

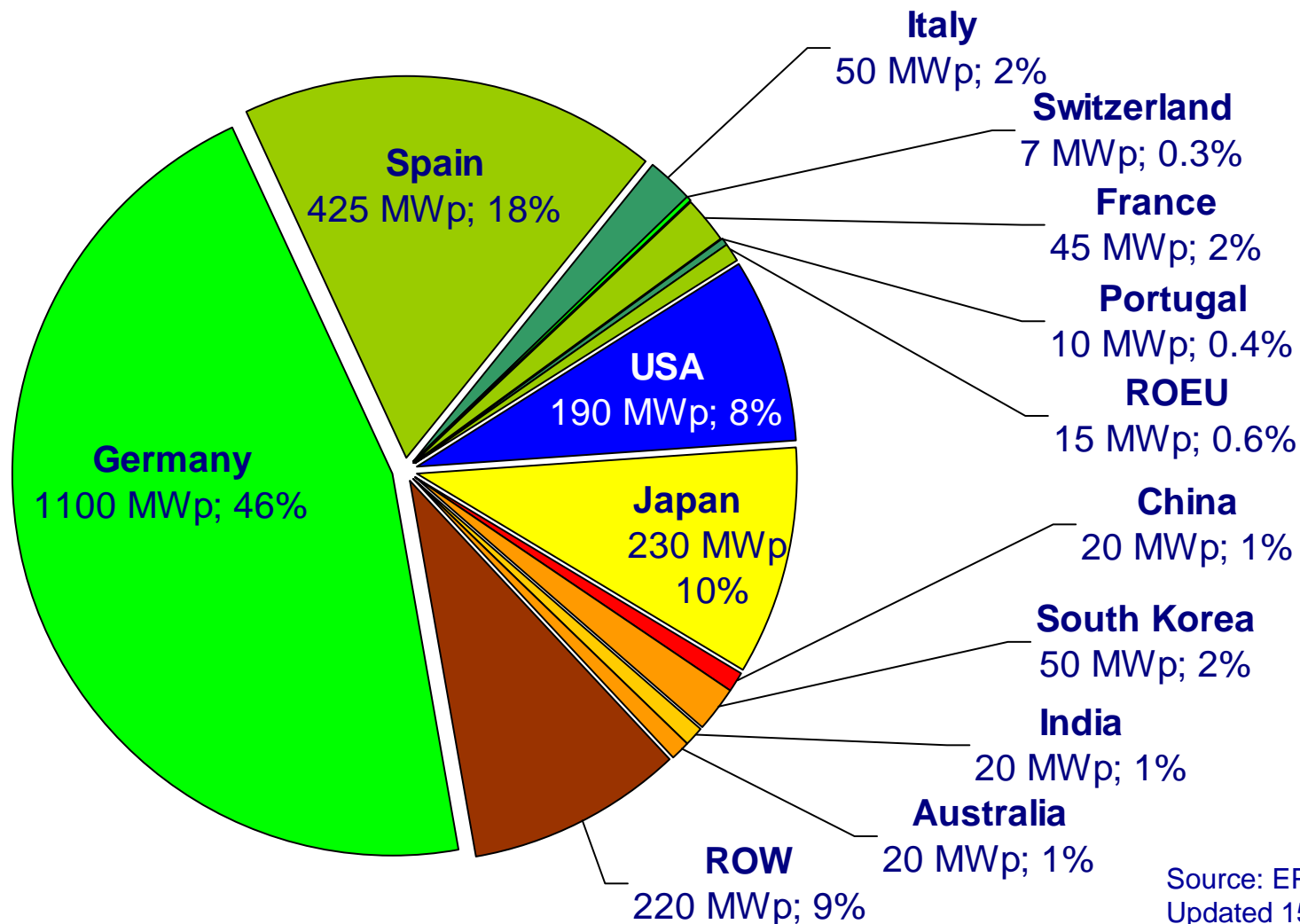
# **“Development and Perspectives of Photovoltaic in Germany”**

10th China National PV Conference & Exhibition  
September 20, 2008 – Changzhou, P. R. of China

