GENERAL VISION OF THE SPANISH PV SECTOR

II WORKSHOP "RENEWABLE ENERGIES AND SPACE"

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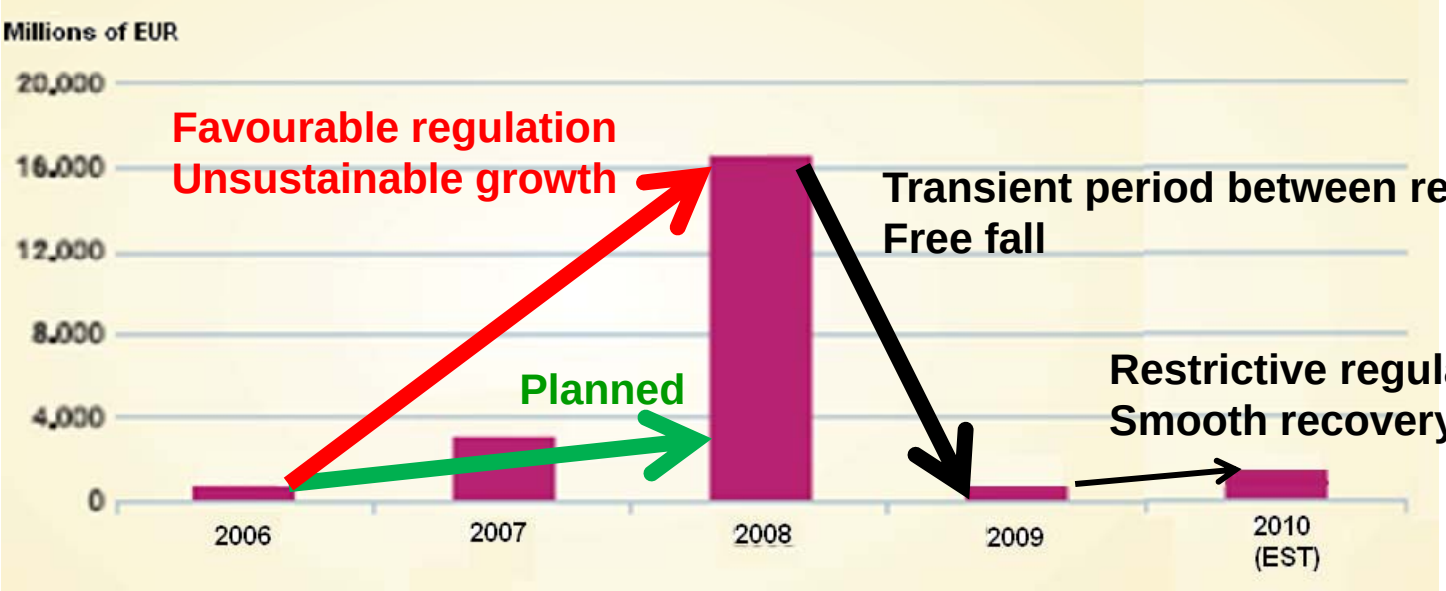
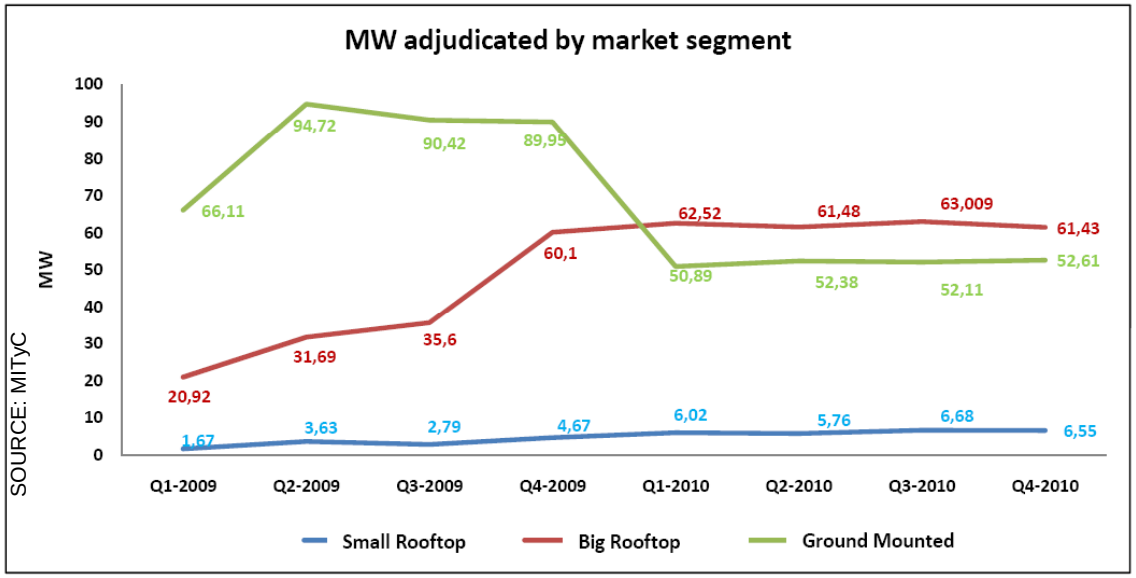
Evolution analysis



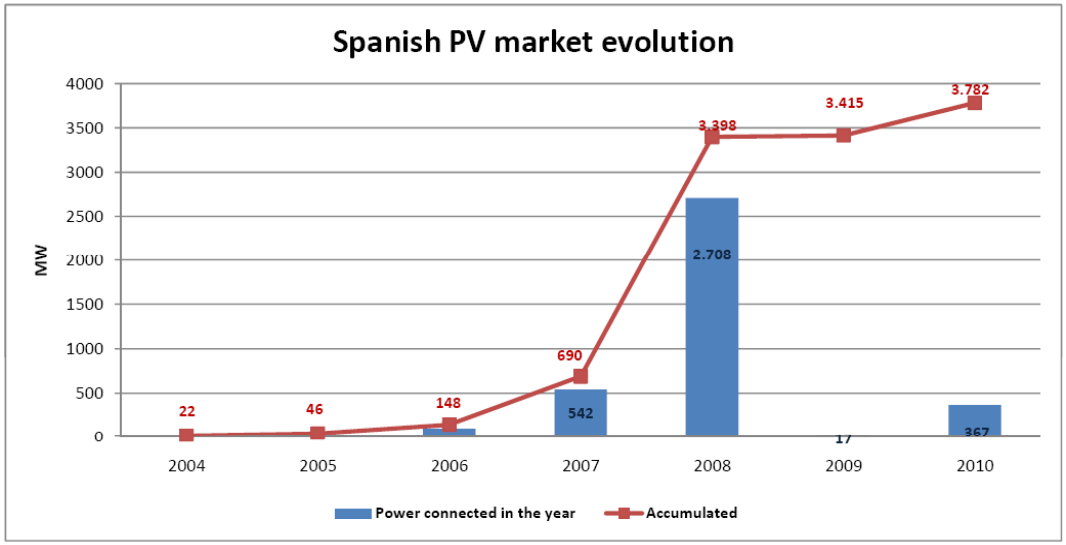
Plenty of credit (national &international)	Very limited credit
Big plants possible (P>10MW)	Plants with liomit size (P<10MW)
No cap	Cap of 500 MW p.a.
Generous PV Tariff (0,47€/kWh)	Adjusted PV Tariff (28,12 / 19,83 /13,03 c€/kWh ,now)
Moderate Acces to electrical network	More difficult access to the grid
Investor from others Sectors arriving to PV	Investors from other Sectors leaving PV
No previous registration	With Register as a precondition
Oil at high prices	Oil at medium prices

