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Annual Review 2008

Free Edition

Denis Lenardič

Large-Scale Photovoltaic Power Plants

Annual and Cumulative Installed Power Output Capacity
Key Statistical Indicators

With contributions from:
Sibylle Petrak
Ulrich Dewald

Dear Reader,

Previously released in January 2008 and revised in April 2008, the pvresources.com Annual Report 2007 was among the first publicly available reports just to present basic statistical data about the majority of large-scale photovoltaic power plants worldwide. Due to positive feedback and numerous citations in professional magazines and events, a new annual review was prepared for 2008. It is much more ambitious than the previous one, targeting professional readers including policy makers, market researchers, consultancy organisations, scientists and others.

The past year was characterised by several projects of MW-range photovoltaic (PV) power plants, and it was also the year with the highest market growth related to large-scale photovoltaic systems ever. Not only in Spain, where progress is abundantly clear, but in some other countries the cumulative installed power increased significantly. In the European Union progress was, among others, observed in Italy, the Czech Republic and France; the German market decreased slightly, but due to the market explosion in Spain the installed power from 2008 still reached the level of the previous year.

Regardless of whether you are an engineer, market analyst, investor or customer – in this report you will find useful comprehensive information and statistical data about large-scale photovoltaic power plants available nowhere else, covering a wide range of their applications. Pvresources.com web site was proven to be a reliable and accurate source of information about large-scale photovoltaic power plants worldwide in the past, and I will do my best to ensure that it will remain the most accurate source of such information into the future.

Enjoy reading,

Denis Lenardič
Jesenice, May 2009

SPECIAL THANKS

For their invaluable contributions to the report's content, the author would additionally like to express his very special thanks to companies, and their representatives, listed below (in alphabetic order):

Ulrich Dewald, *PhD student, RWTH University of Aachen,* **for his contribution of several never before published detailed charts with locations of large-scale photovoltaic power plants;**

Pablo Guil, *Suravia, S.A.*, **for eye catching aerial photography of the largest Spanish PV projects realised in recent months;**

Rolf Hug, *Solarserver*, **for professional media support;**

Sibylle Petrak, *PhD, Focus Solar*, **for precise solar irradiance charts based on satellite solar radiation measurements;**

Credits – Free and Extended Edition (in alphabetic order)
ADES Aplicaciones Energias Sustitutivas S.L. – Beck Energy GmbH – City Solar AG – Conergy AG – Ecostream – Epuron GmbH – Focus Solar – Gehrlicher Solar AG – HiTechSolar s.r.o. – Jiménez Belinchón, S.A. – juwi Holding AG – MEPSOLAR AG – Phoenix Solar AG – RWTH University of Aachen, Department of Economic Geography – SunPower Corp. – SunStrom GmbH – Suravia, S.A. – TAUBER-SOLAR Management GmbH

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Introduction

Introduction

Lucainena de las Torres PV power plant, Andalusia, Spain (courtesy: MEPSOLAR)

Puebla de Montalbán PV power plant, Toledo, Spain (courtesy: Suravia)

Large-scale photovoltaic power plants – available data

This report presents basic statistical data about large-scale photovoltaic power plants currently in operation. The database representing the foundation for this report was built during long term research related to large-scale photovoltaic power plants by author of this report. Please note that only photovoltaic power plants producing more than 200 kWp are considered. It includes only completed photovoltaic power plants or plants that are very close to completion. Photovoltaic power plants in the process of planning or construction are not considered. Exceptions are explicitly noted. This report is based on detailed data of more than 1900 large-scale PV plants with cumulative peak power more than 3.6 GWp. Due to the specific situation of the photovoltaic market – the number of large-scale photovoltaic plants is increasing rapidly – its rate of growth makes it very difficult to maintain such a report and keep it fully up to date. Here, the majority of photovoltaic power plants completed by 31 December 2008 are considered – provided that press releases or other official statements were made before the date of publishing this report. Because there are no reliable databases, or other national[1] or international sources of information concerning large-scale photovoltaic power plants available, statistical data presented here should be considered to be "conservative" values: In comparison with pvresources.com Annual Report 2007 this report shows an increase of installed power for year 2007. The power installed in 2007 presented in this report is about 12 % higher than what was presented in pvresources.com Annual Report 2007. This difference was caused mainly by the fact that some PV plants were partially completed at end of 2007, and therefore as the official year of construction, 2008 was considered first[2] – for PV plants partially constructed the time period for the completion of the whole plant can span several months or even years. Another reason is the process of testing the operation of some large-scale power plants at the end of the year 2007. For grid connection time, the start of (test) operation is considered. If this data is not available, then official data about grid connection is considered the official start of operation. Delays between the start of test operation and official grid connection can extend to several months in some cases.

