



National Survey Report of PV Power Applications in Spain 2015



PHOTOVOLTAIC
POWER SYSTEMS
PROGRAMME

Prepared by
UNEF



PVPS

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Foreword

The International Energy Agency (IEA), founded in November 1974, is an autonomous body within the framework of the Organisation for Economic Co-operation and Development (OECD) which carries out a comprehensive programme of energy co-operation among its member countries

The IEA Photovoltaic Power Systems Technology Collaboration Programme (IEA-PVPS) is one of the collaborative R & D agreements established within the IEA and, since 1993, its participants have been conducting a variety of joint projects in the applications of photovoltaic conversion of solar energy into electricity.

The participating countries and organisations can be found on the www.iea-pvps.org website.

The overall programme is headed by an Executive Committee composed of one representative from each participating country or organization, while the management of individual Tasks (research projects / activity areas) is the responsibility of Operating Agents. Information about the active and completed tasks can be found on the IEA-PVPS website www.iea-pvps.org

Introduction

The objective of Task 1 of the IEA Photovoltaic Power Systems Programme is to promote and facilitate the exchange and dissemination of information on the technical, economic, environmental and social aspects of PV power systems. Task 1 activities support the broader PVPS objectives: to contribute to cost reduction of PV power applications, to increase awareness of the potential and value of PV power systems, to foster the removal of both technical and non-technical barriers and to enhance technology co-operation. An important deliverable of Task 1 is the annual “*Trends in photovoltaic applications*” report. In parallel, National Survey Reports are produced annually by each Task 1 participant. This document is the country National Survey Report for the year 2015. Information from this document will be used as input to the annual Trends in photovoltaic applications report.

The PVPS website www.iea-pvps.org also plays an important role in disseminating information arising from the programme, including national information.

1 INSTALLATION DATA

The PV power system market is defined as the market of all nationally installed (terrestrial) PV applications with a PV capacity of 40 W or higher. A PV system consists of modules, inverters, batteries and all installation and control components for modules, inverters and batteries. Other applications such as small mobile devices are not considered in this report.

For the purposes of this report, **PV installations are included in the 2015 statistics if the PV modules were installed and connected to the grid between 1 January and 31 December 2015, although commissioning may have taken place at a later date.**

1.1 Applications for Photovoltaics

Since 2011, when the lack of regulatory support in Spain began, the national market has been affected and a good example of this is that none ground-mounted installation “on-grid” has been installed in 2015.

At the beginning of 2015, the country went through a new start in the connection of on self-consumption installations, both in residential and industrial sector, under the current legislation at the time about Low Voltage Installations (ITC BT 40).

However, with the publication of the Royal Decree 900/2015 on the 5th of October 2015, which regulates the installation of on self-consumption systems, the development and promotion of new projects went down significantly.

In contrast, thanks to the high costs of fuel, very few off-grid installations, mainly pumping facilities, have been done in the agricultural sector.

1.2 Total photovoltaic power installed

The total power capacity installed in Spain in 2015 has slightly decreased since 2014, in accordance to the data facilitated by the Spanish Regulator, the National Markets and Competition Commission (CNMC) and the Transmission System Operator Red Eléctrica de España (REE). The installed generation capacity in the Spanish national system is near 4,664 MW (4,672 MW in 2014). Nevertheless, this data does not include the total power capacity not connected to the grid and self-consumption installations not registered yet.