Evolution of Spanish PV Sector in 2010



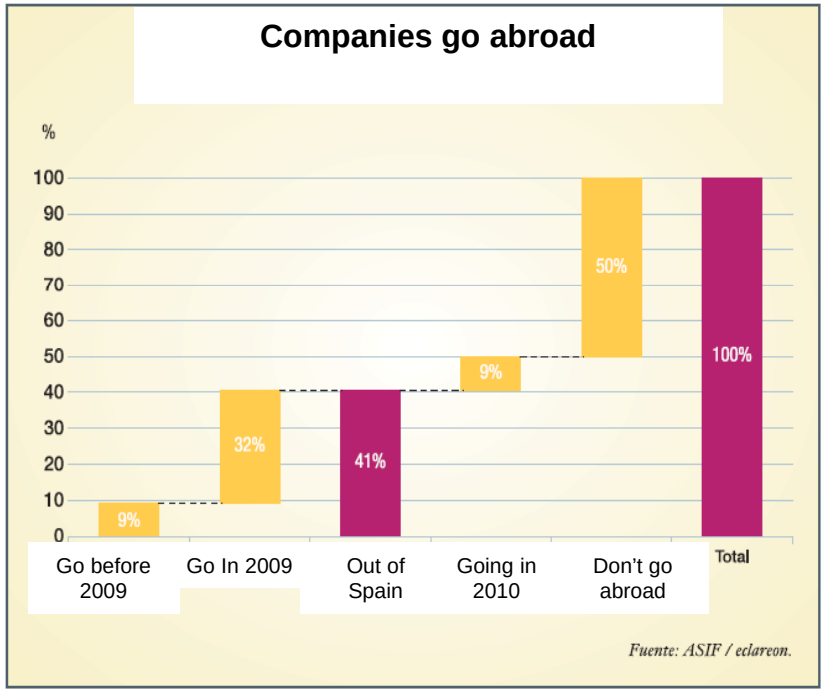
PV market is turning to rooftop development model

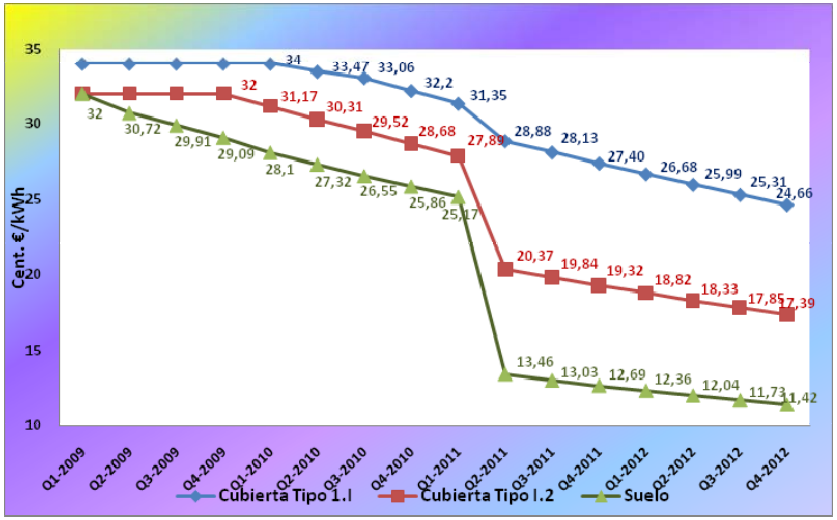
In 2009 and 2010 were 1.000 MW awarded. The year 2009 had a low activity and in 2010 were connected mostly installations awarded in 2009, which indicates that around 100 MW of the 500 MW annual cap for 2009 were lost; the new support scheme doesn't allow to recover them.



SOURCE: CNE

Market focus evolution





SOURCE: MITyC

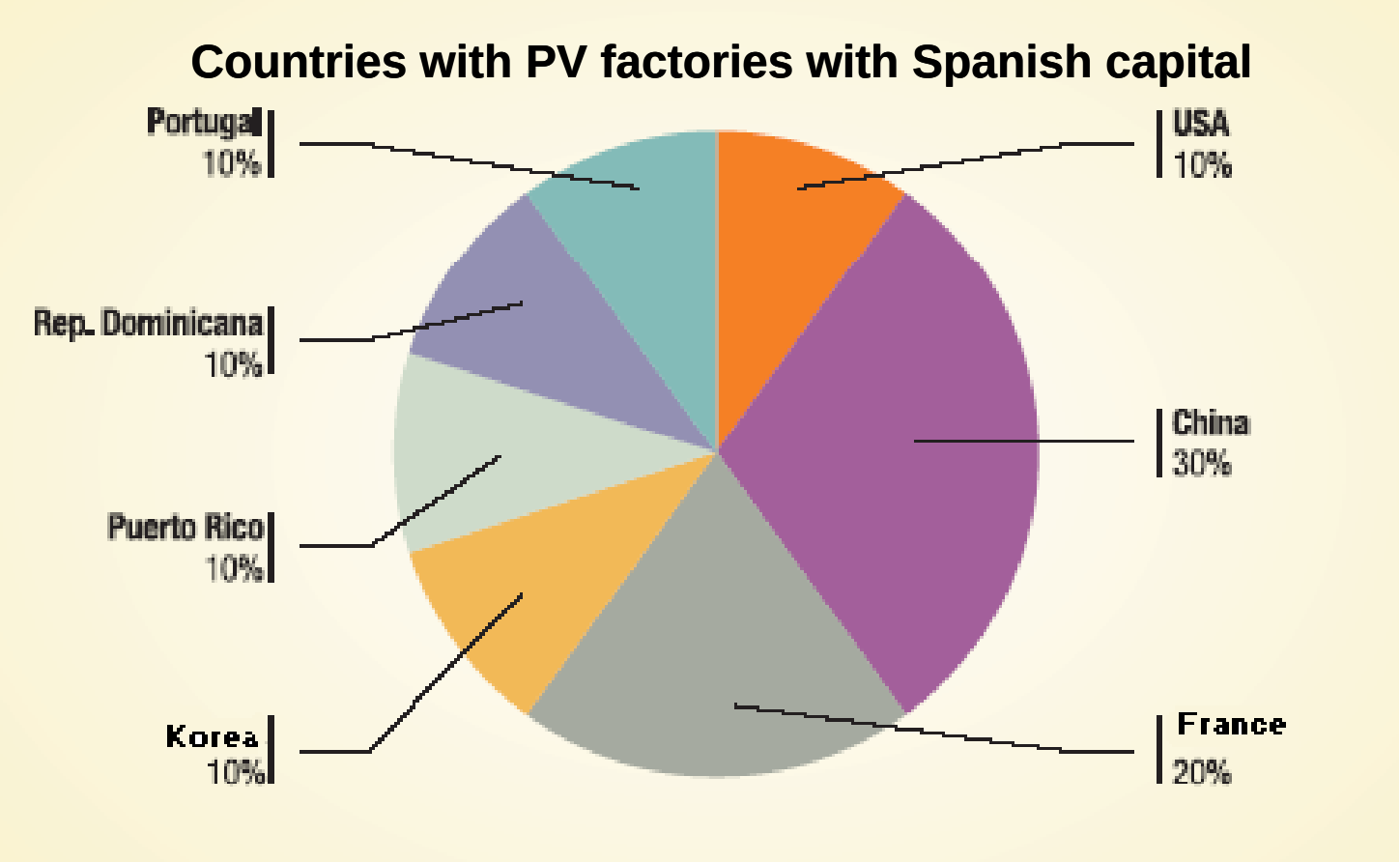
In 2010 all the segment market caps were covered, and the tariffs went down more than 2,6% each quarter

The tariffs went down 30% in 2008 and have reduced a little bit more than 10% in 2009 and 2010, but the reduction costs of the technology has been more aggressive.

The low activity in 2009/2010 forced that around 50% of companies to go abroad to make business to other markets: Italy, France, USA, Canada…, with different activities: development, distribution, EPC… Also there are 10 factories with Spanish capital abroad.