[1] *After 1st January 2009 according new EEG law in Germany new photovoltaic power plants needs to be announced to Federal Network Agency / Bundesnetzagentur.*

[2] *Later, when exact dates of grid-connection became available, the year of construction was corrected to 2007 for whole plants or only a part of them if part of a PV plant was constructed and put into service completely in 2007.*

Power Technologies Economy

Large-scale photovoltaic power plants

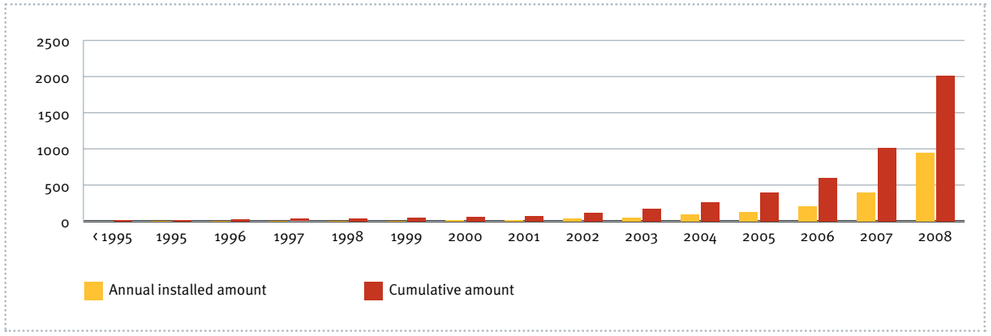
Pvresources.com's database includes more than 1,900 large-scale photovoltaic power plants (put into service in 2008 or earlier), each with peak power of 200 kWp or more (figure 2.1). The cumulative power of all these photovoltaic power plants is more than 3.6 GWp and average plant power output is slightly more than 1.8 MWp. More than 500 large-scale photovoltaic plants are located in Germany, more than 370 are in USA and more than 750 are in Spain (figure 2.2). Several large-scale PV power plants have been partially constructed, and in such case the power plant consists of several smaller power plants. If all parts of a PV plant represent one single PV plant with the same technology, then a particular PV plant is considered as one single power plant. If the year of construction was different for different parts of a particular PV power plant or if in different parts different technology[1] is used, then such PV power plant is considered as many different PV plants, located on the same site, of course. However, multiple distributed residential projects are considered as a single plant only if all parts are located within same municipality or city district and were constructed at the same time as a result of a particular PV programme[2]. Significant increases in the numbers of new photovoltaic power plants are closely related with time periods when favourable subsidies[3] were possible – most notably for Germany, Spain, Korea and California.

In 2008, more than 1000 large-scale PV plants were constructed and put into service worldwide. Many of these plants consist of several stages where each stage can be considered as a unique power plant, so the actual number is even higher. In Spain more than 590 large-scale PV plants were put into service, more than 120 for each Germany and the USA. Among other countries it is worth mentioning Belgium and Czech Republic where several large-scale roof-mounted (Belgium) and ground-mounted (Czech Republic) PV plants were constructed. Regarding large-scale PV power plants Korea took on a leading role in Asia. Several MW-range power plants were put into service in Korea last year. Europe is by far the most advanced region with more than 800 large-scale PV plants put into service in 2008. In Europe more than 1500 large-scale PV power plants are currently operating, followed by the USA with about 400 PV plants.

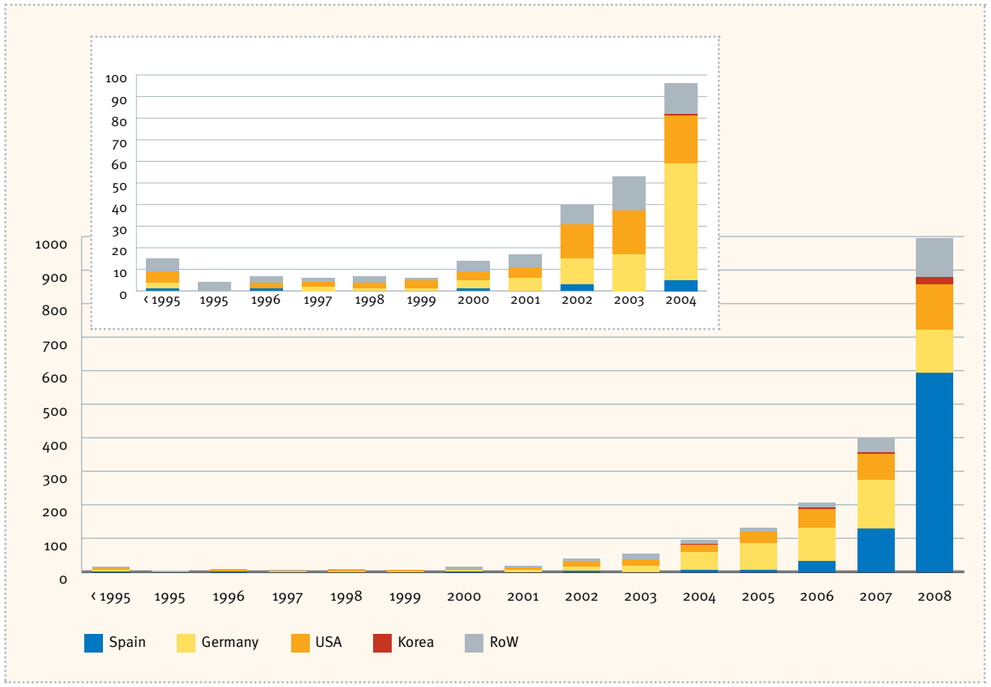
With the intention of simpler comparisons of different power plants related to their size, power plants presented in this report are divided into seven power classes:

Class VII	› 20 MW
Class VI	10 MW – 20 MW
Class V	5 MW – 10 MW
Class IV	3 MW – 5 MW
Class III	1 MW – 3 MW
Class II	500 kW – 1 MW
Class I	200 kW – 500 kW

The definitions of power classes are based on facts and features characterising each power class. Power Class I includes power plants with less than 500 kW peak power[4]. Most PV power plants owned by single investors or small sized companies belongs to Class I. Class II includes the majority of large-scale flat roof mounted power plants. Class III includes ground mounted power plants in the power range from 1 MW to 3 MW. Ground mounted power plants of such size are common in Spain and Germany, and some were constructed in Korea too. This class also includes some of the largest roof mounted power plants. PV plants in power classes IV through VII tend to be exclusively ground mounted, and the majority of power plants in these power classes is located in Spain. The amount of large-scale photovoltaic power plants within a particular power class is closely related to subsidies like Renewable Energy Sources Act in Germany or Royal Decree in Spain. A significant increase in the number of large-scale power plants can be seen in the last two years in power classes of more than 1 MW. Almost all photovoltaic power plants with peak power 10 MW or more were constructed in the last two years.



Annual installed and cumulative amount of large-scale, grid-connected photovoltaic power plants[5] in the period from 1995 to 2008.



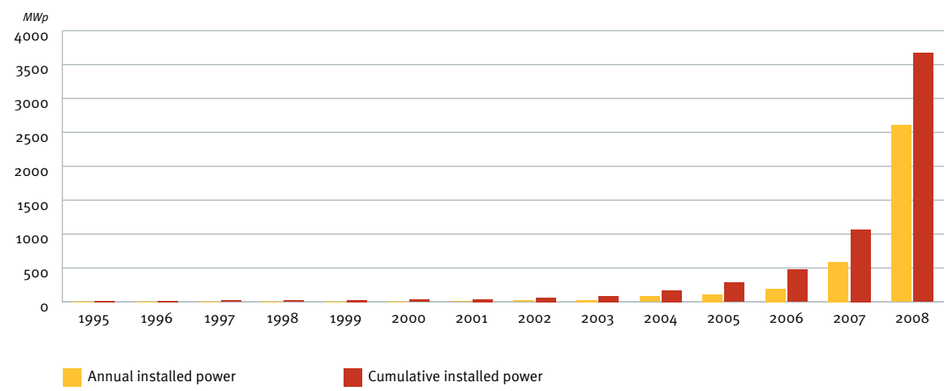
Amount of large-scale photovoltaic power plants put into service annually in the period from 1995 to 2008, sorted by country

[1] *Fixed mount part one, trackers part two, for example.*
[2] *Most of such large-scale systems are located in Japan and Netherlands. Some of them also in California and Germany.*
[3] *Feed-In tariffs, tax credits or direct investment subsidies as most common support mechanisms. More about current support schemes - please see: A. Jäger-Waldau, PV Status Report 2008, Research, Solar Cell Production and Market Implementation of Photovoltaics, September 2008, European Commission, DG Joint Research Centre, Institute for Energy, Renewable Energies Unit Ispra, Italy, ISBN 978-92-79-10122-9 [ZSW 2008]. Supporting Solar Photovoltaic Electricity An Argument for Feed-In Tariffs; EPIA, Published in the frame of the RESTMAC project "Creating Markets for Renewable Energy Sources" financed by the 6th European Framework Programme for Research – http://www.epia.org.*
[4] *In the report the term peak power is related to DC peak power.*
[5] *If particular PV plant consists of several stages constructed in different years then each stage is considered as unique PV plant.*

MWp	COUNTRY	LOCATION	REGION/PROVINCE	DESCRIPTION
60	Spain	Olmedilla de Alarcón	Castilla-La Mancha	Parque fotovoltaico Olmedilla de Alarcón
47	Spain	Puertollano *	Castilla-La Mancha	Parque solar Puertollano
46	Portugal	Moura **	Alentejo	Moura photovoltaic power plant
40	Germany	Brandis ***	Saxony	Solarpark Waldpolenz
34.19	Spain	Arnedo	La Rioja	Planta solar Arnedo
30	Spain	Osa de la Vega ****	Castilla-La Mancha	Huerta solar Osa de la Vega
30	Spain	Trujillo	Extremadura	Solar Park La Magascona/La Magasquila
30	Spain	Merida	Extremadura	Parque fotovoltaico SPEX
28	Spain	Casas de los Pinos	Castilla-La Mancha	Planta fotovoltaica Casas de los Pinos
26	Spain	Fuente Álamo	Murcia	Parque fotovoltaico Fuente Álamo
24	Korea	Sinan	Southern Jeolla	Sinan power plant
23.2	Spain	Lucainena de las Torres	Andalusia	Planta fotovoltaica de Lucainena de las Torres
23.1	Spain	Abertura	Extremadura	Parque fotovoltaico Abertura Solar
23	Spain	Jumilla	Murcia	Parque solar Hoya de Los Vincentes
22.1	Spain	Almaraz	Extremadura	Huerta solar Almaraz
21.2	Spain	Villarrobledo	Castilla-La Mancha	Parque solar El Calaveron
20.28	Spain	El Coronil	Andalusia	Parque solar El Coronil I+II
20	Spain	Calasparra	Murcia	Planta solar fotovoltaico Calasparra I+II+III
20	Spain	Beneixama	Valencia	Planta solar Beneixama

* To be expanded to 70 MW
** To be expanded to 62 MW, part II construction ongoing
*** Largest thin-film (CdTe) PV power plant
**** At the end of 2008 part one (18 MW) finished, part two still under construction

Largest photovoltaic power plants as at December 2008



Large-scale photovoltaic power plants – annual and cumulative installed power output capacity worldwide in period from 1995 to 2008.

