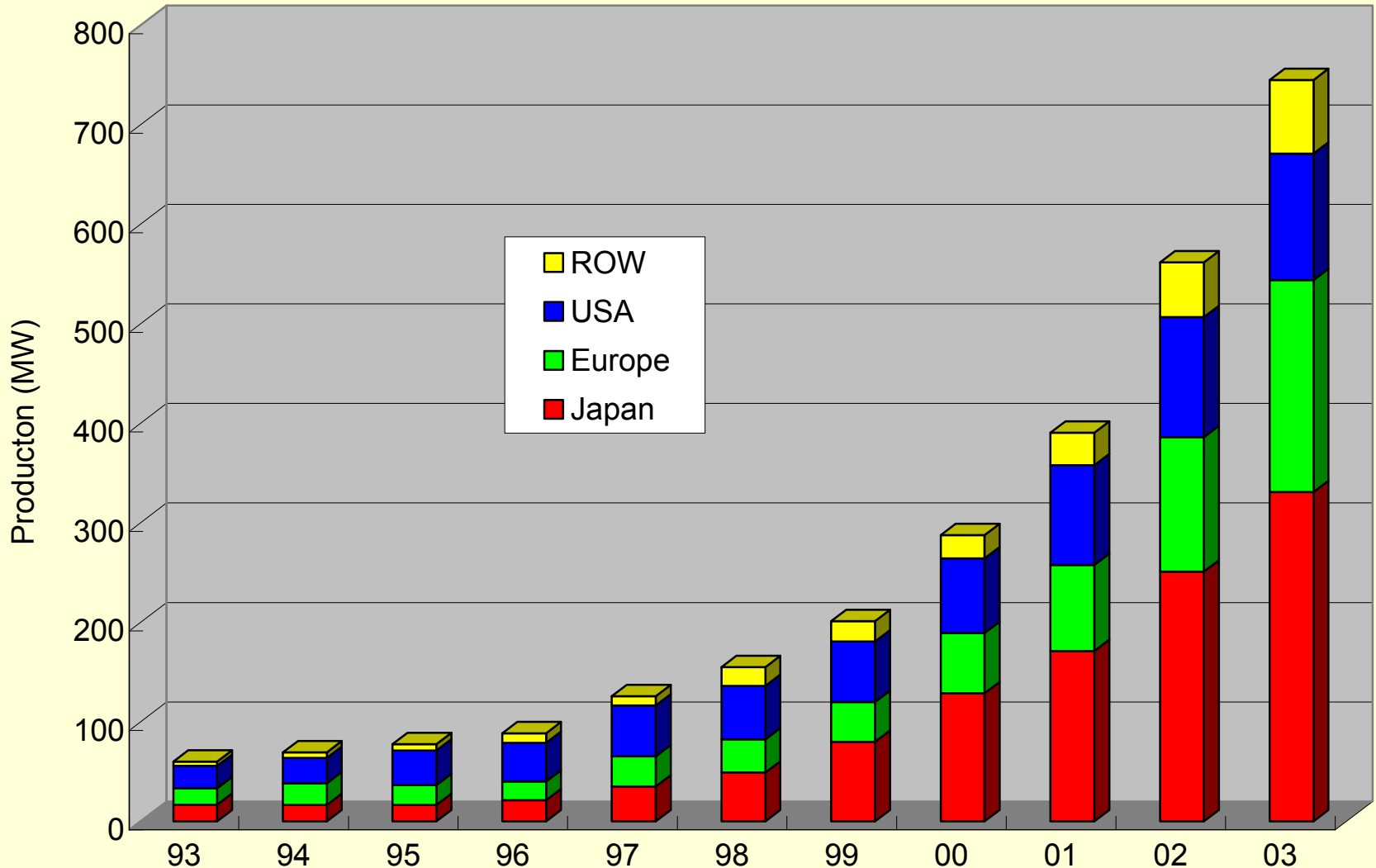
- Subsidy program for private residential PV installations
- Subsidy rate: started at 1/2, reduced gradually year by year

