The State of Play of the Spanish PV sector

– a policy & economic analysis of the PV boom in Spain and its consequences

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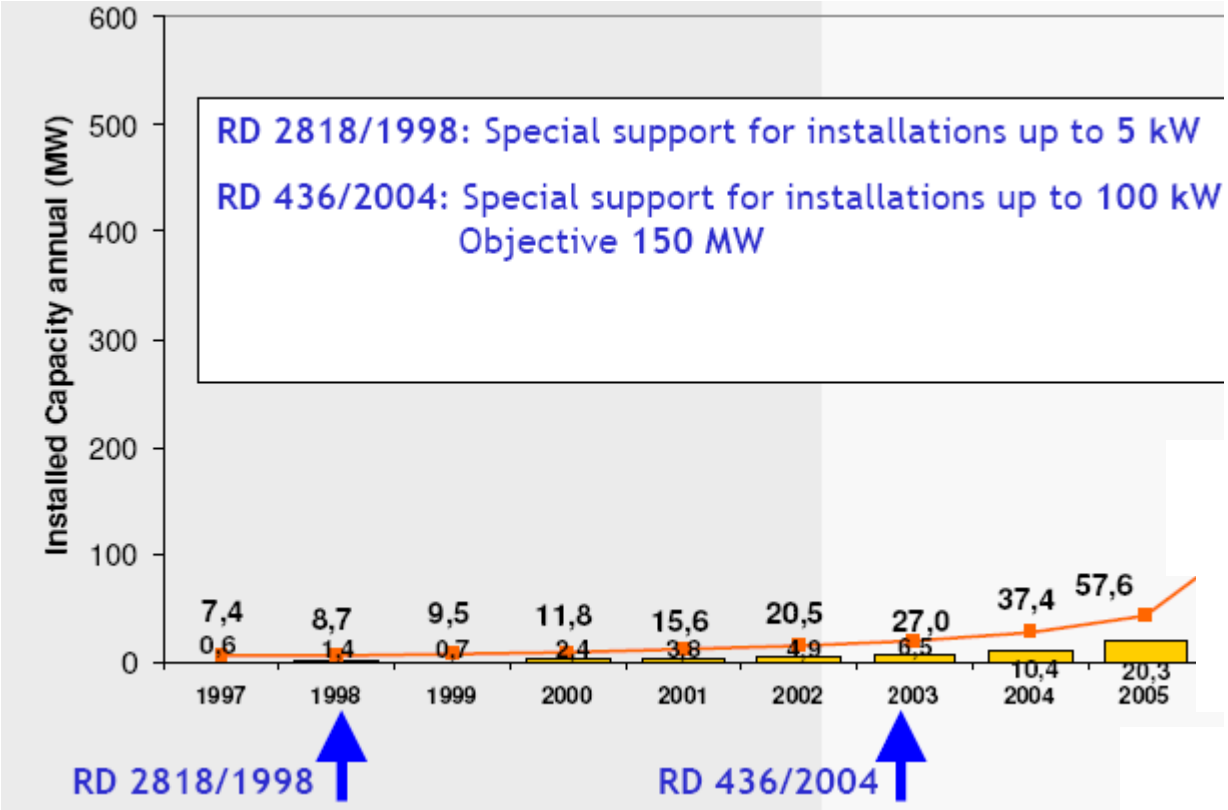
In the run-up of the Spanish PV boom



Source: IDAE 2009

➢ Since 2002 (in preparation since 1999) launching of a new investment product for small investors based on purchase of PV parcels of 5 kWp => so called “Solar Gardens” (due to higher PV tariffs by the RD 2818/98 for small installations (= 5 kW => raised to 100 kW by the RD 436/2004)

The boom phase of PV in Spain

The Royal Decree (RD) 661/2007 (and its main regulations on PV):

In case of PV:

- **introduction of a very high PV tariff for big installations between 100 kW and 10 MW** of installed capacity (nearly as high as for installations up to 100 kW)

- **NO new (higher) PV target** (remained at 400 MW + ignoring much higher overall regional PV targets)

