Update on the German PV Market
德国光伏市场的新进展

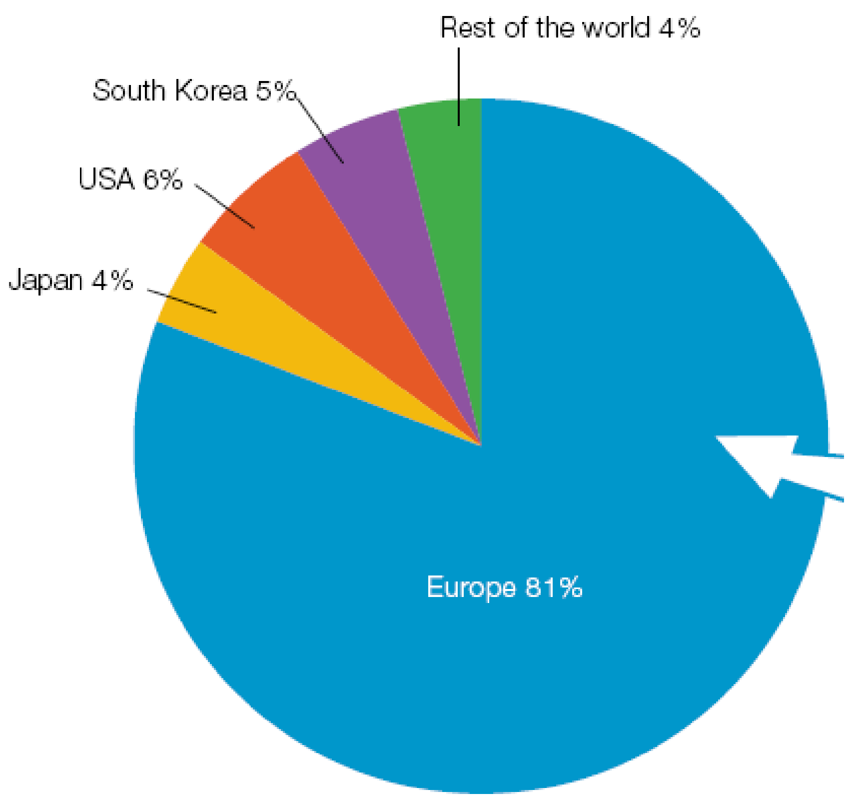
中国光伏产业（安阳）高层论坛

2009年**6**月**27**日下午

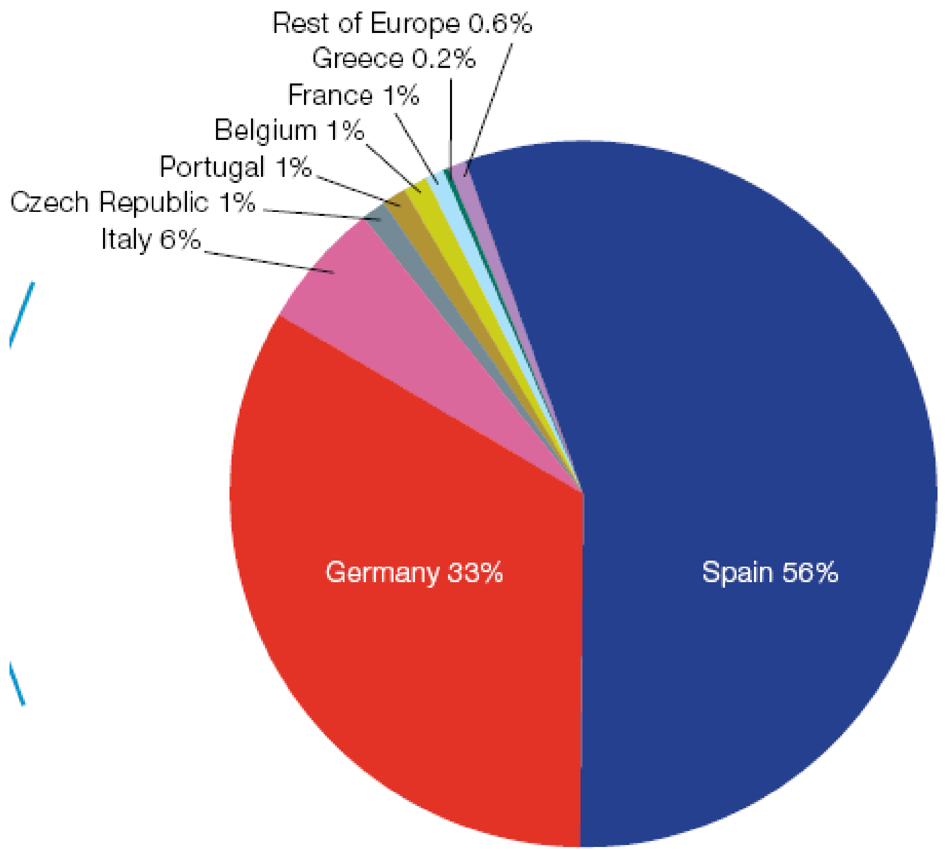
Frank Haugwitz (韩飞)

2008年光伏市场的地区分布情况

2008全球市场分布 (5,6 GWp)

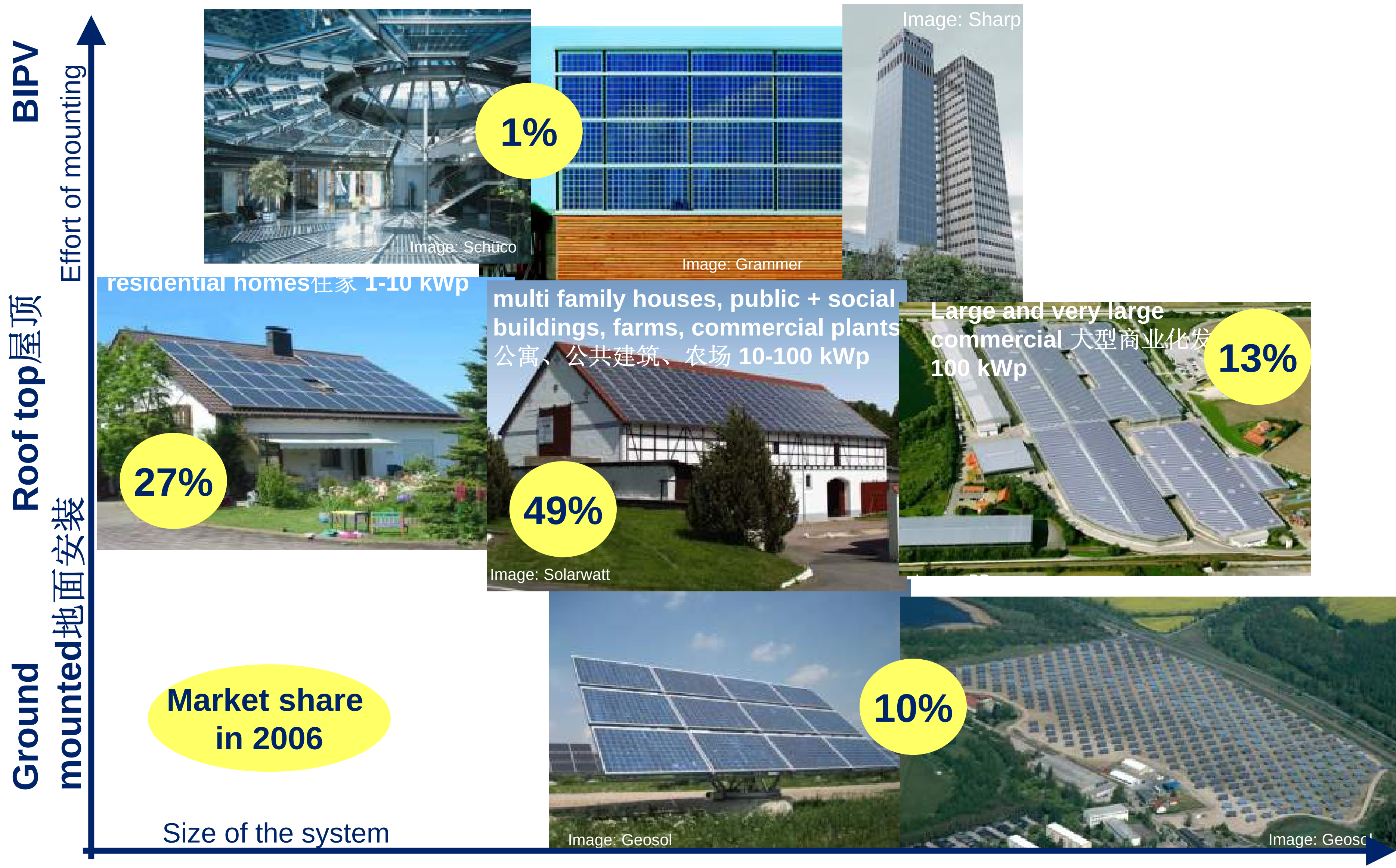


2008欧盟市场分布(4,6 GWp)