Large-scale photovoltaic power plants installed in Europe

More than 70 % of all European large-scale photovoltaic plants (power related) are located in Spain (›2.3 GWp), followed by Germany (›698 MWp, 22 %) and Italy (›70 MWp, ›2 %), and Portugal has reached almost 2 % of the EU market share. This market share however is based only on few very large power plants. The Czech Republic, where significant progress was made in past years, has put about 20 MWp of large-scale PV power plants into service, and it has a current EU market share of about 0.6 %. France and Belgium have also increased installed power in 2008, but their market share is below 0.5 %. Other countries like the Netherlands, Switzerland, Austria, etc. have market shares of less than 0.2 % each. France, Germany, Spain, Greece and Italy should be considered promising markets.

COUNTRY	POWER OUTPUT CAPACITY 2008 (MWp)	EU MARKET SHARE (%)
Spain	2382	72.8
Germany	698	21.4
Italy	70	2.2
Portugal[7]	60	1.8
Czech Republic	19	0.6
Belgium	14	‹0.5
France *	11	‹0.5
Netherlands	8,9	‹0.5
Other EU countries	14	‹0.5

* Not including overseas territories

Large-scale photovoltaic power plants – estimated EU market share. Countries with more than 10 MWp installed capacity large-scale PV plants listed

COUNTRY	POWER OUTPUT CAPACITY 2007 (MWp)	POWER OUTPUT CAPACITY 2008 (MWp)
Spain	342	2382
Germany	471	698
Italy	22.5	70
Portugal	12	60
Czech Republic	2.6	19
Belgium	3	14
France	‹2	12

* Including overseas territories

Large-scale photovoltaic power plants – comparison[8] of estimated installed power capacity for some EU countries in 2007 and 2008

[7] *Portugal has about 60 MW of installed PV power but very few PV power plants. Only a few large-scale PV plants are located within Portugal's territiory. The largest are Moura 46 MWp, phase II under construction; Serpa 11 MWp and 2.38 MWp OLVA PV plant, Mertola.*
[8] *Source of data for year 2007: pvresources.com Annual Report 2007, http://www.pvresources.com/download/AnnualReport2007.pdf. Data published in the report based on estimated value at the time of publishing and last reviewing of the report – April 2008*

Solar arrays in Casas de los Pinos, Cuenca, Spain, constructed in 2008 (courtesy: Suravia)

MWp	CITY	REGION	DESCRIPTION	SYSTEM INTEGRATOR
2.5	Divčice	South Bohemian Region	Ground mounted, fixed tilt, 40,000 a-Si modules	Energy21
2.25	Ostrožská Lhota*	Zlín Region	Ground mounted, fixed tilt, 11,900 c-Si modules	HiTechSolar
2.164	Dubňany	South Moravian Region	Ground mounted, fixed tilt, 12,000 c-Si modules	Sluneta
1.1	České Velenice	South Bohemian Region	Ground mounted, fixed tilt, 5,300 c-Si modules	REN Power
1.1	Hrádek	South Moravian Region	Ground mounted, fixed tilt, 18,000 a-Si modules	Energy21
0.9	Jaroslavice	South Moravian Region	Ground mounted, fixed tilt, 15,000 a-Si modules	Energy21
0.6	Vojkovice	South Moravian Region	Ground mounted, fixed tilt, 7,500 a-Si modules	Energy21
0.5	Krhovice	South Moravian Region	Ground mounted, fixed tilt, 12,600 a-Si modules	Energy21

