The EU PV Market - Update and Outlook
欧盟光伏市场的现状与展望

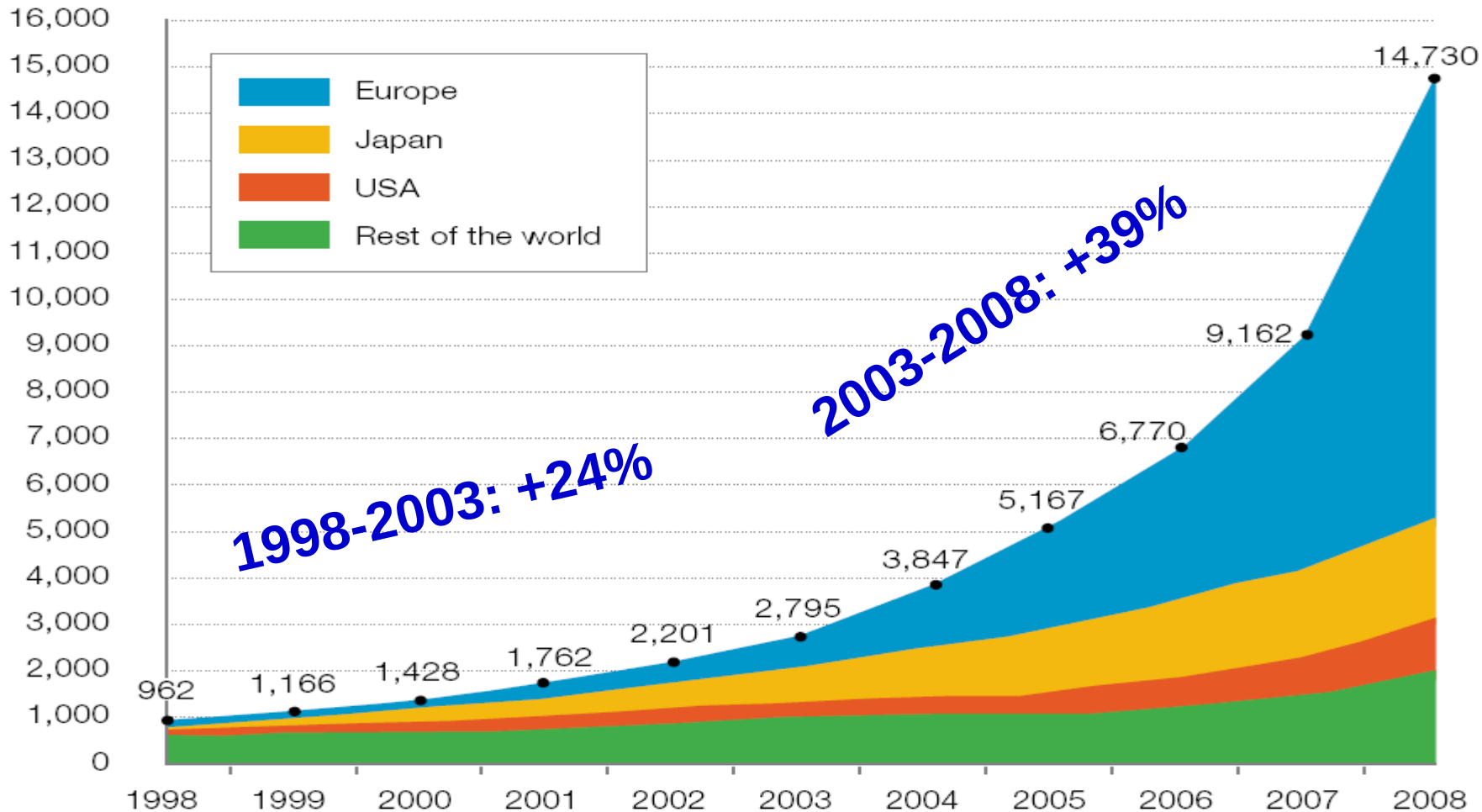
中国（呼和浩特）太阳级硅级光伏发电研讨会

2009年7月18日

Frank Haugwitz

Global Cumulative MWp PV Installations per Region 1998-2008

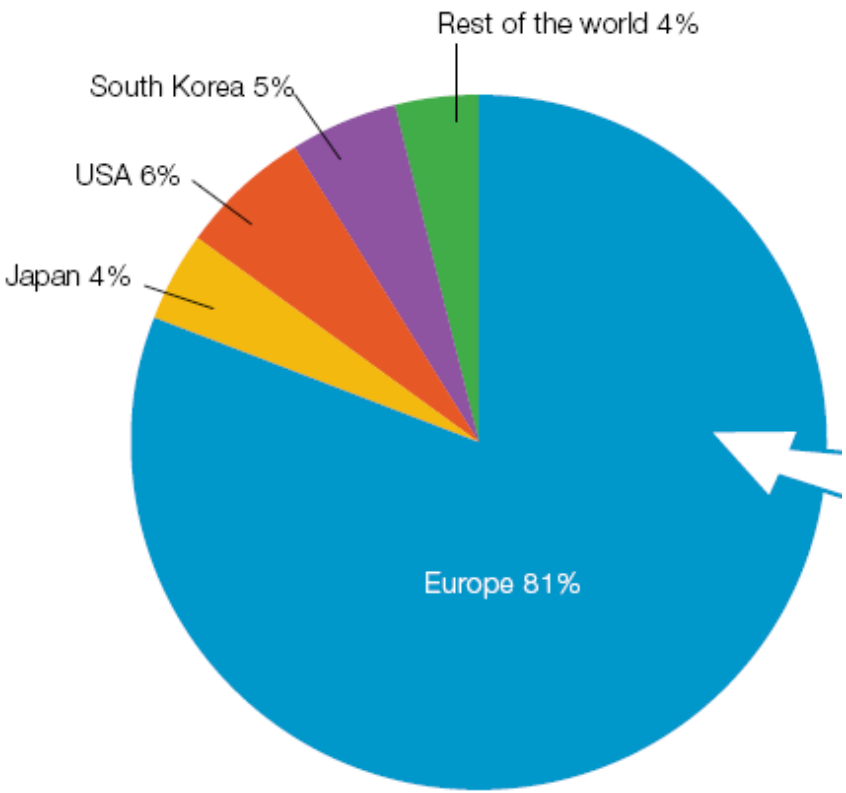
分地区的全球光伏累计安装量



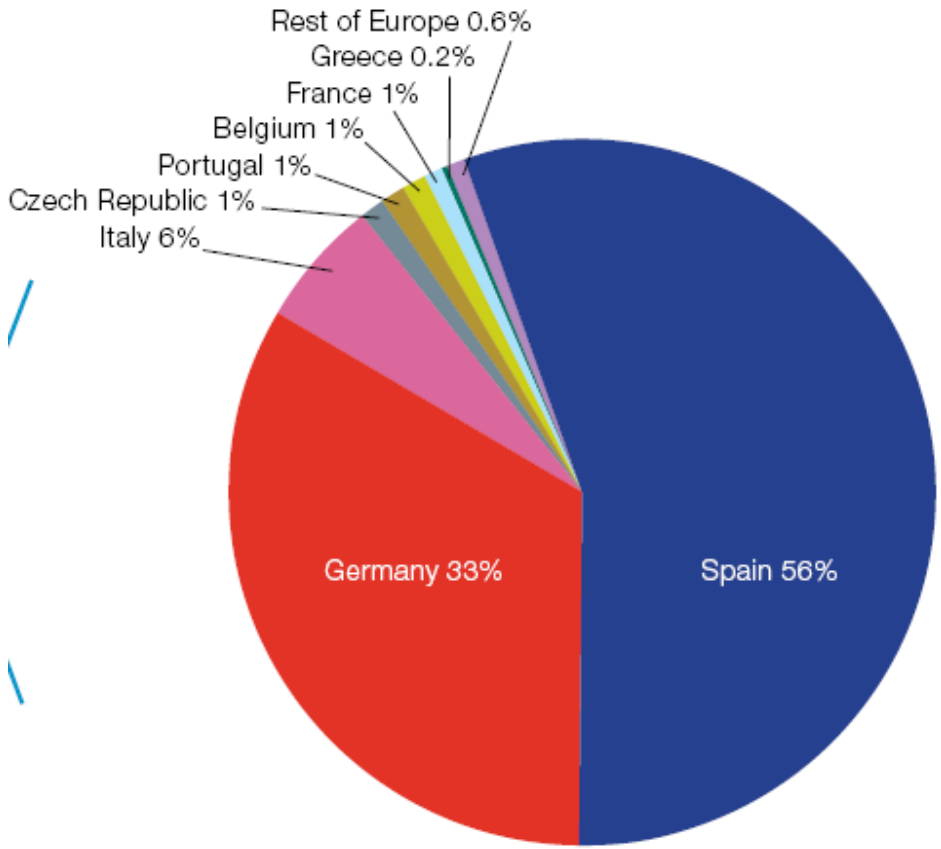
Source: EPIA Global Market Outlook March 2009

2008年光伏市场的地区分布情况

2008全球市场分布 (5,6 GWp)