The boom phase of PV in Spain

RD 661/2007 FEED-IN TARIFFS AND PREMIUMS

	Two options to selling power:			Option a)	Option b) Free sale on the organized		
				Fixed price = Regulated tariff c€/kWh	Reference premium c€/kWh	Maximum limit c€/kWh	Minimum limit c€/kWh
b.2 Wind	b.2.1 Onshore		First 20 years	7,3228	2,9291	8,4944	7,1275
			Afterwards	6,1200			
b.1 Solar	b.1.1 Photovoltaic	Q≤100 kW	First 25 years	44,0381			
			Afterwards	35,2305			
		100 kW<Q≤10 MW	First 25 years	41,7500			
			Afterwards	33,4000			
		10<Q≤50 MW	First 25 years	22,9375			
			Afterwards	18,3811			
	b.1.1 Thermoelectric		First 25 years	26,9375	25,4000	34,3976	25,4038
			Afterwards	21,5498	20,3200		

Source: IDAE 2009

➢ all **remuneration elements are yearly adjusted to the inflation** (consumer price index, CPI): =>PV tariffs in 2009 for existing plants (which entered into force between 6/07 and end of 9/08) increased to 47 €ct/kWh) …

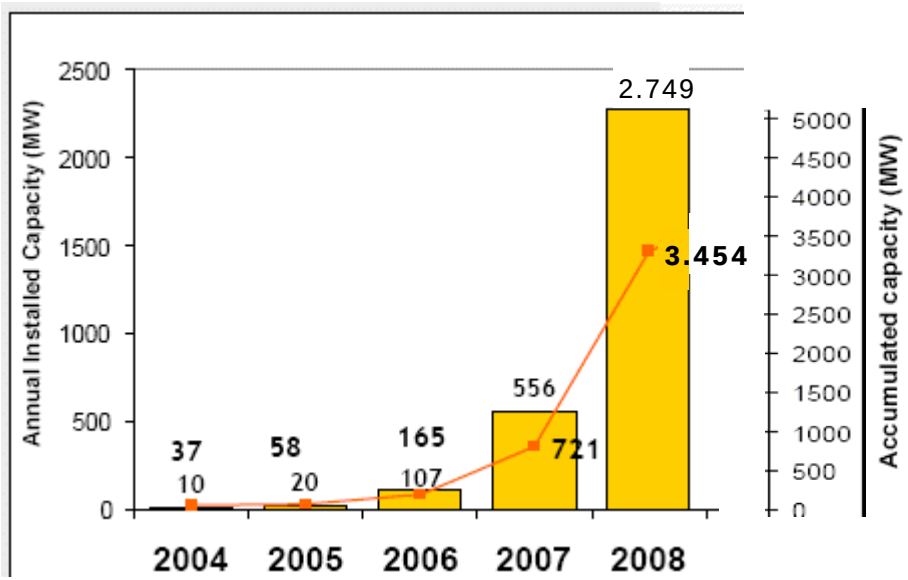
The boom phase of PV in Spain

- **loss of purchase guarantee for new installations generally when achieving 85% of RES-E capacity targets of PER 2005-2010 (BUT: a minimum transition period of 12 month)**

- **produced the 2007/08 PV rush in Spain!**

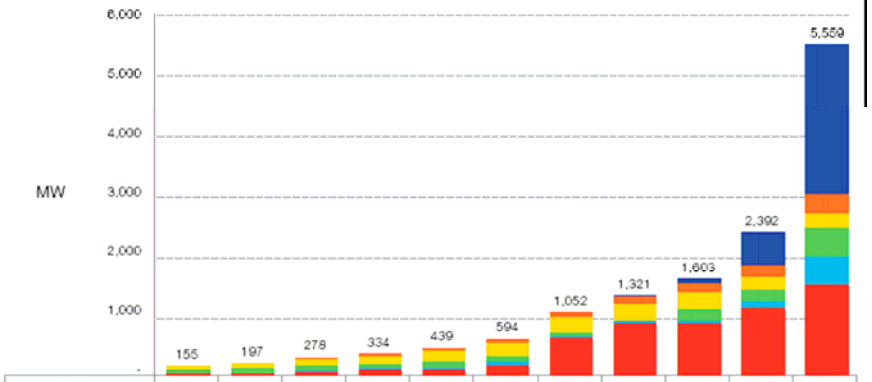
- **Yearly installed capacity quintupled between 2007-08 and 2008-09**