**Frank Haugwitz**

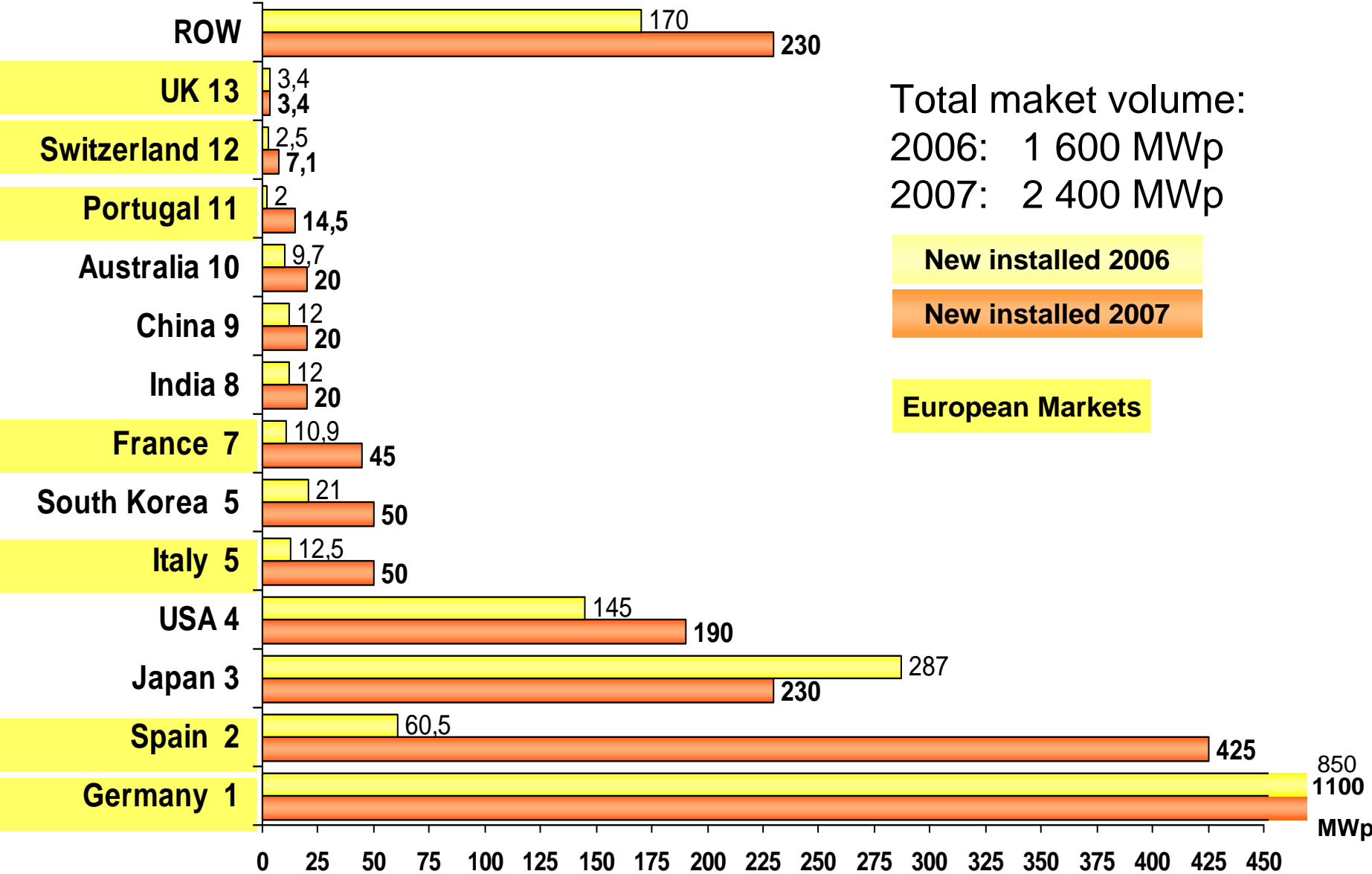
# Germany and the Global Photovoltaic Market