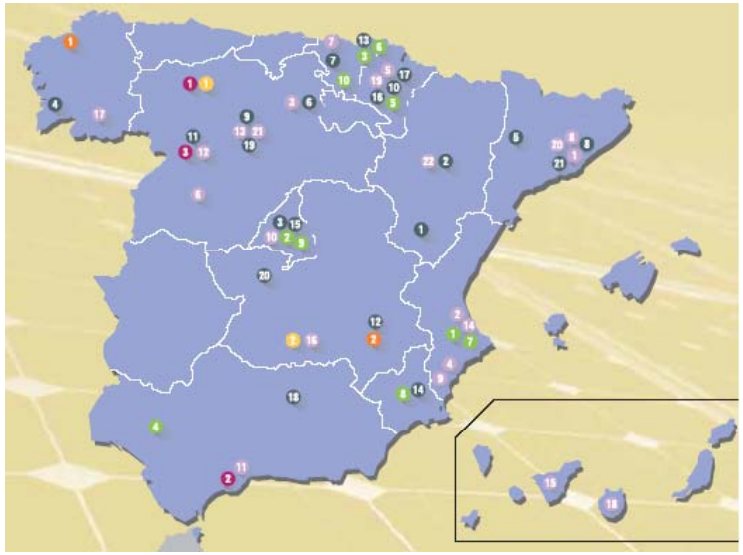
Industry focus evolution

Export , a defence against PV weak domestic market



PV market labour evolution

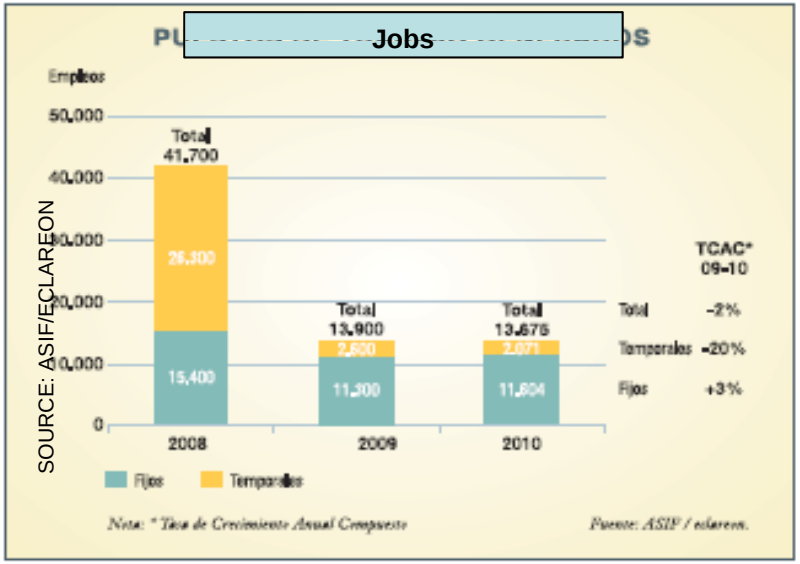
Spanish PV Manufacturing Industry



Silicio		
1 SILICIO FERROSOLAR (FERROATLÁNTICA)	A Coruña	
2 SILIKEN	Albacete	
Obleas		
1 DC WAFERS	León	
2 SILICIO SOLAR	Ciudad Real	
Células		
1 CEL CELIS	León	
2 ISOFOTÓN	Málaga	
3 PEVAFERSA	Zamora	
Módulos		
1 ALEO SOLAR	Barcelona	
2 ATERSA	Valencia	
3 CUANTUM SOLAR	Burgos	
4 EURENER	Alicante	
5 FLUITECNIK	Navarra	
6 GRUPO UNISOLAR	Salamanca	
7 GUASCOR FOTÓN	Vizcaya	
8 HELIENE	Barcelona	
9 IATSO	Alicante	
10 I.B HELIOS	Madrid	
11 ISOFOTÓN	Málaga	
12 PEVAFERSA	Zamora	
13 PEVAFERSA	Valladolid	
14 SILIKEN	Valencia	
15 SILIKEN	Tenerife	
16 SOLARIA ENERGÍA Y MEDIOAMBIENTE	Ciudad Real	
17 T-SOLAR	Orense	
18 TECNOLOGÍA SOLAR KANARIAS	Gran Canaria	
19 UNITEC EUROPA	Navarra	
20 VIDURSOLAR	Barcelona	
21 YOHKON	Valladolid	
22 ZYTECH SOLAR	Zaragoza	

Seguidores		
1 ADEM	Teruel	
2 ADES	Zaragoza	
3 APOLO SOLAR	Madrid	
4 BRAUX	Pontevedra	
5 CONTROL Y ACCESOS	Lérida	
6 DENERSA	Burgos	
7 ESALINE SOLAR	Vizcaya	
8 FENA SCP	Barcelona	
9 MECAPESA	Valladolid	
10 MECASOLAR	Navarra	
11 PEVAFERSA	Zamora	
12 PRIUS ENERGY	Albacete	
13 SAMA TALOFA	Guipúzcoa	
14 SOLTEC ENERGÍAS RENOVABLES	Murcia	
15 SOLUCIONES ENERGÉTICAS (SOLENER)	Madrid	
16 STENORLAND	Navarra	
17 TALLERES CLAVIJO	Navarra	
18 TECNO SOLAR	Jaén	
19 THAR ENERGY	Valladolid	
20 TITAN TRACKER	Toledo	
21 WATTPIC	Barcelona	
Inversores		
1 ATERSA	Valencia	
2 ENERTRON	Madrid	
3 FAGOR AUTOMATION	Guipúzcoa	
4 GREENPOWER TECHNOLOGIES	Sevilla	
5 INGETEAM	Navarra	
6 JEMA	Guipúzcoa	
7 SILIKEN	Valencia	
8 SOLTEC ENERGÍAS RENOVABLES	Murcia	
9 SOLUCIONES ENERGÉTICAS (SOLENER)	Madrid	
10 ZIDOR	Álava	

SOURCE: ASIF/ECLAREON

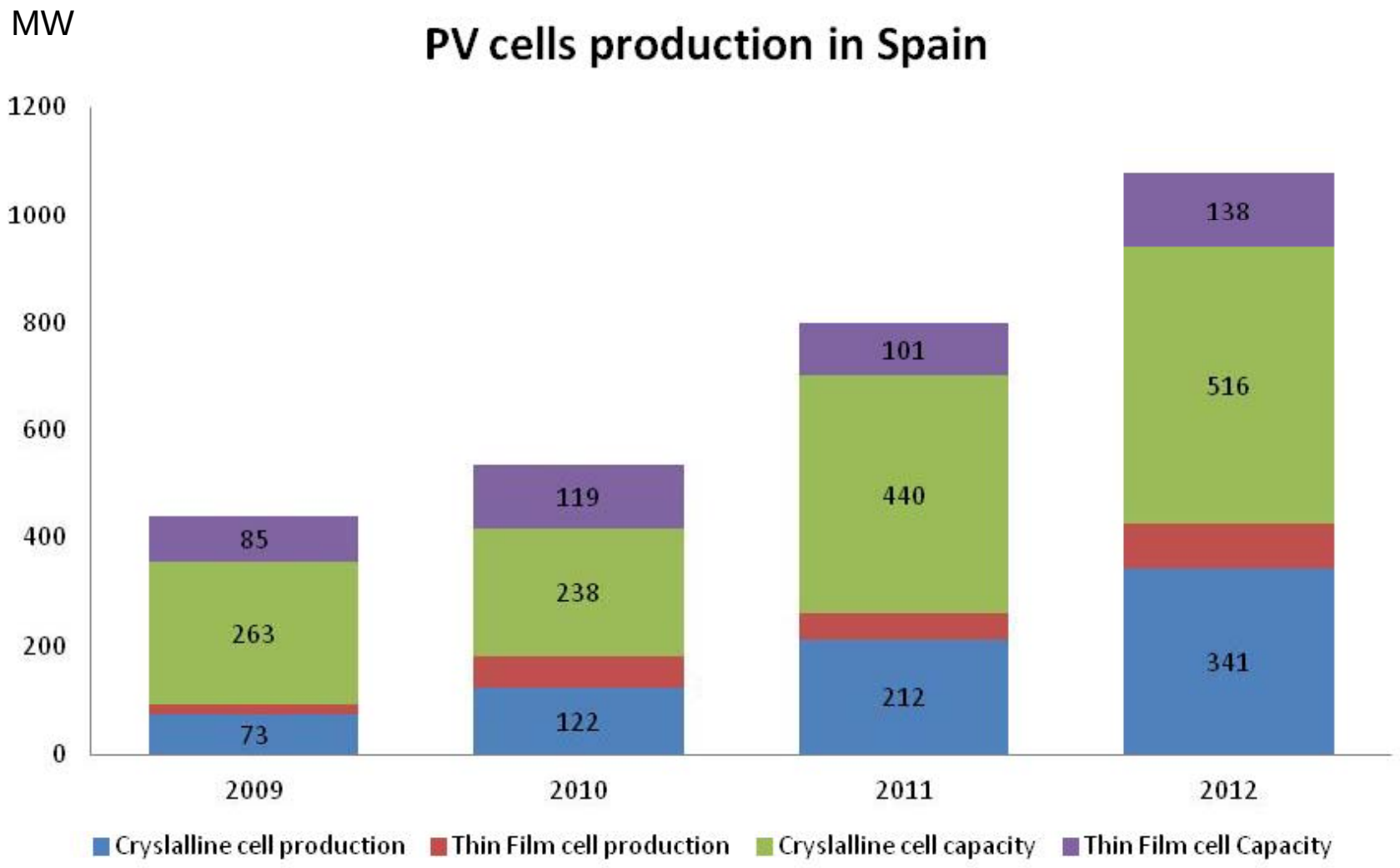


Spanish PV Manufacturing Industry: covering all the value chain

The Spanish PV Manufacturing Industry sum up 60 companies, with a capacity over 1.000 MW per year for modules and 1.500 MW for inverters.

