IEA INTERNATIONAL ENERGY AGENCY

UNEF
Unión Española Fotovoltaica

Universidad Carlos III de Madrid

National Survey Report of PV Power Applications in Spain 2013

PVPS

PHOTOVOLTAIC POWER SYSTEMS PROGRAMME

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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 23 member countries. The European Commission also participates in the work of the Agency.

The IEA Photovoltaic Power Systems 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 24 participating countries are Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), China (CHN), Denmark (DNK), France (FRA), Germany (DEU), Israel (ISR), Italy (ITA), Japan (JPN), Korea (KOR), Malaysia (MYS), Mexico (MEX), the Netherlands (NLD), Norway (NOR), Portugal (PRT), Spain (ESP), Sweden (SWE), Switzerland (CHE), Thailand (THA), Turkey (TUR), the United Kingdom (GBR) and the United States of America (USA). The European Commission, the European Photovoltaic Industry Association, the US Solar Electric Power Association, the US Solar Energy Industries Association and the Copper Alliance are also members.

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 2013. 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 more. 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 2013 statistics if the PV modules were installed and connected to the grid between 1 January and 31 December 2013, although commissioning may have taken place at a later date**.

1.1 Applications for Photovoltaics

PV industry in Spain has mainly developed medium to big ground-mounted installations. Self-supply regulation was little developed in Spain until recent times. Due this lack of regulatory support not much is been done in the residential or commercial sectors.

Spain has supported PV development through a "feed-in-tariff" scheme as a chapter of the renewables promotion strategy. While the first part of the last decade could be seen as the PV golden years in Spain reality was not so bright. Until 2007 average installation speed was not even 100 MW/year. 2007 is a key period for PV industry in Spain. A new piece of regulation (RD 661/2007) brought a singular PV expansion that lasted until 2008. Since then several regulatory modifications has undermine PV investor's expectations. In 2013, new PV projects were almost non-existence, ONLY KJDD

1.2 Total photovoltaic power installed

In 2013 there is a total amount of 4.640 MW PV installed; only 102 MW were installed in the year 2013. From this 102, 15 are in installations of selconsumption.

Table 1: PV power installed in Spain during calendar year 2013

			MW installed in 2013 - AC value
Grid-connected	BAPV	Residential	6
		Commercial	7
		Industrial	20
		Total BAPV	***33***
	BIPV	Residential	
		Commercial	2
		Industrial	
		Total BIPV	***2***
	Ground-mounted	cSi and TF	67
		CPV	
		Total Ground-mounted	**67**
Off-grid		Residential	
		Other	
		Hybrid systems	
		Total off-grid	**0**
		Total	**102**

Table 2: Data collection process:

Are the installation data reported in AC or DC?	AC
Is the collection process done by an official body or a private company/Association?	Collection process is done by a Public body (CNMC)
Link to official statistics (if this exists)	www.unef.es, www.ree.es, www.cnmc.es

Table 3: PV power and the broader national energy market.

MW-GW for capacities and GWh-TWh for energy	**2013 numbers**	**2012 numbers**
Total power generation capacities (all technologies)	108,148	107,502
Total power generation capacities (renewables including hydropower)	273,598	283,072
Total electricity demand (= consumption)	260,870	267,011
New power generation capacities installed during the year (all technologies)	646	
New power generation capacities installed during the year (renewables including hydropower)	510	
Total PV electricity production in GWh-TWh	8,397	8,171
Total PV electricity production as a % of total electricity consumption	3,07	2,88

Table 4: Other informations

	2013 Numbers
Number of PV systems in operation in your country (a split per market segment is interesting)	60 698
Capacity of decommissioned PV systems during the year in MW	0
Total capacity connected to the low voltage distribution grid in MW	1 647
Total capacity connected to the medium voltage distribution grid in MW	2 247
Total capacity connected to the high voltage transmission grid in MW	746

Table 5: The cumulative installed PV power in 4 sub-markets.