Newly installed PV Power in 2007: 2.4 GWp



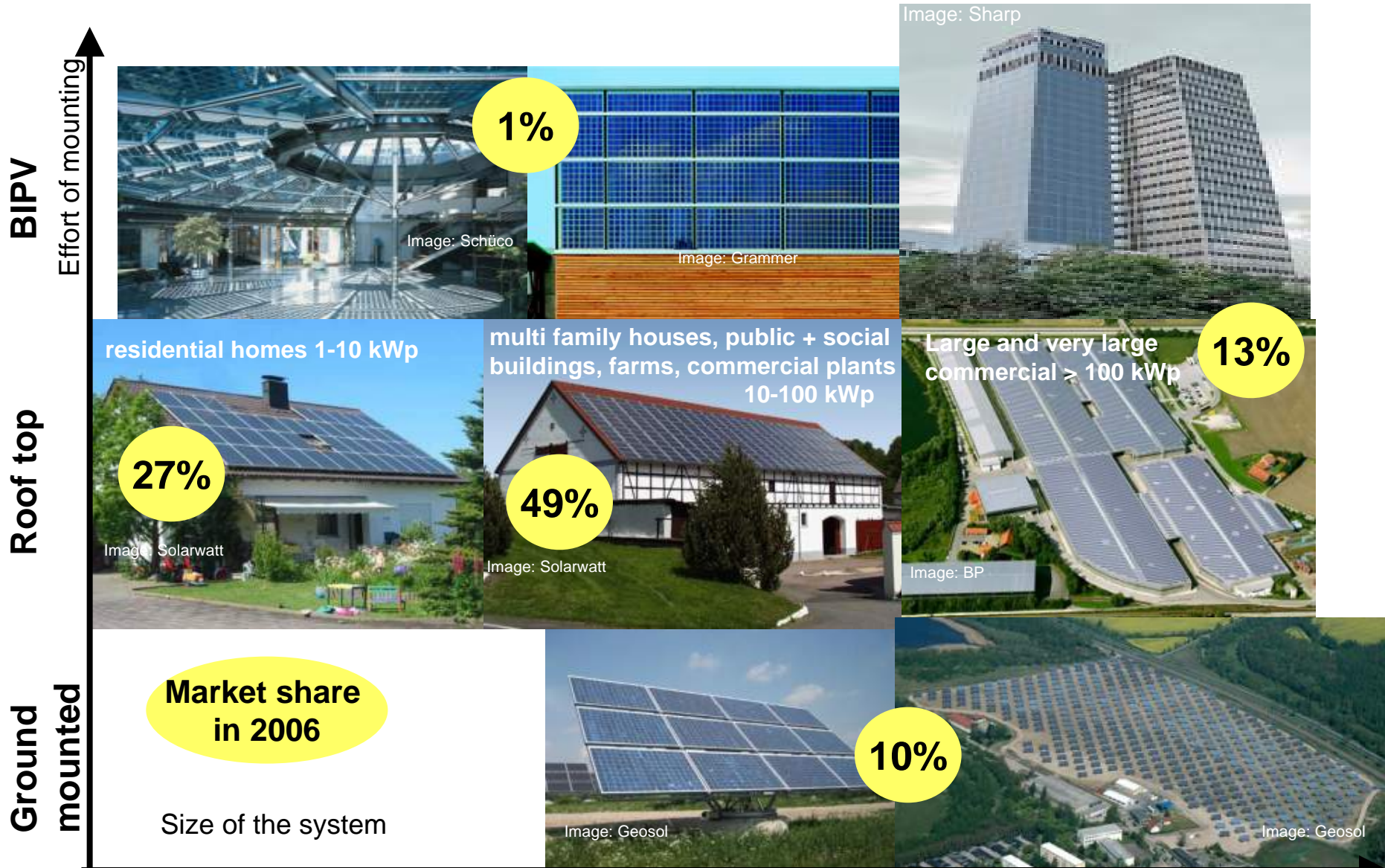
Source: EPIA, BSW, ASIF, SEIA  
Updated 15 July 2008