- **Nearly half (45.2% resp. 47.9%) of the new global PV capacity in 2008 was installed in Spain**



Source: IDAE & CNE 2009

Figure 2: Historical development of the Global annual PV market per Region



MW	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Spain	0	1	-	2	9	10	6	26	88	560	2,511
USA	-	17	22	29	44	63	90	114	145	207	342
Japan	69	72	112	135	185	223	272	290	287	210	230
Rest of the world	68	84	94	75	104	98	53	12	196	207	485
Rest of Europe	8	11	10	16	16	50	30	30	37	108	492
Germany	10	12	40	78	80	150	600	850	850	1,100	1,500
TOTAL	155	197	278	334	439	594	1,052	1,321	1,603	2,392	5,559

Source: EPIA: 2009

From boom to hard landing

Summing up: Main reasons which led to Royal Decree 1578/08

- **promotion approach mainly stimulating big ground based installations** introduced by RD 436/2004

- **even intensived by RD 661/07 with a new and high priced** (41.75 €ct/kWh) **PV segment for installations between 100 kW – 10 MW** => **not amended during more than 4 years until RD 1578/08**

- **ignorance of much higher regional PV targets when fixing 85% rule of RD 661/2007**

- **85% rule itself (guarantee during at least 12 month present/previous tariff levels)**

- **long hesitance of the Government to establish/adopt new PV promotion scheme**

- **relative lack of PV installations in the residential sector**

- **bargain/purchase and sale (speculation) of/with issued licences for big PV installations => price driver!**

From boom to hard landing

Main characteristics / aspects of RD 1578 / 2008 (1):

- **new classification into building integrated and ground based PV installations** with individual capacity limits of 2 MW (BIPV) resp. 10 MW (ground based)

- **sharp tariff cuts** (between 34.7% - 39.3%): 32 €ct/kWh for all ground based & bigger (> 20 kW) BIPV installations resp. 34 €ct/kWh for smaller (= 20 kW) BIPV systems

- **limiting of purchase guarantee to 25 years**

- **introduction of yearly capacity caps of 500 MW between 2009-2012 (with slightly increases as tariffs decrease)**

From boom to hard landing

Main characteristics / aspects of RD 1578 / 2008 (2):

➢ **decreasing tariffs for new installations** => degression of up to 16% per year

➢ **introduction of 4 yearly calls**

➢ **establishment of a register of pre-assignment** with a series of new administrative & financial pre-requisites developer have to fulfill to obtain the actual PV tariff:

- Administrative permit including concession for grid access and connection
- building licence
- proof of a bank guarantee of 50 €/kW installed capacity for installations = 20 kW and 500 €/kW for bigger installations

➢ **after inscription**, project developer have a **12 month time limit to build their installation**

From boom to hard landing

Results of the first two calls:

1st call

		Nº de expedientes	Potencia total (MW)
Tipo I.1 Cubierta potencia menor o igual 20 kW	Cupo trimestral	-	6,675
	Inscritas	153	1,669
	Inadmitidas	59	1,444
Tipo I.2 Cubierta potencia mayor 20 kW	Cupo trimestral	-	60,075
	Inscritas	143	20,916
	Inadmitidas	44	7,350
Tipo II Suelo	Cupo trimestral	-	58,250
	Inscritas	96	66,113
	No inscritas	664	529,800
	Inadmitidas	440	302,853
TOTAL INSCRITAS		392	88,698