Sub-market	2012	2013
Stand-alone domestic	26	28
Stand-alone non-domestic	62	65
Grid-connected distributed	2664	2714
Grid-connected centralized	1786	1833
TOTAL (MW)	4538	4640

2 POLICY FRAMEWORK

This chapter describes the support policies aiming directly or indirectly to drive the development of PV. Direct support policies have a direct influence on PV development by incentivizing or simplifying or defining adequate policies. Indirect support policies change the regulatory environment in a way that can push PV development.

2.1 Direct support policies

Table 6: PV support measures (summary table)

	On-going measures	Measures that commenced during 2013
Feed-in tariffs (gross / net?)	No	New regulation (1)
Capital subsidies for equipment or total cost	No	
Green electricity schemes	No	
PV-specific green electricity schemes	No	
Renewable portfolio standards (RPS)	No	
PV requirement in RPS	No	
Investment funds for PV	No	
Income tax credits	Yes	
Prosumers' incentives (self-consumption, net-metering, net-billing…)	No	
Commercial bank activities e.g. green mortgages promoting PV	No	
Activities of electricity utility businesses	No	
Sustainable building requirements	No	

2.2 Direct Support measures

2.2.1 Support measures exiting in 2013

2.2.1.1 Description of support measures excluding prosumers, BIPV, and rural electrification

2013 was a complex year regarding regulatory frame. Until July a classic "feed in tariff" scheme was in place. With several reforms it was the main support mechanism since 1994. After the Decree-law 9/2013 everything changes. A shift from remunerating production (kW/h) to remunerating installed capacity is established as the element to support renewals technologies. Even when a new support mechanism was established the new scheme was not develop and It could not be put to work. 2S 20113 and 1S 2014 did not bring any light to this matter so it is unclear to define any level of PV public support. The moratoria for new renewables energy projects is still going on.

(1) The remuneration regime of the Renewable Installations is based, according to RD 413/2014, on the necessary participation of these installations in the market, supplementing market income with specific regulated remuneration, which would permit these technologies to compete on equal footing with the rest of the technologies in the market. In this way, installations will be able to receive, throughout their regulatory useful life, in addition to remuneration from the sale of the energy valued at market price, specific remuneration consisting of:

(i) A return on investment per unit of installed capacity, which covers, when appropriate, the investment costs for each standard installation which cannot be recovered through the sale of the energy on the market in question, and

(ii) A return on operation, which covers, when appropriate, the difference between the operating costs and the earnings through the participation in the generation market of said standard installations. This supplementary specific remuneration must be sufficient to reach the minimum level necessary to cover the costs which, unlike conventional technologies, they cannot recover in the market and allows them to obtain a reasonable profit (not real, but in reference to the standard installation applicable in each case).

2.2.1.2 Prosumers' development measures

In 2013 none has been done to develop prosumer development. 24/2014 Act only permits very restrictive self-supply with PV technology. Two types of self-supply are established: i) with sales of excess power and ii) without feeding the grid. Shared self-supply is not permitted. The maximum capacity installable is the same as the amount contracted from the grid up to 100 kW, where it is capped. Net Balance is not permitted

2.2.2 Support measures phased out in 2013

The feed in tariff system in place since 1994 and key part of the successful renewals deployment in Spain.

2.2.3 New support measures implemented in 2013

A shift from remunerating production (kW/h) to remunerating installed capacity is established as the element to support renewables technologies.

2.2.4 Measures currently discussed but not implemented yet

After the 24/2013 Act, the self-consumption royal decree is still missing. It is an essential regulatory piece to deploy PV potential in Spain. The draft 0of the new decree impose a toll that will be a important economical barrier r for the development of the selfconsumption.

2.3 Indirect policy issues

There are several European programs to support prosumers and renewables.. To some regions have small programs of support.

3 HIGHLIGHTS OF R&D

3.1 Highlights of R&D

Spain has significant infrastructure and R & D across the value chain.

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 + i. On average there are twenty scientific publications and several patents and knowledge transferred to the PV industry. Some of the most significant one in 2013 were:

- Development of silicon, to a solar standard, purified via metal, reaching standards similar to those of silicon purified by conventional ways.

- 40 % reduction in radiation losses in the Siemens reactor through the use of heat shields.

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

This data are approximate.

Table 7: Public budgets for R&D, demonstration/field test programmes and market incentives.