FY	Budget (B yen)	□ No. Systems	Total Cap. □ □ (MW)
1994	2.0	539	1.9
1995	3.3	1,065	3.9
1996	4.1	1,986	7.5
1997	11.0	5,654	19.5
1998	14.7	6,352	24.1
1999	16.0	17,277	63.8
2000	17.8	25,741	95.8
Total	68.9	58,614	216.5

Monitoring Program for Res. PV

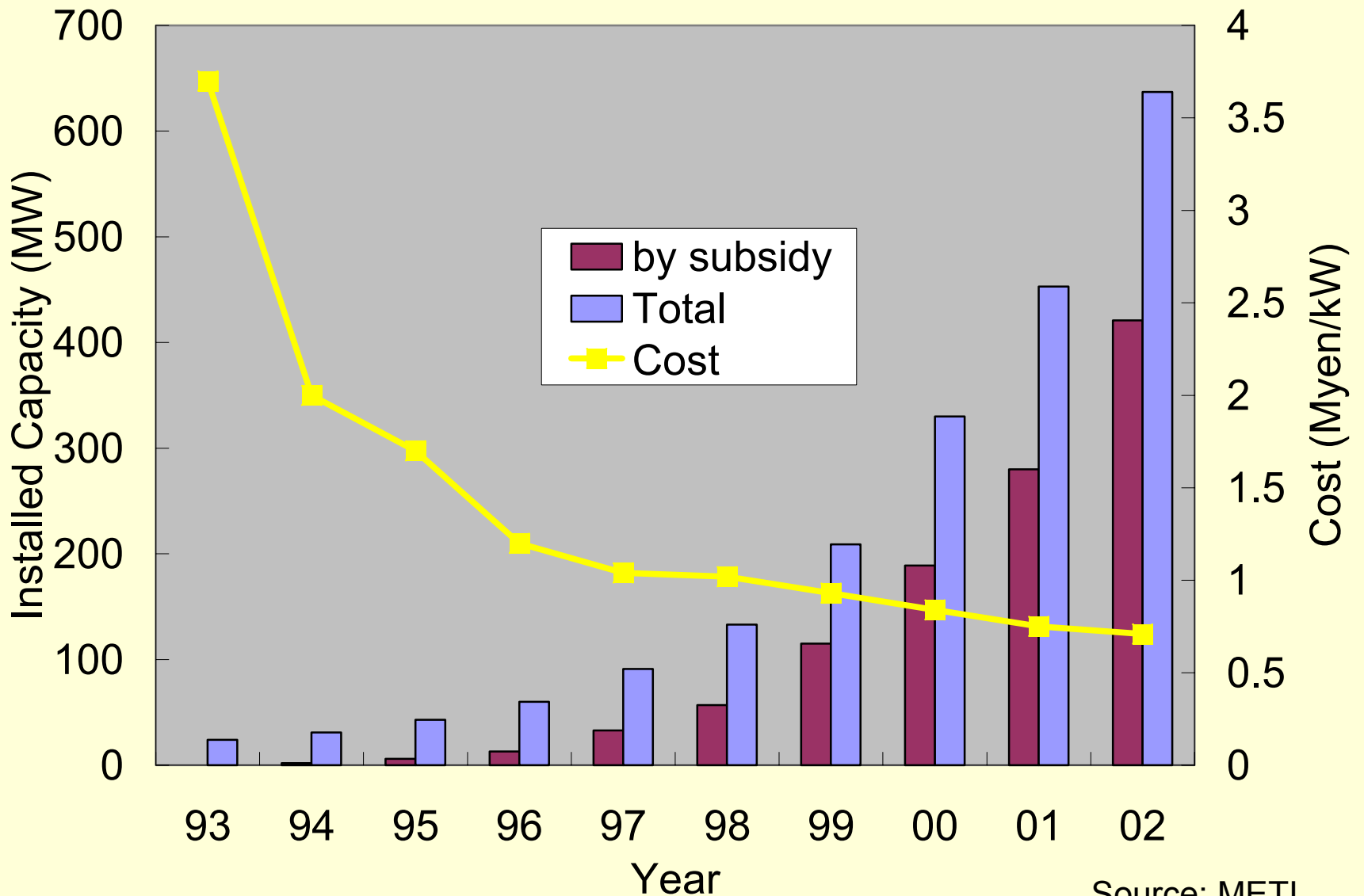


World PV Module Production



Source: PV News

Installed Capacity & Cost



Large System for Building