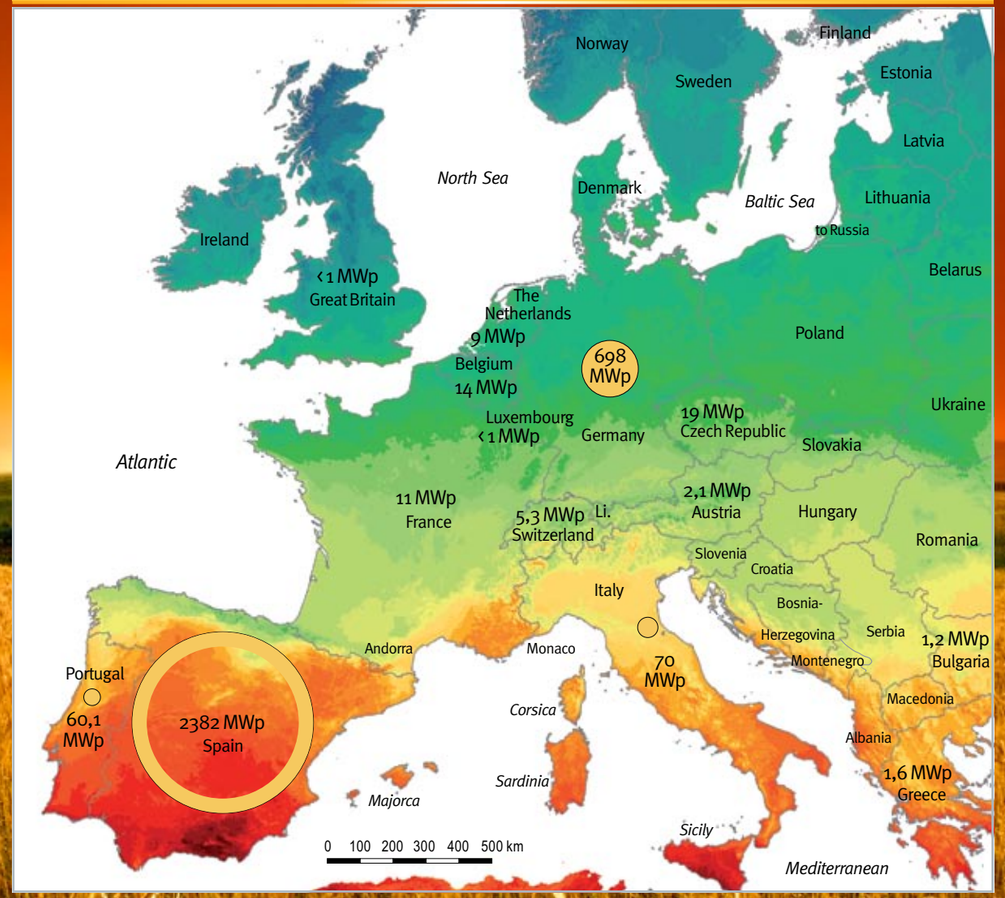
* Part one contructed in 2007

Some large-scale PV power plants put into service in the Czech Republic in 2008

MWp	CITY	REGION	DESCRIPTION	SYSTEM INTEGRATOR
1.909	Boom	Antwerp	Roof mounted, fixed tilt, 11,000 c-Si modules	SolarAccess
1.347	Deurne	Antwerp	Roof mounted, fixed tilt, 6,100 c-Si modules	SolarAccess
0.96	Willebroek	Antwerp	Roof mounted, fixed tilt, 4,500, c-Si modules	SolarAccess
0.888	Aalst	East Flanders	Roof mounted, fixed tilt, 5,500 c-Si modules	Solarenergie Dach
0.589	Grimbergen	Flemish Brabant	Roof mounted, fixed-tilt, 3,500, c-Si modules	SolarAccess
0.583	Duffel	Antwerp	Roof mounted, fixed-tilt, 3,070 c-Si modules	Energiebau

Some large-scale PV power plants put into service in Belgium in 2008

Large-scale PV power plants - installed power capacity in European countries
(map is courtesy of Sibylle Petrak, Focus Solar and Ulrich Dewald, Hans-Joachim Ehrig, RWTH University of Aachen)



Solar arrays of Ostrožská Lhota power plant, Zlín region, Czech Republic; the power plant consisting of c-Si modules was constructed in the period 2007 to 2008 (courtesy: HiTechSolar)

Power MWp	Country	Location	Region/Province	Description	System integrator
40	Germany	Brandis *	Saxony	Ground mounted, 550,000 CdTe modules	juwi Holding
14.75	Germany	Köthen	Saxony-Anhalt	Ground mounted, 200,000 CdTe modules	juwi Holding
12	USA	Boulder City	Nevada	Ground mounted, 167,000 CdTe modules	First Solar
11.8	Spain	Zaragoza	Aragon	Roof mounted, 85,500 a-Si modules	Veolia Environment
10	Germany	Helmeringen	Bavaria	Ground mounted, 135,000 CdTe modules	Gehrlicher Solar
8.5	Germany	Eckolstädt	Thuringia	Ground mounted, 115,000 CdTe modules	Beck Energy
8.4	Germany	Trier	Rhineland-Palatinate	Ground mounted, 112,500 CdTe modules	Conergy
7	France	La Narbonnaise	Languedoc-Roussillon	Ground mounted, 95,000 CdTe modules	EDF
5.9	Spain	Darro	Granada	Ground mounted, 80,000 CdTe modules	Beck Energy
5.8	Germany	Igling-Buchloe	Bavaria	Ground mounted, 78,000 CdTe modules	Epuron
5.6	Germany	Wörrstadt	Rhineland-Palatinate	Ground mounted, 76,800 CdTe modules	juwi Holding
5.3	Spain	Villanueva de la Jara	Cuenca	Ground mounted, 75,500 CdTe modules	Phoenix Solar
5.3	Spain	San Clemente	Granada	Ground mounted, 75,500 CdTe modules	Phoenix Solar

* Brandis PV plant was constructed in the period 2007 to 2008 and finalized late in 2008.