UNEF, thanks to the collaboration of national providers and installer companies, has been able to estimate a total capacity installed of 49 MW in 2015, as described below:

Table 1: PV power installed during calendar year 2015

AC			MW installed in 2015 (mandatory)	MW installed in 2015 (optional but HIGHLY NEEDED)	AC or DC
Grid-connected	BAPV	Residential	36.1 MW	22.60 MW	AC
		Commercial			
		Industrial		13.5 MW	AC
	BIPV (if a specific legislation exists)	Residential			
		Commercial			
		Industrial			
	Ground-mounted	cSi and TF			
		CPV			

Off-grid	Residential			
	Other (pumping installations)	12.9 MW	12.9 MW	AC
	Hybrid systems			
	Total		49 MW	AC

Table 2: Data collection process

If data are reported in AC, please mention a conversion coefficient to estimate DC installations.	Figures are in AC, the conversion rate from AC to DC – 10%
Is the collection process done by an official body or a private company/Association?	Collection process has been done by official institutions (CNMC, REE, OMIE) and a private association (UNEF)
Link to official statistics (if this exists)	www.unef.es www.ree.es www.cnmc.es www.omie.es
Graphics	The figures from UNEF have been collected by the information supplied by their members.

Table 3: PV power and the broader national energy market

<i>MW-GW for capacities and GWh-TWh for energy</i>	2015 numbers	2014 numbers
Total power generation capacities (all technologies) – Excl. Self-consumption capacity	106,247 MW	107,954 MW
Total power generation capacities (renewables including hydropower)	51,095 MW	50,902 MW
Total electricity demand (= consumption)	262,931 GWh	258,117 GWh
New power generation capacities installed during the year (all technologies) – Incl. Self-consumption capacity	473 MW	63 MW
New power generation capacities installed during the year (renewables including hydropower) – Incl. Self-consumption capacity	473 MW	63 MW
Total PV electricity production in GWh-TWh	8,236 GWh	8,199 GWh
Total PV electricity production as a % of total electricity consumption	3,13	3.18

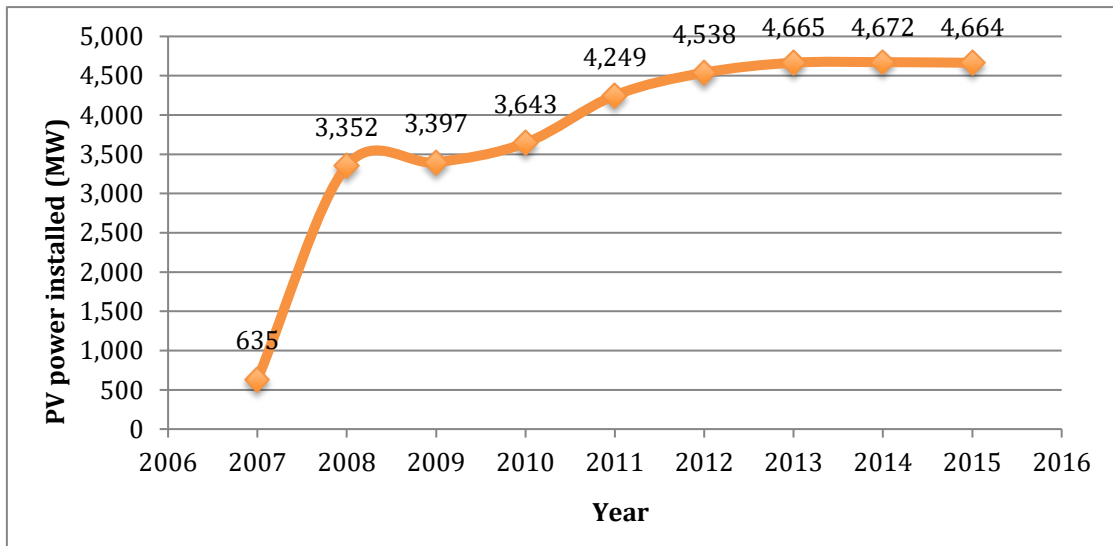
Table 4: Other Information

	2015 Numbers
Number of PV systems in operation in your country (a split per market segment is interesting)	64,422
Capacity of decommissioned PV systems during the year in MW	n.d
Total capacity connected to the low voltage distribution grid in MW	n.d
Total capacity connected to the medium voltage distribution grid in MW	n.d