# TOP PV Markets 2006 and 2007

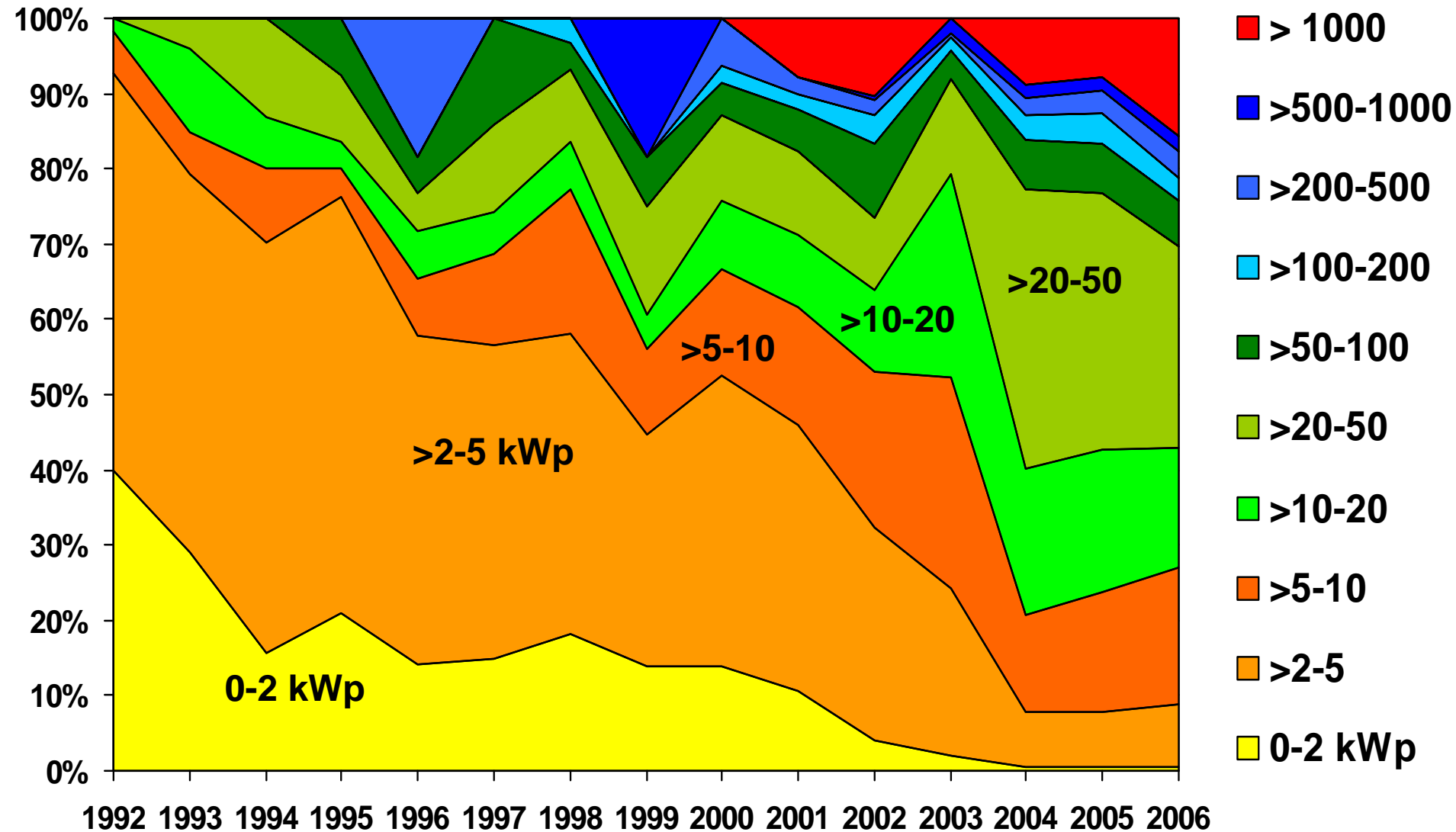


Updated 15 July 2008, Source: 2007: EPIA/BSW/national PV associations, 2006: Euroobserver, IEA-PVPS

# Market Segments On-Grid Systems



# Market Share of PV Systems According to Size



# Small, Medium & Large Rooftop Sys.



Image: SMA



Image: Frankensolar



Image: Wagner & Co



Image: Solar-Fabrik