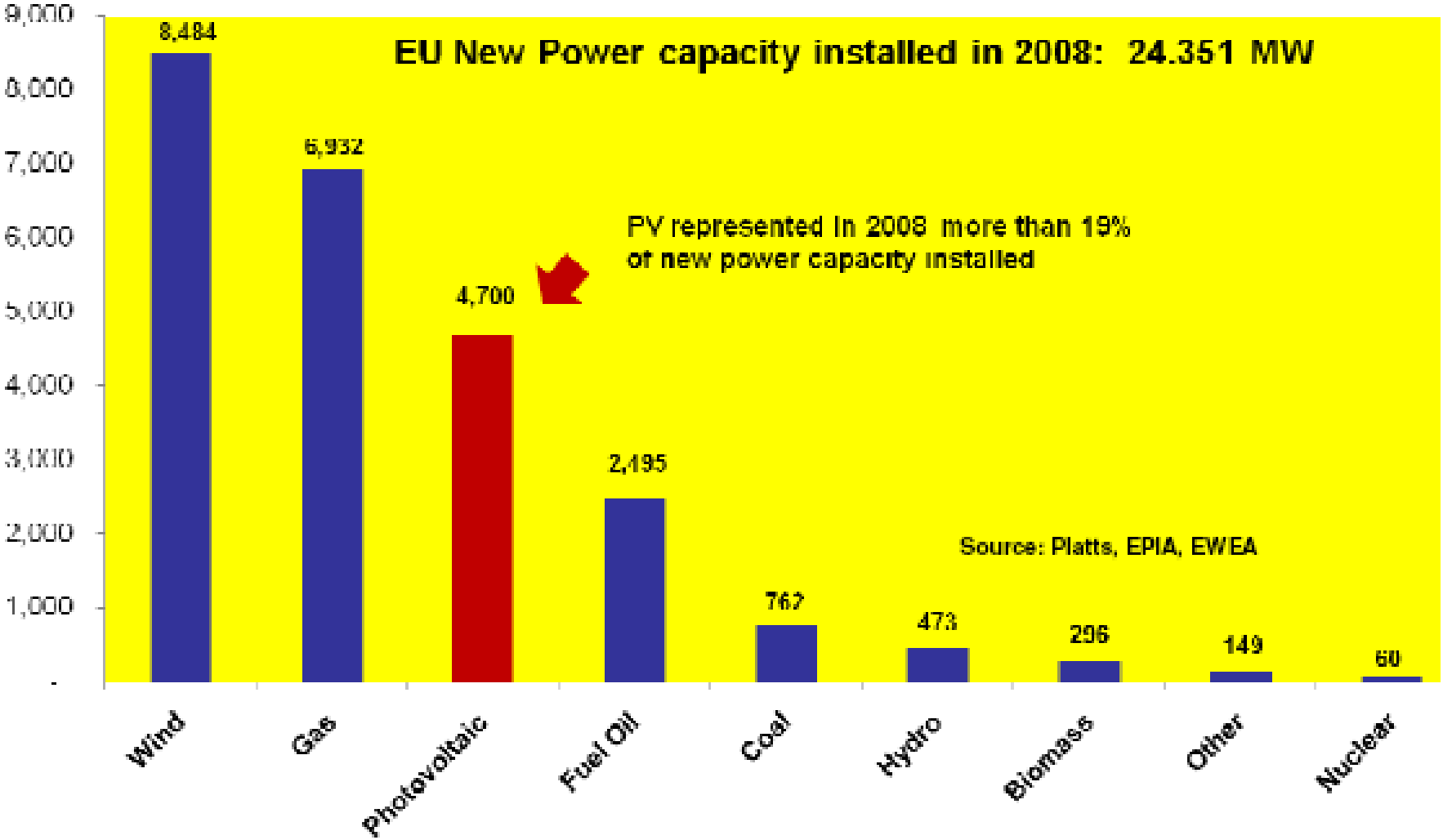
2008欧盟市场分布(4,7 GWp)



Source: EPIA Global Market Outlook March 2009

PV represented 19% of new EU power capacity installed in 2008

2008年欧盟的新装发电能力中光伏占19%



Overview Natl. Support Scheme of EU Member States

欧盟成员国国家激励机制概览

Country	Main support scheme	Ground mounted	BIPV	BAPV	Duration	Cap	Cumulative PV Power installed (end 2008)
France	FiT	0.32 - 0.43	0.60	0.32 - 0.43	20	-	87 MW
Germany	FiT	0.32	0.33 – 0.43		20	-	5,308 MW
Italy	FiT	0.35 – 0.39	0.43 – 0.48	0.39 - 0.43	20	1200 MW	430 MW
Switzerland	FiT	0.30 - 0.40	0.38 - 0.56	0.37 - 0.46	25	16 Mio CHF	46 MW
Austria	FiT	0.30 - 0.46			10+1+1	3.3 MW/year	30 MW
Belgium	GC	Brussels: 0.15 - 0.65 Wallonia: 0.15 - 0.63 Flanders: 0.45			Brussels 10 Wallonia 15 Flanders : 20	-	71 MW
Bulgaria	FiT	0.38 - 0.42			25	-	1.4 MW
Czeck Republic	FiT	0.48 - 0.49			20	-	54 MW
Greece	FiT	0.40 - 0.50			20	-	20 MW
Luxembourg	FiT	0.36 - 0.39			15	5MW	24 MW
Netherlands	FiT	0.29			15	15 MW (2009)	59 MW
Portugal	FiT	0.62			5+10	12 MW	68 MW
Romania	GC	0.11 – 0.22			10		0.45 MW
Slovenia	FiT	0.33 - 0.37			5+5+10	-	2.1 MW
Spain	FiT	0.32 – 0.34			25	500 MW (2009)	3,137 MW
UK	GC	0.03-0.06			lifetime		24.1 MW

Status EU New Member States
新欧盟成员国的情况

	Feed-in tariff	Quota system	Green certificates	Tax incentives	Preferential loans	Net-metering
Bulgaria	✓				✓	
Cyprus	✓	✓				
Czech Republic	✓			✓		
Estonia	✓			✓		
Hungary	✓	✓			✓	✓
Latvia	✓					
Lithuania	✓			✓	✓	
Malta				✓	✓	✓
Poland		✓	✓	✓	✓	
Romania		✓	✓	✓	✓	✓
Slovakia	✓				✓	
Slovenia	✓			✓	✓	

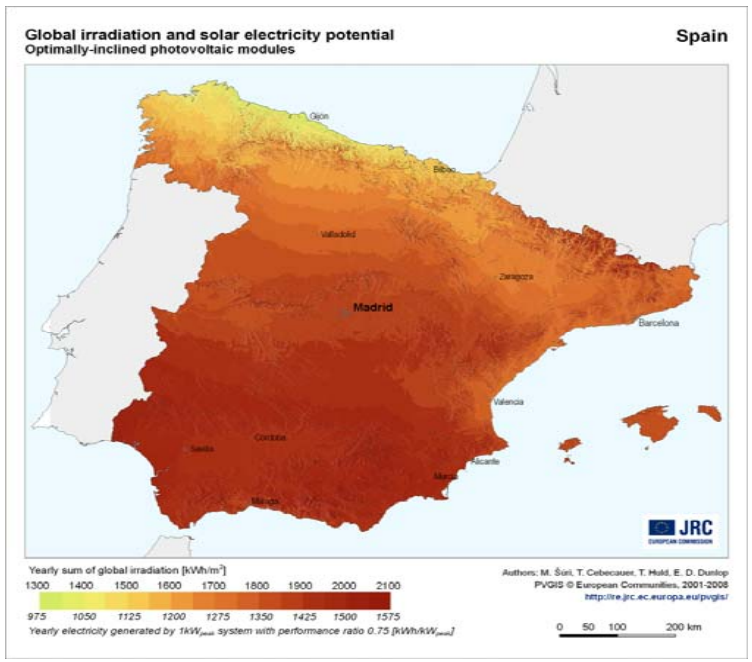
Country	Feed-in tariff rate for PV (EUR/kWh)	Granting period (years)	Degression	Price of electricity (EUR)
Bulgaria	<5KW – 0,428 >5KW – 0,380	25	no	
Cyprus	0,383 for houses and non-profit entities 0,36 for companies 20,5–22,5 with subsidy	15 or 20	no	0.12-0.16
Czech Republic	0.4603-0.4634 or bonus	20	5%	
Estonia	0,073	12		
Hungary	0,093	investment payback	no	0,156€/kWh for households
Latvia	0,427 since 02.2009	10	no	0,106
Lithuania	to be set by National Control Commission for Prices and Energy		no	
Malta	No			
Poland	GC = 250 PLN (57 EUR)			0,09
Romania	CG = 4 x (27 – 55) EUR	15	no	0,144 – 0,256
Slovakia	0,280 0,45 since 2009	1	yes (from 2009) 10%	
Slovenia	0,399 or bonus	15	7%	

Market Development in EU New Member States 2003 – 2008

2003-2008新欧盟成员国的市场开发

Country NMS	2003	2004	2005	2006			2007			2008		
	Total	Total	Total	Off-grid	On-grid	Total	Off-grid	On-grid	Total	Off-grid	On-grid	Total
	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]
Czech Rep.	330	363	470	194	546	740	209	5252	5361	380	54 294	54 674
Slovenia	51	96	200	95	310	405	100	925	1025	100	2 046	2 146
Cyprus	254	340	518	450	578	1028	560	843	1403	600	1586	2186
Bulgaria	20	33	43	13	53	66	20	55	75	32	1 375	1 407
Poland	107	234	291	337	101	438	488	152	640	832	179	1011
Hungary	100	138	155	100	150	250	130	220	350	180	270	450
Romania	50	86	101	95	95	190	175	125	300	205	245	450
Malta	4	9	15	0	48	48	0	97	97	0	238	238
Lithuania	17	17	19	40	0	40	55	0	55	55	0	55
Slovakia	10	15	20	20	0	20	20	26	46	20	46	66
Estonia	2	2	2	5	0	5	12	0	12	12	0	12
Latvia	3	3	3	3	0	3	4	0	4	4	0	4
TOTAL	948	1336	1837	1352	1881	3233	1773	7695	9368	2 420	60279	62 699