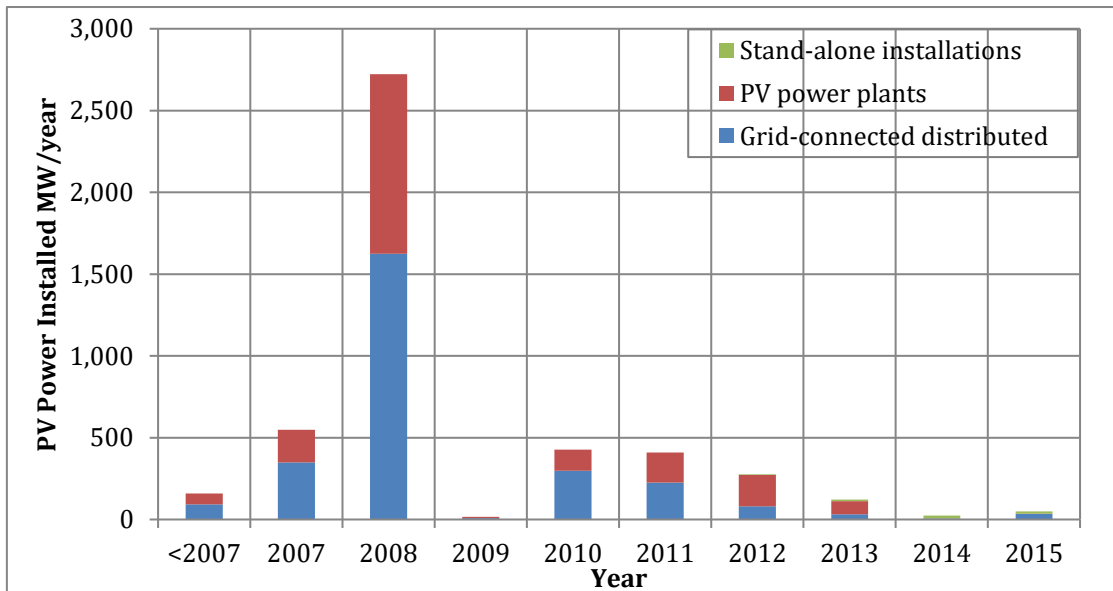
Total capacity connected to the high voltage transmission grid in MW	n.d
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Table 5: The cumulative installed PV power in 4 sub-markets

Sub-market	Stand-alone domestic	Stand-alone non-domestic	Grid-connected distributed	Grid-connected centralized
2014	32	73	2,719	1,953
New 2015		12.9	36.1	
2015	32	85.9	2,755.1	1,953



Graphic 1: Accumulative PV power installed since 2007 (Source: REE)



Graphic 2: PV power installed per year since 2007 (Source: REE and UNEF)

2 COMPETITIVENESS OF PV ELECTRICITY

2.1 Module prices

None ground-mounted installation “on-grid” has been installed in 2015, therefore the prices provided correspond to small installations (self-consumption and a maximum capacity of 100 KW) and they are not representatives of the market in Spain.

The prices are in Euro per Watt peak (€/Wp) in Table 6 and they have been provided by suppliers companies (excluding transport to the site, VAT/TVA and sales commission).

Table 6: Typical module prices for a number of years

Year	2014	2015
Standard module crystalline silicon price(s): Typical	0.60	0.60
Lowest prices	0.50	0.50
Highest prices		1.05

2.2 System prices

There are many kinds of self-consumption installations in Spain, depending on the characteristics of the surface available (ground or rooftop), location and meteorological conditions of the project, and this has a large impact on the associated costs.

To understand the estimation provided regarding costs, it is necessary to describe the regulatory situation in Spain nowadays, which has a strong influence on them.

Before the publication of Royal Decree 900/2015 which regulates the installation of on self-consumption systems, all installations in development during 2015 in Spain, were approved to be connected directly to the main switch board of the electrical installation in low voltage.