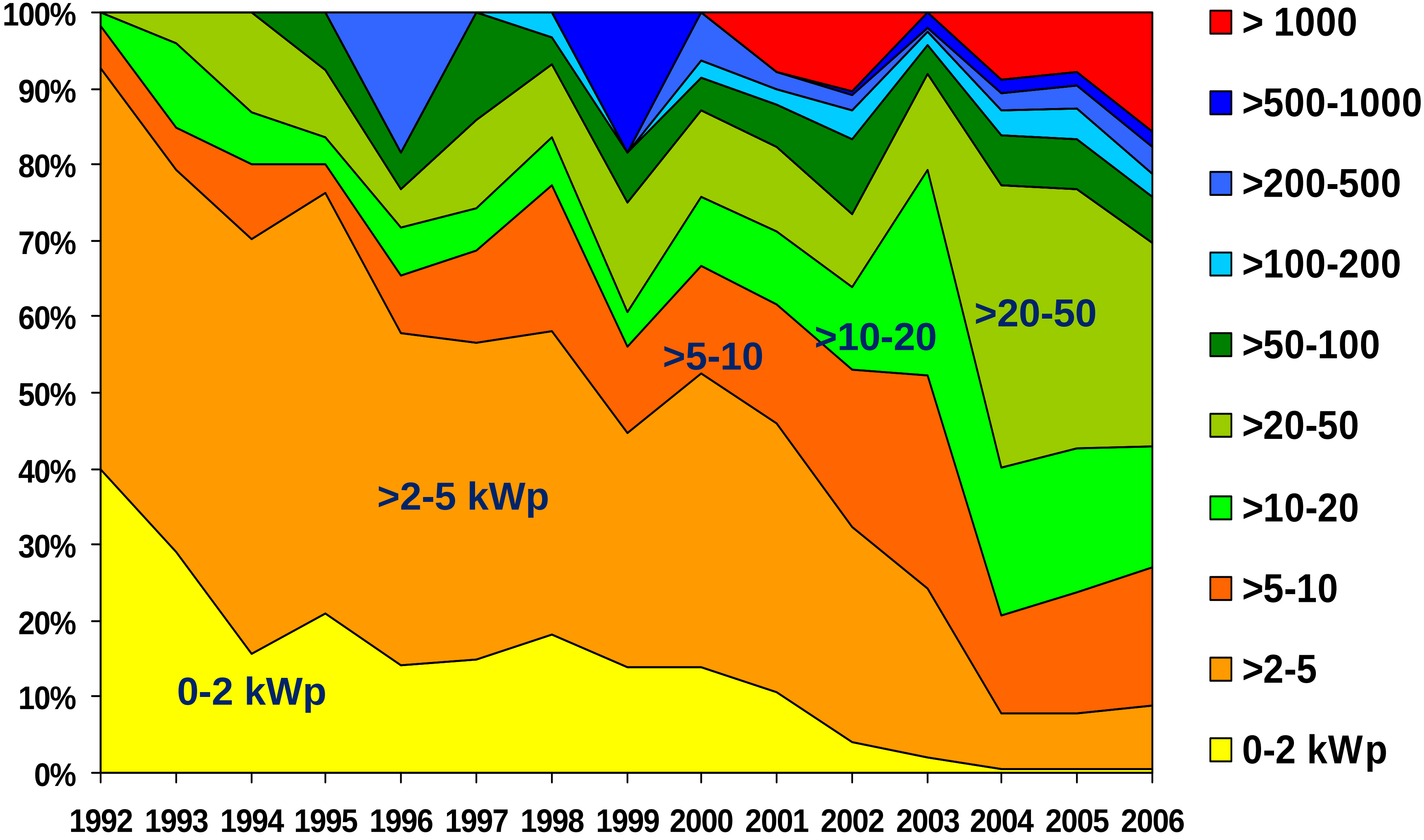
Source: EPIA Global Market Outlook March 2009

PV Market Segments 光伏市场细分



Market Share According to Size

不同规模发电厂的市场份额



Source: BSW-Solar, calculated from data of 2.2 GWp PV systems from EnBW, EON, RWE, Vattenfall

Small, Medium & Large Rooftop Sys.
小、中、大型屋顶系统

Ground-Mounted PV Systems
地面安装的光伏系统

德国光伏市场发展状况

2008年光伏市场数据:

新增光伏发电容量	**1 500 MWp**
总装机容量	**5 334 MWp**
安装系统总数	**500 000**
2008年营业总额	**6 Bln €**
就业岗位	**45 000**

重要里程碑

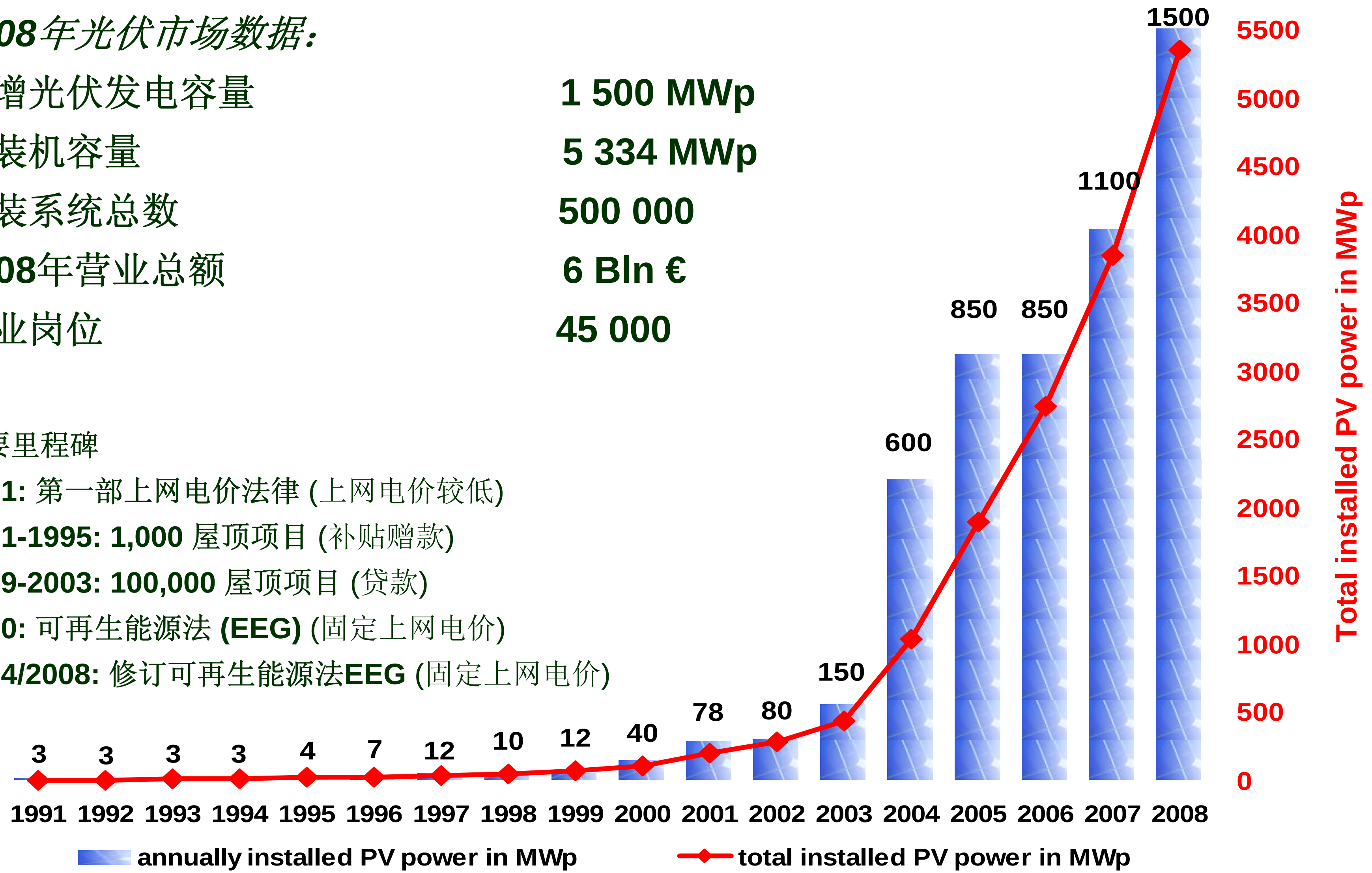
1991: 第一部上网电价法律 (上网电价较低)

1991-1995: 1,000 屋顶项目 (补贴赠款)

1999-2003: 100,000 屋顶项目 (贷款)

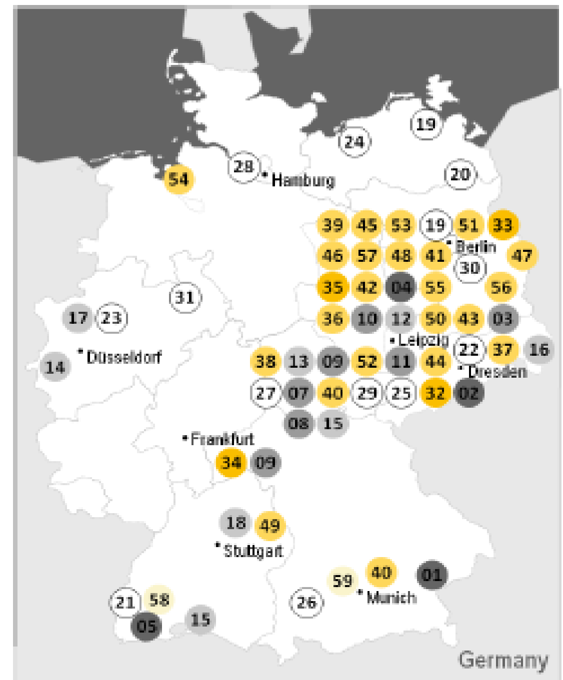
2000: 可再生能源法 **(EEG)** (固定上网电价)

2004/2008: 修订可再生能源法**EEG** (固定上网电价)