Spanish PV Market Development
西班牙光伏市场的发展



Royal Decree 29.09.2008

- **500 MWp Cap / a**
- **Pre-Registration**
- **Ø 10% Market Growth**

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

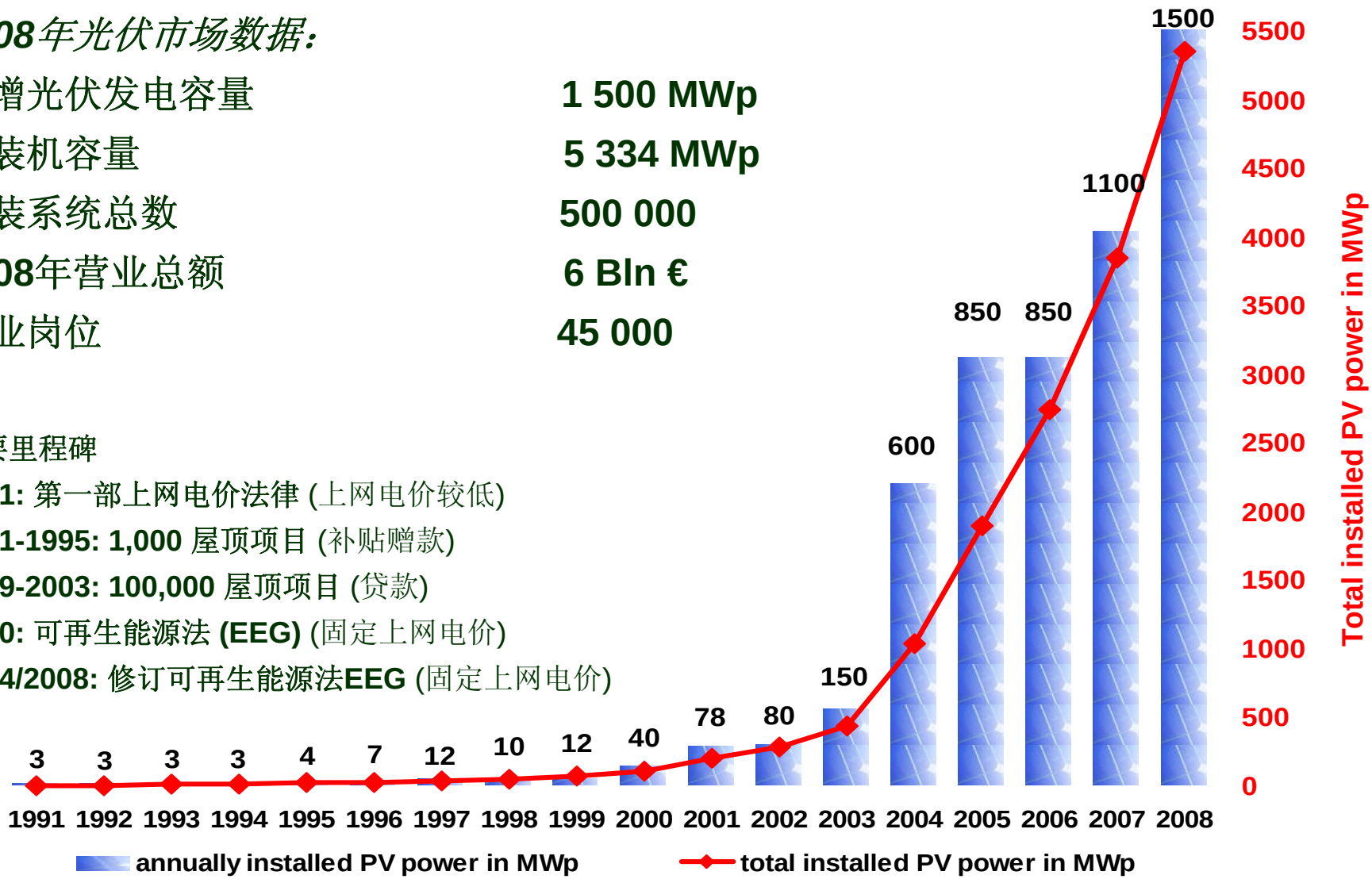
1991: 第一部上网电价法律 (上网电价较低)

1991-1995: 1,000 屋顶项目 (补贴赠款)

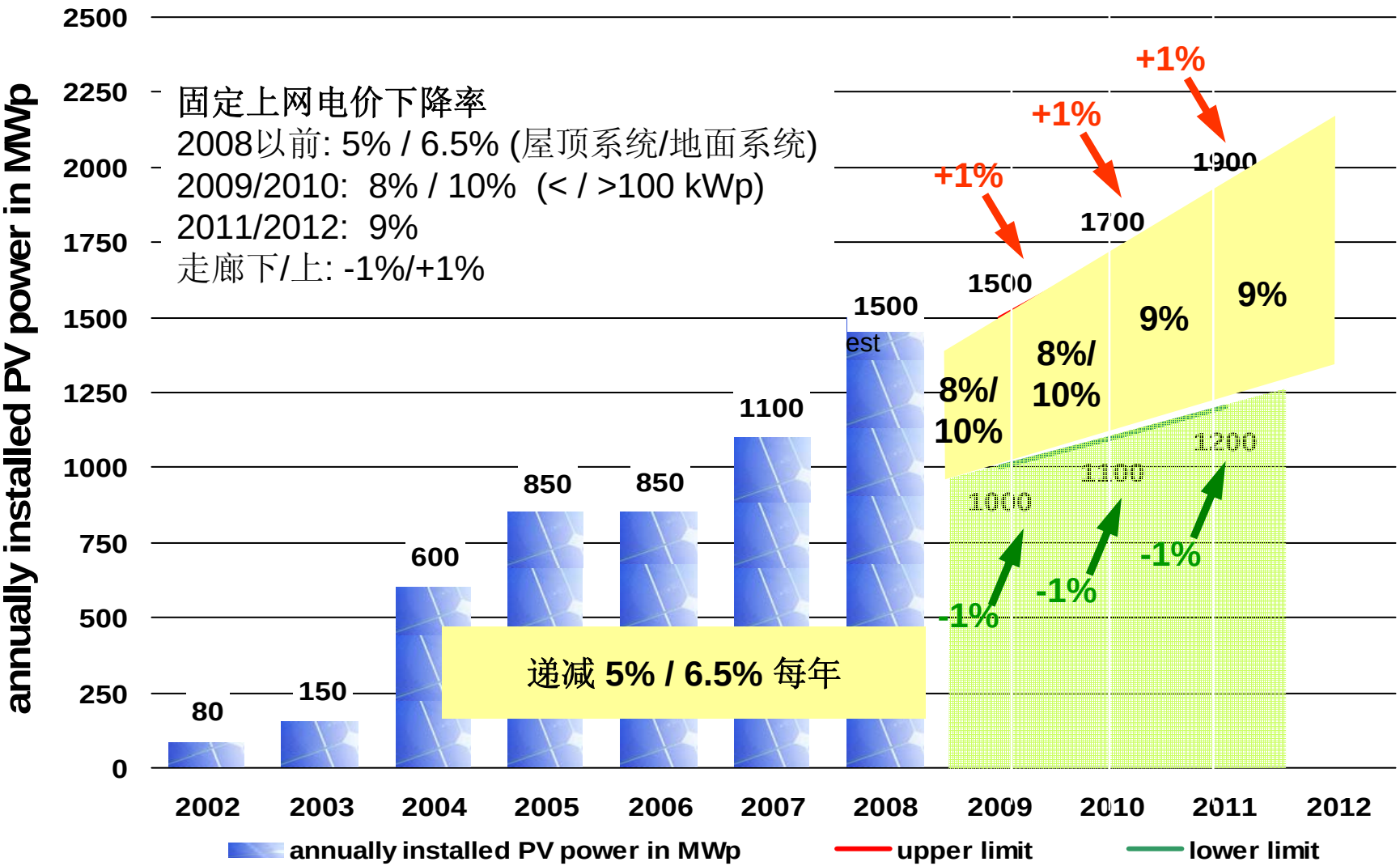
1999-2003: 100,000 屋顶项目 (贷款)

2000: 可再生能源法 **(EEG)** (固定上网电价)

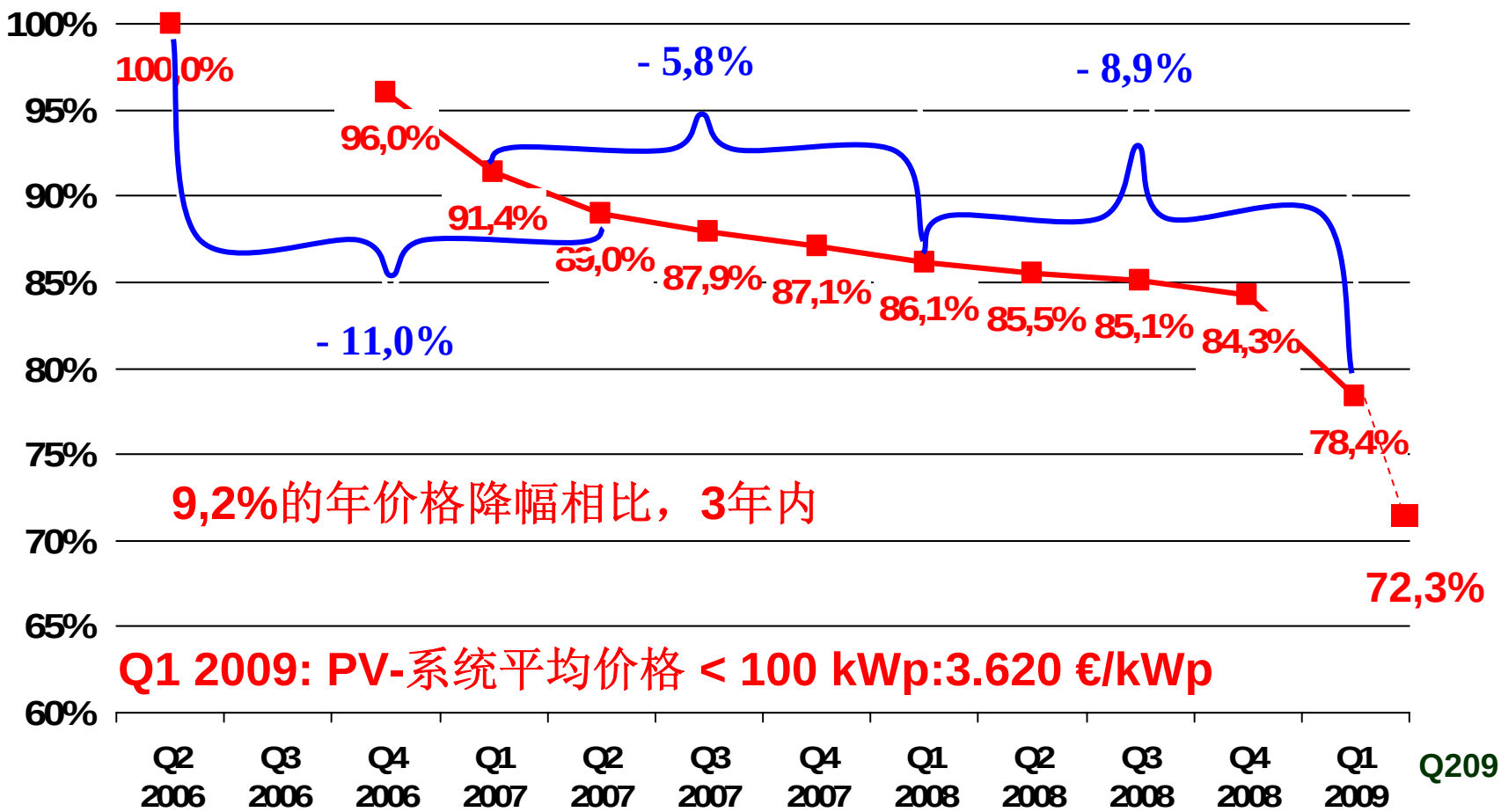
2004/2008: 修订可再生能源法**EEG** (固定上网电价)