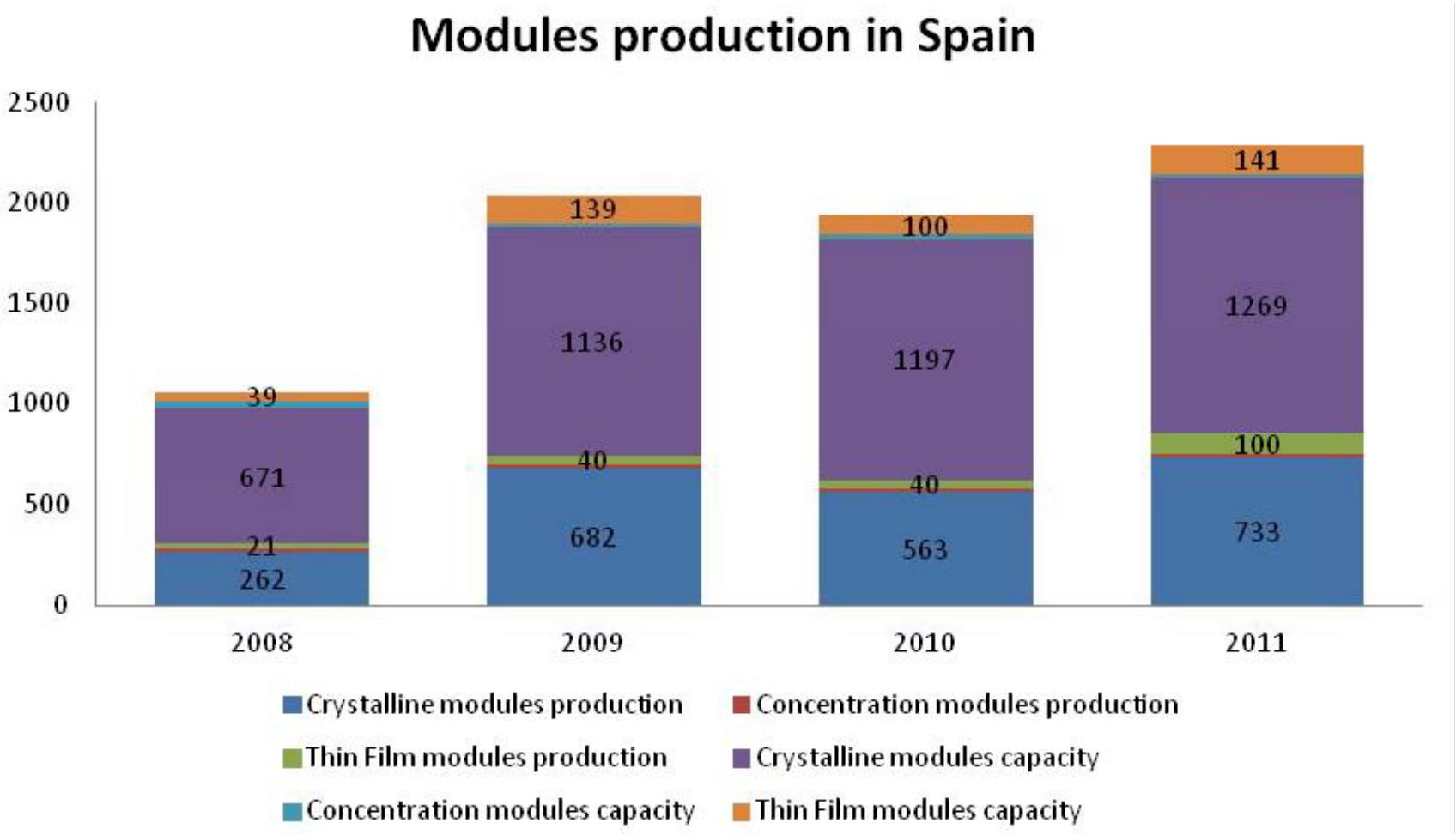
Spanish PV Sector employees around 10.000 people, 25% in manufacturing.