Production Follows the Market: PV Manufacturers I 光伏产业链上的企业产量1

Value chain	No.	Company	Location	Capacity 2008 [MWp]	Current Empl.
Silicon	1	Wacker Chemie	Burghausen	10,000t	960
	2	Scheuten Solar World Solizium	Freiberg[1]	1000t	n/a
	3	Sunways	Spreewitz[1]	1000t	n/a
	4	PV Silicon	Bitterfeld-Wolfen[1]	900t	15
	5	Joint Solar Silicon	Rheinfelden[1]	850t	n/a
	6	City Solar	Bitterfeld-Wolfen[1]	n/a	25
Wafers	7	PV Silicon[2]	Erfurt	290	140
	8	ASi Industries[3]	Arnstadt	180	220
	9	Wacker Schott Solar	Alzenau, Jena[1]	160	120
	10	Q-Cells	Thalheim[1]	80	10
	11	WPI Wafer Production Int.[2]	Leipzig	n/a	n/a
Cells	12	Q-Cells	Thalheim	875	1460
	13	Ersol Solar Energy	Erfurt, Arnstadt	220	350
	14	Solland Solar Cells	Aachen	170	200
	15	Sunways	Konstanz, Arnstadt	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	400
	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	Solarnova	Wedel	10	30
	29	GSS	Löbichau	10	30
	30	PVflex Solar	Fürstenwalde	5	30
	31	Schüco Solar	Bielefeld	5	n/a



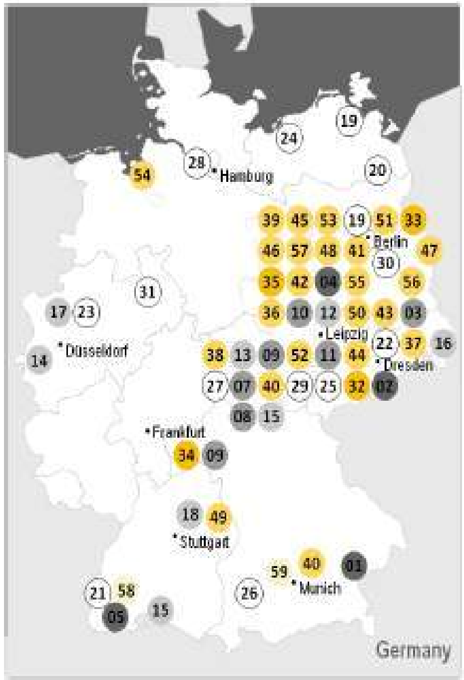
1) Planned/under construction
2) Excluding ingots
3) Subsidiary of Ersol
4) Subsidiary of Q-Cells
5) Subsidiaries of Solarworld: Deutsche Solar, Deutsche Cell, Solar Factory
6) Wafer production by Wacker Schott Solar No.9

Source: *Invest in Germany*, March 2008

Source: Invest in Germany, March 2008

Production Follows the Market: PV Manufacturers II 光伏产业链上的企业产量2

Fully Integrated	32	Solarworld[6]	Freiberg	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	36	CSG Solar	Thalheim	20	140
a-Si a-Si/μc-Si	37	Sunfilm	Großröhrsdorf[1]	60	10
	38	Ersol Thin Film	Erfurt	40	130
	39	Malibu	Osterweddingen[1]	40	n/a
	40	Schott Solar	Jena, Putzbrunn[1]	30	160
	41	Inventux	Berlin[1]	30	n/a
	42	Brilliant 234.[4]	Thalheim	25	60
	43	EPV	Senftenberg[1]	25	n/a
	44	Signet Solar	Mochau[1]	20	10
CIS CIGS CIGSSe	45	Johanna Solar Technology	Brandenburg	30	100
	46	Solibro[4]	Thalheim[1]	30	20
	47	Odersun	Frankfurt (Oder), Fürstenwalde[1]	30	80
	48	Global Solar Energy	Berlin[1]	30	n/a
	49	Würth Solar	Schwäbisch Hall	30	220
	50	Avancis	Torgau[1]	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[1]	n/a	50
CdTe	56	First Solar	Frankfurt (Oder)	160	50
	57	Calyxo[4]	Thalheim	25	4
CPV	58	Concentrix Solar	Freiburg	10	4
	59	SolarTec	Munich	10	5



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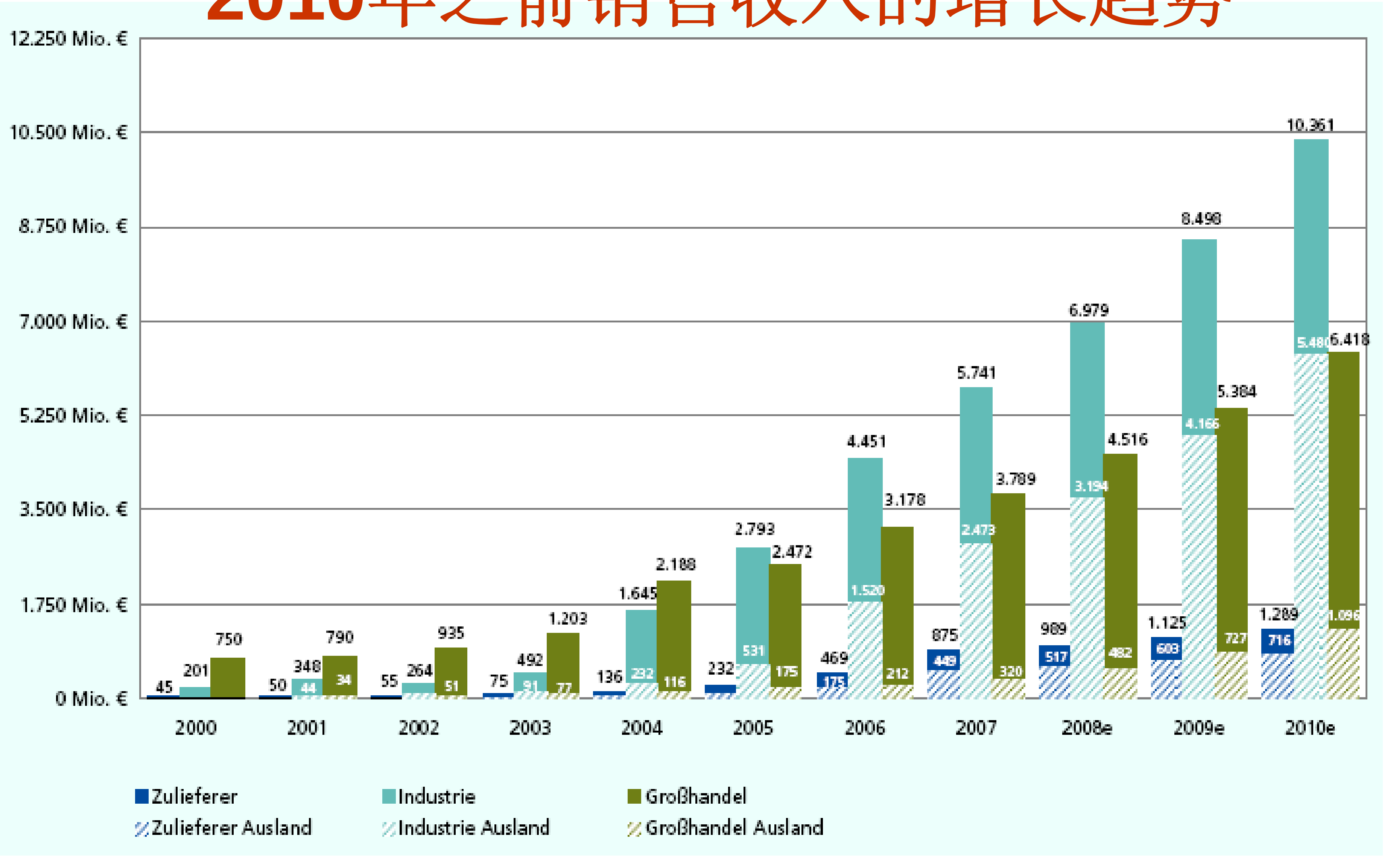
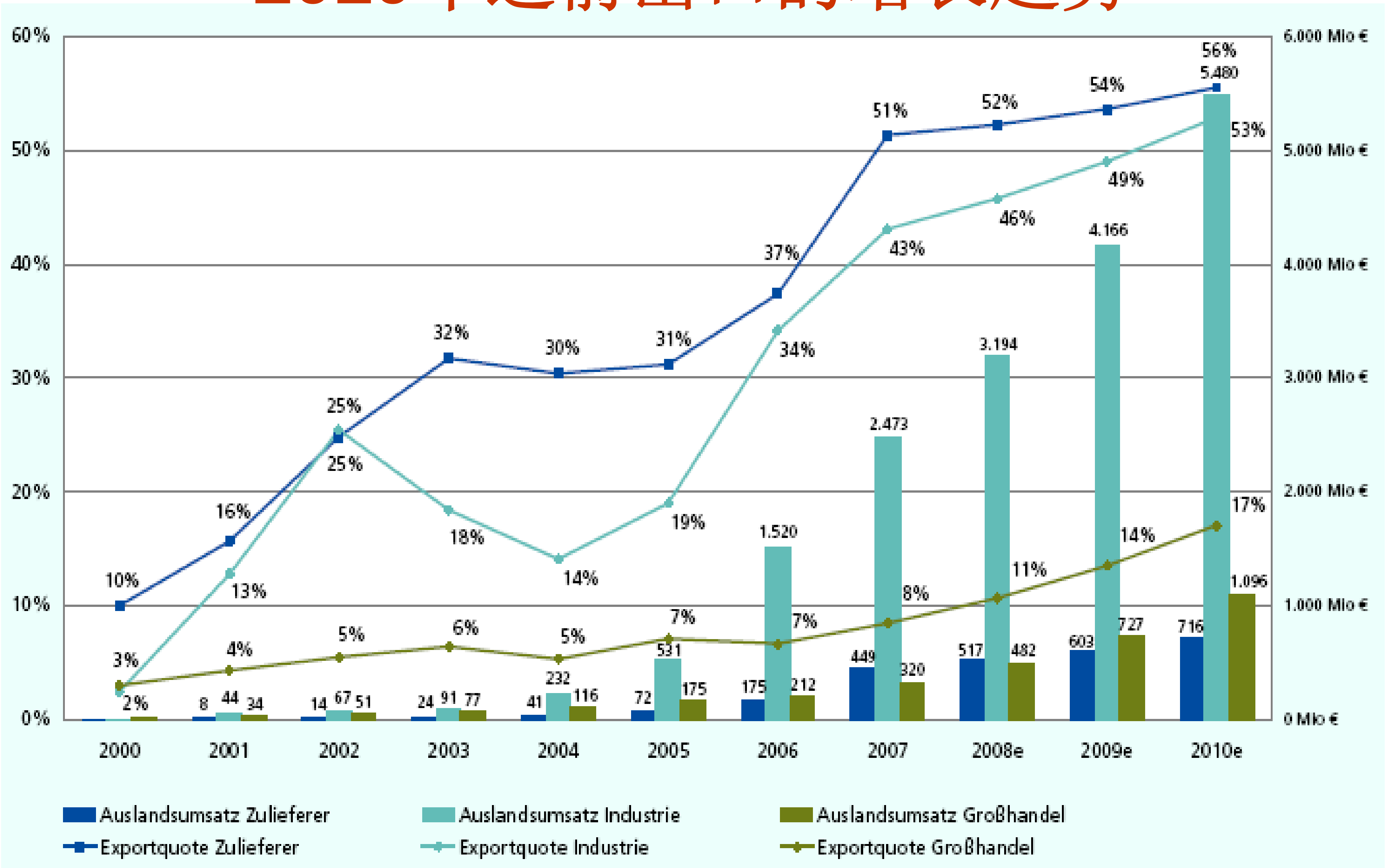
Source: Invest in Germany, March 2008