德国固定上网电价- 06/2008修订

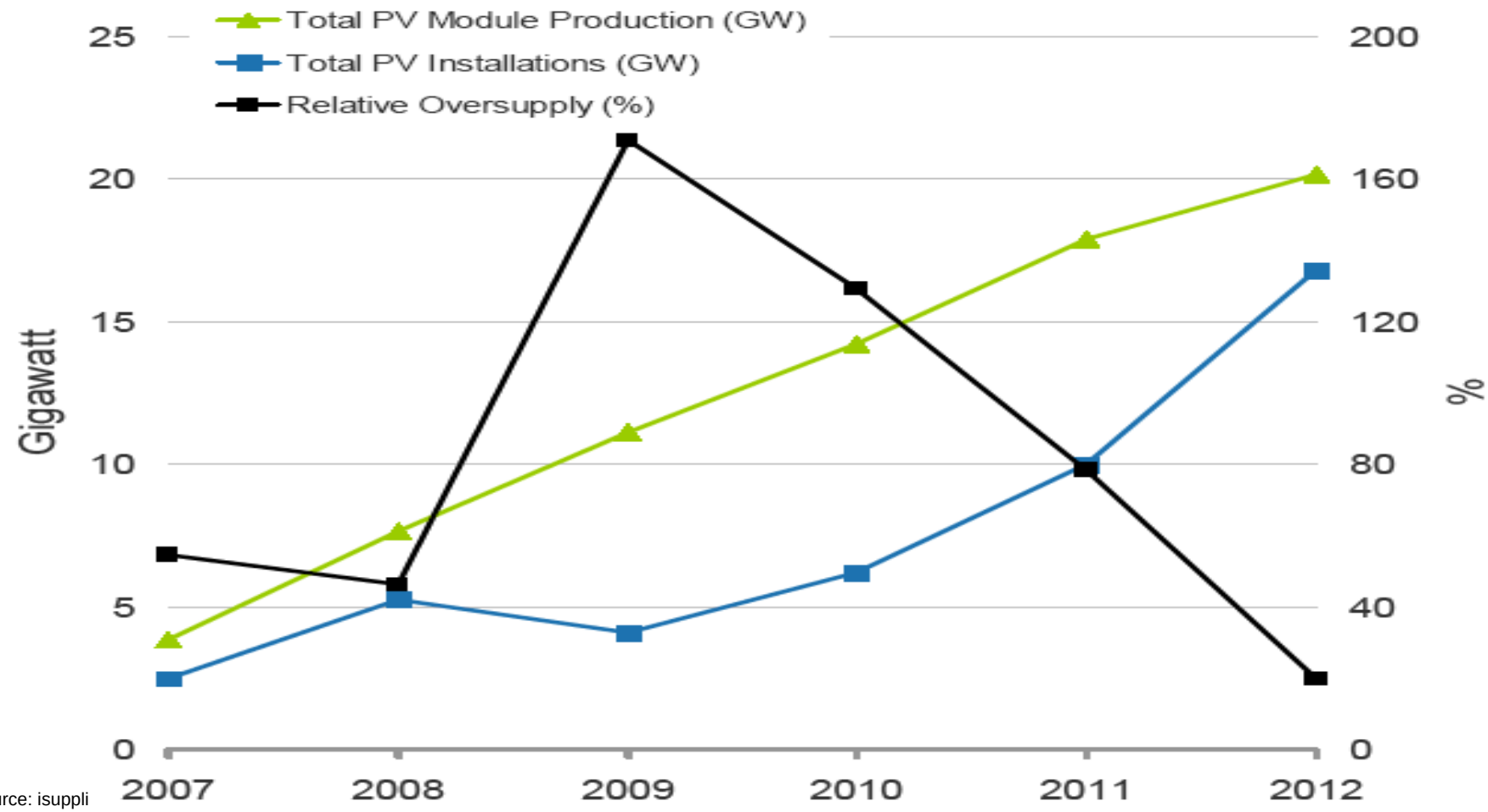


德国光伏系统价格指数



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

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

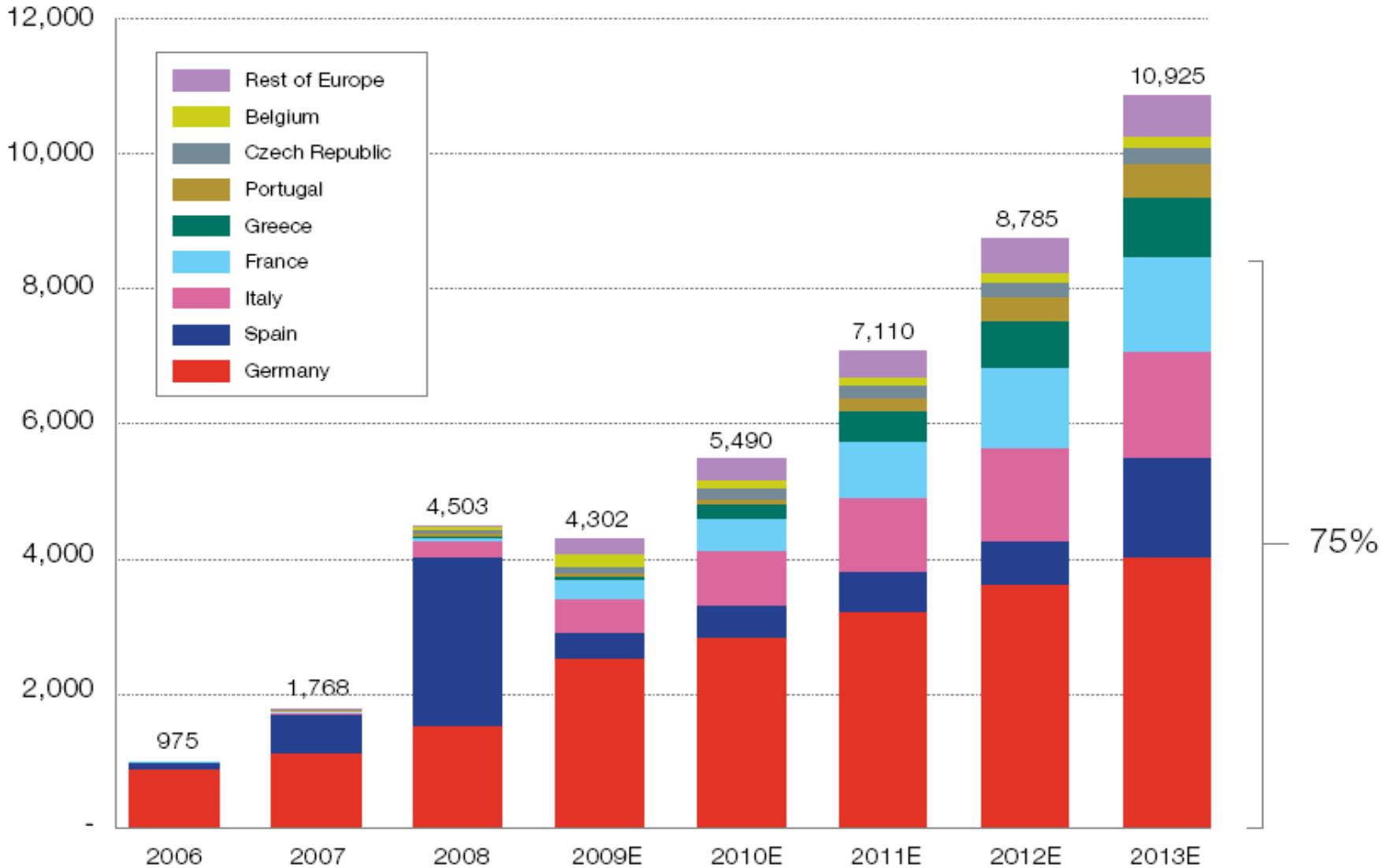
European PV Markets – Perspectives欧洲光伏市场的展望