When the new regulation entered into force, all installations had to be modified to fulfil all the mandatory requirements established. Among others, each installation has to submit a new application to the Distributor System Operator (DSO) to be connected to the grid and to be granted with a point of connection. Plus, it is mandatory to install a new energy meter, to measure the power production, in a location accessible from a public way to warranty 24/7 access to the DSO.

Currently, the technical conditions to be connected to the grid have not been approved yet by the National Authorities and each DSO has developed different and particular rules to be connected to their networks. This situation means that there are different costs depending on the regional area in the country.

Table 7: Turnkey Prices of Typical Applications – local currency

Category/Size	Typical applications and brief details	Current prices (per W)
Off-Grid Up to 1 kW	Streetlight, telecommunication system, taximeter, camping, shelter...	2.5-3 €/W (can be higher with batteries)
Off-Grid >1 kW	Farming, irrigating system, pumping, agricultural sector, rural electrification	2-2.8 €/W (can be higher with batteries)
Grid-connected Rooftop up to 10 kW (residential)	Service sector, PYMES, Domestic Sector	1.4-1.5 €/W

Grid-connected Rooftop from 10 to 250 kW (commercial)	Hotels, Big industries, Cinemas	0.8-1.2 €/W
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Table 8: National trends in system prices (current) for different applications – local currency

Price/W _p	2011	2012	2013	2014	2015
Residential PV systems (< 10 kW)	2.7	2.6	2.4	2.2	1.5
Commercial and industrial	2	1.8	1.6	1.5	1.2
Ground-mounted (>3 MW)	1.6	1.4	1.2	1.2	0.7

2.3 Cost breakdown of PV installations

The costs shown above have been compiled by UNEF thanks to the collaboration of their members, such as installers, suppliers and consultants.

2.3.1 Residential roof PV System < 10 kW

Table 9: Cost breakdown for a residential PV system – local currency

Cost category	Average (€/W)	Low (€/W)	High (€/W)
Hardware			
Module	0.675	0.6	0.7
Inverter	0.2	0.2	0.2
Other (structure, racking, wiring...)	0.48	0.2	0.6
Soft costs			
Installation	0.11	0.07	0.15
Operation and Maintenance	0.02	0.02	0.02
Subtotal Hardware	1.355	1	1.5
Subtotal Soft costs	0.13	0.09	0.17
Total	1.5	1.1	1.7

2.3.2 Utility-scale PV systems > 3 MW

Table 10: Cost breakdown for a utility-scale PV system – local currency

Cost Category	Average (€/W)	Low (€/W)	High (€/W)
Hardware			
Module	0.44	0.25	0.57
Inverter	0.05	0.03	0.06
Other (structure, racking, wiring, etc.)	0.06	0.03	0.08
Soft cost			
Installation	0.13	0.07	0.16
Operation and Maintenance	0.02	0.01	0.03
Subtotal Hardware	0.55	0.31	0.7
Subtotal - Soft cost	0.15	0.1	0.2
Total Installed Cost	0.7	0.4	0.9

2.4 Financial Parameters and specific financing programs

Not information available.

Table 11: PV financing scheme

Average rate of loans – residential installations	
Average rate of loans – commercial installations	
Average cost of capital – industrial and ground-mounted installations	

2.5 Specific investments programs

Not information available.

Third Party Ownership (no investment)	
Renting	
Leasing	
Financing through utilities	
Investment in PV plants against free electricity	
Crowdfunding (investment in PV plants)	
Other (please specify)	

2.6 Additional Country information

Table 12: Country information

Retail Electricity Prices for an household (range)	0.1088-0.1936 €/kWh (LV and P< 10kW) 0.1405-0.1982 €/kWh (LV and 10<P<15 kW)
Retail Electricity Prices for a commercial company (range)	0.1397 €/kWh (LV and P<15 kW)
Retail Electricity Prices for an industrial company (range)	0.0675-0.1212 €/kWh (HV and P< 15 kW)
Population at the end of 2014 (or latest known)	46,438,422 (01/01/2016)
Country size (km ²)	504,645 km ²
Average PV yield (according to the current PV development in the country) in kWh/kWp	1,300 kWh/kWp
Name and market share of major electric utilities.	ENDESA, IBERDROLA, GAS NATURAL FENOSA, EDP, EON