2nd call

		Nº de expedientes	Potencia total (MW)
Tipo I.1 Cubierta potencia menor o igual 20 kW	Cupo trimestral	-	6,675
	Inscritas	273	3,63
	Inadmitidas	168	2,51
Tipo I.2 Cubierta potencia mayor 20 kW	Cupo trimestral	-	60,075
	Inscritas	233	31,69
	Inadmitidas	216	32,39
Tipo II Suelo	Cupo trimestral	-	58,250
	Inscritas	225	94,72
	No inscritas	1053	924,82
	Inadmitidas	359	323,48
TOTAL INSCRITAS		731	130,05

Source: MITYC 2009

3rd call

		Nº de solicitudes	Potencia (MW)
Tipo I.1 Cubierta potencia menor o igual 20 KW	Cupo trimestral		6,67
	Inscritas	227	2,79
	Inadmitidas	217	2,98
Tipo I.2 Cubierta potencia mayor 20 KW	Cupo trimestral		60,07
	Inscritas	277	35,60
	Inadmitidas	329	72,10
Tipo II Suelo	Cupo trimestral		89,51
	Inscritas	91	90,41
	No inscritas	1056	875,84
	Inadmitidas	271	318,66

⇒ **In first three tender rounds only 251.2 MW were approved, whereas the number of correctly presented projects amounted to 2,051.9 MW (8.2 times higher as approved projects)**

⇒ **Between 2/09 – 7/09 PV tariffs for ground mounted installations were further reduced by 9.5%**

⇒ **Results of 4th call 10 weeks delayed!**

From boom to hard landing

Most visible (negative) impacts of the RD 1578/08 in the Spanish PV sector:

- **difficulties to calculate project profitability in advance and delays in publication of tender results (definitive cups and PV tariffs), which lead to:**

- **problems to find/obtain project finance**

- **lost of up to 27,000 jobs since autumn 2008**

- **closure of PV facturies or job adjustment plans**

- **again: bargain/purchase and sale (speculation) of/with issued licences**

From boom to hard landing

Most visible (negative) impacts of the RD 1578/08 in the other Spanish renewable (sub-)sectors:

- **„imitator effect" through the Royal Decree Law 6/2009**

⇒ since 5/2009 register of pre-assignment (RPA) for all kind of RES-E, which not only introduced:

⇒ **new administrative hurdles**

⇒ **but mainly new financial barriers mainly affecting SMEs much more relying on project finance as big players**

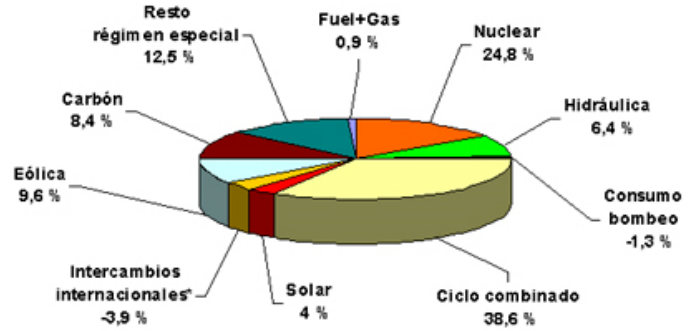
⇒ **but also strongly increased investment & legal insecurity**

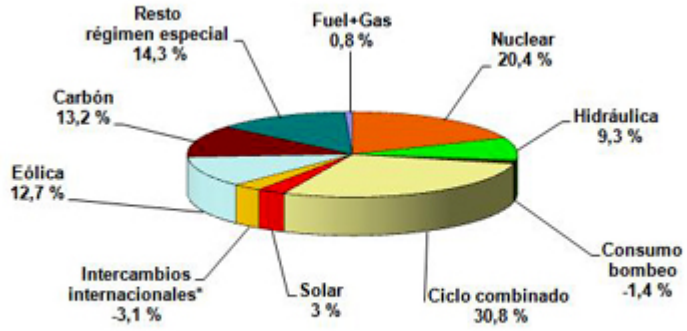
⇒ **regulatory chaos** through intent to abolish the RPA in October 09, thereby putting into danger up to 9-10 billion € of RES-E investments (mainly in CSP and wind plants)

From boom to hard landing

In spite of everything: The positive effects of RD 661/07 and RD 1578/08 (1):

➢ world record regarding PV share in electricity demand (August 2009 & January – September 2009)





Source: REE 2009

*Saldo negativo porque es exportador.