AIST Waterfront Center 300kW (Odaiba, Tokyo)

Industrial Application



World Trade Center 80kW (Hamamatsucho)

PV for Apartment Houses



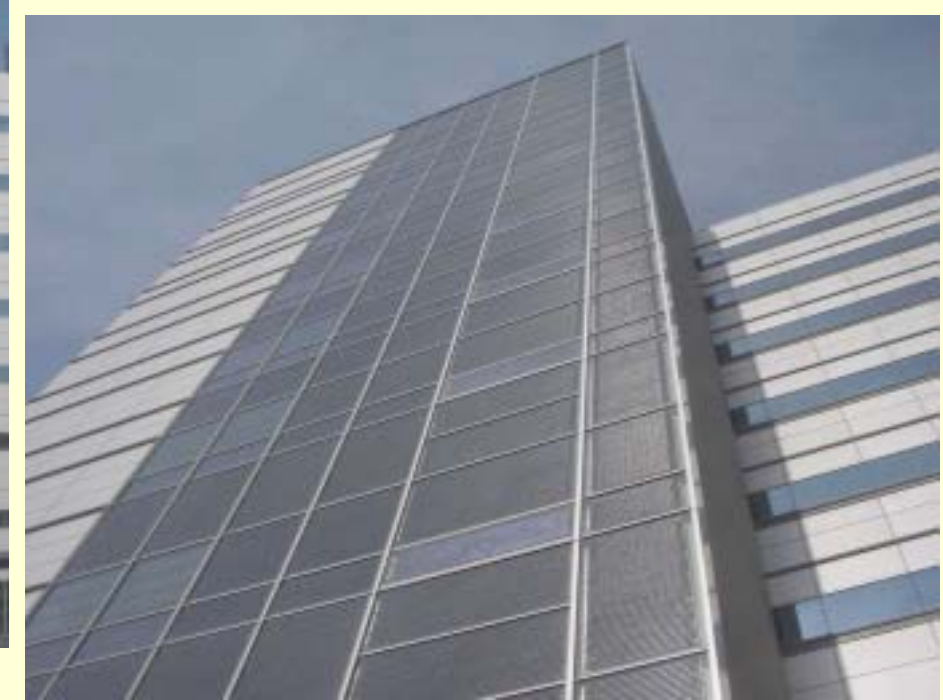
Municipal Residence 32kW (Kurobe, Toyama)

Large BIPV



AIST Tsukuba OSL 11kW (Tsukuba, Ibaraki)

Large BIPV



AIST Tsukuba New Building 40kW (Tsukuba, Ibaraki)

PV House Complex



Kasugai City, Aichi Pref.