	R & D	Demo/Field test
National/federal	18 M €	
State/regional		
Total	18 M €	

4 INDUSTRY

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

List by name: Silicio Ferrosolar, is a company dedicated to the production of silicon metal with quality solar electrometallurgical procedures

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

Module manufacturing is defined as the industry where the process of the production of PV modules (the encapsulation) is done. A company may also be involved in the production of ingots, wafers or the processing of cells, in addition to fabricating the modules with frames, junction boxes etc. The manufacturing of modules may only be counted to a country if the encapsulation takes place in that country.

a) **List by name all manufacturers operating in Spain:** Atersa, Helios Energy Europe, Isofoton and Tamesol

b) **Type of technology**: Thin film and crystalline cells

c) **Total production** was 350 MW crystalline cells in total. It is not possible to provide this information by company. 75 MW were thin film.

4.3 Manufacturers and suppliers of other components

Balance of system component manufacture and supply is an important part of the PV system value chain in Spain, with the next actors:

- **PV inverters**: for a total of 1 670 MW market the biggest manufacturers are Ingeteam (34,7 % market share), Power Electronics (27,5 %), and GPTech (11,8 %). From Gamesa there is no data.

- **Supporting structures**: 650 MW market, the biggest manufacturers are Hiasa (18,5 % market share), Isowat Made (15,4 %), Clavijo (12,3 %).

5 COMPETITIVENESS OF PV ELECTRICITY

5.1 Module prices

In Spain, the price of modules in 2013, have followed the global trend that can be seen in the following graph of Fraunhofer.

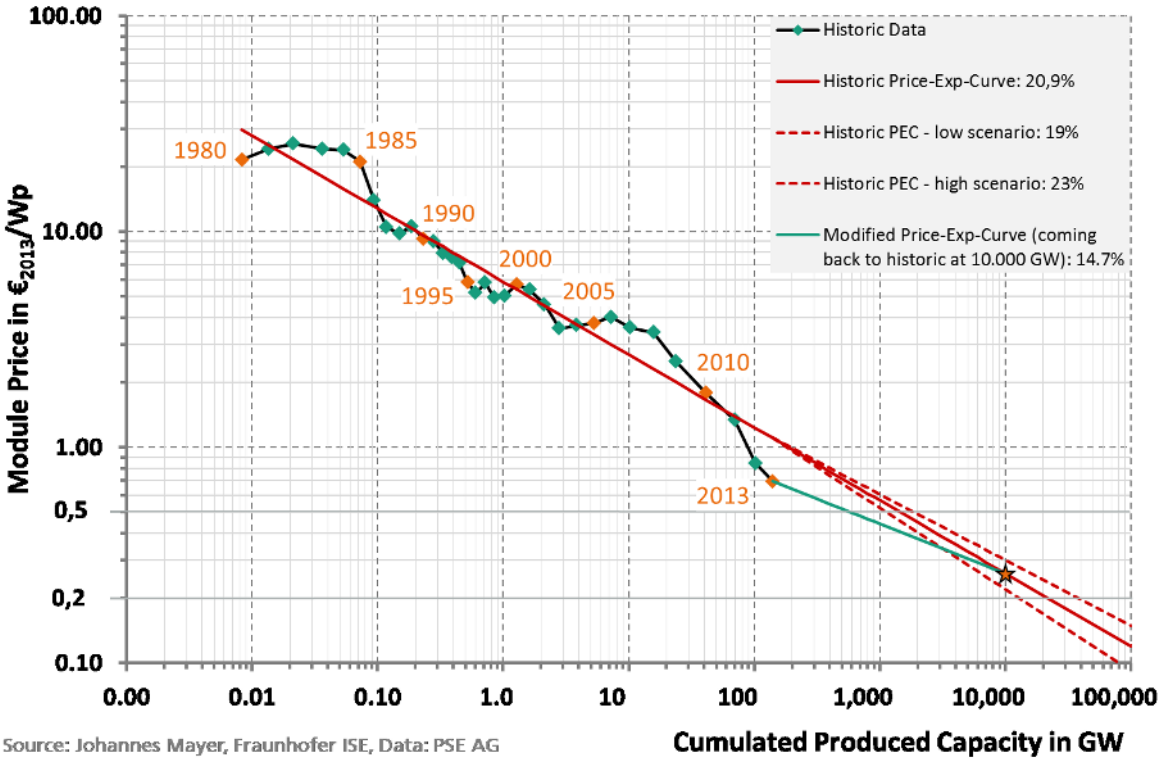

Table 10: Typical module prices for a number of years

Year	2013
Standard module price(s): Typical	0,65
Best price	0,55
PV module price for concentration (if relevant)	2