Germany's Revenue Growth until 2010
2010年之前销售收入的增长趋势



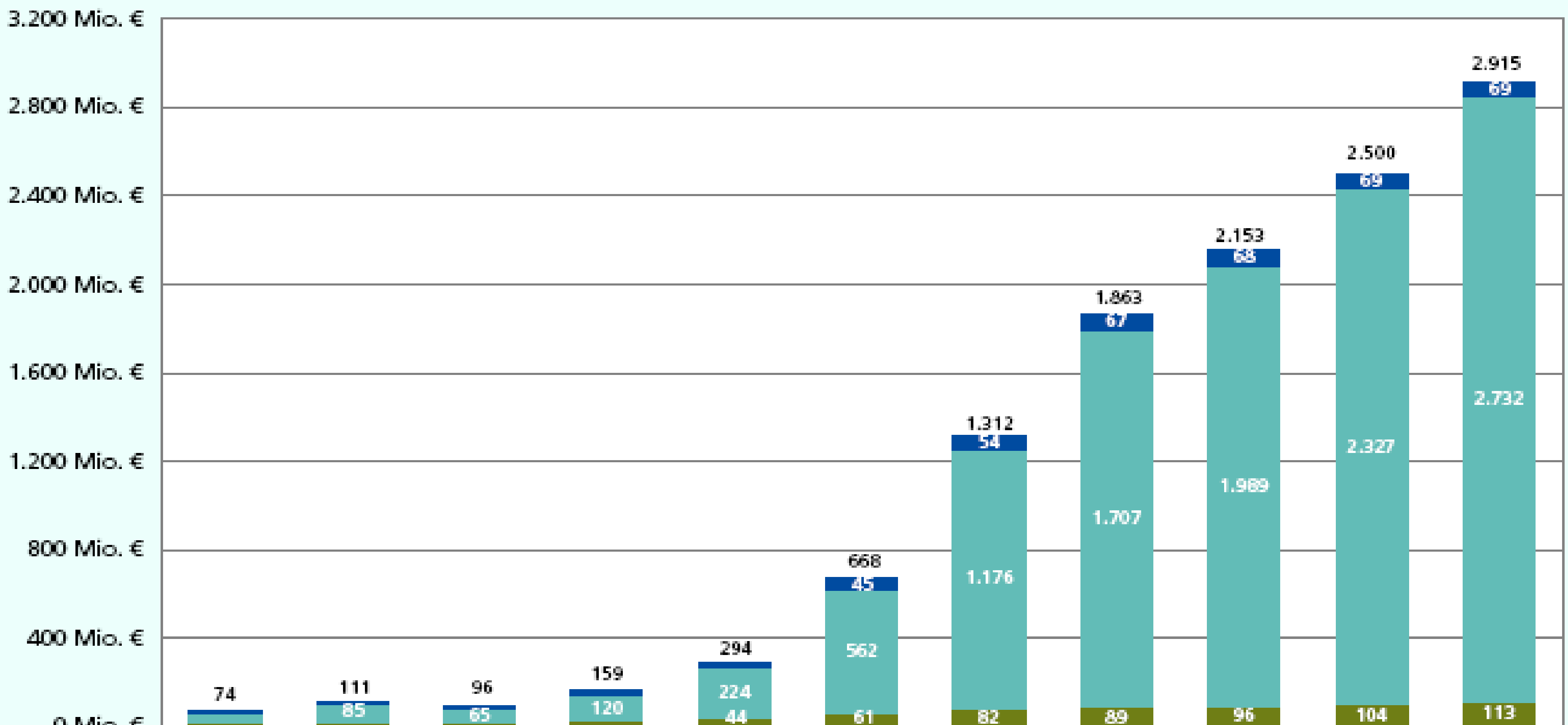
Source: EuPD Research

Germany's Export Growth until 2010
2010年之前出口的增长趋势



Source: EuPD Research

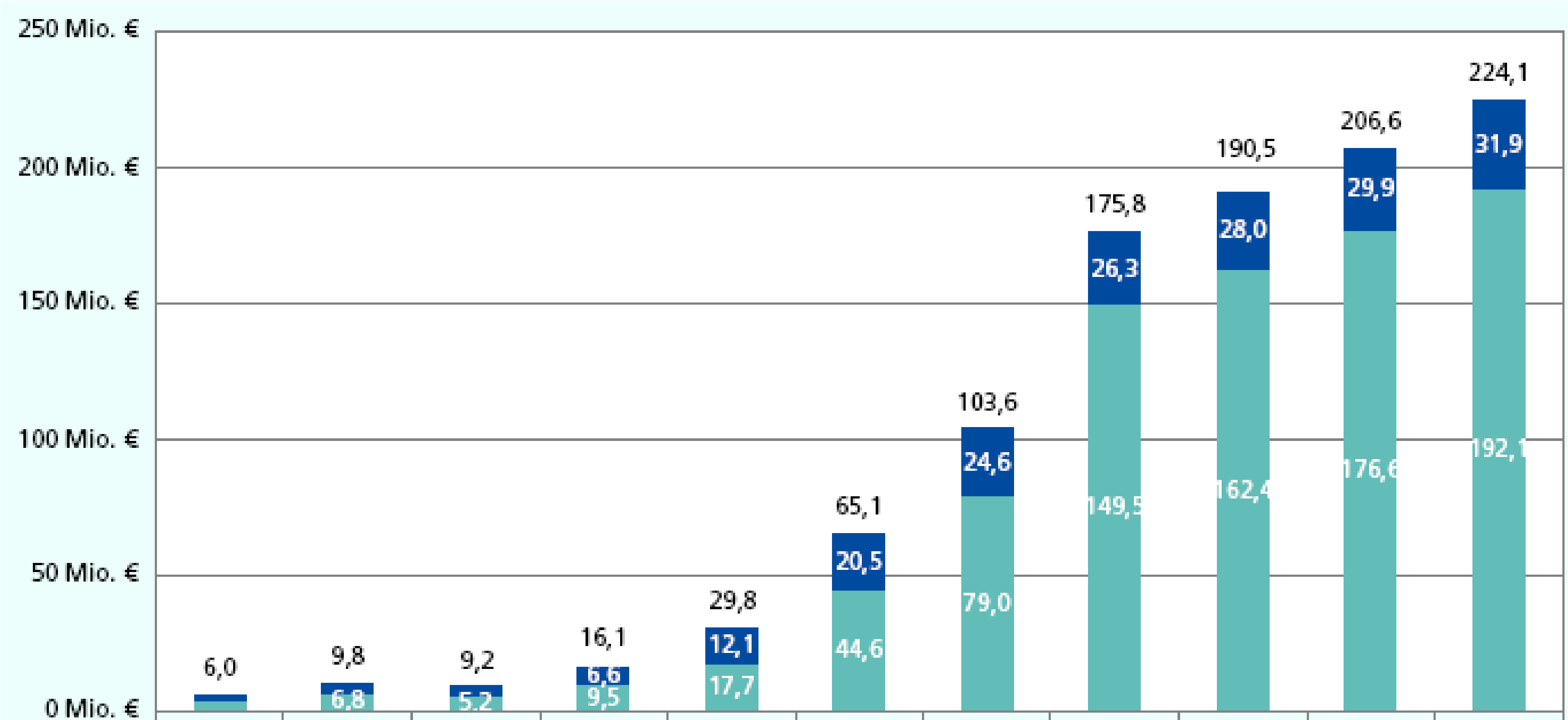
Germany’s Investment until 2010
2010年之前投资的增长趋势