➢ highest share of installed PV capacity per capita in the EU-27 (and globally)

Tabl. n°3

Puissance photovoltaïque par habitant des différents pays de l'Union européenne en 2008 (en Wc/hab).*
Photovoltaic power per inhabitant for each European Union country in 2008 (in Wp/inhab).*

	Wc/hab Wp/inhab
Spain	75,19
Germany	65,08
Luxembourg	50,46
Belgium	6,67
Portugal	6,40
Italia	5,33

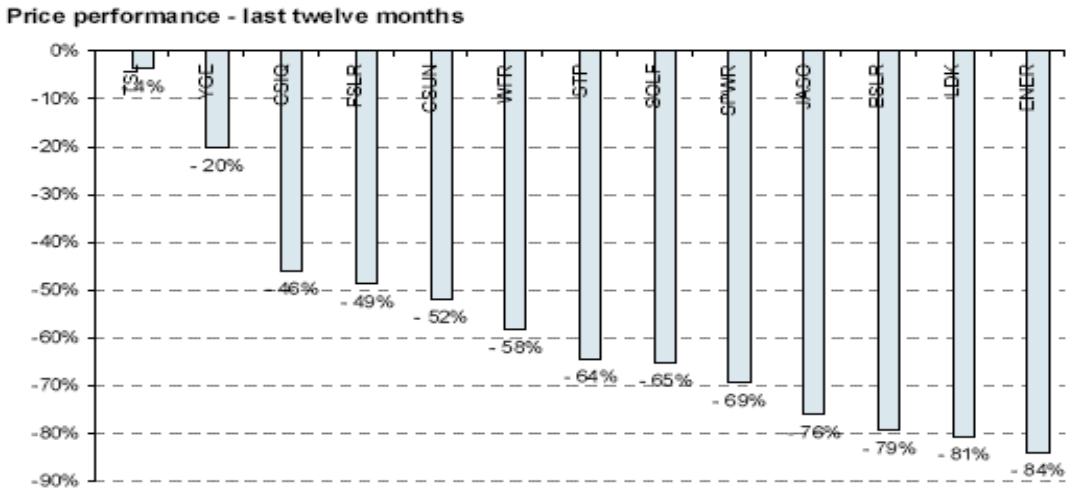
Source: EurObserv'ER 2009

From boom to hard landing

<u>In spite of everything: The positive effects of RD 661/07 and RD 1578/08 (2):</u>

- **positive impact PV in the Spanish macro economy: PV contributed with a surpluss of 474 M€ in 2008** (Source: Deloitte 2009)

- **reduction of > 50% of PV component prices during last 12 month** (Source: Barclays Capital 2009)



Success conditions for a restart and sustained growth path of the Spanish PV market

- **adoption of a Renewable Energy Law with ambitious targets for 2020 an 2050** (30% RES in final energy consumption in 2020 and 80% in 2050)

- **adoption of a new and ambitious National Action Plan for RES 2011-2020** (**including a 20 GW target for PV**)

- **firm transition of the new Renewable Directive 2009/28/CE to Spanish legislation ASAP**

- **maintainance of the feed-in tariff scheme (but with improved mechanisms for adaptation/revision),** i.e adaptation in line with
  - the target performance (i.e. in form of a capacity corridor),
  - their additional costs,
  - learning curve effects,
  - as well as the speed of approximation to grid parity (incl. possibility of time limits to reach grid parity).
  - establishment of a tariff for own consumption of PV electricity for smaller roof top installations

Success conditions for a restart and sustained growth path of the Spanish PV market

- **Elimination of (capacity) caps & register of pre-assignment**

- **amendment of national building code adapted to forseen revision of the EPBD (binding targets for Net-Zero-Energy Buildings ,...)**

- **strong increase (factor 2-3) of RES investments to reach the 2020 targets**

- **supply infrastructure necessary to reach government target of 1 M electric cars by 2014 mainly supplied/loaded with RES electricity (including PV)**