5.2 System prices

A summary of typical system prices is provided in the Tables 11 and 12.

Table 11: Turnkey Prices of Typical Applications

Category/Size	Current prices per W
OFF-GRID Up to 1 kW	5
OFF-GRID >1 kW	4

Grid-connected Rooftop up to 10 kW (residential)	2,40
Grid-connected Rooftop from 10 to 250 kW (commercial)	1,70
Grid-connected Rooftop above 250kW (industrial)	1,40
Grid-connected Ground-mounted above 1 MW	1,20
Other category existing in your country (hybrid diesel-PV, hybrid with battery…)	-

Table 12: National trends in system prices (current) for different applications

Price/Wp	2011	2012	2013
Residential PV systems < 10 KW	2,7	2,6	2,4
Commercial and industrial	2	1,8	1,6
Ground-mounted	1,6	1,4	1,2

5.3 Financial Parameters and programs (leasing…)

Currently, funding schemes for photovoltaic systems are virtually paralyzed due to the current crisis.

5.4 Additional Country information

The Table 14 provides additional information regarding the country's population and additional parameters linked to its electricity system.

Table 14: Country information

Retail Electricity Prices for an household (range)	0.1752 €/kWh
Retail Electricity Prices for a commercial company (range)	0.1752 €/kWh
Retail Electricity Prices for an industrial company (range)	0.1165 €/kWh
Population at the end of 2013 (or latest known)	47 129 783 hab
Country size (km^2)	504 645 km
Average PV yield (according to the current PV development in the country) in kWh/kWp	
Name and market share of major electric utilities.	ENDESA, IBERDROLA, GAS NATURAL FENOSA, EDP, EON

6 PV IN THE ECONOMY

6.1 LABOUR PLACES

Table 15: Estimated PV-related labour places in 2013

The number of workers in Spain, is devoted primarily to the work of operation and maintenance of existing facilities, and facilities development work in other countries.

Research and development (not including companies)	200
Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D	
Distributors of PV products	
System and installation companies	7000
Electricity utility businesses and government	200
Other	100
Total	7.500

6.2 Business value

In Figure 16 is shown some data about the business value in Spain.

Table 16: Value of PV business

Sub-market	**Capacity installed *in 2012* (MW)**	**Price per W** *(from table 7)*	**Value**	**Totals**
Off-grid domestic				
Off-grid non-domestic				
Grid-connected distributed	**292**	**1,9**		
Grid-connected centralized				
Export of PV products				
Change in stocks held				
Import of PV products				
Value of PV business				

7 INTEREST FROM ELECTRICITY STAKEHOLDERS

7.1 Structure of the electricity system

Short description of the electricity industry landscape - structure –separate generation, transmission, distribution but most part of the electric value chain in own my the 5 big utilities companies. - retailers and network businesses – integrated; - ownership is mainly private. There is a TSO in place and Red Eléctrica de España is the company doing the electricity transport. It is partially public (28% share own by state l) - Electricity industry regulator? Yes the Comisión Nacional de la Energía until september 2013. Since then Comisión Nacional de Mercados y Competencia	

7.2 Interest from electricity utility businesses

At present there are major barriers to the development of the photovoltaic industry, as the existing regulation prevents self-consumption, under the threat of a toll backup ("peaje de respaldo"). Nor is allowed for consumption facilities, energy storage.

7.3 Interest from municipalities and local governments

The PV LEGAL project (FP7 of European Union http://www.pvlegal.eu/) developed all barriers of photovoltaic's in Spain, in it was shown that the administrative, legal and technical barriers are very high in relation to developing countries with more photovoltaic (Germany, Italy, .. .).