	2000	2001	2002	2003	2004	2005	2006	2007	2008e	2009e	2010e
Zulieferer	8,7	9,7	10,7	14,6	26,5	45,0	54,0	67,0	67,8	68,6	69,5
Industrie	50,3	85,5	65,4	119,8	223,6	562,4	1176,0	1707,4	1989,0	2326,9	2732,2
Großhandel	15,0	15,5	20,0	25,0	44,0	61,0	82,0	88,9	96,3	104,4	113,2
gesamt	74,1	110,7	96,1	159,3	294,1	668,4	1312,0	1863,3	2153,2	2499,9	2914,8

Source: EuPD Research

Germany's R&D Investment until 2010
2010年之前研发投资的增长趋势



	2000	2001	2002	2003	2004	2005	2006	2007	2008e	2009e	2010e
Zulieferer	2,0	3,0	4,0	6,6	12,1	20,5	24,6	26,3	28,0	29,9	31,9
Industrie	4,0	6,8	5,2	9,5	17,7	44,6	79,0	149,5	162,4	176,6	192,1
gesamt	6,0	9,8	9,2	16,1	29,8	65,1	103,6	175,8	190,5	206,6	224,1

Source: EuPD Research

Solarvalley Mitteldeutschland 德国太阳谷

High-Tech Strategy Germany 德国高技术战略

- Industry Cluster Contest “Ignite Ideas” (3 years of qualification)
  工业区创意竞赛（3年资质）
- 27 PV Companies, 12 Research Institutes27个光伏公司，12个研究所
- 200 Mio € govt. support for R&D for 5 years 5年、2亿欧元的政府支持
- Grid Parity by 2015 ! 2015年实现评价上网！

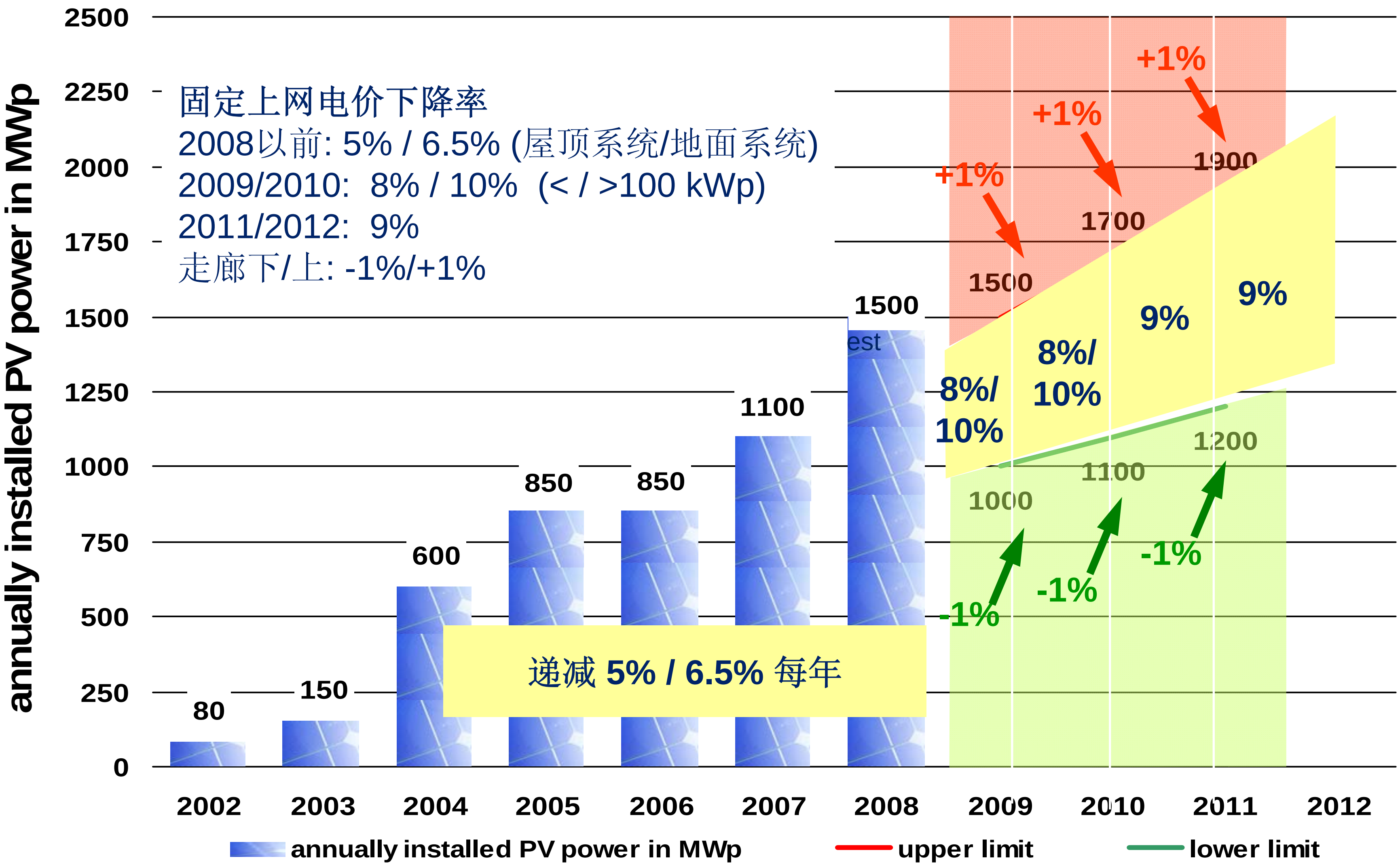
Competence Center Thin-Film and Nano Technology founded 2009

Fraunhofer - Center for Silicon Photovoltaic (CSP) founded 2/2008

2009年建立薄膜和纳米技术中心、2008年2月建立弗兰豪芬硅电池中心

- R&D → Analysis of Crystallization and Materials, Thin-Film, Module Integration 研发-材料和结晶分析、薄膜、组件集成
- Aim to maintain global technological leadership
  以保持全球技术领先为目标
- 60 Mio € investment6000万欧元投资

德国固定上网电价- 06/2008修订



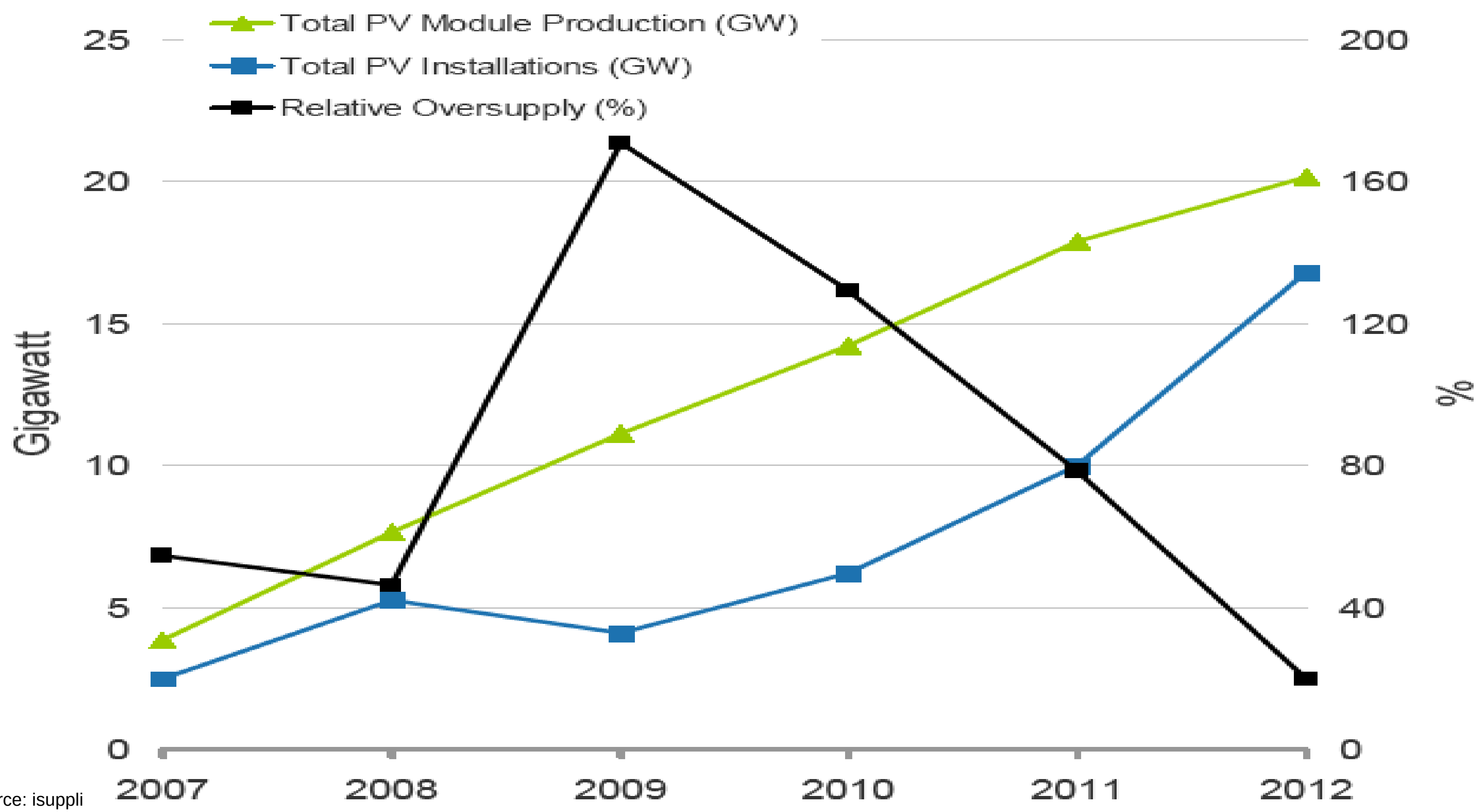
Germany's Feed-in-Tariffs until 2011
2011年前的上网电价机制