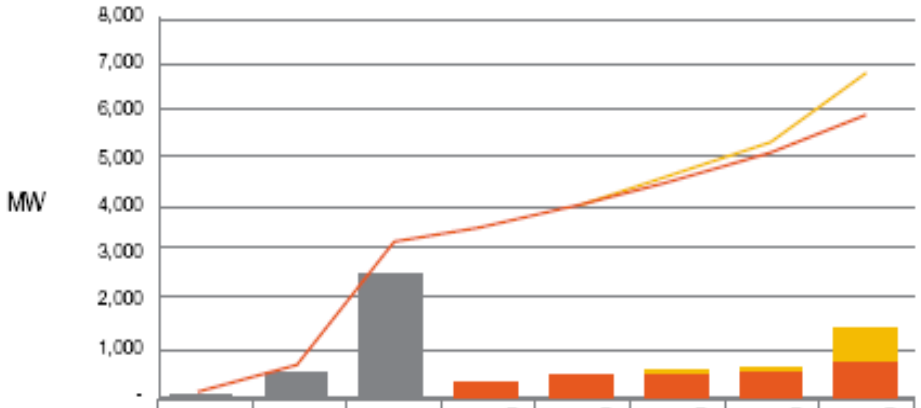
- **advance/push high voltage interconnections with neighboring countries (mainly France)**

- **<u>need to cope with further challenges like:</u>**

- Continued decrease of electricity consumption (leading to a higher share/impact of the RES-E remunerations within the overall system costs)
- competition through restablishment of premiums for electricity based on domestic coal

Success conditions for a restart and sustained growth path of the Spanish PV market

Possible PV market developments in Spain until 2020



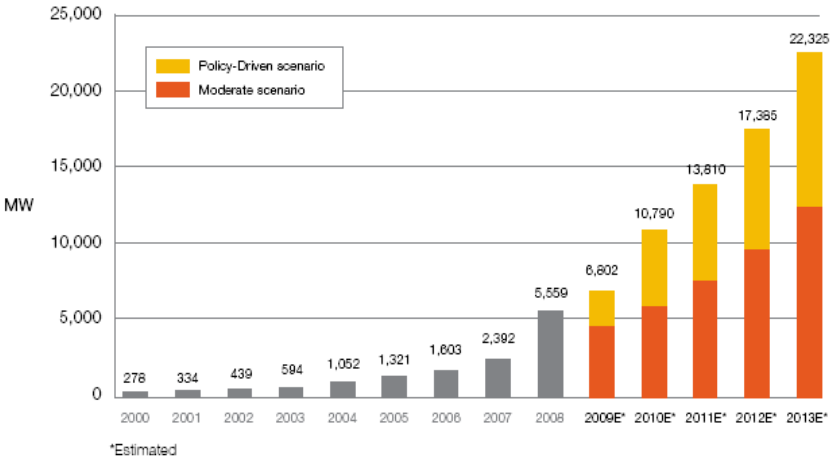
EPIA outlook until 2013

		2006	2007	2008	2009E	2010E	2011E	2012E	2013E
Annual market (MW)	Moderate scenario	88	560	2,511	375	500	500	550	800
	Policy-Driven scenario				375	500	600	650	1,500
Projected cumulative PV power installed (MW)	Moderate scenario	151	712	3,223	3,598	4,098	4,598	5,148	5,948
	Policy-Driven scenario				3,598	4,098	4,698	5,348	6,848

- **REPAP 2020 project: up to 20.1 GW in 2020**
- **SET For 2020 study by EPIA: up to 40 GW in a paradigm shift scenario**