Large-scale thin-film based power plants › 5 MWp put into service in 2008

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Power capacity per capita

Due to different population densities, significant differences in PV power capacity per capita between countries, regions or provinces have been observed. The largest figures for power capacity per capita[9] exist in the Spanish regions of Andalucía, Castilla-La Mancha and Extremadura (table 5.1) and in the German states of Bavaria and Saxony (table 5.2). Among Asian countries Korea takes the leading role with most power capacity per capita installed in its Southern Jeolla Province where this figure has reached a similar level as in Bavaria, Germany. In the USA the greatest power capacity per capita is installed in California, but due to high population density, the value is still much lower than in the previously mentioned regions.

Autonomous Community	Power per capita installed (*Wp/capita*)
Andalusia	63
Aragon	60
Castile-La Mancha	360
Extremadura	339
La Rioja	135
Murcia	›115
Navarre	210

*Estimated power capacity per capita[10] related to large scale PV power plants and installed in some Spanish autonomous communities as at December 2008 *only autonomous communities with more than 60 Wp per capita installed are listed.*

State	Power per capita installed (*Wp/capita*)
Bavaria	›25
Rhineland-Palatinate	17
Saarland	20
Saxony	20
Saxony-Anhalt	14
Thuringia	›13

*Estimated power capacity per capita[11] installed in some German states as at December 2008 *only states with more than 10 Wp per capita installed are listed*

[9] The first rough estimate about power capacity per capita related to large scale PV power plants was published in Photovoltaics International, Third Edition, February 2009 (For details please refer to: Installations of PV Power Plants in 2008, PVInternational, Third Edition, page 148 – 153). Comparison with this data shows an even increase of power per capita installed for most regions as more accurate data about power capacity installed became available in recent weeks.

[10] Population data are retrieved from the database of the "Instituto Nacional de Estadística" and are valid for January 1st 2008. For details refer to http://www.ine.es.

[11] Population data are retrieved from the database of "Statistische Ämter des Bundes und der Länder"and are valid for December 31st 2007. For details refer to http://www.statistik-portal.de.

Solar arrays in Spain (courtesy: Suravia)

Other economic indicators

A detailed analysis of other economic indicators is not an easy task and should be performed by experts within this field. Examples of some key indicators are the effects on jobs (employment) and identifying entirely data driven analysis[12]. Studies related to employment are rare; some scenarios were evaluated among others such as in EPIA's and Greenpeace's report [EPIA 2008]. Detailed analysis related to economic indicators should take all effects into account – positive and negative. Other related environmental benefits like the reduced emmision of Greenhouse gasses will be discussed in the next chapter.

[12] For detailed economic analysis for Germany you may refer to: B. Wenzl, J. Nitsch: Ausbau erneuerbarer Energien im Strombereich; EEG-Vergütungen, -Differenzkosten und -Umlage sowie ausgewählte Nutzeneffekte bis zum Jahr 2030; Teltow, Stuttgart, December 2008 [IFNE 2008].

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Products for solar rooftop systems:

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address based calculator of PV system output in annual kWh

PERFORMANCE CALCULATOR
address based calculator of PV system performance in percent of nominal rating (the performance ratio)

All photos courtesy: Suravia

› 20 MWp

Olmedilla de Alarcón – Puertollano – Moura – Brandis – Arnedo – Osa de la Vega – Trujillo – Don Alvaro, Merida – Casas de los Pinos – Fuente Álamo – Sinan – Lucainena de las Torres – Abertura – Jumilla – Almaraz – El Coronil – Villarrobledo – Calasparra – Beneixama

10 MWp – 20 MWp

Olivenza – El Bonillo – Calzada de Oropesa – Gochang – Mahora – Köthen – Nellis, NV – Zarapicos – Taean – San Roque – Crevillent – Granadilla de Abona – Lobosillo – Boulder City, NV – Hinojosa del Valle – Villafranca – Erlasee – Figueruelas – Frechilla de Almazan – Arroyo de San Serván – Valverde de Mérida – Serpa – Belmez – Corella – Las Gabias – La Partala – Bardenas – Vejer de la Frontera – Fontiveros – Villanueva de Serena – Magacela – Olmedilla de Alarcón – Villares del Saz – Albacete – Mendavia – Jerez de la Frontera – Puebla de Almoradiel – Espejo – Espejo – Helmeringen – Almodovar del Campo – Talayuela – Almodovar del Rio – Calzada de Calatrava – Las Gabias – Alconchel – Pocking