Feed-in Tariff 上网电价	Roof-Top屋顶								Ground-mounted installations 地面安装	
	≤ 30 kW		> 30 kW		> 100 kW		> 1.000 kW		All Sizes所有容量	
	Degression Rate递减率	€/kWh	Degression Rate递减率	€/kWh	Degression Rate递减率	€/kWh	Degression Rate递减率	€/kWh	Degression Rate递减率	€/kWh
2009	8%	0.4301	8%	0.4091	10%	0.3958	25%	0.3300	10%	0.3194
2010	8%	0.3957	8%	0.3764	10%	0.3562	10%	0.2970	10%	0.2875
2011	9%	0.3601	9%	0.3425	9%	0.3242	9%	0.2703	9%	0.2616

Additional Incentive Schemes其他激励政策

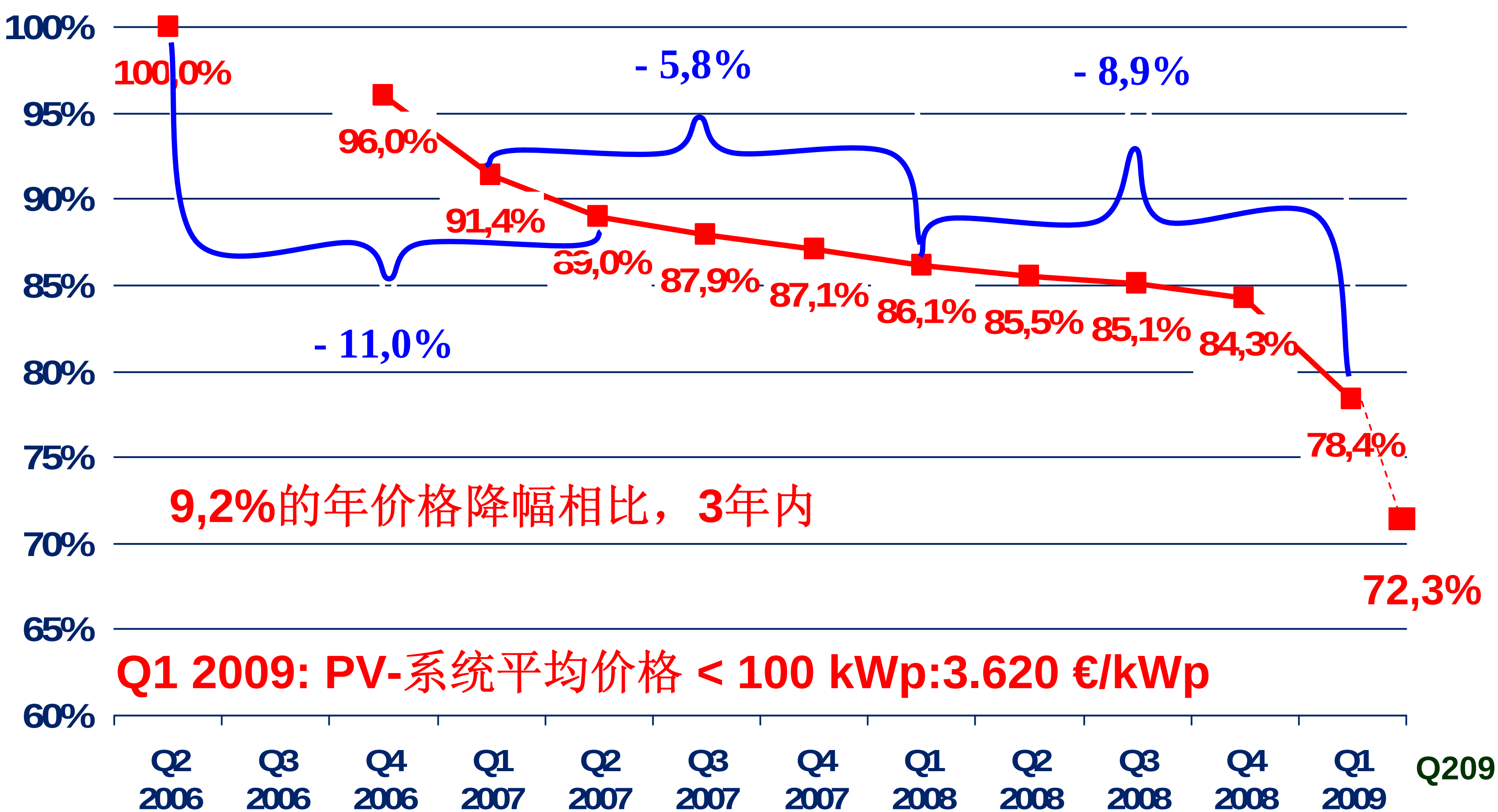
Tax Credits **税收优惠**	Investment cost for commercial sys. (incl. planning & installation) can be depreciated over a 20 year period and other costs can be considered as operation costs 商业化系统的投资成本（包括计划与安装）可以按20年折旧，其他成本可被算作运行成本 Commercial sys. are VAT (19%) exempted 商业化的系统免除增值税（19%） In exceptional cases for some commercial sys. which operate close to producing and manufacturing facilities 12.5 – 27.5% can be claimed as tax credits 对于一些接近生产和制造设施的商业化系统，可以申请税收返还12.5-27.5%
Beneficial Credit Terms **优惠条件**	KFW Program “Solarstrom Erzeugen” (No. 140) for private investors: Up to 100% invest, max €50,000, up to 10 years with 1-2 years free of redemption or up to 20 years with up to 3 years free of redemption at nominal interest rates of 4.15-4.45% depending on duration, except investors under direct supervision of local authorities KFW针对私人投资者的140号程序：可100%投资额贷款，5万欧元以内，十年头1-2年免还，或者20年贷款前3年免还。根据贷款年限，利率在4.15-4.45%之间 KFW “ERP-Umwelt- und Energiesparprogramm” for commercial investors: 50% for SMEs, other companies up to 35% of max. €500,000 invest (in old federal states) alternatively € 1 Mio. Invest (in new federal states), duration 10 years with 2 years free of redemption (in old federal states) alternatively 15 years with 5 years free of redemption , nominal interest rates between 4-7% (depending on location, duration and credit risk evaluation) KFW针对商业化投资者的ERP程序：联邦旧州50万欧元以下，其他州100万欧元以下，中小企业50%，其他企业35%可以贷款。旧州十年期前两年免还。其他州十五年期前五年免还。根据地点、贷款期和信用风险评估，名义利率为4-7%。 KFW “Umweltprogramm” for commercial investors: 75% of invest of max €10 mio. per Installation 96% net payment, up to 20 years duration, with up to 3 years free of redemption, nominal interest rates between 4-7.72% KFW针对商业化投资者：每个电站投资的75%，最多可贷款1000万欧元，净付款为96%，最长期限20年前3年免还，名义利率4-7.72%。