Global PV perspective on the road to Post-Copenhagen

Huge growth perspective for PV on a European and global level …



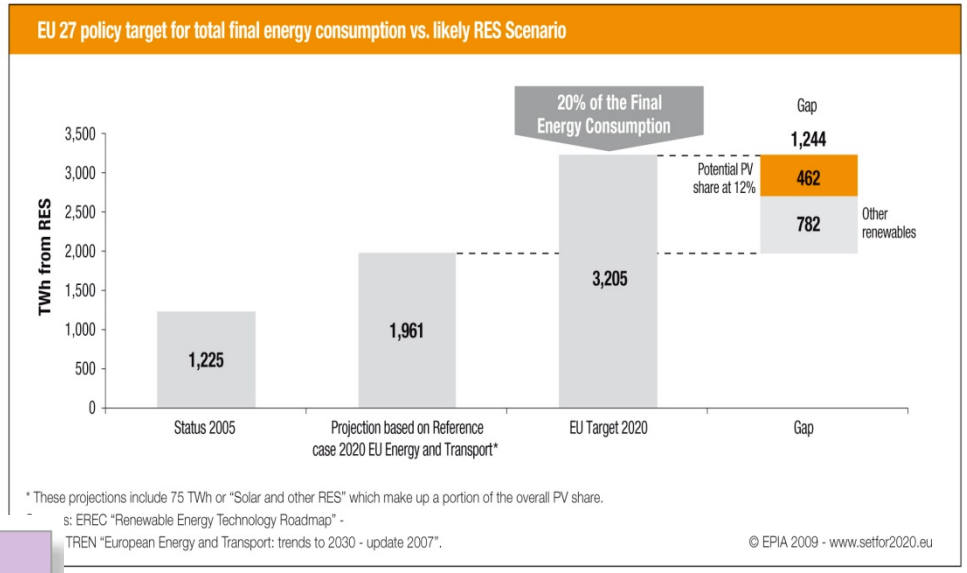


Table 3.1: Solar Generation scenario results for global PV market up to 2030

	Current situation	Scenarios		
	2007	2010	2020	2030
Advanced Scenario				
Annual Installations in GW	2.4	6.9	56	281
Accumulated Capacity GW	9.2	25.4	278	1,864
Electricity Production in TWh	10	29	362	2,646
PV Contribution to electricity consumption - reference scenario (EA)	0.07%	0.16%	2.05%	8.90%
PV Contribution to electricity consumption - alternative scenario	0.07%	0.20%	2.18%	13.79%
Grid connected people / households / people living on PV in Million	5.5	18	198	1,280
Off grid connected people in Million	14	32	757	3,216
Employment in thousand people	119	333	2,343	9,967
Market value in Billion €	13	30	139	454
Annual CO_2 savings in Mt	6	17	217	1,588
Cumulative carbon savings in Mt	27	65	976	8,953

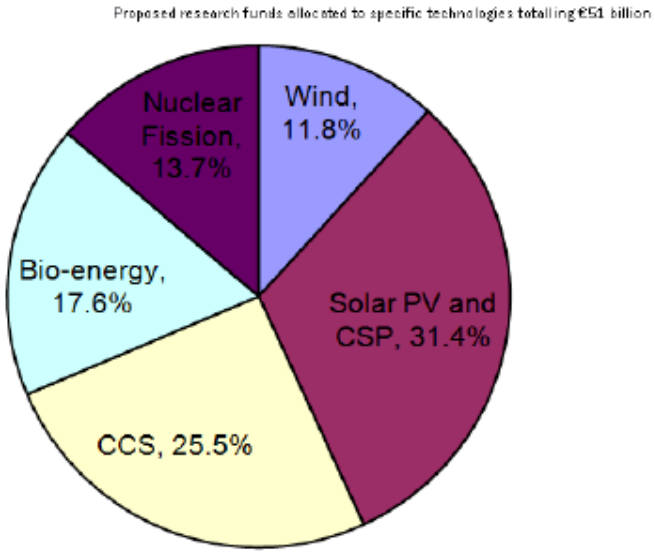
But …

Sources: EPIA 2009; Greenpeace/EPIA 2008

Global PV perspective on the road to Post-Copenhagen

<u>... would need the fulfillment of a number of important preconditions, like:</u>

- **global extension of best practise suppport schemes** mainly based on feed-in tariff schemes
- **removal of inherent barriers to the take-up of solar power**
- **implementation of a variety of legally-enforced mechanisms**
- **strong efforts in R&D programs, like the EU SET Plan** (with priority on PV)