# Ground-Mounted PV Systems



Image: Geosol



Image: Phönix



Image: Geosol



Image: Epuronl

# Development of the Market

## PV Market Data 2007

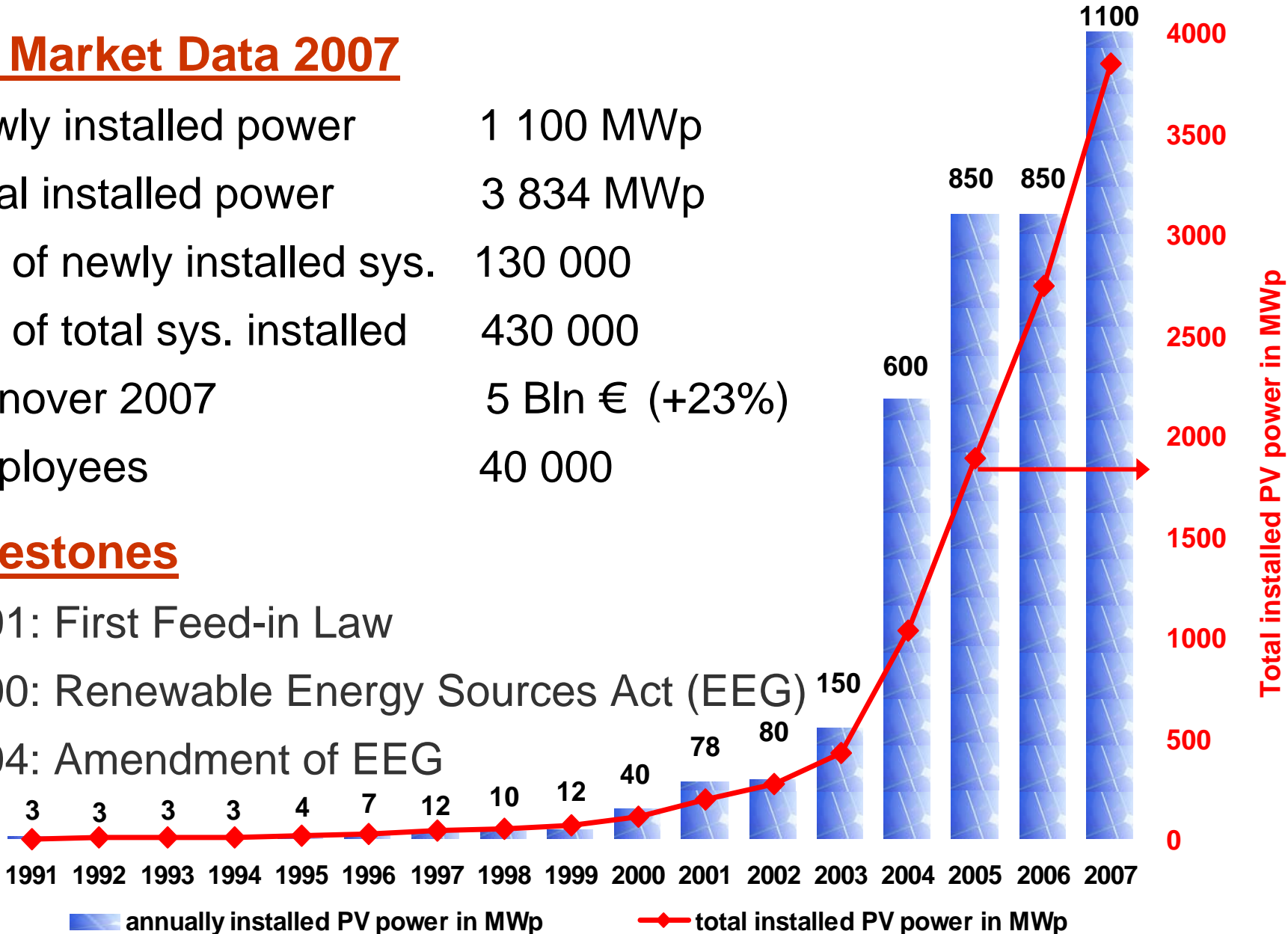
Newly installed power	1 100 MWp
Total installed power	3 834 MWp
No. of newly installed sys.	130 000
No. of total sys. installed	430 000
Turnover 2007	5 Bln € (+23%)
Employees	40 000