全球市场需求与电池生产能力对比（PV模块总产量(GW)/PV总装机容量(GW)/相对供大于求比例%）



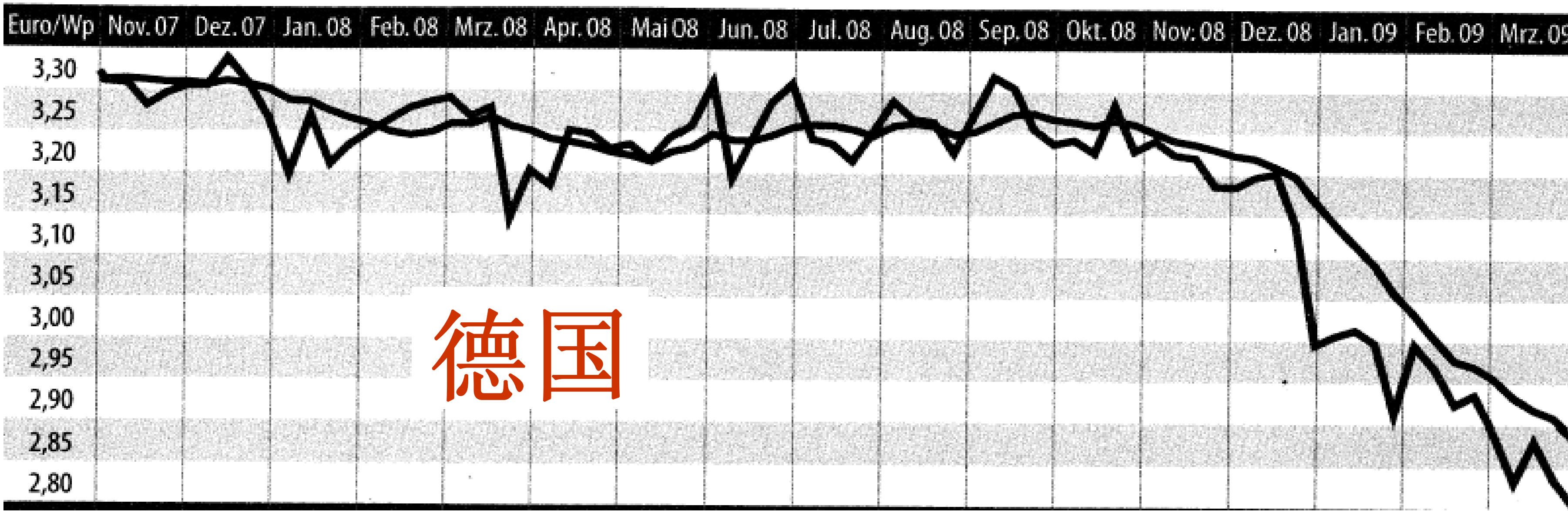
Source: isuppli

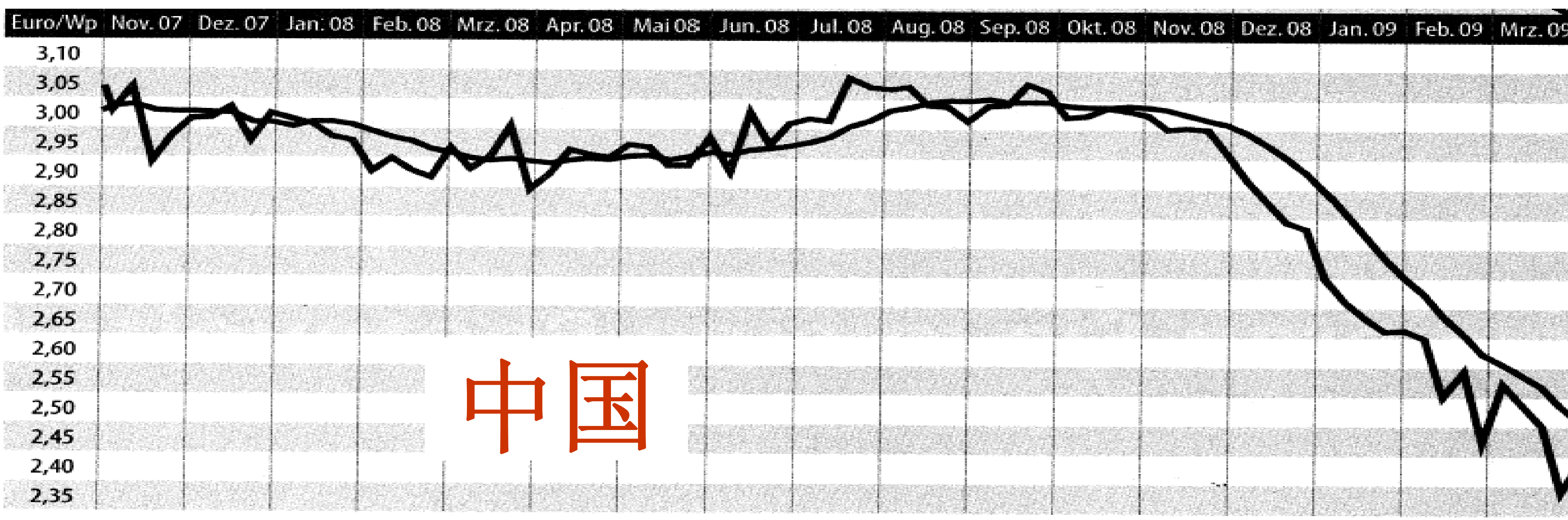
德国光伏系统价格指数



Source: Representative independent poll of 100 installers by EuPD-Research on behalf of BSW-Solar
PV-System Price means final customer price