3 POLICY FRAMEWORK

3.1 Direct support policies for PV installations

3.1.1 *New, existing or phased out measures in 2015*

3.1.1.1 *Description of support measures excluding BIPV, and rural electrification*

In Spain, the main support scheme (the “Régimen Especial”) operated until the end of 2011 and was suspended at the beginning of 2012. In October 2015, a new support scheme (the “Régimen Retributivo Específico”) was established.

The premium tariff or “specific remuneration regime” is not technically defined as a support scheme, but as a complementary retribution to allow renewable technologies to compete with traditional technologies in the energy market.

The specific amounts are based on a number of parameters, each calculated for a set of “standard plants”. The rationale behind the scheme is to provide developers an amount based on the “reasonable rentability” that a well-managed renewable plant would have. In order to determine such costs and values, a set of theoretical standard installations has been developed and their values calculated. Furthermore, these values are linked to the “reasonable rentability”, defined as the average yield of the State obligations to ten years in the secondary market for the 24 months prior to the month of May of the year preceding the start of the regulatory period increased by a spread (art. 19 RD 413/2014). On the basis of these results, an actual plant would receive the amount that its correspondent well-managed theoretical standard installation would receive. For PV plants the “reasonable rentability” is 7.4% approximately.

The main statutory provisions are:

Royal Decree 413/2014 of 6 June, regulating the activity of electricity production from renewable energy, CHP and waste);

Order IET/1344/2015 of 2 July, approving the “standard plants” and their corresponding specific compensation regime, applicable to specific new plants of electricity production from renewable energy, CHP and waste);

Order IET/2735/2015 of 17 December, establishing grid access charges for 2016 and approving certain “standard plants” and compensation regimes for plants of electricity production from renewable energy, CHP and waste);

Royal Decree 900/2015 of 9 October, regulating the administrative, technical and economic conditions for the supply and production of electricity under self-consumption);

3.1.1.2 *BIPV development measures*

The technical building code from 2006 establishes the requirement of building PV panels to contribute to the global electricity demand of certain buildings, such as hotels with more than 100 beds, sport centres, etc.

As of 2015 Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012, on energy efficiency, energy audits, accreditation of service providers and energy auditors and promotion of efficiency of the power supply, promoting the use of renewable energy systems integration in buildings to achieve “zero energy buildings” hasn’t been implemented.

3.1.1.3 *Rural electrification measures*

There are no support measures for rural electrification in Spain.

3.1.1.4 Support for electricity storage and demand response measures

There are no support measures for electricity storage and demand response in Spain.

Table 13: PV support measures (summary table)

	On-going measures residential	Measures that commenced during 2015 - residential	On-going measures Commercial + industrial	Measures that commenced during 2015 - commercial + industrial	On-going measures Ground-mounted	Measures that commenced during 2015 - ground mounted
Feed-in tariffs	No	No	No	No	No	No
Feed-in premium (above market price)	No	No	No	No	No	No
Capital subsidies	No	No	No	No	No	No
Green certificates	No	No	No	No	No	No
Renewable portfolio standards (RPS) with/without PV requirements	No	No	No	No	No	No
Income tax credits	No	No	No	No	No	No
Self-consumption (regulation exists but not support measures. These exist only at a limited regional level)	No	No	No	No	-	-
Net-metering	No	No	No	No	No	No
Net-billing	No	No	No	No	No	No
Commercial bank activities e.g. green mortgages promoting PV	Yes	-	Yes	-	Yes	-
Activities of electricity utility businesses	No	No	No	No	No	No
Sustainable building requirements	Yes (minimum energy in certain buildings)	No	No	No	No	No
BIPV incentives	No	No	No	No	No	No
Other ("reasonable	Yes	-	Yes	-	Yes	-

rentability") offered						
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3.2 Self-consumption measures