Germany 德国	FIT Amendment 06/2008 will ensure continuity until 2012; no changes expected, market demand for 2010 est. 2 GWp/a 2008年6月上网电价法的修改将保证到2012年前连续不变的发展，2010年预计的市场需求为2GW/年
Spain 西班牙	Explosive growth in 2008; Royal Decree 09/2008 reduces the PV market to 500 MWp in 2009/2010 and foresees annual market growth of 10% 2008年爆炸式增长；2008年9月的皇家法令使2009/2010年的光伏市场减少到500MW，预计年市场增长率为10%
Italy 意大利	FIT, Natl. Target of 1200 MW by 2010/11, New FIT 2011 although tight control expected sound market development envisaged, admin barriers on regional level, market demand for 2010 est. 650-900 MWp/a 上网电价法，2010/2011年国家目标为1200MW，2011年新上网电价后会有更大发展，2010年市场需求约为650-900MW/年
France 法国	FIT, good market development, favorable conditions for BIPV, further improvements of framework conditions expected, 2010 est. 600 MWp/a 上网电价法，市场发展良好，对BIPV优惠，将进一步改进网络环境，2010年市场需求约为600MW/年
Greece 希腊	Jan 15, 2009 new FIT incl. degression from 08/2010 onwards, new Roof-Top Prog. to be initiated, former cap abolished, due to admin procedures applications for 3.7 GW are waiting to be approved 2009年1月15日新的上网电价法包括了自2010年8月开始的递减，将发起新的屋顶项目，废除了以前的封顶政策，由于管理程序，3.7GW的应用等待批准

Promising Future European PV Markets其他欧洲市场:

Belgium (48 MWp), Czech Republic (51MWp), Portugal 50 MWp), Slovenia, UK, Turkey, …

2013年前欧盟年度市场发展

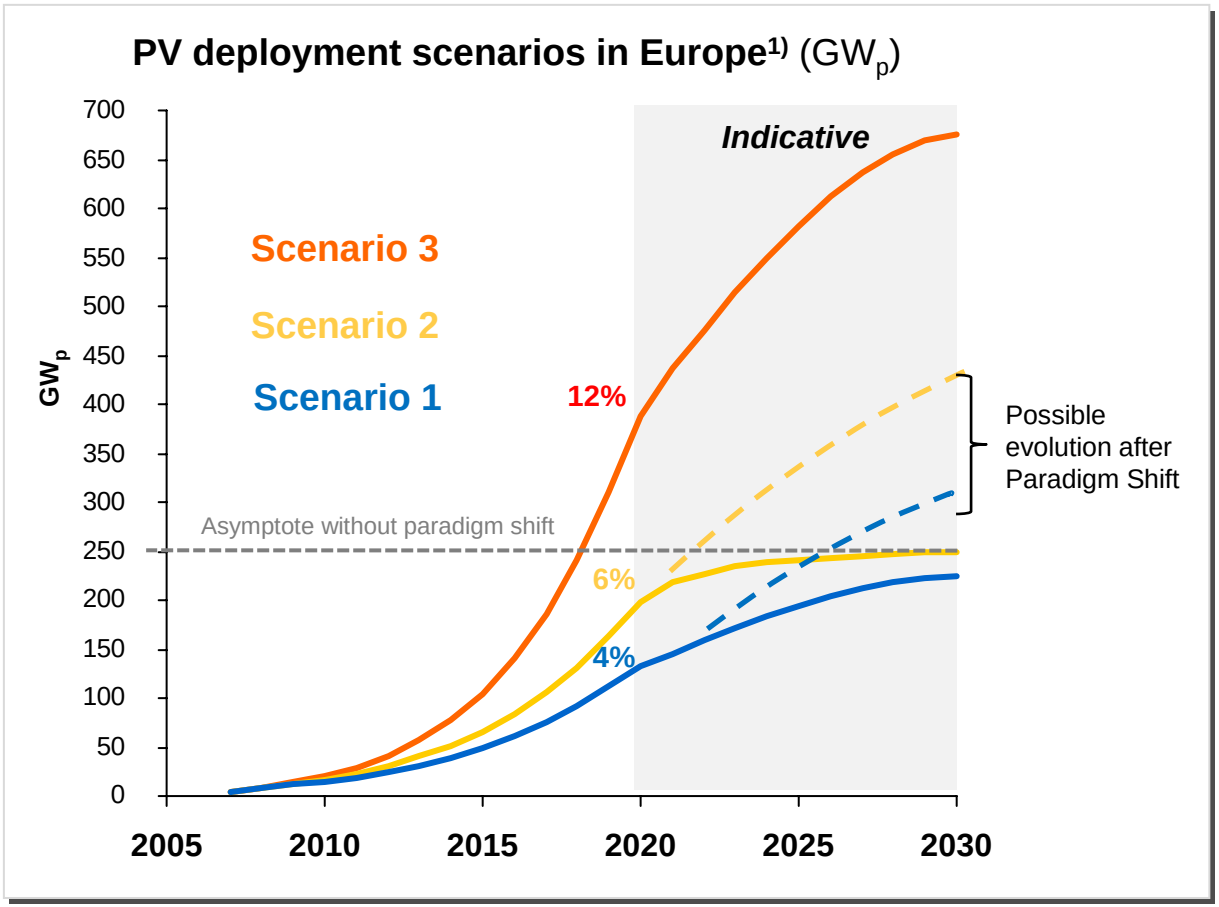


Source: EPIA Global Market Outlook March 2009

3 PV deployment scenarios in Europe[1]
3种欧洲光伏发展预想

The Paradigm Shift requires significant changes in the existing electricity system and at market and regulatory level, together with a strong collaboration with other players in the energy sector

光伏的发展需要现有电力系统、市场和调度环节的显著改变，还需要电力系统其它参与者的密切合作



1) Europe 27, Croatia, Norway and Turkey

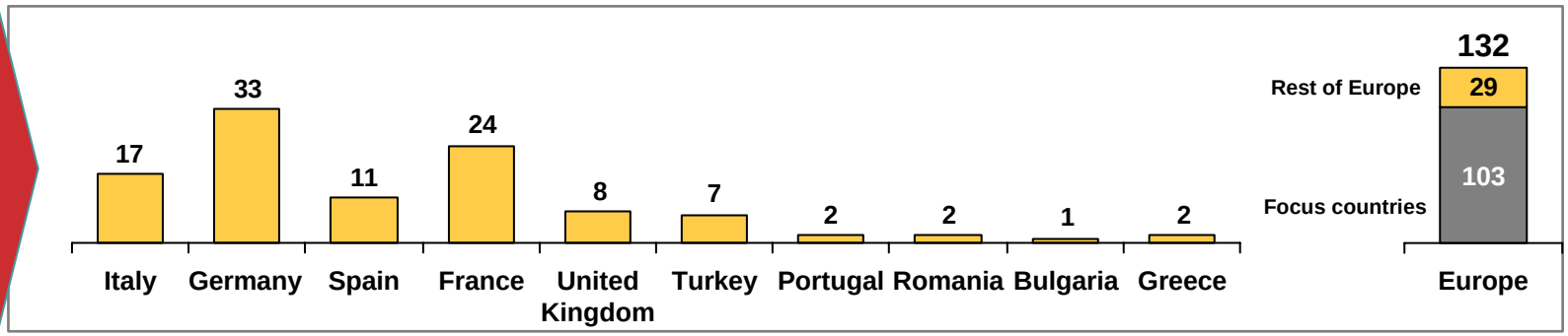
Sources: EPIA, EU DG TREN "European Energy and Transport: trends to 2030, update 2007", Eurostat Data Portal, EU JRC Photovoltaic Geographical Information System, A.T. Kearney analysis

For the Baseline scenario, PV penetration in the 10 countries is expected to reach ~100 GW_p out of the total 130 GW_p