Cells production in PV Sector

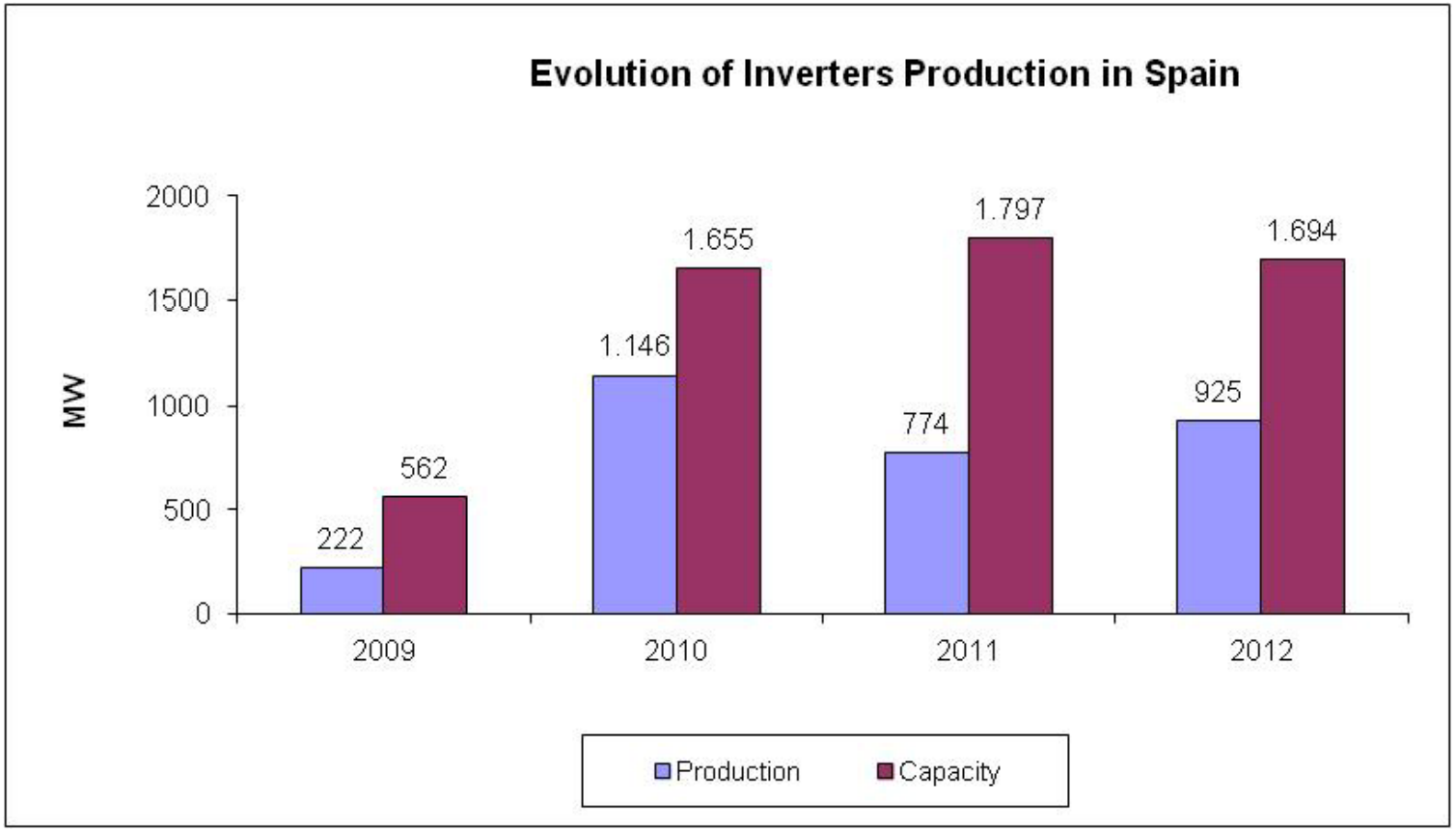


Modules production in the PV Spanish Sector

MW

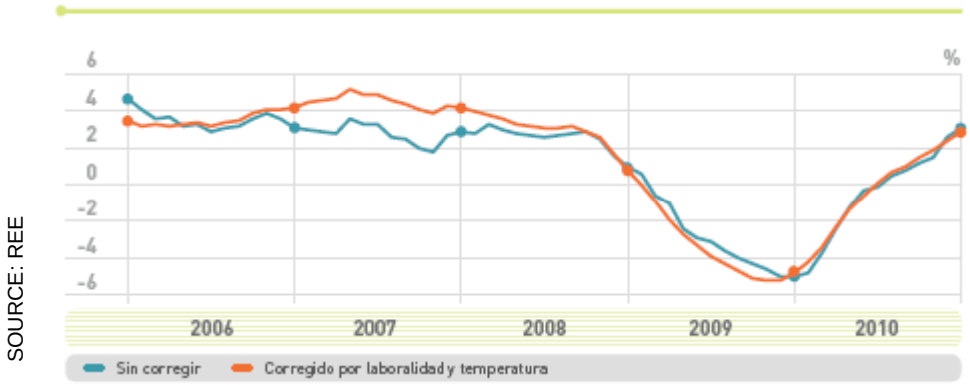


Evolution of inverters production in Spain



Electricity Market and PV growth

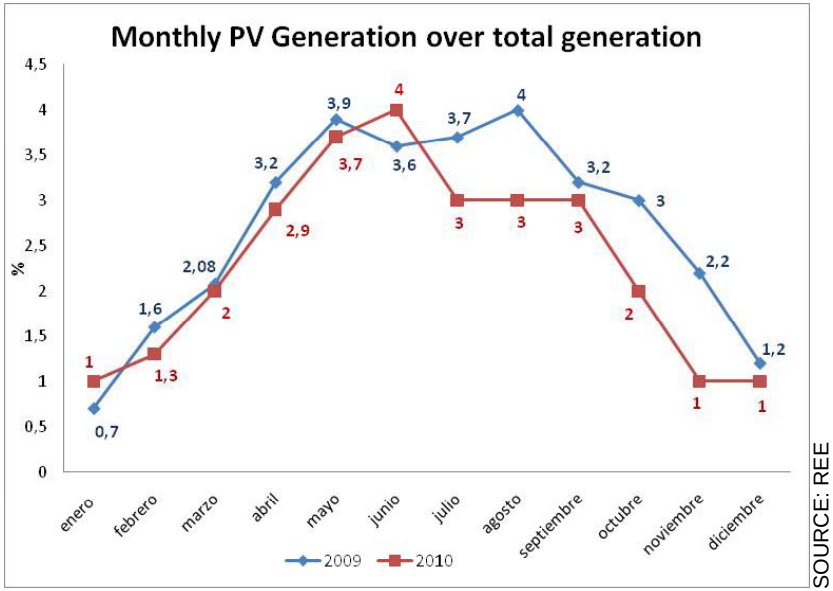
Evolution of national electricity demand



SOURCE: REE

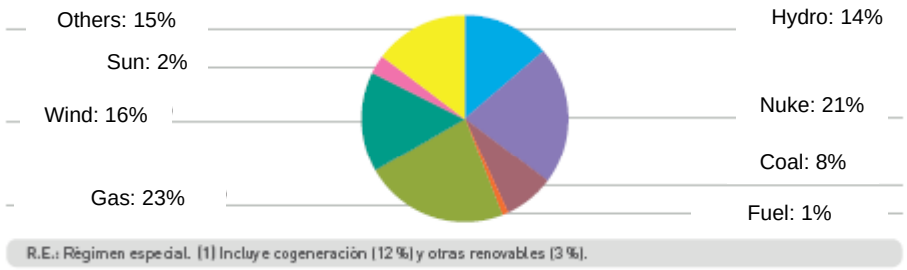
Electricity demand recovered and similar PV production in 2009 and 2010

Monthly PV Generation over total generation



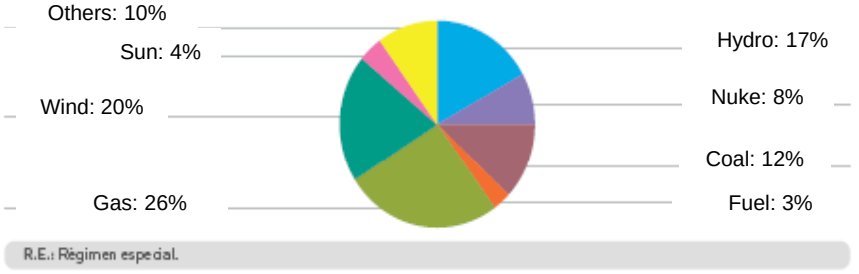
SOURCE: REE

Demand coverage by generating technology



SOURCE: REE

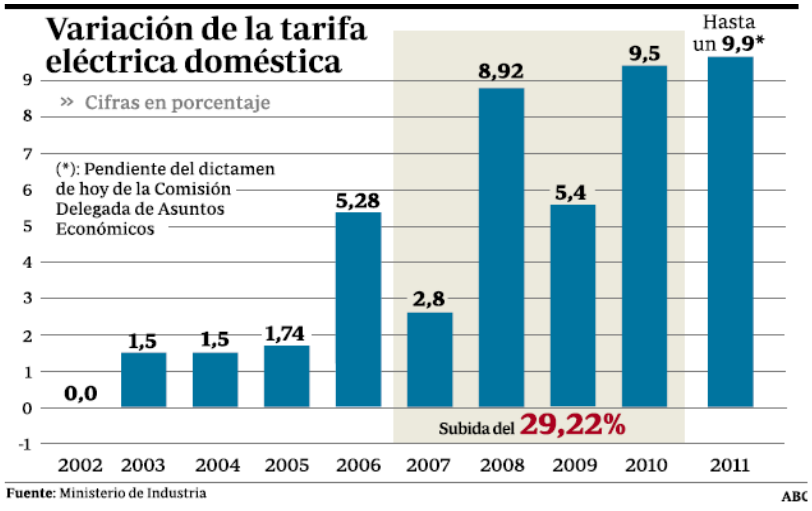
Power connected to the grid



SOURCE: REE

Spanish mix: diversified but overpowered: 103,086 MW connected to the grid when record demand peak is 47.876 MW (November, 17, 2007). In 2010 RES and big hydro covered 35% of demand.

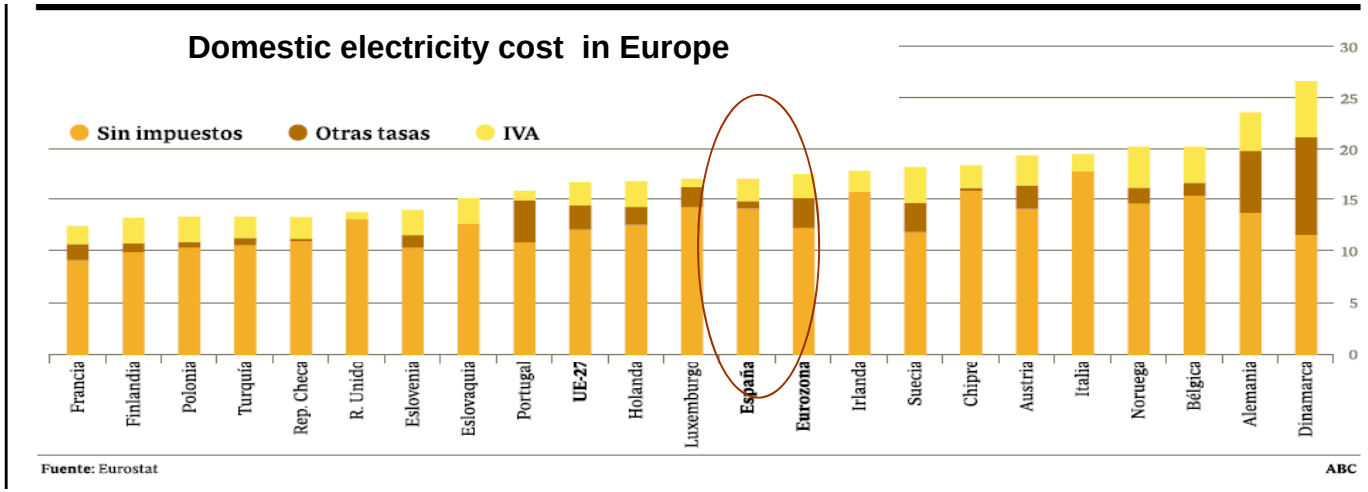
Electricity Market and PV growth



Domestic electricity prices has risen up 40% in five years

The cost of domestic electricity in Spain is within the Europe's average, but rising strongly, due to several factors. PV annual FiT is around 2.700 M€, 10% of total electricity system cost.