- Self-consumption is allowed in Spain under Royal Decree 900/2015.
- Maximum capacity of the self-consumption installation must be equal or below the contracted capacity.
- There are two types of self-consumers:
 - Type 1: maximum capacity installed of 100 kW – there is no compensation for the electricity surplus fed in the grid.
 - Type 2: not limit to the allowed capacity – the surplus can be sold in the wholesale market directly or through an intermediary. A specific grid tax of 0.5 EUR/MWh has to be paid together with a 7% tax on the electricity produced.
- Self-generated power above 10 kW is charged with a fee per kWh consumed as a “grid backup toll”, also known as the “tax on the sun”.
- Adding battery storage implies also an additional tax.
- Geographical compensation is not allowed, and self-consumption for several end customers or a community is not allowed.

. Mandatory

			Type 1	Type 2
PV self-consumption	1	Right to self-consume	Yes	Yes
	2	Revenues from self-consumed PV	Savings on the electricity bill	Savings on the electricity bill
	3	Charges to finance Transmission & Distribution grids	Yes (“tax on the sun”)	Yes (“tax on the sun”)
Excess PV electricity	4	Revenues from excess PV electricity injected into the grid	Not	Yes (sold in the wholesale market)
	5	Maximum timeframe for compensation of fluxes	Real time	Real time
	6	Geographical compensation	No	No
Other characteristics	7	Regulatory scheme duration	Unlimited	Unlimited
	8	Third party ownership accepted	No	Yes
	9	Grid codes and/or additional taxes/fees impacting the revenues of the prosumer	Yes (> 10 kW)	Yes
	10	Regulations on enablers of self-consumption (storage, DSM...)	No	No
	11	PV system size limitations	< 100 kW but ≤ capacity contracted	Not limited but ≤ capacity contracted
	12	Electricity system limitations	Distributors license	Distributors license

	13	Additional features	Taxes on batteries	Taxes on batteries
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3.3 Tenders, auctions & similar schemes

No tender or auctions organised for PV projects in 2015.

3.4 Financing and cost of support measures

In Spain, the remuneration of the plants is a regulated charge that all electricity consumers pay in the tariff. In 2015 the remuneration for renewable energy sources, CHP and waste was 2.3% of the total electricity bill for industrial consumers and 6.5% for household consumers according to Eurostat. In 2015 the total amount awarded for PV support was 2,434.954 million € according to the Spanish regulator, the CNMC.

3.5 Indirect policy issues

In Spain the EU Energy Union Package may influence the implementation of PV power systems, because this strategy has the objectives of increasing the share of renewable energy consumption, decrease GHG emissions and increase energy efficiency. The recent Paris Agreement may also influence the Spanish policy environment once it is ratified by the government, since Spain needs to increase the share of clean energy to reduce emissions.

4 HIGHLIGHTS OF R&D

4.1 Highlights of R&D

The rise of photovoltaics in Spain was accompanied by a major effort of technological innovation and development R&D groups since the eighties, both in the field of crystalline silicon and thin-film technologies with different materials, including concentration photovoltaic technologies. Spain has suitable infrastructure for R&D, homologation and certification as well. However, this reality has been put in danger due to the lack of a minimum domestic market to support the activity of these groups.

Today, there are around 10 research groups working on crystalline silicon, 63 work areas, 155 institutions engaged in R&D in PV, and more than 700 people working in the areas of R&D. On average there are twenty scientific publications and several patents and knowledge transferred to the PV industry.

The industrial sector of the country has declined significantly by the above reasons, living at present preferably from foreign markets. Still, there are two Spanish companies among the top 10 of the EU in component manufacturing and construction of facilities.