- 16 bilion € foreseen only for PV until 2020 within the EU-Strategic Energy Technology (SET)-Plan

Global PV perspective on the road to Post-Copenhagen

As well as:

➢ **strong GHG reduction agreement in Copenhagen**, including measures to:

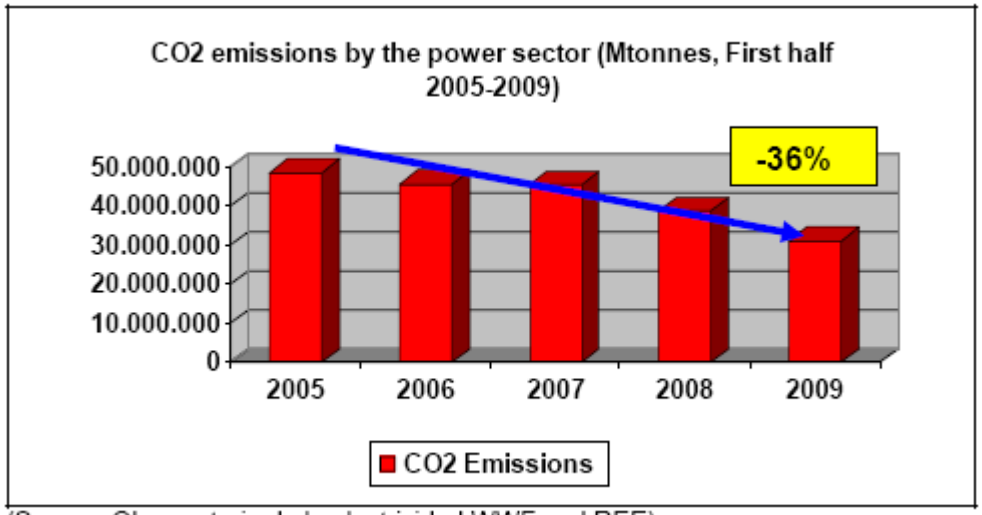
- **Make sure GHG will peak in 2015**
- **Decrease GHG emissions of developed countries by 40% below 1990 levels until 2020**
- **Decrease GHG emissions of developing countries by 15-30% by 2020 with help of industrialised nations**

⇒ Reaffirmation of the EU council (within its common position for the Copenhagen summit from 21 October 2009) to commit itself

⇒ "***to move to a 30% reduction compared to 1990*** *levels as its contribution to a global and comprehensive agreement for the period beyond 2012, provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities.*"

Global PV perspective on the road to Post-Copenhagen

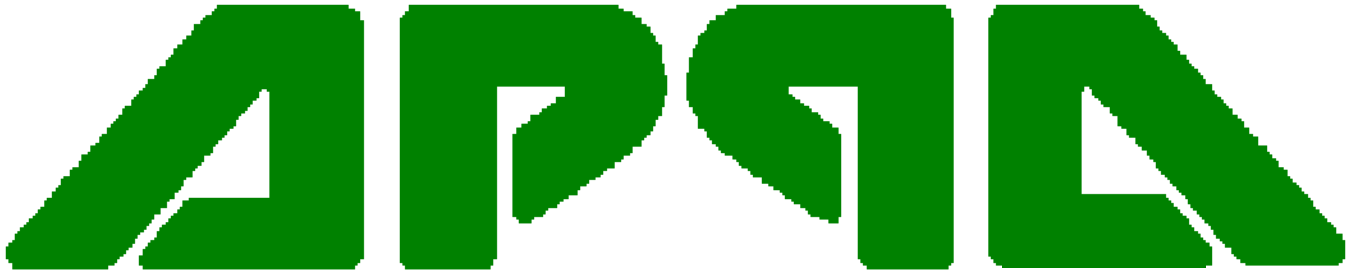
The best at the end: it already works: GHG emissions are decreasing by the help of renewables…



(Source: Observatorio de la electricidad WWF and REE)

- Take the positive experience of the Spanish power sector and establish higher GHG reduction targets in diffuse sectors (as proposed by WWF-Spain)

THANKS FOR YOUR ATENTION



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