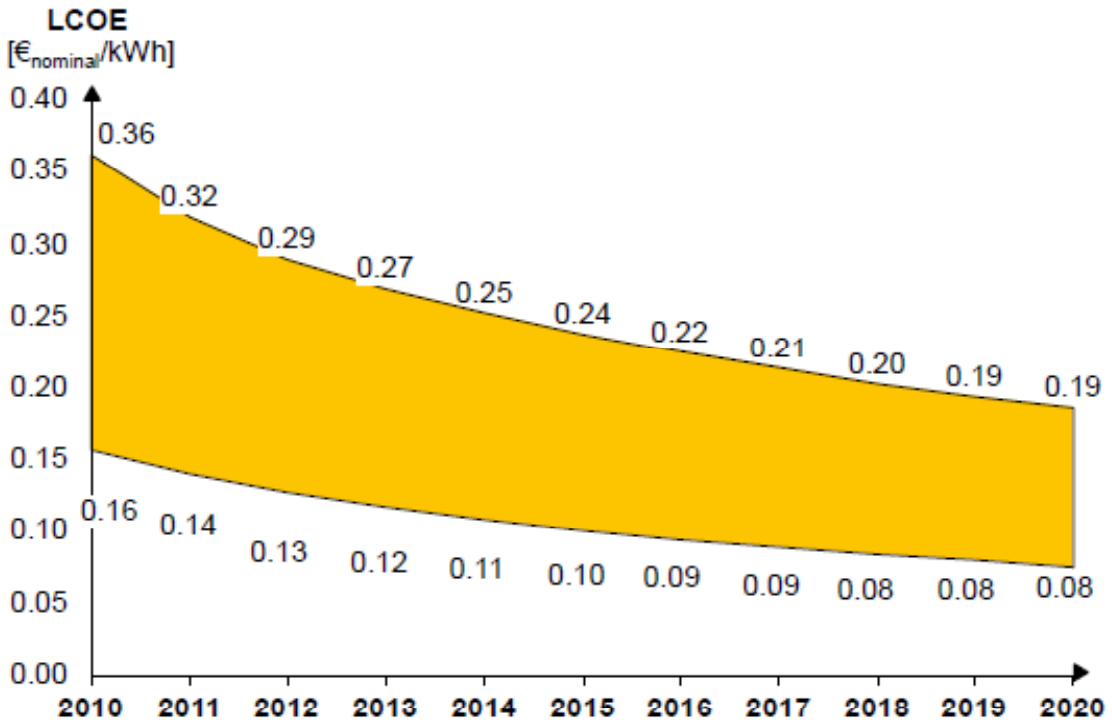
On the other hand, there is an accumulated deficit, since 10 years, of 20,000 M€ which is still growing. The annual deficit should be zero in 2014 by law. This is one reason to expect electricity prices increases in Spain.



The integration of photovoltaic generation
- Price reductions in the future

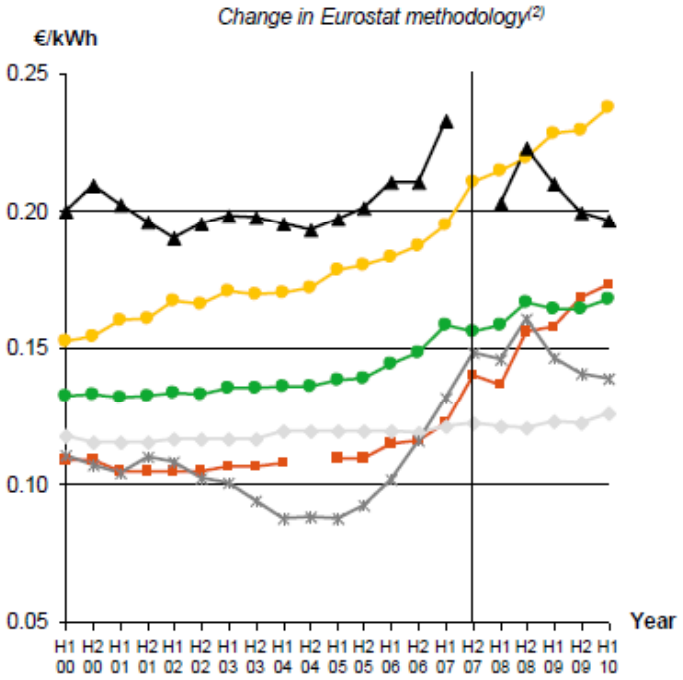
The levelized cost of PV generation in Europe is expected to decline by around 50% until 2020. Spain is located at the bottom of this band (has a higher irradiation).

European PV LCOE range projection 2010 – 2020



The integration of photovoltaic generation - Price reductions

Evolution on residential grid electricity prices.
Prices of domestic electricity tariff every year are higher.