4.2 Public budgets for market stimulation, demonstration / field test programmes and R&D

Under the *Plan Estatal de Investigación Científica y Técnica y de Innovación 2013-2016*, the State Program in R&D oriented to society challenges includes. Among others, the Call *Collaboration Challenges* is a call for Public-Private Partnership whose main objective is to guide scientific research, developed in universities and public research organizations, and the R&D to the resolution of problems and present and future needed of our society, in line with the challenges contained in the Spanish Strategy and State Plan, as well as the European Union programme "Horizon 2020".

The support granted in this call includes subsidies for agents of public and private R&D, loans for companies (0.329% interest and amortization in 10 years, with 3 grace and 7 return), and the possibility of advance refundable FEDER to public authorities.

Five projects were granted in this Call with a total aid of 3,049,969 €.

Table 14: Public budgets for R&D, demonstration/field test programmes and market incentives

	R & D	Demo/Field test
National/federal	3 M€	
State/regional		
Total	3 M€	

5 INDUSTRY

5.1 Production of feedstocks, ingots and wafers (crystalline silicon industry)

Silicio FerroSolar is a company dedicated to the production of silicon metal with quality solar electrometallurgical procedures.

5.2 Production of photovoltaic cells and modules (including TF and CPV)

a) PV modules manufacturers in Spain were the following:

- Atersa
- Exiom Solution
- Helios Energy Europe
- Sitecno
- Tamesol

b) Thin film and crystalline cells

5.3 Manufacturers and suppliers of other components

1. PV inverters:

- Circutor
- Fronius
- Ingeteam
- Power Electronics
- GPTech
- Gamesa
- SMA

2. Supporting structures:

- Clavijo
- Hiasa
- Praxia
- Soltec
- SUNFER Energy

3. Storage batteries

- Exide

6 PV IN THE ECONOMY

6.1 Labour places

The number of labour places in Spain is devoted primarily to operation and maintenance of existing facilities and business development in third countries.

In Spain, direct labour places in 2014 were 5,000 according to UNEF.

Table 17: Estimated PV-related labour places in 2014

Research and development (not including companies)	150
Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D	4550
Distributors of PV products	
System and installation companies	
Electricity utility businesses and government	200
Other	100
Total	5000

6.2 Business value

The Spanish PV sector contributed to the GDP with a total of 2,610 million €, 2,450 million € was direct contribution.

In 2014, the Spanish PV sector reduced its contribution to national GDP by 13% over the previous year. Taking the data of 2012, the sector has decreased its contribution to national wealth by 22 percentage points. These figures show the slowdown registered in the PV sector in recent years as a result of not forward-looking regulation.

According to the Spanish TSO, Red Eléctrica de España, in 2014 only 7 MW were connected to the grid. According to UNEF data, 19 MW of PV were installed in Spain in 2014. The remaining 12 MW are likely pumping installations and other off-grid installations that may have not been registered.

Export of PV products – the data has been collected from the trade statistics website of the Ministry of Economy of Spain. The product taken has been “85414091 - PV Cells”.

Table 18: Value of PV business

Sub-market	Capacity installed in 2014 (MW)	Price per W (from table 7)	Value	Totals
Off-grid domestic	12	2,5-3 €	33,000,000	33,000,000
Off-grid non-domestic	0	2-2,8 €	0	
Grid-connected distributed	7	1,4-1,5 €	10,150,000	10,150,000
Grid-connected centralized	0	0,8-1,2 €	0	
				43,150,000
Export of PV products				0
Change in stocks held				-