Spot-Market PV Module Price Development
现货市场光伏组件价格的变化

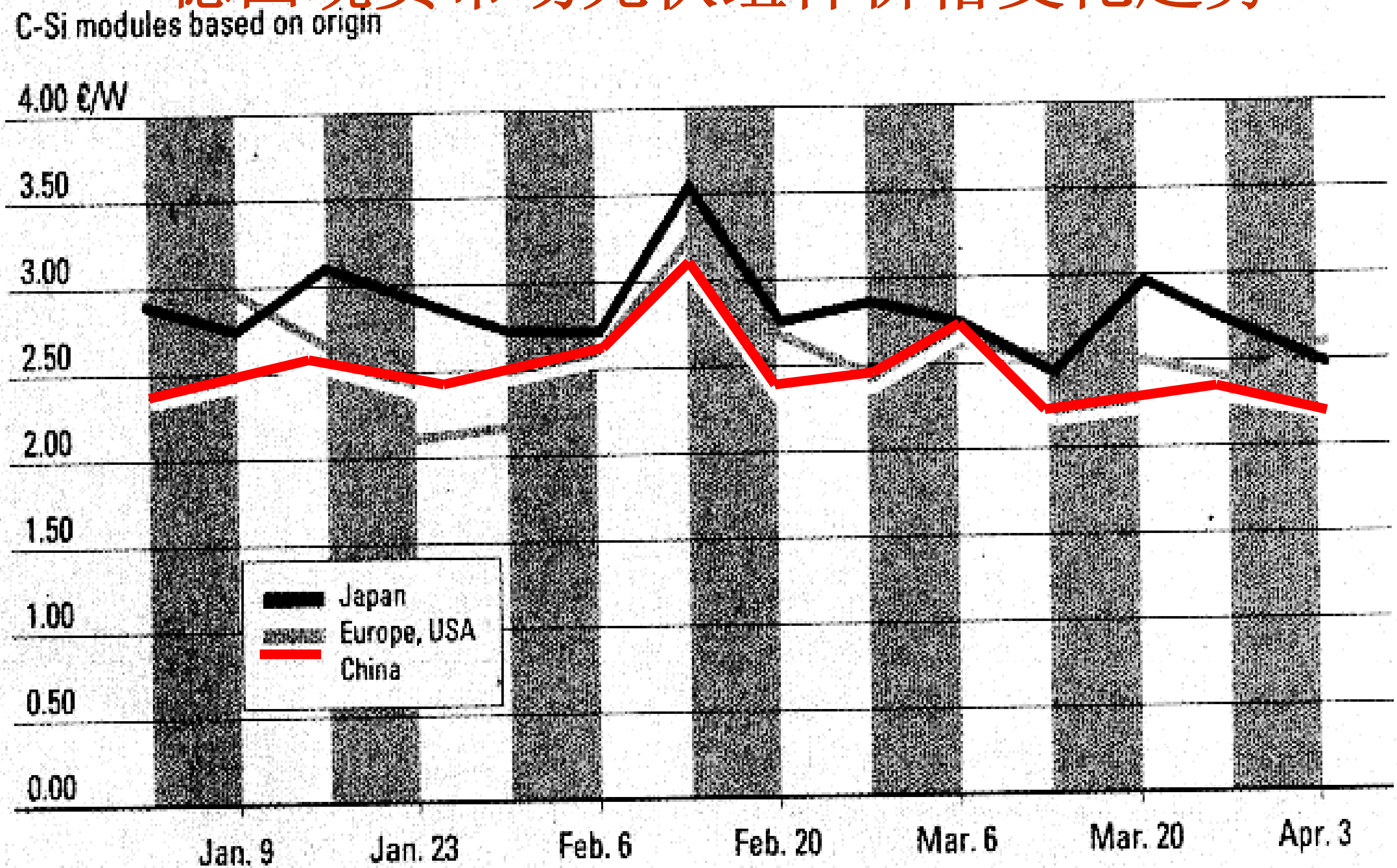




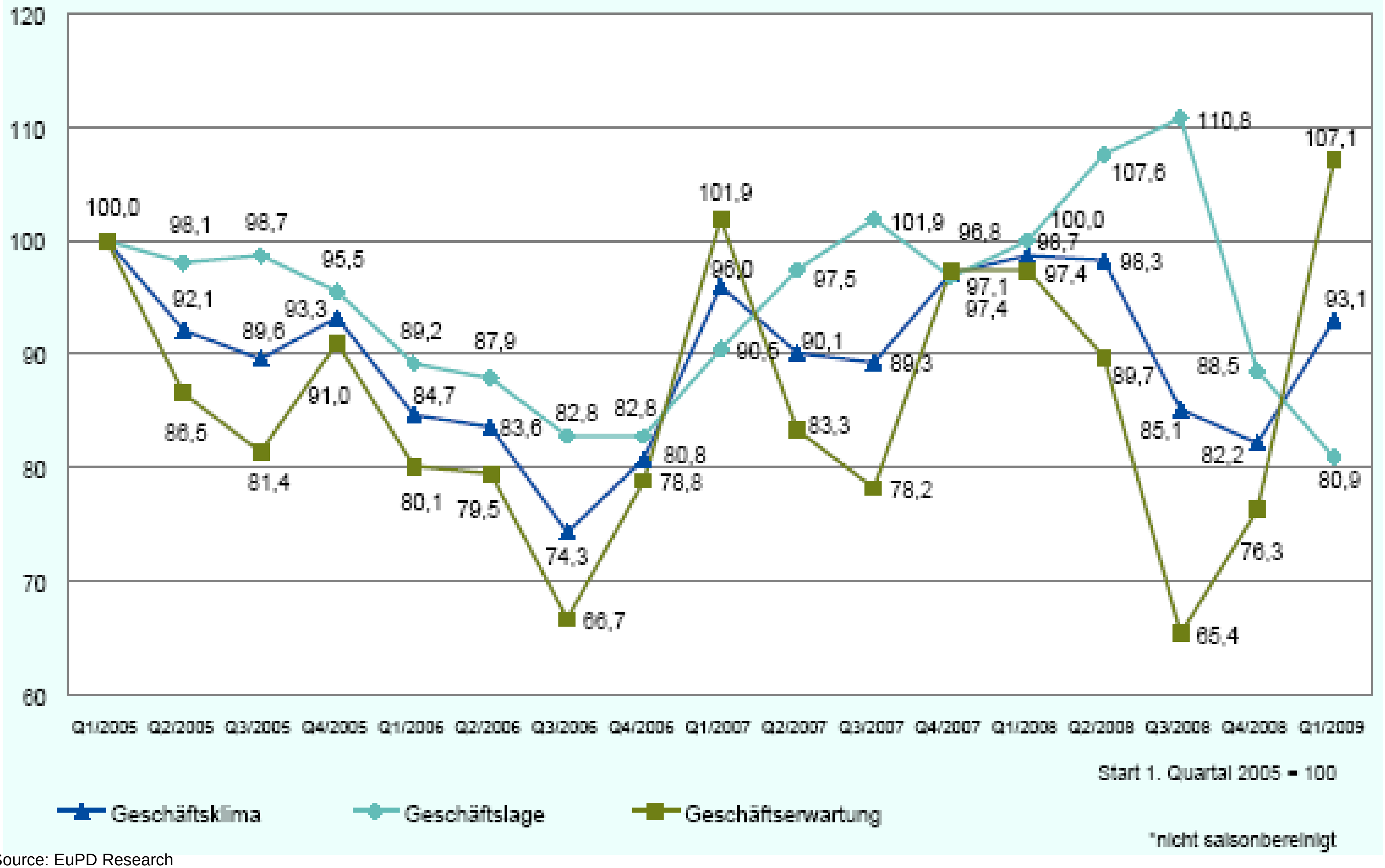
Source: PV Exchange

Module price trends on the German spot market

德国现货市场光伏组件价格变化趋势

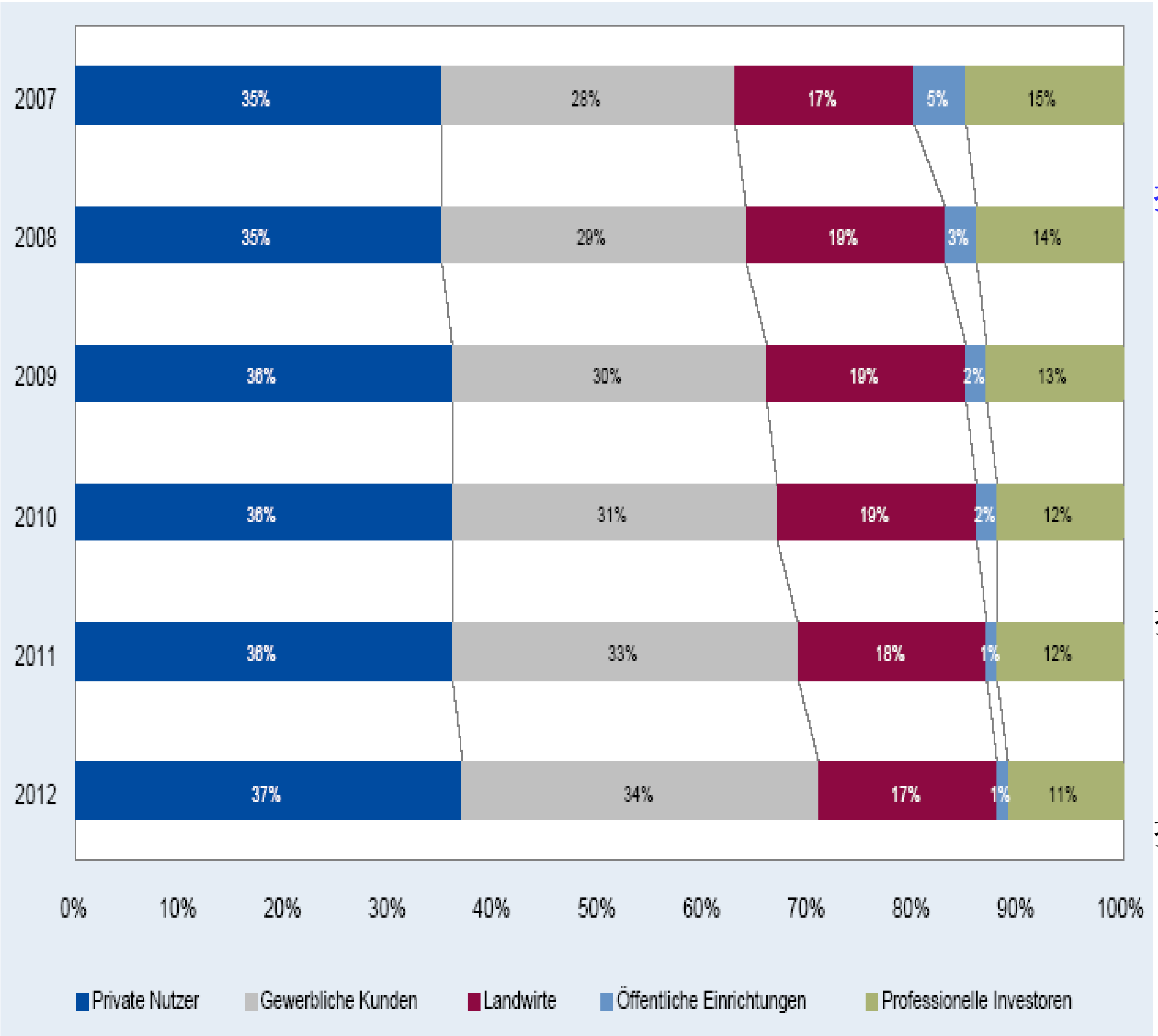


Business Confidence Indications
商业信心指数



Source: EuPD Research

Investor Origins until 2012投资来源的变化



Main Drivers to Invest

投资光伏电站的主要动力

Revenues (Ø 6%/a) 增加收入

Legislative Framework法律框架

Alternative Energy 替代能源

Ecological Aspects生态保护

Attractiveness of the Tech

技术吸引力

Image Reasons形象因素

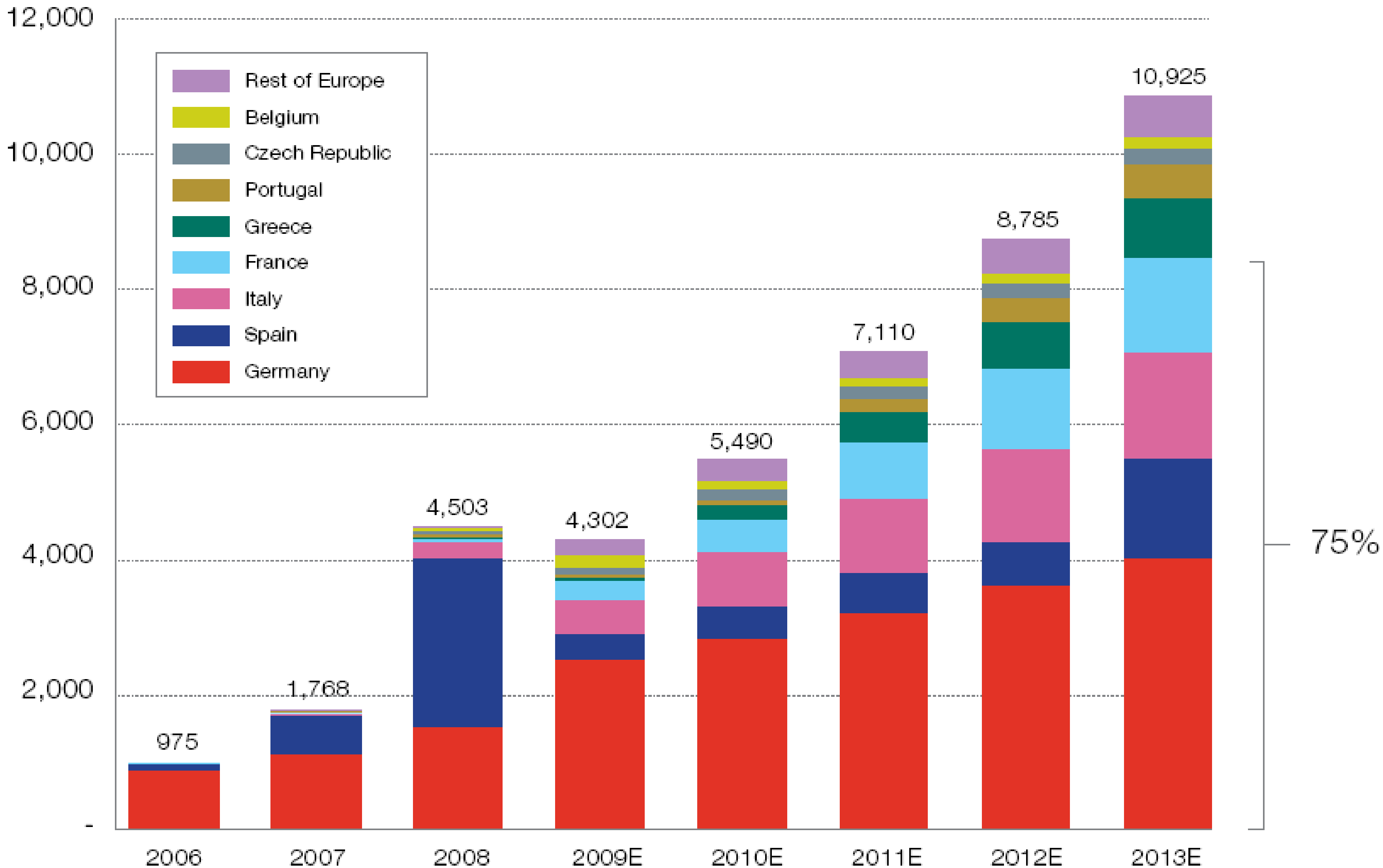
Increased Value of the Build.

提升建筑的价值

Own electricity producer 自己发电

Source: EuPD Research

2013年前欧盟年度市场发展



Source: EPIA Global Market Outlook March 2009

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