5 MWp – 10 MWp

Zuera – Albacete – La Carlota – El Carpio – Milagro – Villar de Cañas – Jaén – Zaratan – Viana – Aguilar de la Frontera – Vinaceite – Eckolstädt – Alange – Trier – Isla Mayor – Göttelborn – Almansa – San Luis Valley, CO – Malagón – Madridejos – Hellin – Flix – Villa del Rio – Olmeda de la Cuesta – Yecla – Portichuelo – Alconera – Archidona – Alcaudete – Lebrija – Granadilla de Abona – Pedro Muñoz – La Narbonnaise – Casas de don Pedro – Don Benito – L'Olleria – Blanca – Los Navalmorales – La Solana – Rödgen – Alcolea – Mühlhausen – Aldea del Conde – Fuente Palmera – Carmona – Föhren – Arico – Castelnou – Moorenweis – Olmedilla – Doberschütz – Darro – Lorca – Alhama de Murcia – Igling–Buchloe – Darro – Alvarado – Cantillana – Bonete – Almonacid de la Siera – Hasborn – Wörstadt – Jerez de la Frontera – Oberottmarshausen – Valverdon – Castuera – Castejon – Villanueva de la Jara – San Clemente – Miegersbach – Emmelsbüll – Kameyama – Casas Ibáñez – Kleinaitingen – Alvarado – Bullas – Moraleja – Manzanares – Alvarado – Orgaz – Villaldemiro – Pozohondo – Valdecaballeros – Rota – Logrosán – Fustiñana – Daimiel – Bargas – Abenojar – Thierhaupten – Bürstadt – Espenhain

3 MWp – 5 MWp

Pitiegua – Campo Lugar – Llerena – Baar – La Herrera – Serravale Scrivia – Haßleben – La Rinconada – Escuzar – Tucson, AZ – Torres del Rio – Sádaba – Noblejas – Fuentes de Valdepero – Pozal de Gallinas – Königsbrück – Vinon–Sur–Verdon – Herencia – Montilla – Hurlach – Froschham – Baena – Aznalcóllar – Jessen – Granadilla de Abona – Pozoblanco – Bargota – Riaza – Castelnou – Wakkanai city – Pozohondo – San Clemente – Ojo de Valdelafuente – Llerena – Sembach – Saarbrücken – Braunsbedra – Teisendorf – Hemau – Rancho Seco, CA – Buchheim – Huescar – La Pedrera – Lebrija – Muggensturm – La Gineta – Stuttgart – Dos Hermanas – Humilladero – Kronwieden – Muga de Sayago – Carmona – Greding – Laudenbach – Münster – El Carpio – Villena – Fuente Alamo – Abanilla – Saucedilla – Prescott, AZ – Homburg – La Roda– Fuenteovejuna – Mehring – Villa de Ingenio – Penzing – Borna – Sigüenza – Zahna – Finca La Portuguesa – Barcelona – Azaila – Chinchilla de Montearagón – Fürstenfeldbruck – Campo de Cariñena – Wolfsburg – Nuehaus – Yecla – San Clemente – La Alcayna – Abuzaderas – Serre – Ulldecona – Albacete – Dingolfing – Calvia – Matino – Binissalem – Casa de la Azuara – Romica – Chinchilla de Monte–Aragon – Jumilla – Abáran – Santa Margalida – Longuich – Corvera – Bockelwitz – Cieza – Baena – La Gineta – Riudarenes – Tordesillas – Casar de Cáceres – Waldeck – Riol – Badajoz – Vitigudino – Paradas – Puebla de Prior – Yeonggwang – Yeongam–gun – Sádaba – Villanueva del Aceral – Coreses – Coreses – Fairless Hills, PA – Almansa – Antae–ri – San Salomó – Jindo – Yecla – Pina de Ebro – El Pedernoso – Villarrobledo – Ocaña – Puerto Lápice – Madrid – Biberach/Riß