8 STANDARDS AND CODES

On 12 July 2013 the Spanish Council of Ministers approved a reform of the Spanish energy sector. It is the **Royal Decree-Law 9/2013**, of 13 July, of urgent measures to guarantee financial stability in the electricity system. The energy reform has been done by means of a new Energy Sector Act, a Decree-Law, eight Royal Decrees and three Ministerial Orders.

The main aims of the energy reform are:

- To establish a regulatory framework to guarantee financial stability in the electricity system.
- To remove deficit in the electricity sector once and for all, preventing future deficit and guaranteeing supply to consumers at the lowest possible cost and with increased transparency.

- To simplify and clarify electricity bills and encourage competition in domestic electricity tariffs to foster competition towards consumers, while maintaining the discount known as the "social bonus".

In December 27, 2013 saw the publication in the Official State Gazette of **Law 24/2013**, of December 26, 2013.

The law emerged in a context of "continual legislative changes that have led to a significant distortion in the functioning of the electricity system, and that needs to be corrected by action by the legislature that will provide the regulatory stability that the electricity business needs."

To this end, the basic aim of Law 24/2013 is "to lay down the provisions governing the electricity industry that will guarantee the electricity supply with the necessary quality levels and at the lowest cost possible, to ensure the economic and financial sustainability of the system and to permit an effective level of competition in the electricity industry, all in accordance with the environmental protection principles of a modern society."

This new Law regulates self-consumption of electricity for the first time. By way of illustration only some forms of self-consumption are listed, because generally self consumption is considered " any electricity consumption originating in generation facilities connected inside a consumer network or via a direct electricity line associated to a consumer," whether in one of the forms described by law or in any other form, as long as the association between production facilities and consumption exists. It is specified, however, that the obligations and rights regulated in the law only apply to those cases where at least the production facility or the consumer facility is fully or partially connected to the electricity system. When the production or consumption facility is fully or partially connected to the electricity system, the consumers involved must pay not only the network access tolls and charges generally applicable, but also what the law calls" costs for the provision of the system's backup services."

Consumers benefitting from the different forms of self-consumption must register with the Ministry of Industry, Energy and Tourism's administrative registry of self-consumption of electricity

The elaboration of standards and codes for PV systems in Spain is performed on the European level (CENELEC) and international level (IEC). The actual list of international standards and codes can be found on the web site: www.iec.ch.

In Spain, the following standard codes were published in 2013:

- UNE-EN 62109-2:2013 "Seguridad de los convertidores de potencia utilizados en sistemas de potencia fotovoltaicos. Parte 2: Requisitos particulares para inversores"
- UNE 206008:2013 IN (IEC/TS 61836:2007 Ed.2, modificada) "Energía solar fotovoltaica. Términos y definiciones
- UNE 206007-1 IN Requisitos de conexión a la red eléctrica. Parte1: Inversores para conexión a la red de distribución

From last mid month on May 2013, a new technical report applied to PV inverters marketed in Spain has been published as UNE 206007-1 IN (Requirements for connecting to the power system. Part 1: Grid-connected inverters). Highlights and prospects Even though currently there are some official documents that are related with photovoltaic technical issues, PV manufactures have found completely defenceless on inhomogeneous exigencies coming from the Spanish utilities. Then, from the Spanish Standardization Committee, CTN 206/SC 82, Solar photovoltaic energy systems, a new technical report has been published related to PV inverters. This document has been divided into two parts: the first one, published, is about the inverters for the connection to the network; and the second one, in draft, is about the security of the system for installations set up by inverters.

The scope of this new report divided into two parts is provided the minimum technical requirements address to the grid connection side of the inverter system. Lot of them are coming to International standards but others are shown for first time. In that Technical Report, PV inverters are divided into two groups: Group 1 are the inverters that have their junction point in the low-voltage network (LF transformer, HF transformer and transformerless inverters) and Group 2 are those inverters that have their junction point in the high- voltage network.