## Milestones

1991: First Feed-in Law

2000: Renewable Energy Sources Act (EEG)

2004: Amendment of EEG





# Feed-in Tariffs in Germany 2008

Feed-in tariff per kWh	< 30 kWp	30–100 kWp	> 100 kWp
on buildings and noise protection walls	<b>€ct 46.75</b> \$ct 67.8	<b>€ct 44.48</b> \$ct 64.5	<b>€ct 43.99</b> \$ct 63.8
Façade-integrated	<b>additional €ct 5</b> \$ct 7.25		
Open land (ground-mounted)	<b>€ct 35.49</b> \$ct 51.5		

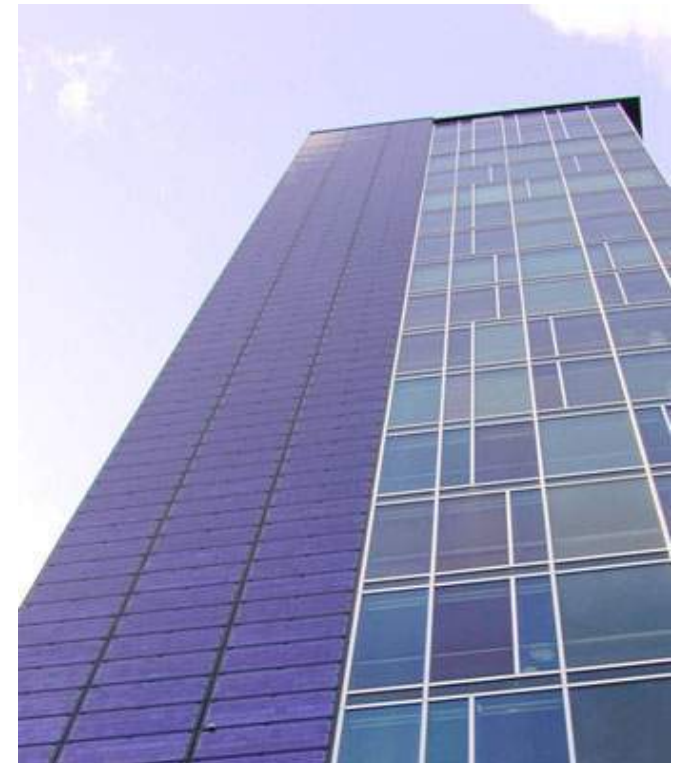
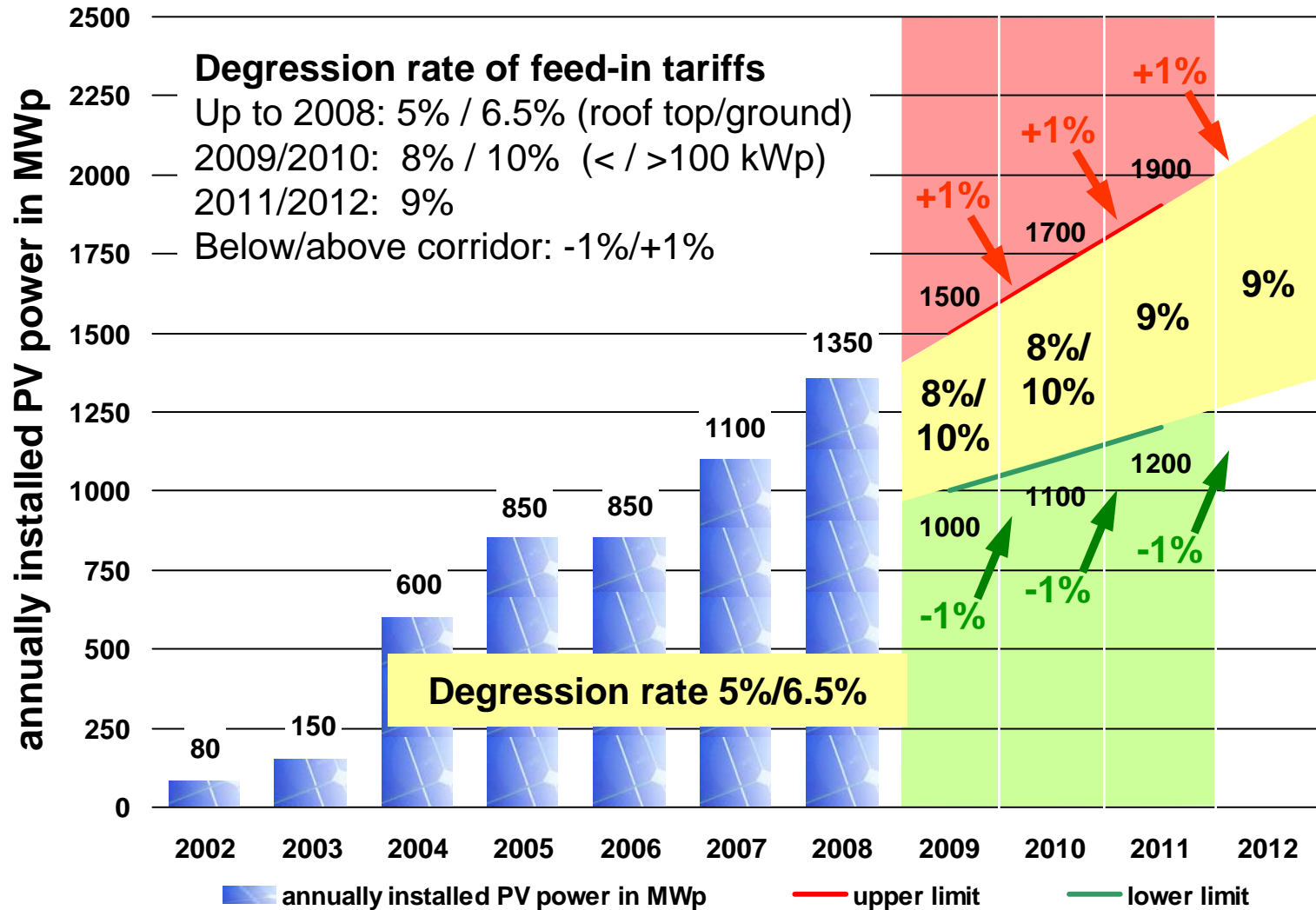