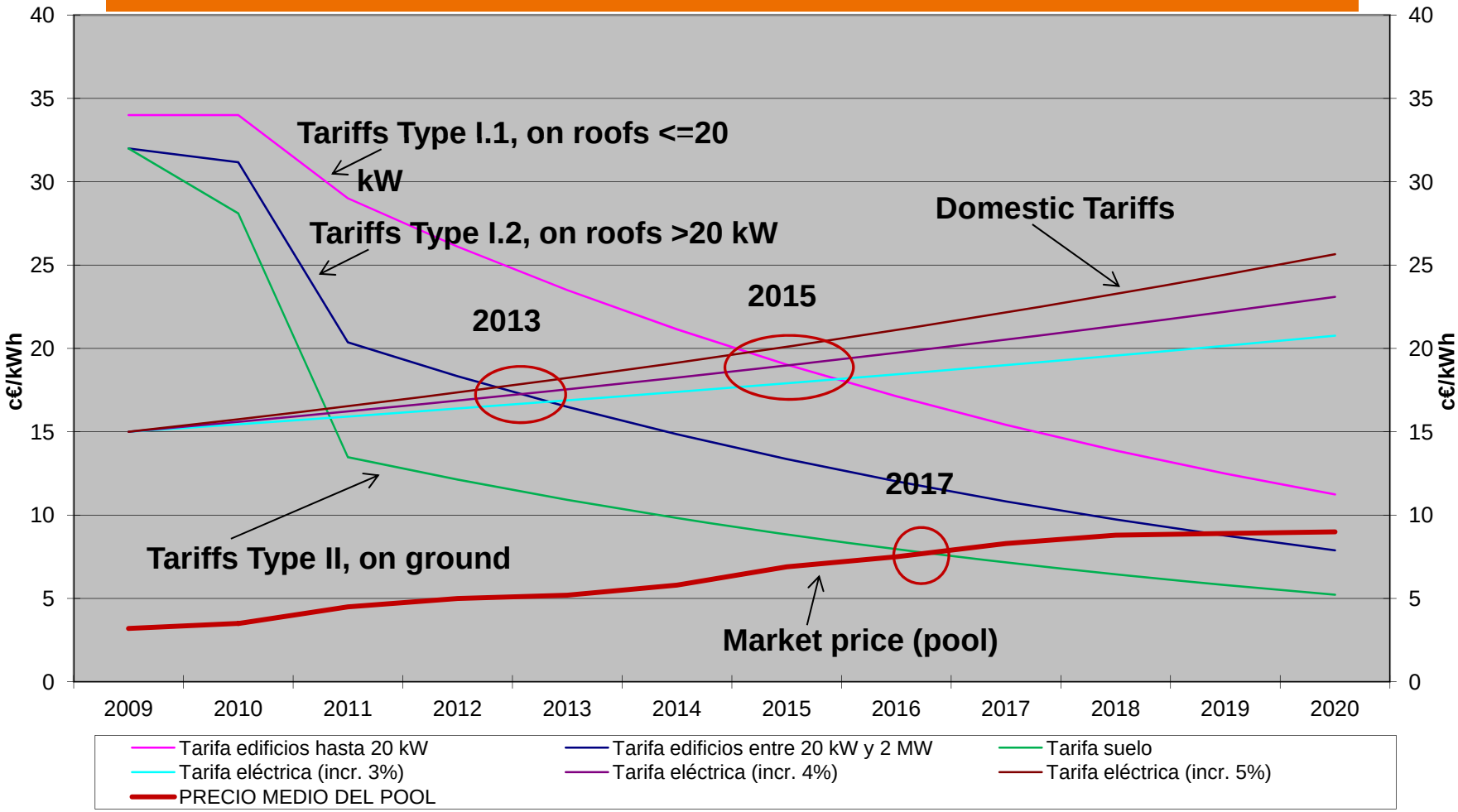


	Forecast / assumption	
	CAGR 2011-2020	CAGR 2020-2055
Germany	3%	2%
Italy	3%	2%
Spain	5%	2%
EU 15/27(3)	*3%*	*2%*
UK	2%	2%
France	5.4%	2%

1) Prices in nominal terms incl. all taxes for a yearly consumption between 2.500 – 5.000 kWh
2) Prices are provided for a different consumer profile (old methodology: standard consumption; new methodology: standard consumption range)
3) CAGR 2000-2007 is provided for EU 15 and CAGR 2008-2010 is given for EU 27
Sources: Eurostat, A.T. Kearney expert estimate, ENEL Green Power, Enerzine, Le Parisien, UK Dept. for Energy and Climate Change, Prognos, EPIA

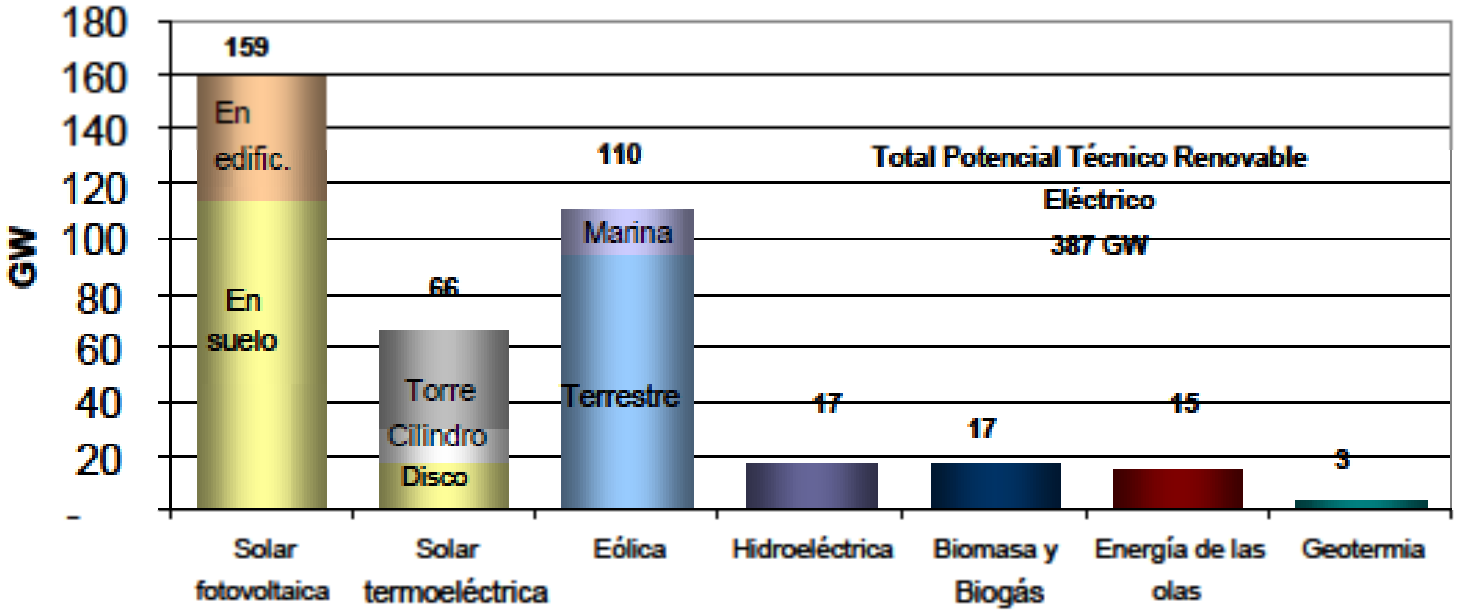
The integration of photovoltaic generation - Price reductions

Analysis of Grid Parity in Spain regarding the domestic market on roofs, and large PV installations on the ground, with the price of the pool.



The integration of photovoltaic generation - Price reductions

Maximum potential of installing renewable generation in Spain.



PV Solar Energy is the one with greatest potential in Spain.
Therefore only need to have reasonable costs to compete with other energy

SWOT Analysis

Weaknesses

- Limiting, Complex and Expensive Administrative Procedures.
- Complex and Expensive Connection Procedures to the grid.
- Economic and financial situation of Spain and the electrical system

Threats

- Unfavorable regulatory change (RDL 1/2012 removed incentives for the new PV installations).
- Opposition of gas and other displaced technologies by a strong entrance of PV in the system
- Other renewable technologies getting more share of EU 2020's target of Renewable than planned.

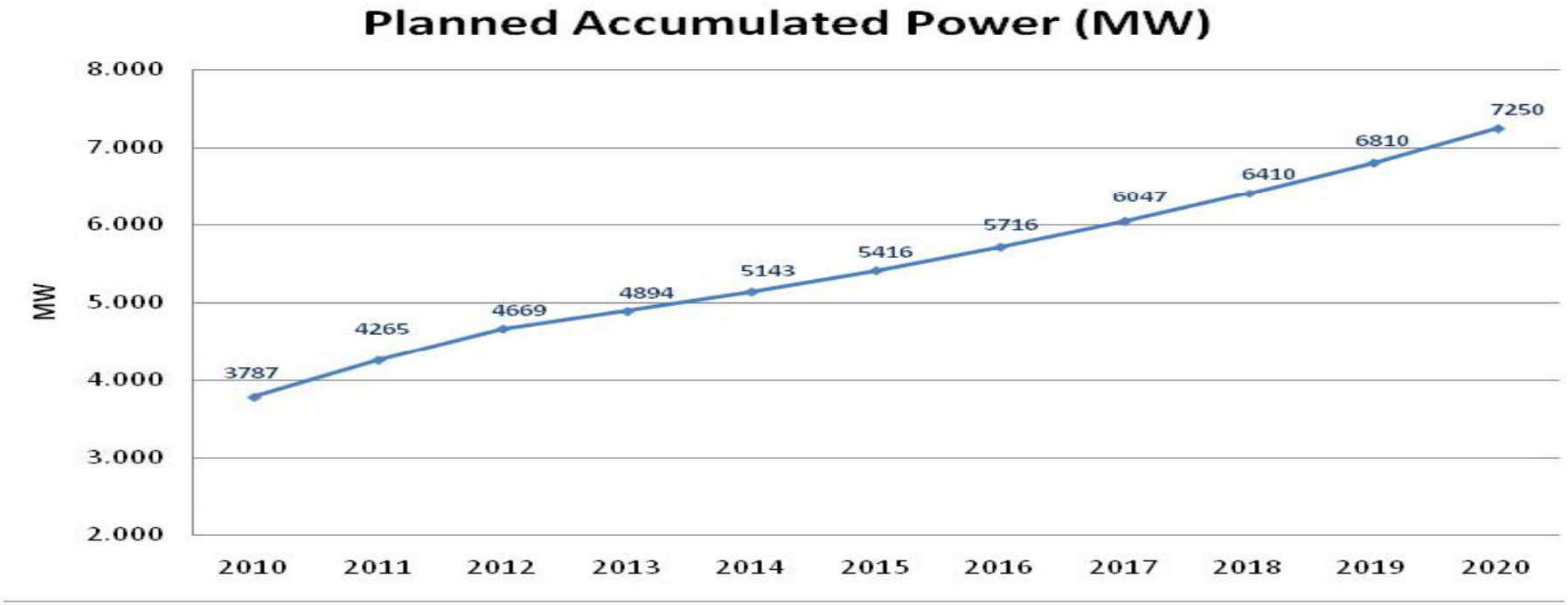
Strengths

- High sun irradiation.
- PV Industry with high experience and quality products
- Determination of the PV associates in UNEF to overcome existing and looming problems