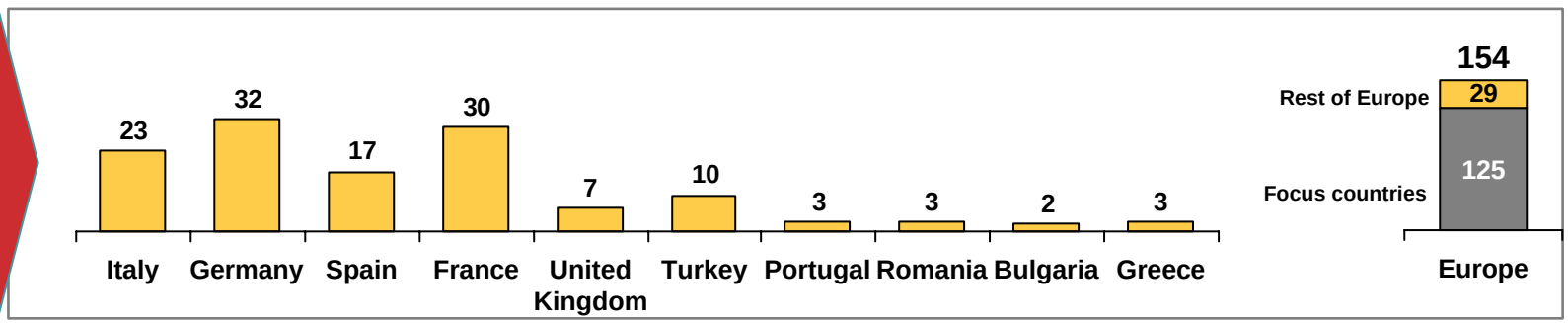
基线预想，10个领先国家将安装100GW，欧盟将安装130GW

PV baseline scenario

2020 PV Installed Capacity GW_p
2020年光伏安装容量GW_p



2020 PV Electricity Production TWh
2020年光伏发电产量TWh



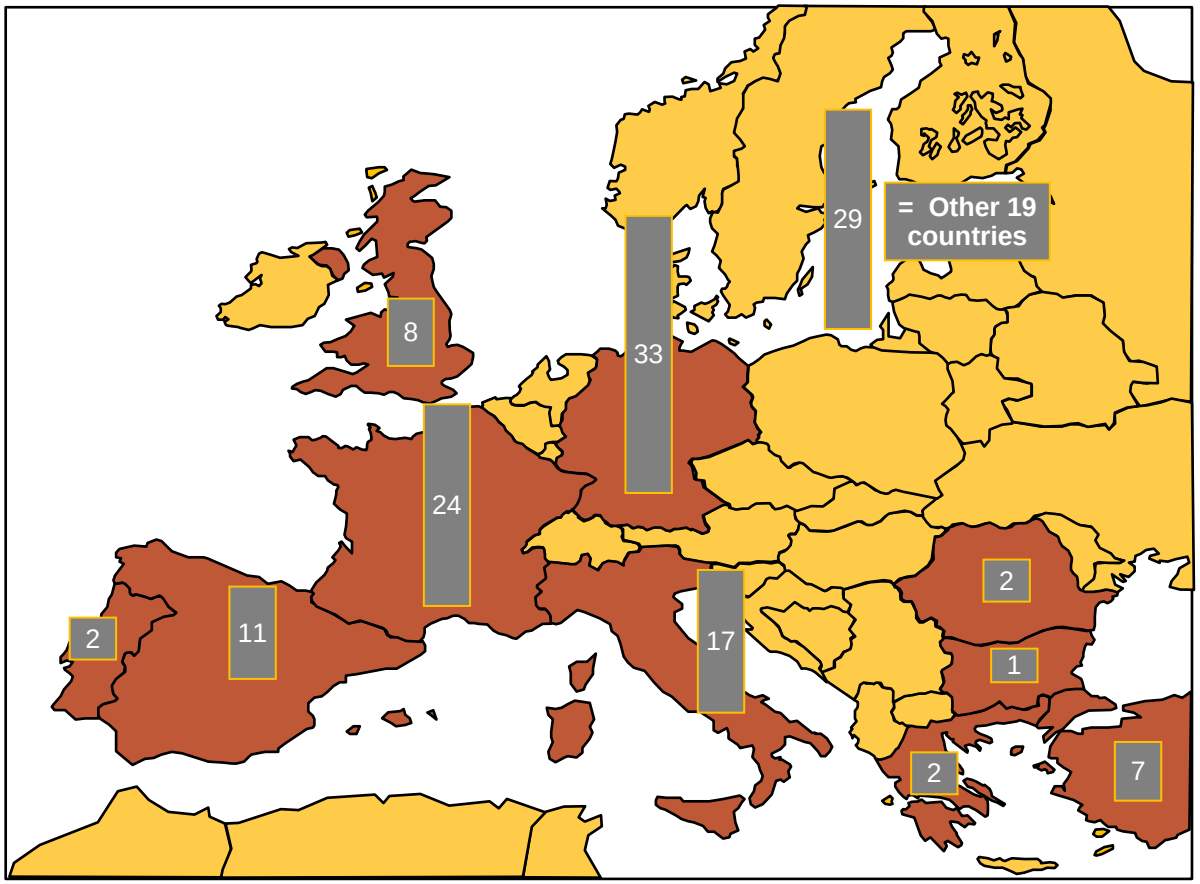
PV Penetration on total electricity consumption in 2020
2020年光伏发电占总电力消耗比例

The geographical deployment scenario is based on the key drivers of PV penetration

地理上的发展预想基于一些领先国家

Example – Baseline scenario cumulative installation by 2020 (GW_p)

例：到2020年基线预想的总安装量GW



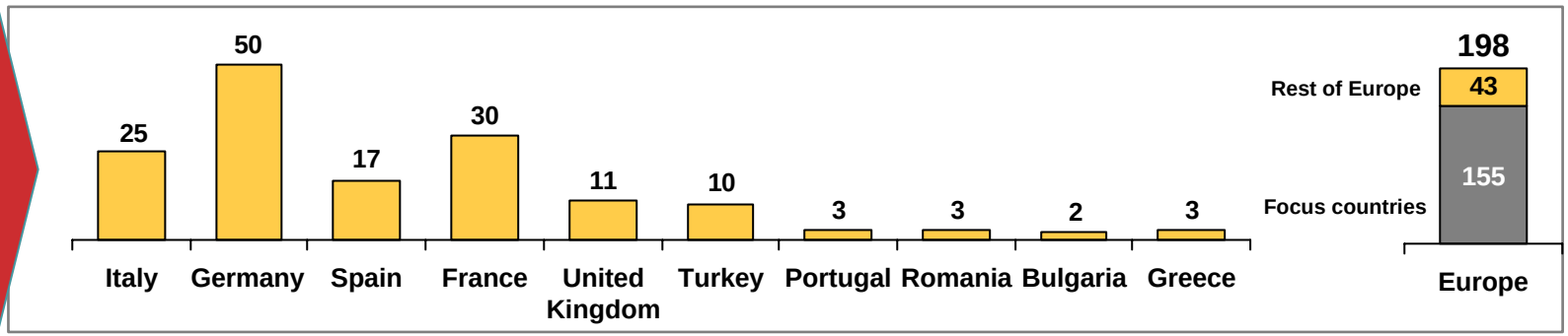
- **The deployment takes into account all the drivers identified to drive PV penetration:**
  - Evolution of electricity prices by country and customer segment
  - Irradiation data
  - Size and pattern of electricity consumption
  - Support schemes available
  - The likely results of the implementations of the recommendations for the SET plan

Accelerated Growth Scenario, PV penetration in the 10 countries will amount to ~155 GW_p

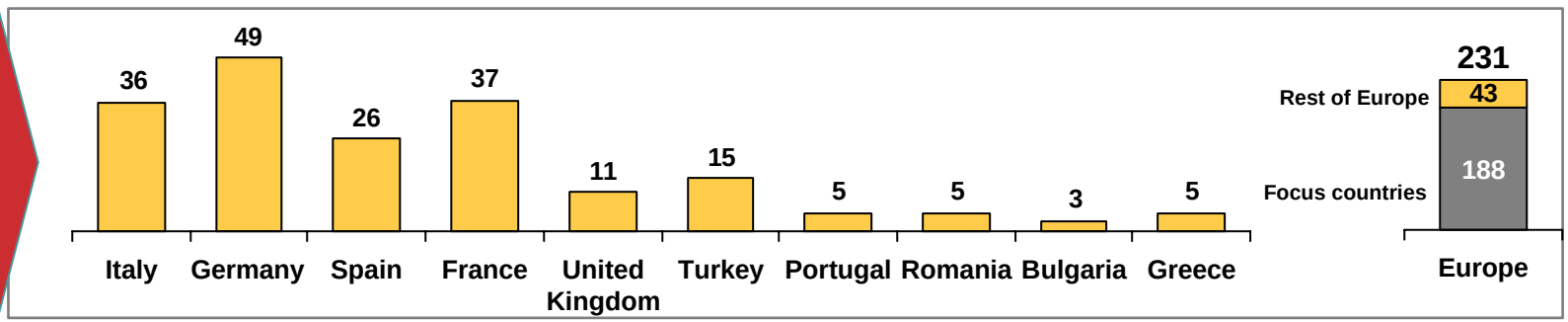
加速预想,10个领先国家光伏总安装量达到155GW

PV Accelerated Growth Scenario 加速预想

2020 PV Installed Capacity GW_p
2020年光伏安装容量GW_p



2020 PV Electricity Production TWh
2020年光伏发电产量TWh



PV Penetration on total electricity consumption in 2020
2020年光伏发电占总电力消耗比例

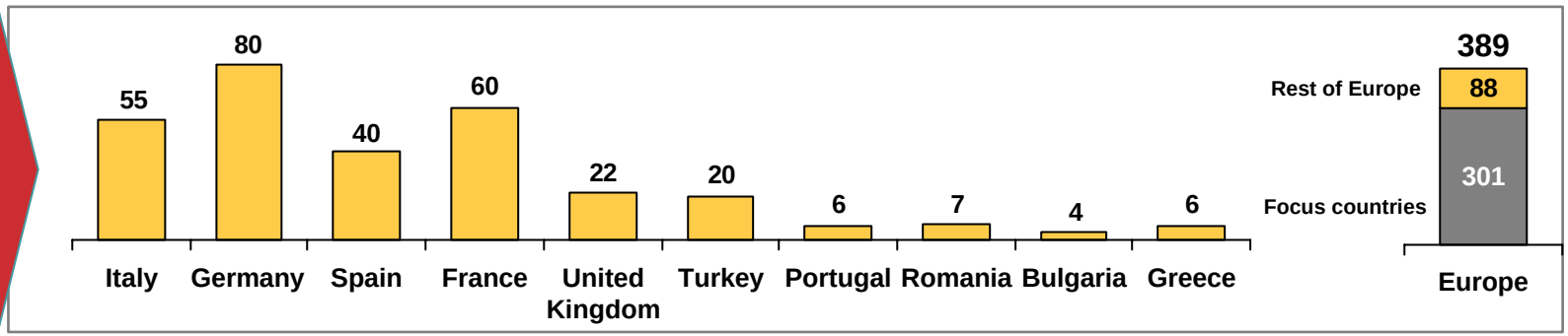
8.3%	8.2%	7.6%	7.2%	2.6%	7.8%	7.6%	6.7%	6.3%	6.2%	6.0%

In the Paradigm Shift scenario, total PV installation in the 10 countries will reach ~300 GW_p