Image: Solar-Fabrik



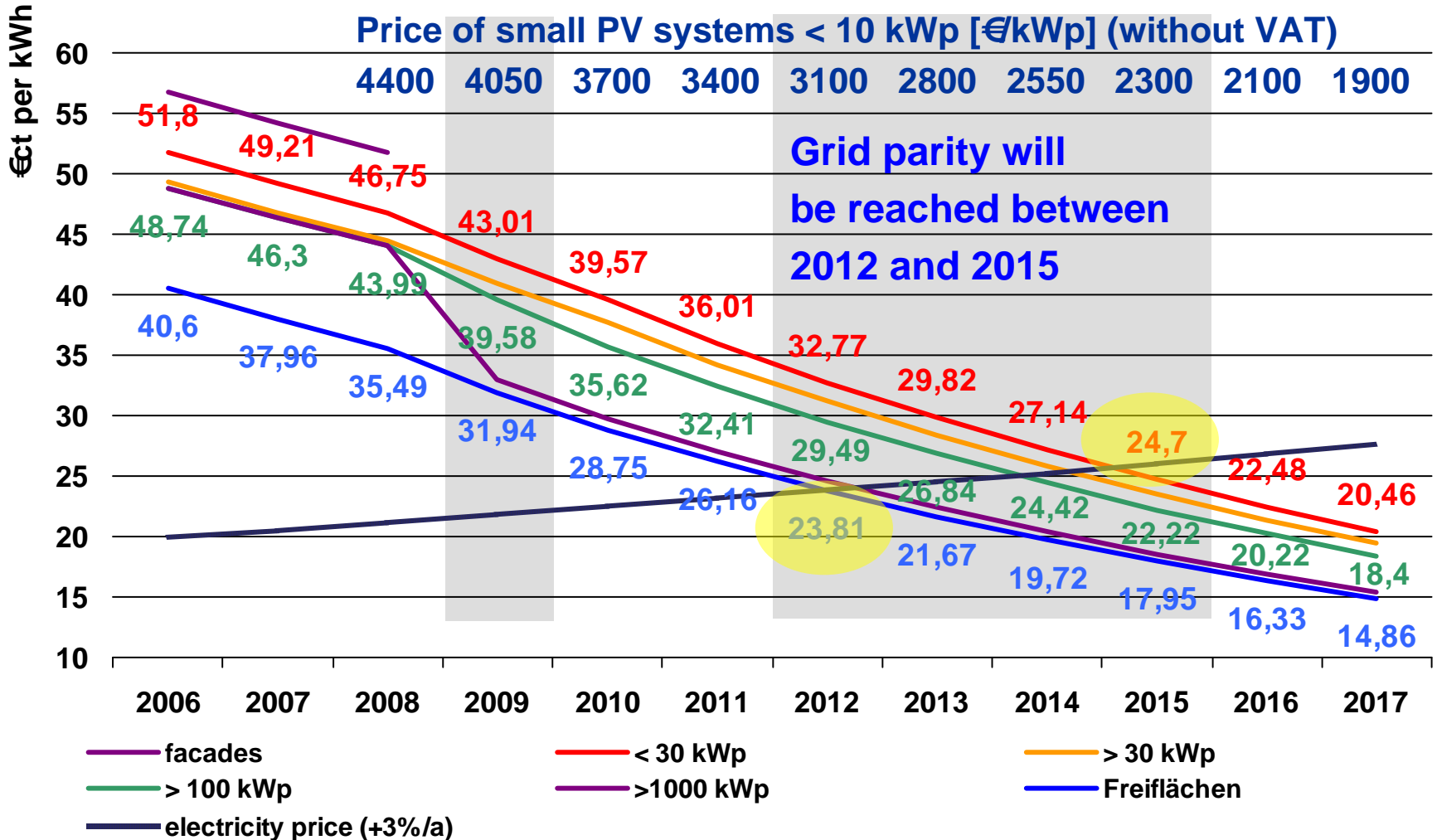
Image: Degussa

# German PV Market up to 2008 and Feed-in Tariffs as of 2009



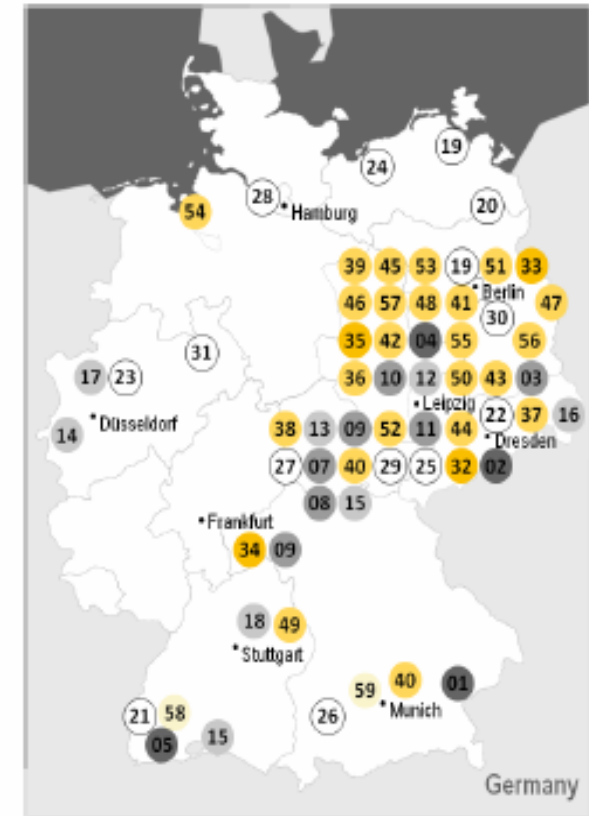
# Feed-in Tariffs for PV within the German EEG

Based on higher degression rates as of 2009, decided on June 6th, 2008



# Destination ⇒ Made in Germany

Value chain	No.	Company	Location	Capacity 2008 [MWp]	Current Empl.
Silicon	1	Wacker Chemie	Burghausen	10,000t	960
	2	Scheuten Solar World Solizium	Freiberg <sup>1</sup>	1000t	n/a
	3	Sunways	Spreewitz <sup>1</sup>	1000t	n/a
	4	PV Silicon	Bitterfeld-Wolfen <sup>1</sup>	900t	15
	5	Joint Solar Silicon	Rheinfeld <sup>1</sup>	850t	n/a
	6	City Solar	Bitterfeld-Wolfen <sup>1</sup>	n/a	25
Wafers	7	PV Silicon <sup>2</sup>	Erfurt	290	140
	8	ASi Industries <sup>3</sup>	Amstadt	180	220
	9	Wacker Schott Solar	Alzenau, Jena <sup>1</sup>	160	120
	10	Q-Cells	Thalheim <sup>1</sup>	80	10
	11	WPI Wafer Production Int. <sup>2</sup>	Leipzig	n/a	n/a
Cells	12	Q-Cells	Thalheim	875	1460
	13	Ersol Solar Energy	Erfurt, Amstadt	220	350
	14	Solland Solar Cells	Aachen	170	200
	15	Sunways	Konstanz, Amstadt	115	130
	16	Arise Technologies	Bischofswerda	35	10
	17	Scheuten Solar Cells	Gelsenkirchen	35	80
	18	Solarwatt	Heilbronn	25	60
	Modules	19	Solon	Berlin, Greifswald	260
20		Aleo Solar	Prenzlau	170	425
21		Solar-Fabrik	Freiburg	130	270
22		Solarwatt	Dresden	110	350
23		Scheuten Solar Technology	Gelsenkirchen	90	140
24		Solara Sonnenstromfabrik	Wismar	80	130
25		Heckert Solar	Chemnitz	60	80
26		Webasto Solar	Landsberg/Lech	35	20
27		Asola	Erfurt	30	80
28		Solamova	Wedel	10	30
29		GSS	Löbichau	10	30
30		PVflex Solar	Fürstenwalde	5	30
31		Schüco Solar	Bielefeld	5	n/a