The technical requirements are based on the following topics: DC injection into the grid, requirements based on inverter isolation and array grounding, fault-tolerance of residual current monitoring, voltage and frequency reconnection time after grid faults, self-reconnection, anti-islanding, over voltages, grid quality, reconnection out-of-step operation and input and output ranges.

In order to guarantee of the fulfilment of the technical requirements shown later, conformity certification must be obtained for the equipment under test. That certificate will be obtained by an accredited body certification accredited for this report.

With respect to the self-consumption, In Spain there are two types of self-consumption installations:

1. Instantaneous self-consumption with or without energy storage
2. Off-grid self-consumption

1. Instantaneous self-consumption

It consists in generating electrical energy oneself and consuming it at the same time. Although the PV installation is connected to the grid, there is not injection to the grid. The photovoltaic inverter regulates its power to the actual demand without consuming energy from the grid. This particular form of electricity generation is increasing significantly despite current laws in some countries such as Spain, because it is precisely this form of electricity generation that makes it possible to authorise generation installations as any type of electrical installation. This simplifies and reduces the cost of managing photovoltaic installation to the authorities.

Under Spanish law, the photovoltaic installation must meet three requirements:

- It must not inject electricity generated into the electrical distribution lines,
- It must comply with European “anti-islanding” regulations that do not allow a stand-alone generator to supply electricity if there is no supply from the electrical distribution lines.
- It must comply with the current safety standards

The current process for the legalization with the administration for this type of installations is the following:

- **Normal procedure**: by applying the Royal Decree 1699/2011, of 18 November 2011, on the regulation of the network connection of electricity production for small-scale renewable energy installations. Then, it is applicable the procedure required for installations in Special Regime. It is a laborious process. The Spanish government will approve new administrative and technical conditions for the connection of these facilities. In addition, these installations will have to be registered when the creation of the registry of installations with self-consumption is approved and regulated.

- **Simplified procedure**: for the moment, only applicable in some Autonomous Communities (Aragón, Basque, Catalonia, Madrid, La Rioja, Navarre). The Ministries of Industry of those Autonomous Communities accept the procedure of said installations under the interpretation of the Low Voltage Generating Installations, ITC 40, included in the Spanish Low Voltage Electro technical Regulation (REBT). Thus, the procedure required for a generator installation under the Special Regime is not applicable. In the future, these types of installation will have to be registered when the creation of the registry of installations with self-consumption is approved and regulated. In addition, they will have the obligation to satisfy the administrative requirements, which the administration will define over time.

Definitions, Symbols and Abbreviations

For the purposes of this and all IEA PVPS National Survey Reports, the following definitions apply:

PV power system market: The market for all nationally installed (terrestrial) PV applications with a PV power capacity of 40 W or more.

Installed PV power: Power delivered by a PV module or a PV array under standard test conditions (STC) – irradiance of 1 000 W/m^2, cell junction temperature of 25^{o}C, AM 1,5 solar spectrum – (also see 'Rated power').

Rated power: Amount of power produced by a PV module or array under STC, written as W.

PV system: Set of interconnected elements such as PV modules, inverters that convert d.c. current of the modules into a.c. current, storage batteries and all installation and control components with a PV power capacity of 40 W or more.

CPV: Concentrating PV

Hybrid system: A system combining PV generation with another generation source, such as diesel, hydro, wind.

Module manufacturer: An organisation carrying out the encapsulation in the process of the production of PV modules.

Off-grid domestic PV power system: System installed to provide power mainly to a household or village not connected to the (main) utility grid(s). Often a means to store electricity is used (most commonly lead-acid batteries). Also referred to as 'stand-alone PV power system'. Can also provide power to domestic and community users (plus some other applications) via a 'mini-grid', often as a hybrid with another source of power.

Off-grid non-domestic PV power system: System used for a variety of industrial and agricultural applications such as water pumping, remote communications, telecommunication relays, safety and protection devices, etc. that are not connected to the utility grid. Usually a means to store electricity is used. Also referred to as 'stand-alone PV power system'.