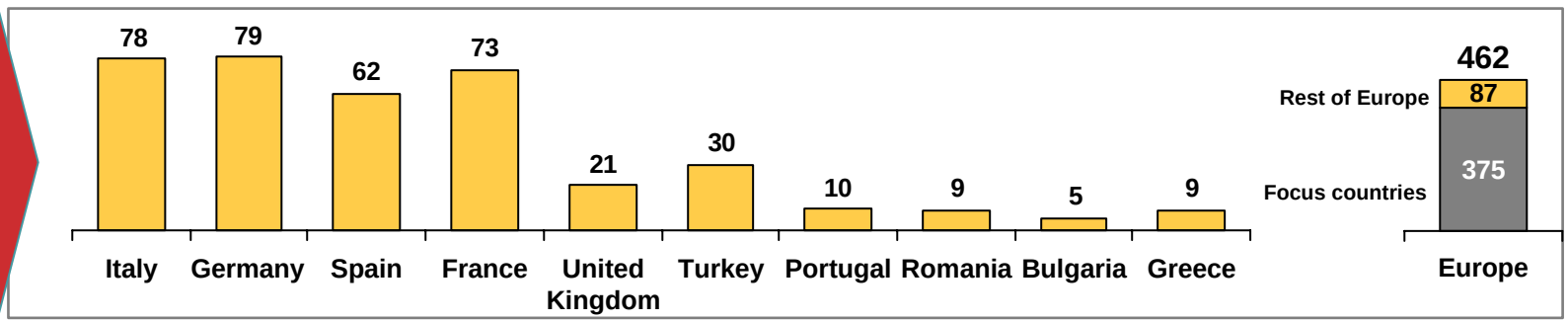
范例预想,10个领先国家光伏总安装量达到300GW

PV paradigm shift scenario 范例预想

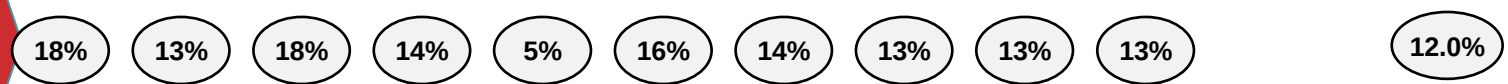
2020 PV Installed Capacity GW_p
2020年光伏安装容量GW_p



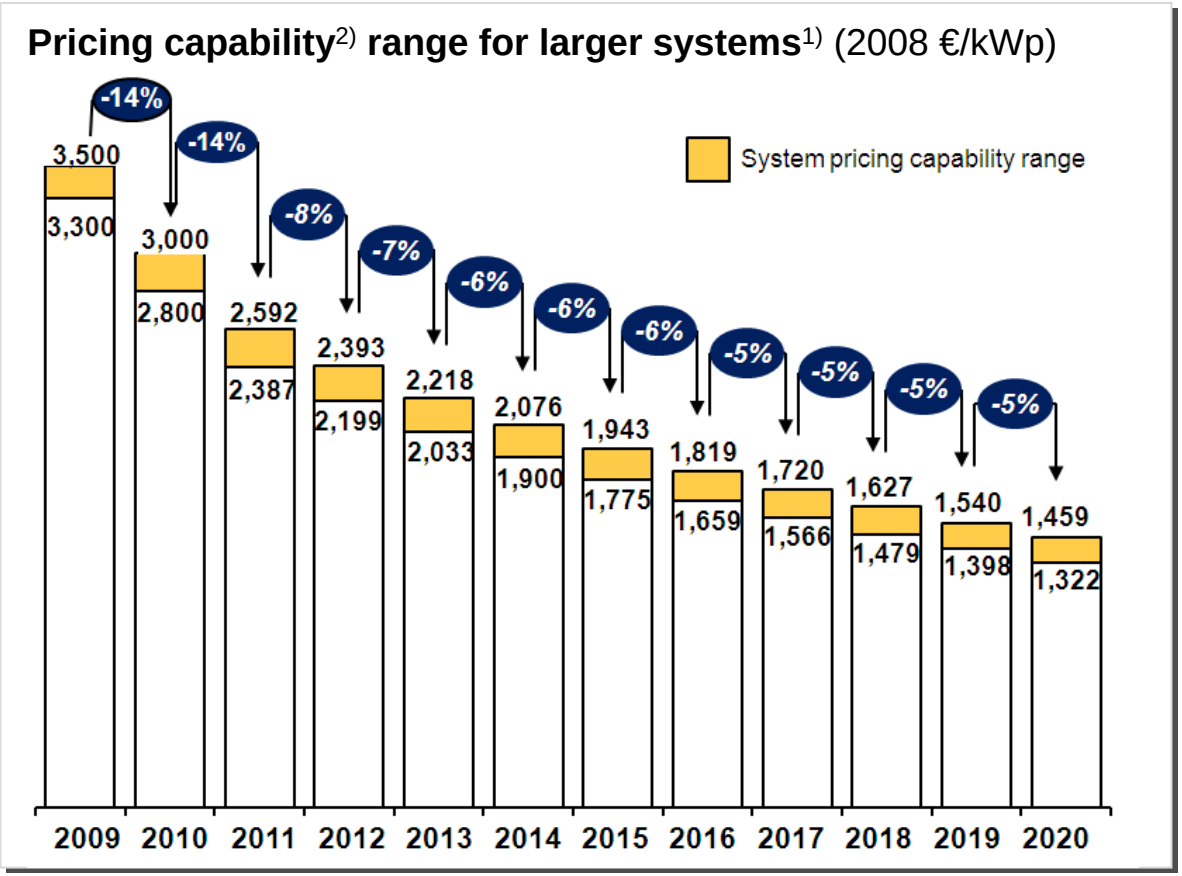
2020 PV Electricity Production TWh
2020年光伏发电产量TWh



PV Penetration on total electricity consumption in 2020
2020年光伏发电占总电力消耗比例



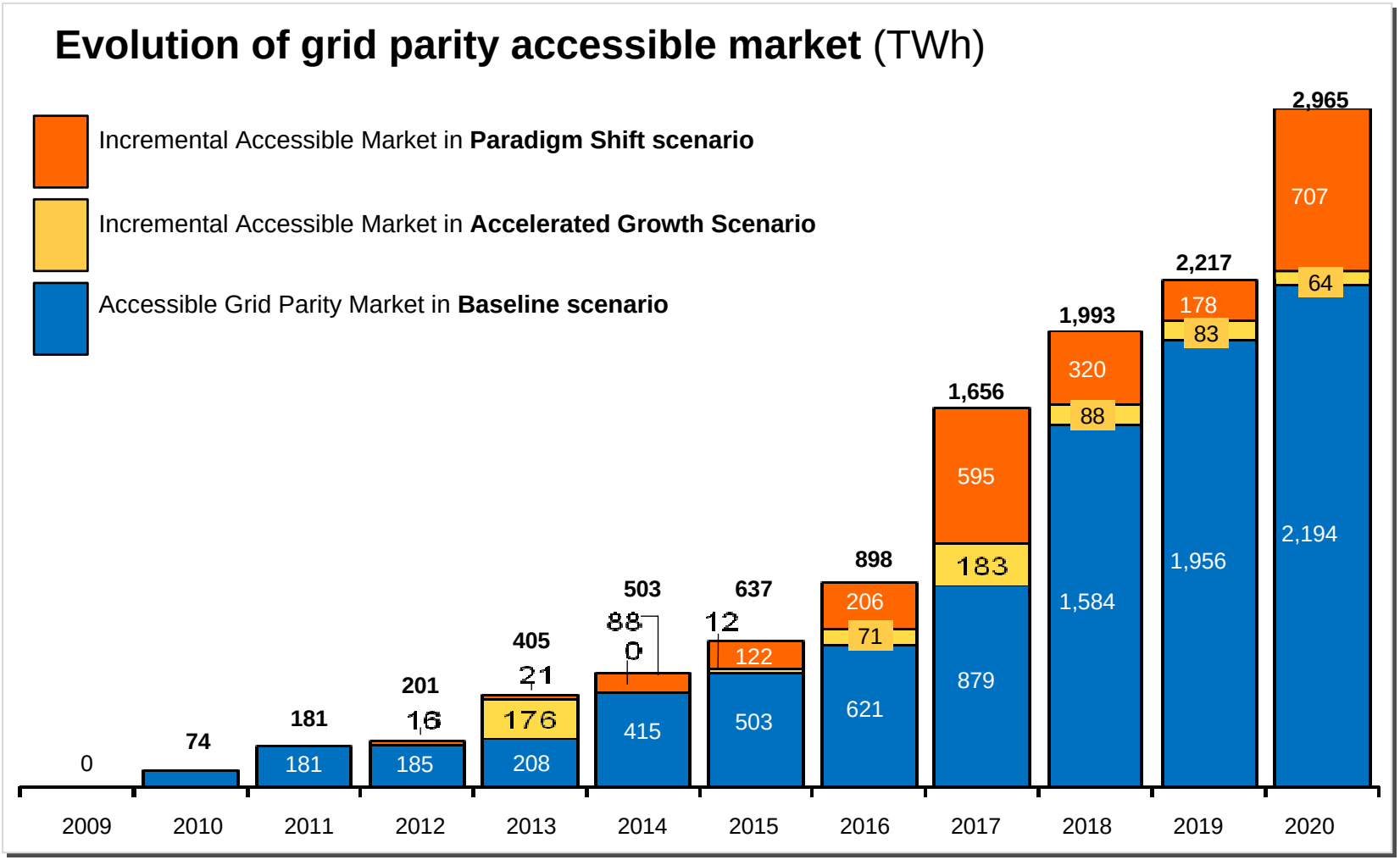
Potential for further cost reductions under the accelerated scenario



With the **accelerated deployment of PV** and the **required R&D efforts**, technologies will continue to rapidly improve, allowing a 50% price reduction at system level by 2020 with further future improvement potential

1) Industrial or IPP systems larger than 1 MW_p
2) In real terms 2008 €
Sources: EPIA, National Renewable Energy Laboratory;