# Destination ⇒ Made in Germany

Fully Integrated	32	Solarworld <sup>6</sup>	Freiburg	450/300/250	900
(Wafers/Cells/ Modules)	33	Conergy	Frankfurt (Oder)	300/275/250	370
	34	Schott Solar	Alzenau	160/275/200	1000
	35	EverQ	Thalheim	100/100/100	450
Thin Film					
Poly-Si	38	CSG Solar	Thalheim	20	140
a-Si a-Si/μc-Si	37	Sunfilm	Großröhrsdorf <sup>1</sup>	60	10
	38	Ersol Thin Film	Erfurt	40	130
	39	Malibu	Osterweddingen <sup>1</sup>	40	n/a
	40	Schott Solar	Jena, Putzbrunn <sup>1</sup>	30	160
	41	Inventux	Berlin <sup>1</sup>	30	n/a
	42	Brilliant 234. <sup>4</sup>	Thalheim	25	60
	43	EPV	Senftenberg <sup>1</sup>	25	n/a
	44	Signet Solar	Mochau <sup>1</sup>	20	10
CIS CIGS CIGSSe	45	Johanna Solar Technology	Brandenburg	30	100
	46	Solibro <sup>4</sup>	Thalheim <sup>1</sup>	30	20
	47	Odersun	Frankfurt (Oder), Fürstenwalde <sup>1</sup>	30	80
	48	Global Solar Energy	Berlin <sup>1</sup>	30	n/a
	49	Würth Solar	Schwäbisch Hall	30	220
	50	Avancis	Torgau <sup>1</sup>	20	60
	51	PVflex Solar	Fürstenwalde	10	30
	52	Solarion	Leipzig	10	20
	53	Sulfurcell	Berlin	5	60
	54	CIS-Solartechnik	Bremerhaven	Pilot	20
	55	Nanosolar	Luckenwalde <sup>1</sup>	n/a	50
CdTe	56	First Solar	Frankfurt (Oder)	160	500
	57	Calyxo <sup>4</sup>	Thalheim	25	40
CPV	58	Concentrix Solar	Freiburg	10	40
	59	SolarTec	Munich	10	50



# German Poly-Prod.-Cap. in Europe

Company	Country	Process	Production Capacity			
			2008	2009	2010	2011
Nitol	Russia	GT Solar		3700	3700	3700
Silicio Energia	Spain	Siemens		400	1500	2500
Silfab	Italy	Siemens		2500	2500	5000
Estelux	Italy	Siemens			4000	4000
Elkem	Norway	Upgrade MG-Si	2500	5000	5000	5000
REC	Norway	Siemens	6000	12000	19000	21000
Silicium de Provence	France	Siemens		4500	4500	9000
TSM	NL	Siemens			4000	4000
<b>Solizim</b>	<b>Germany</b>	<b>Upgrade MG-Si</b>			<b>1000</b>	<b>1000</b>
<b>Solarvalue</b>	<b>Germany</b>	<b>Upgrade MG-Si</b>		<b>4400</b>	<b>4400</b>	<b>4400</b>
<b>PrimeSolar</b>	<b>Germany</b>	<b>Upgrade MG-Si</b>			<b>5000</b>	<b>10000</b>
<b>JSSI</b>	<b>Germany</b>	<b>Upgrade MG-Si</b>	<b>850</b>	<b>1200</b>	<b>1600</b>	<b>1600</b>
<b>PV Crystalox</b>	<b>Germany</b>	<b>Siemens</b>		<b>900</b>	<b>1100</b>	<b>1800</b>
<b>Schmidt Solar Technology</b>	<b>Germany</b>	<b>SST</b>		<b>2000</b>	<b>2000</b>	<b>2000</b>
<b>Wacker</b>	<b>Germany</b>	<b>Siemens</b>	<b>12500</b>	<b>14500</b>	<b>21500</b>	<b>21500</b>
<b>Total Capacity</b>			<b>21850</b>	<b>51100</b>	<b>80800</b>	<b>92800</b>

# Solarvalley Mitteldeutschland

- **High-Tech Strategy Germany**
  - Industry Cluster Contest “Ignite Ideas” (3 years of qualification)
  - 27 PV Companies, 12 Research Institutes
  - 200 Mio € govt. support for R&D for 5 years
  - Grid Parity by 2015 !
- **Competence Center Thin-Film and Nano Technology to be founded summer 2009**
- **Fraunhofer - Center for Silicon Photovoltaic (CSP) founded 2/2008**
  - R&D → Analysis of Crystallization and Materials, Thin-Film, Module Integration
  - Aim to maintain global technological leadership
  - 60 Mio € investment

# German Perspectives

- Market Growth 2008: 25% (1350 MW)
- Annual Turnover 2008: 8 Bln €
- Export Volume 2008: 3,2 Bln € / 46%  
2 Bln € / 38% ( 2007)  
5,5 Bln € / 56% (2010)
- Investment 2008: 1,8 Bln €/a (2010: 2,6 Bln €/a )
- R&D expenditure 2008: 175 Mio € (2010: 225 Mio €)
- Employment in 2010: 60000 (2007: 40000)
- Bosch buys Ersol / IPOs: SMA / Schott Solar



**Thank you for your  
attention !**

**Contact**

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