Import of PV products	<i>0</i>
<i>Value of PV business</i>	86,300,000

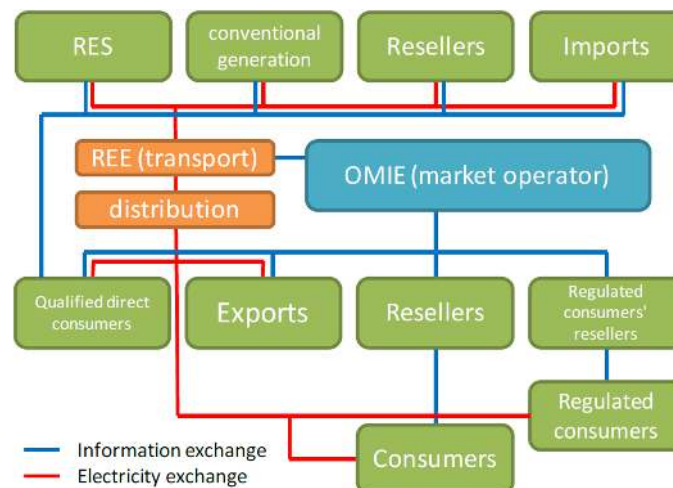
7 INTEREST FROM ELECTRICITY STAKEHOLDERS

7.1 Structure of the electricity system

The structure of the electricity system is separate in different players from generation to consumers. It is an open market, partially regulated by the Government, to guarantee the security of supply, environmental protection and climate change, and competitiveness of the market.

The main players of the electricity system are:

- Generators: they are the agents that produce electricity, regardless of the type of technology used for it. The generation is a liberalized activity.
- Transport System Operator (TSO): It is the company that transports electricity from power plants where it is produced to the consumption centers where it is delivered to distributors. In Spain, by law, there is one single TSO, Red Eléctrica de España (REE).
- System Operator: It is the company, in this case REE, who is responsible for the whole process of the operation of the system.
- Distributor System Operator: companies who transport electricity to the final consumers in medium and low voltage. There are different companies in Spain who operates as DSO in a specific regional area of the country.
- Retailers: they are the agents who sell energy. They buy electricity in the wholesale market and sell it to consumers. It is also a liberalized activity.
- Consumers: any person or company who consumes electricity at any time.



Picture 1: Structure of the electricity system in Spain



Picture 2: Transport and Distribution System Operators of the electricity system in Spain

7.2 Interest from electricity utility businesses

The new interest shown by the key electricity utility companies in the PV business is remarkable. They have already implemented customer solutions with PV support initiatives. A few examples:

- Iberdrola has released a new product called Smart Solar, an integrated solar solution, to generate and consume customer's own energy. They offer preliminary assessment, maintenance, including managing permissions for possible subsidies in the future and web services to manage the installation. The consumer stays connected to the network to guarantee the supply at all times.
- Endesa launched SPEL Solar, which allowed them the holding of the first auction of solar energy, offering generators to sell the photovoltaic power production at "stable prices". The auction is coordinated by the independent manager OMIP and it is focus on solar producers, directly or through their representatives.

7.3 Interest from municipalities and local governments

In accordance with the distribution of competences in Spain, different actions have been considered from local governments and municipalities in 2015.

- Regional Governments: Law 11/2015, on 30th March, which modifies Law 10/2006 for Renewable Energies and Energy Efficiency of the Region of Murcia. To promote self-consumption PV installations.
- Local Governments: in many of them, it is still applicable the reduction of taxes related to the construction and installation of PV systems, with bonus up to 95% of the fee.

8 HIGHLIGHTS AND PROSPECTS

The Spanish PV sector is undergoing a process of removal of all RES support, which has created high instability and low predictability for future investments. Recent Spanish regulation only guarantees “reasonable rentability” and it contributes to not actively promote renewable energies, with special mention to PV Systems, due to the high risk added in regulation.

The perspective for self-supply PV installations has not been improved either. Even if it has been positive that the new Royal Decree 900/2015 regulates the appropriate framework to develop new self-consumption projects, additional fees have been introduced, making self-consumption hardly competitive.

This is especially important for the industrial market in self-consumption, which has more resources to invest in renewables, due to the fact that this market doubles its payback period compared to a net-balance model.