Huge Monument

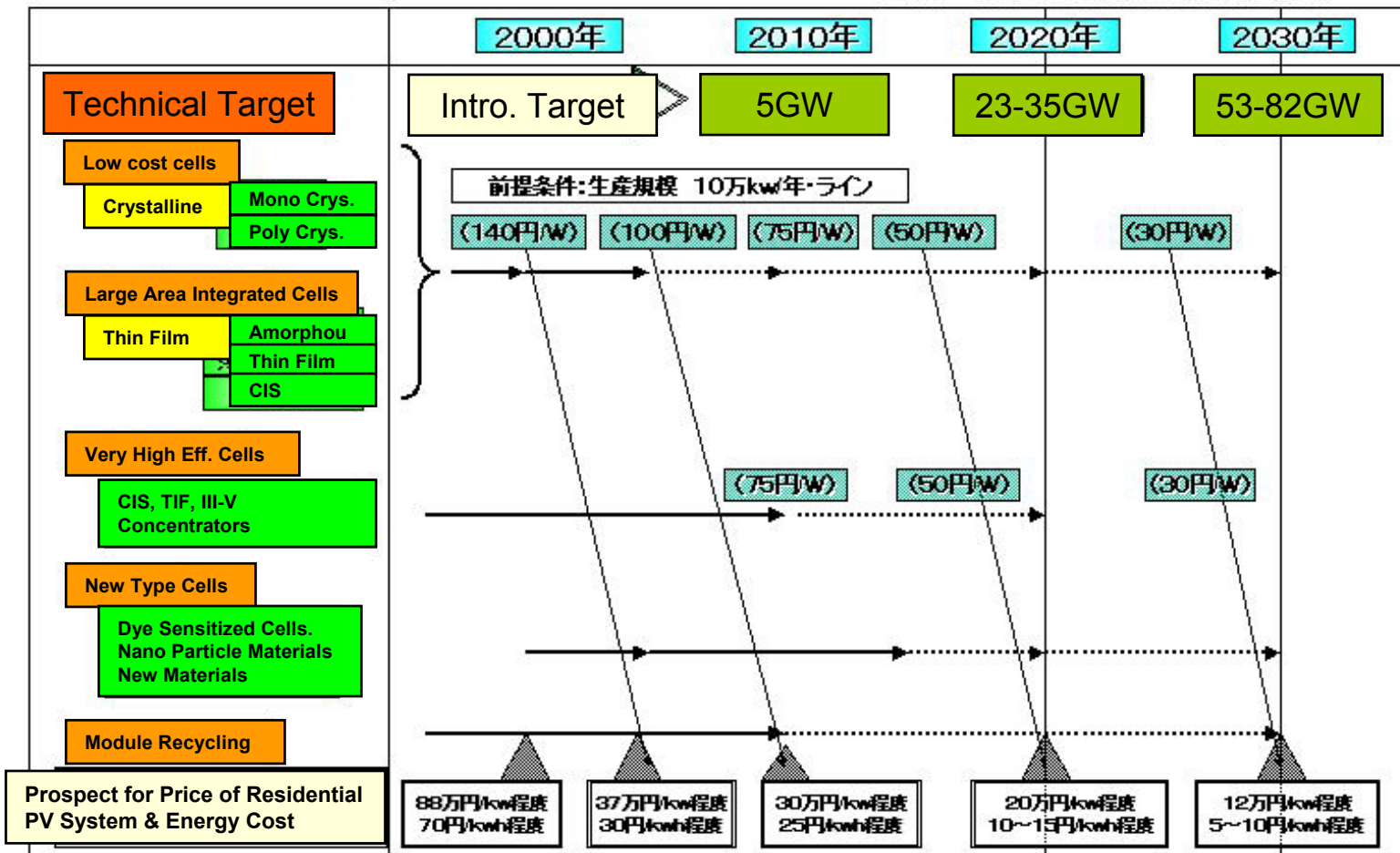


Solar Ark 630kW by Sanyo Corp. (Anpachi, Gifu)

Roadmap for PV R&D

太陽光発電技術開発ロードマップ抜粋

(出典:新エネルギー技術戦略策定検討会 平成12年3月)