... leads to large grid parity markets



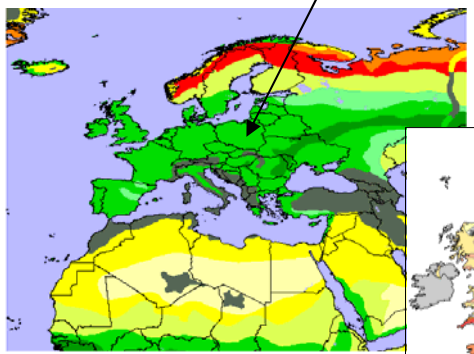
Sources: EPIA, Eurostat Data Portal, EU JRC Photovoltaic Geographical Information System

Plenty RE Resources in EUMENA

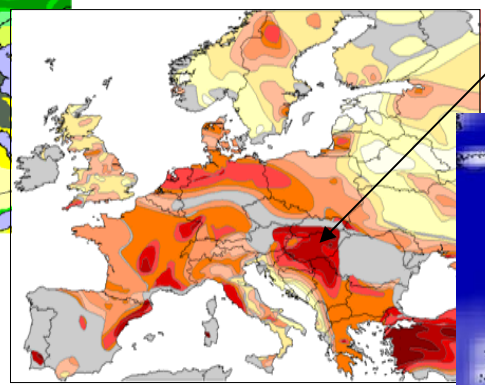
欧盟国家丰富的可再生能源资源

Biomass生物质 (1)

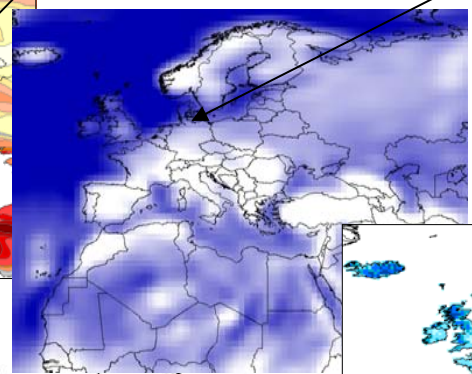
In brackets括弧: (Typical Yield in $GWh_{el}/km^2/y$)



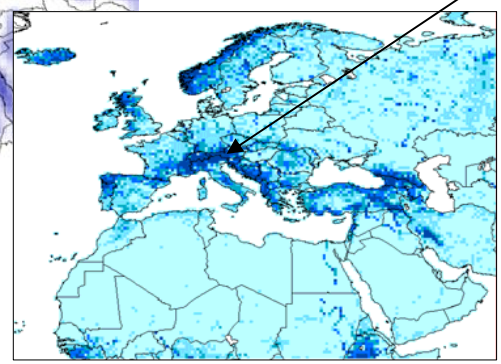
Geothermal Energy地热 (1)

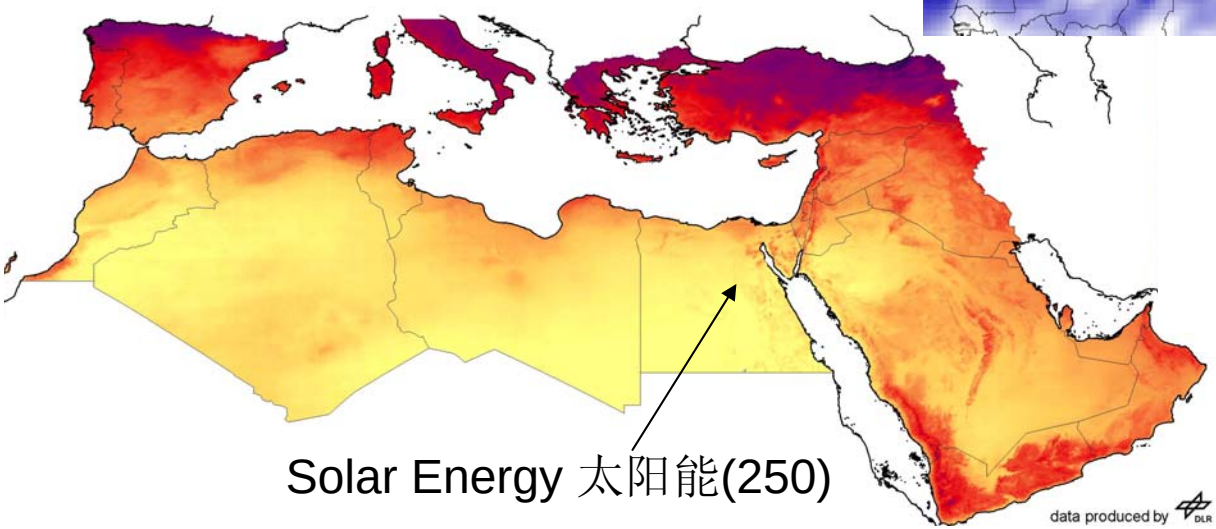


Wind Energy风能 (30)



Hydropower 水能(30)





Solar Energy 太阳能(250)

Every 10 km² in MENA yield 15 million barrels of fuel oil per year in form of solar energy

Concentrating Solar Thermal Power
聚光太阳能热发电

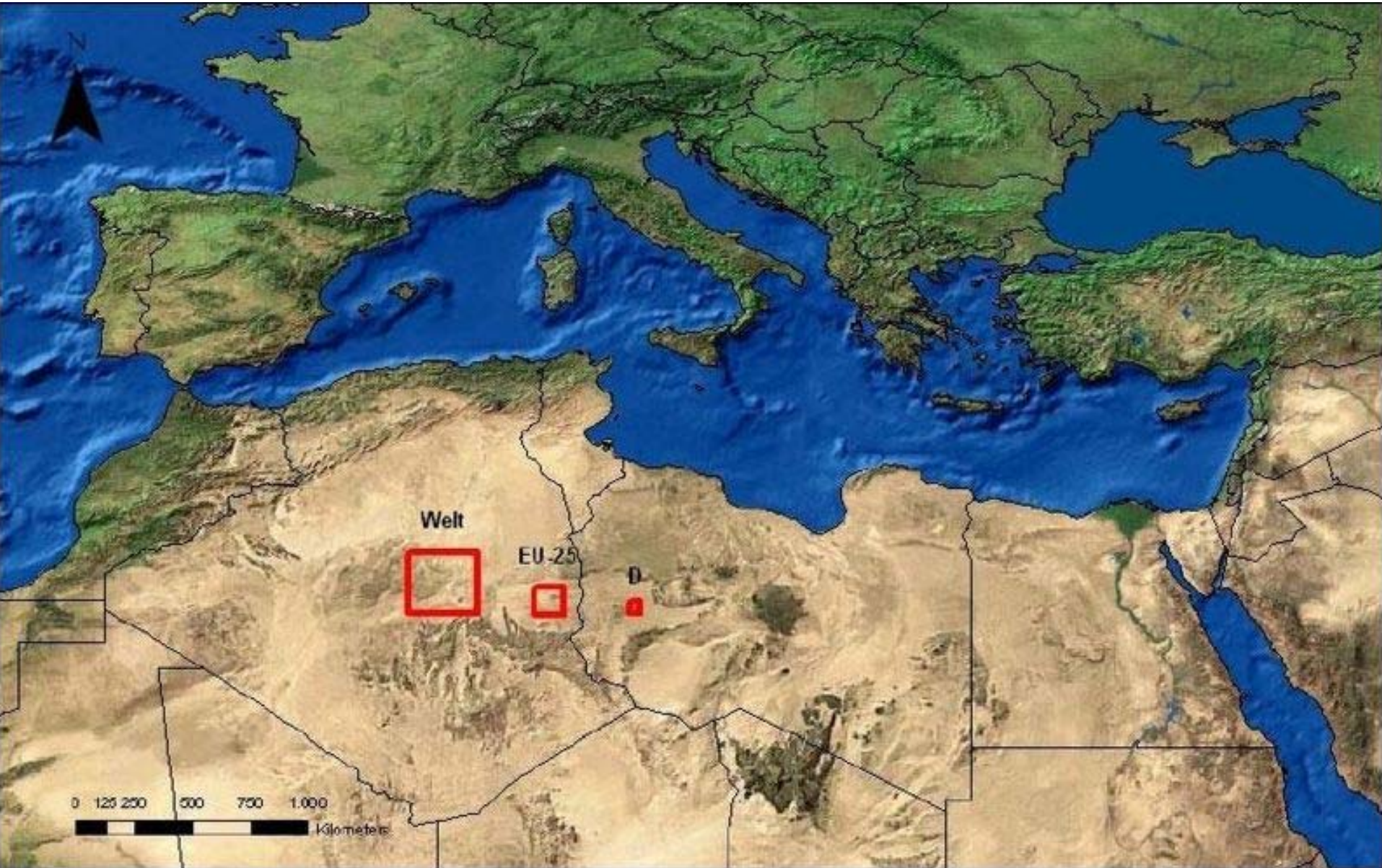
parabolic trough 抛物线槽式(PSA)

solar tower 塔式(SNL)

linear Fresnel 线性费涅尔(Solarmundo)

parabolic dish 抛物面蝶式(SBP)

Area Requirements to Supply the EU
供应欧盟电能所需面积



Europe's Future Electricity Supply from Concentrating Solar Power

聚光太阳能为欧洲供电展望

DESERTEC Project 沙漠项目

- Timeframe: By 2050 approx. 17% of EU energy demand met by DESERTEC 到2050年，沙漠项目将满足欧盟约17%能源需求
- Investment amount to EUR 400 bln 投资4000亿欧元
- DESERTEC Industry-Initiative founded July 13 Members are7月13日沙漠项目发起成员: Münchener Rück, Deutsche Bank, HSH Nordbank, Siemens, ABB, RWE, Eon, M+W Zander, Schott Solar, MAN Solar Millennium, Abengoa Solar (Spain), Cevital-Gruppe (Algeria)
- First Step: Elaborate the Technical and Financial Feasibility of this project 第一步：详细的技术和财务可行性研究

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