Opportunities

- Support to the PV Spanish Sector by the Government
- Large PV plants are very competitive even with the price of the energy market.
- Self consumption for PV

Plannification for PV.
Renewable Energy Plan (PER 2011-2020)



The future of the PV in Spain:

- **Soon, it will be achieved the Grid Parity in all Spain and this situation will cause a significant increase in installed PV capacity for self-consumption.**

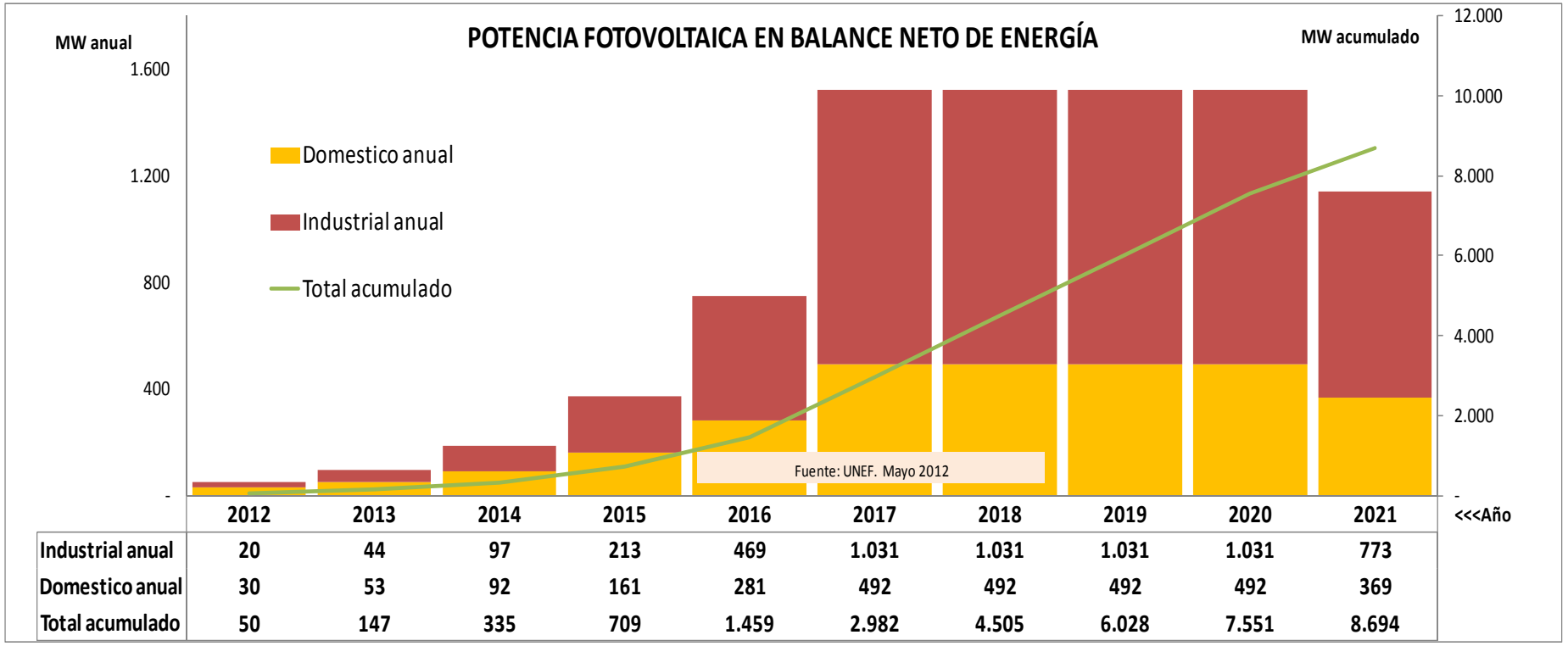
- **Attained grid parity and self consumption being regulated, the future will provide a stronger PV market**

PV Grid Connected . July 2012

AÑO	MES	Nº Instalaciones (Datos CNE)	Energía Vendida (GWh)	Energía Primada (GWh)	Potencia (MW) en SICILIA* (Datos CNE)	Potencia (MW) RAIPRE (Datos: MINETUR)
2004	Diciembre	3.208	1,2	1,2	22	
2005	Diciembre	5.300	2,9	2,9	46	
2006	Diciembre	9.864	9,7	9,7	148	
2007	Diciembre	20.284	53,7	53,7	690	
2008	Diciembre	51.310	255,8	255,8	3.398	3.234
2009	Diciembre	52.145	243,9	243,9	3.417	3.400
2010	Diciembre	55.014	313,7	313,7	3.841	3.789
2011	Enero	55.210	350	350	3.862	
	Febrero	55.411	503	503	3.901	
	Marzo	55.711	534	534	3.937	
	Abril	56.015	659	659	3.979	
	Mayo	56.186	746	746	4.002	
	Junio	56.409	809	809	4.042	
	Julio	56.703	855	855	4.074	
	Agosto	56.984	803	797	4.123	
	Septiembre	57.215	733	543	4.141	
	Octubre	57.400	623	206	4.155	
	Noviembre	57.672	361	73	4.201	
	Diciembre	57.933	421	66	4.243	4.260
2012	Enero	58.117	500	500	4.265	
	Febrero	58.117	654	654	4.271	
	Marzo	58.362	765	765	4.290	
	Abril	58.362	653	653	4.300	
	Mayo	58.515	855	855	4.304	
	Junio	58.515	857	857	4.315	
	Julio	58.645	920	920	4.324	
	Agosto	-	-	-	-	
	Septiembre	-	-	-	-	
	Octubre					4.434

**SICILIA: Base de datos de la CNE, donde aparece el listado las instalaciones FV que cobran la prima equivalente FV*

Market Scenario for PV in Spain with Net Balance



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Industrial anual	20	44	97	213	469	1.031	1.031	1.031	1.031	773
Domestico anual	30	53	92	161	281	492	492	492	492	369
Total acumulado	50	147	335	709	1.459	2.982	4.505	6.028	7.551	8.694

Macroeconic Impact

EVOLUCIÓN ANUAL 2012/2016/2021

DE ALGUNOS PARÁMETROS MACROECONÓMICOS

2012 2016 2021

770 10.910 21.520

Direct Jobs

211 2.774 4.552

Aggregate turnover (M€)

Agencia Tributaria

41 555 1.217

State Returns (M€)

4 122 808

Avoided imports (M€)

Conclusions

-The new Royal Decree-Law 1/2012, dated 27 January 2012, has suspended the remuneration pre-assignment procedure and removed incentives for new electricity installations which use combined heat and power, renewable energy sources and waste.

•Due to rising electricity costs and aggressive reductions of PV technology, the Grid Parity will be achieved soon. Now the Government is working in a net-metering support scheme for self-consumption. If the PV sector wants to reach 15-20 GW in 2020, not only 8 GW (as the new PER indicates), it is necessary that this self-consumption power installed is not counted in the caps established in the current regulations.

•Integration on the electric grid of a large quantities of PV systems in Spain depends on:

- Price reductions in the future
- Integration into the grid, complying with new requirements
- Reduction of barriers
- New RD of Net Balance

Due to the high penetration of distributed generation, it becomes increasingly imperative to use Prediction Systems of Generation

a. How can ESA help using satellite data for current weather (clouds, temperature, radiation ...) and forecasts in the short and medium term, the expected generation of the network nodes, and that the System Operator integrates it in its Control Center for Renewable Energy (CECRE)?

b. How can ESA help ESA to integrate in CECRE, the real-time measurements of this amount of distributed generation installations?

c. How to help integrate data from monitoring stations of the radiation data, for use in previous predictions?

d. How to provide PV systems with trackers of warning signs, (when winds can be very dangerous), so that they can be sent to "flag" position, preventing them from being spoiled.

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Thank you for your attention!

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