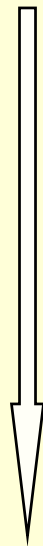
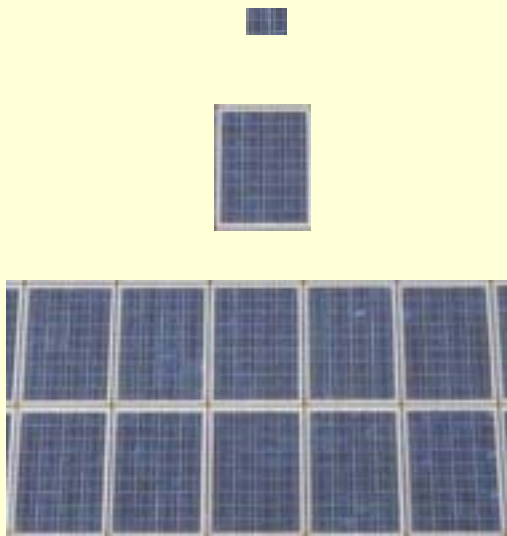


Roadmap for PV Market

		2010	2020	2030
<hr/>				
Annual install.	(MW)	1,230	4,300	10,000
- Residential		830	1,950	2,800
- Public		105	600	1,000
- Industrial		195	930	2,500
- Overseas		100	800	2,500
Cumulative install.	(MW)	4,820	28,700	82,800
Market size	(B yen)	473	1,250	2,250
Oil reduction	(10 ⁶ kl)	1.2	7.2	20.7
System cost	(yen/W)	300	250	< 200

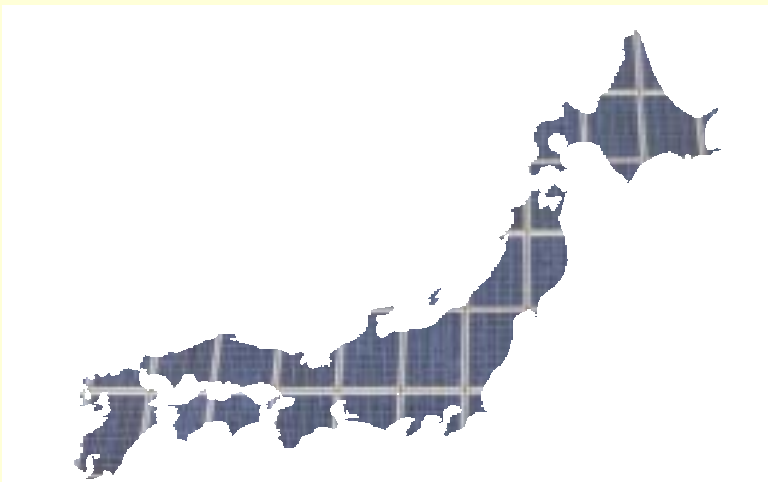
Japan Photovoltaic Energy Association (JPEA) (June 2002)

PV Watt per Capita



2002	0.5GW	4W/p
2010	5GW	40W/p
2030 ?	50GW 50TWh/y	400W/p

Total Capacity : 260GW
 Total Electricity: 1,000TWh/y



All the land area covered by PV
 □ □ □ → 40,000GW
 □□□ □□□ → 40,000TWh/y

New Promotion Policies

- Green Electricity Fund (2000)(by Utilities)
- Basic Law for Energy (2002)
 - Identify PV as an important source of energy
- Special Law to Promote RE (2002)
 - RPS(Renewables Portfolio Standard)
 - Quota + Green certificate

Outlook of Energy Demand and Supply towards 2030

- Discussion started in Advisory Committee for Natural Resources and Energy in 2003.12
- Interim report expected in 2004.6

Budget of METI for FY 2004

	FY2004	FY2003 (B yen)
• Grand Total of METI	1,908.0	1,825.5
• New & Renewable Energy	161.3	156.8
– Fuel Cells / Hydrogen	32.9	30.7
– Photovoltaics	25.0	26.0
– Support for NRE introduction	69.2	58.6
• Photovoltaics		
– R&D	6.5	7.4
– Field test program	5.2	3.8
– Promotion	5.3	10.5
– Demo. concentrated GCS	5.5	2.2
– International demo.	2.1	1.9

Works for the future

- Improvement of life-cycle system efficiency
- Wider applications
- Recycling of PV modules and components
- New energy network systems with distributed power generators