Grid-connected distributed PV power system: System installed to provide power to a grid-connected customer or directly to the electricity grid (specifically where that part of the electricity grid is configured to supply power to a number of customers rather than to provide a bulk transport function). Such systems may be on or integrated into the customer's premises often on the demand side of the electricity meter, on public and commercial buildings, or simply in the built environment on motorway sound barriers etc. They may be specifically designed for support of the utility distribution grid. Size is not a determining feature – while a 1 MW PV system on a rooftop may be large by PV standards, this is not the case for other forms of distributed generation.

Grid-connected centralized PV power system: Power production system performing the function of a centralized power station. The power supplied by such a system is not associated with a particular electricity customer, and the system is not located to specifically perform functions on the electricity grid other than the supply of bulk power. Typically ground mounted and functioning independently of any nearby development.

Turnkey price: Price of an installed PV system excluding VAT/TVA/sales taxes, operation and maintenance costs but including installation costs. For an off-grid PV system, the prices associated with storage battery maintenance/replacement are excluded. If additional costs are incurred for

reasons not directly related to the PV system, these should be excluded. (E.g. If extra costs are incurred fitting PV modules to a factory roof because special precautions are required to avoid disrupting production, these extra costs should not be included. Equally the additional transport costs of installing a telecommunication system in a remote area are excluded).

Field Test Programme: A programme to test the performance of PV systems/components in real conditions.

Demonstration Programme: A programme to demonstrate the operation of PV systems and their application to potential users/owners.

Market deployment initiative: Initiatives to encourage the market deployment of PV through the use of market instruments such as green pricing, rate based incentives etc. These may be implemented by government, the finance industry, electricity utility businesses etc.

Final annual yield: Total PV energy delivered to the load during the year per kW of power installed.

Performance ratio: Ratio of the final annual (monthly, daily) yield to the reference annual (monthly, daily) yield, where the reference annual (monthly, daily) yield is the theoretical annual (monthly, daily) available energy per kW of installed PV power.

Currency: The currency unit used throughout this report is EURO

PV support measures:

Feed-in tariff	an explicit monetary reward is provided for producing PV electricity; paid (usually by the electricity utility business) at a rate per kWh that may be higher or lower than the retail electricity rates being paid by the customer
Capital subsidies	direct financial subsidies aimed at tackling the up-front cost barrier, either for specific equipment or total installed PV system cost
Green electricity schemes	allows customers to purchase green electricity based on renewable energy from the electricity utility business, usually at a premium price
PV-specific green electricity schemes	allows customers to purchase green electricity based on PV electricity from the electricity utility business, usually at a premium price
Renewable portfolio standards (RPS)	a mandated requirement that the electricity utility business (often the electricity retailer) source a portion of their electricity supplies from renewable energies
PV requirement in RPS	a mandated requirement that a portion of the RPS be met by PV electricity supplies (often called a set-aside)
Investment funds for PV	share offerings in private PV investment funds plus other schemes that focus on wealth creation and business success using PV as a vehicle to achieve these ends
Income tax credits	allows some or all expenses associated with PV installation to be deducted from taxable income streams

Compensation schemes (self-consumption, net-metering, net-billing…)	These schemes allow consumers to reduce their electricity bill thanks to PV production valuation. The schemes must be detailed in order to better understand if we are facing self-consumption schemes (electricity consumed in real-time is not accounted and not invoiced) or net-billing schemes (the electricity taken from the grid and the electricity fed into the grid are tracked separately, and the electricity account is reconciled over a billing cycle). The compensation for both the electricity self-consumed and injected into the grid should be detailed. Net-metering schemes are specific since they allows PV customers to incur a zero charge when their electricity consumption is exactly balanced by their PV generation, while being charged the applicable retail tariff when their consumption exceeds generation and receiving some remuneration for excess electricity exported to the grid
Commercial bank activities	includes activities such as preferential home mortgage terms for houses including PV systems and preferential green loans for the installation of PV systems
Activities of electricity utility businesses	includes 'green power' schemes allowing customers to purchase green electricity, operation of large-scale (utility-scale) PV plants, various PV ownership and financing options with select customers and PV electricity power purchase models
Sustainable building requirements	includes requirements on new building developments (residential and commercial) and also in some cases on properties for sale, where the PV may be included as one option for reducing the building's energy foot print or may be specifically mandated as an inclusion in the building development