1 MWp – 3 MWp

Seefeld – Valverde – Villanueva de la Jara – Merzig–Fitten – El Viso – Alcolea – Iznalloz – Mahora – Belvis de Monroy – Markt Bibart – Santanyí – Claravalls – Lobón – Socuéllamos – Alcublas – Gundelfingen – Albacete – Castejón – El Cañarico – Escalona – Socuéllamos – Waldalgesheim – La Pedrera – Griesheim – Manacor – Stockstadt – Viso del Marques – Divčice – Ramstein – Konz – Villarubia de Santiago – Arjona – Ocaña – Atlantic City – Villardefrades – Siruela – La Pachona – La Gineta – Gebersdorf – Kettershausen – Kissing – La Roda – Tagewerben – Vilamesias – Ocaña – Mértola – Caudete – Jengen – Hofkirchen – Mallorca – Marratxi – Casablanca – Tomitz – La Gineta – Lupiñén – San Martin de Pusa – Ejea de los – Cabaleros – Orgiva – Neu Ulm – Ecija – Ontario, CA – Bad Grönenbach – Vijfhuizen – Medina de las Torres – Villarrobledo – Minaya – Ostrožská Lhota – Villarrobledo – Pedro Martinez – Mohorte – Ávila – Victorbur – La Roda – Galisteo – VillaMartin – Atzeneta del Maestrat – Granada – Acula – Morón de la Frontera – Sant Agostino – Casas de Ves – Mungyeong – Althegnenberg – Bad Kreuznach – Böhringen – Burgos – Zaragoza – Espejo – Dubňany – El Redondo – Los Llanos, Marchal – Phetchaburi – Caravaca de la Cruz – Ota city – Arguedas – Petra – Cambil – Pfarrkirchen – Jerez – Campollano – Mazarambroz – Morón de la Frontera – Escacena del Campo – Aznalcóllar – Sunnyvale, CA – Hererra – München – Calera y Chozas – Munera – Jaén – Ronda – Kloster Veßra – Cañada del Tollo – Albacete – Sierra Vana Las Blanquillas – Alcala de Gurreas – Manzanilla – Kaufbeuren – Malgersdorf – La Palma del Condado – Almodovar del Rio – La Parra – Villanueva del Aceral – Casatejada – Alfamen – Santa Amalia – Albarreal de Tajo – Jindo – Vilshofen – Gangjin – Navalmoral de la Mata – Saint Pierre – Albarreal de Tajo – Añover de Tajo – Alcázar de San Juan – La Herrera – Calera y Chozas – Casas Ibáñez – Almadén – Villanueva de Alcardete – Valencia – Fontana, CA – Cabanes – La Roda – El Pedernoso – Sanlucar la Mayor – Torija – Villamesias – Escuzar – Moraleda – Casas de Juan Nuñez – Casas de Ves – Tudela – Jerez de los Caballeros – San Marco in Lamis – Jeonju – Denver, CO – Fresno, CA – Aznalcóllar – Santa Bárbara – Antequera – Manacor – Riverside, CA – Hampyeong – Manzanares – Tuejar – Mula – Aznalcóllar – Rincón de Soto – Cascante – Vilshofen – Eggenfelden – Hettenkofen – El Carpio – Sagrajas – Fort Carson, CO – Vilacidro – Don Benito – Rodenäs – Falces – Cabanillas – Neustadt a.d.Weinstrasse – Alcolea de Calatrava – Los Palacios y Villafranca – Geisenfeld–Imendorf – Pfersdorf – Heretsried – Bruhrain – Villanueva de la Reina – Casariche – Manzanares – Hererra – Cerro Montiver de Berja – Pfarrkirchen – Peñarroya—Pueblonuevo – Fuentes de Andalucia – Boom – Albatana – Riedstadt – Burujón – La Luisiana–Cañada del Rosal – Manteca, CA – Palmdale, CA – Fuentealbilla – El Espartal – Landau in der Pfalz – Espejo – Linares – Ventorros de San José – Hallstadt – Minihof – Günching – Antequera – Ecija – Ecija – Ecija – Paradas – Olivenza – Villanueva Mesía – Puente de Genave – Haarbach – Alhama – Casabermeja – Großbardorf – La Roda – Hornachuelos – Höslwang – Lucca – Muggensturm – Sulzemoos – Las Cabezas de San Juan – Cartaya – Archidona – Sevilla – Aznalcázar – Espejo – Totanes – Ocaña – Olvera – Namchang–ri – La Zaida – Palma del Condado – Los Hinojosos – Campillos – Siurana – Fuentealbilla – Mallorca – Cacin – Sinning – Rada – Mering – Kolitzheim – Spandowerhagen – Motilleja – Villar del Rey – Manacor – La Castra – Aidenbach – Löbnitz – Lakewood, CO – Encimero – Wiesenbach – Sonnen – Albacete – Castuera – Oberrüsselsbach – Azuaga – Orgaz – Hausen – Blumroda – Droyßig – Son Servera – Almendral – Meerane – Lehrberg – Oberötzdorf–Untergriesbach – Massalengo – Pfenninghof – Altomünster – Barrax – Alfaro – Weichering – Haunsfeld – Arico – Fünfstetten – Plattling – Gnodstadt – Las Pedroñeras – Neuburg an der Donau – Chachoengsao – Els Alamús – Ballstadt – Gibraleón – Eggenbach – Neumarkt – Frohburg – Schlanstedt – Kappel–Grafenhausen – Whitehorse – tation, NJ – Don Benito – La Pueblanueva – Lukavice – Laudun – Puebla de Almoradiel –Les Borges – lanques – Quintanar de la Orden – Salching – Alcuneza – Mallorca – Jeongeup – Hinojosa del Duque – Hornillos de Eresma – Tudela – Mountain View, CA – Markstetten – Don Alvaro – Calasparra – Sogeun–ri – Cortes – Mutterstadt – Caravaca de la Cruz – Barrax – Sesma – Wiedersbach – Udon Thani – Dasing – Adelsdorf – Tietar – Abanilla – Laichingen–Suppingen – Manzaneque – Schneeweiderhof – Mota del Marqués – Altenstadt – Jangheung – Villarrobledo – Casatejada – Inca – Pedania de Tinajeros – Villares del Saz – Chillarón – Albacete – Azuébar – Unterliezheim – Riosalido – Mora la Nova – Ciudad del Tajo – Villar de Cañas – Ecija – Viana – Miramontes – Valdepeñas – Baena – Kiyota – Relzow – Waldstetten – Rodvínov – Volkach – Madroñera – Pozoamargo – Alcála del Rio – Citruénigo – Groß Stieten – Gescher–Estern – El Robledo – Fahrenzhausen – Kammerberg – Wandersleben – Corral de Almaguer – Murillo el Fruto – Kirchroth – Erustes – Torremejía – Vila–Sana – Noez – Gochang – Tijola – Puiggrós – Hampyeong – Chico, CA – Narros de Matalayegua – Los Arcos – Sierra Engarcerán – Eschbach – Cuerva – Hettenleidelheim – Sinzheim – Cunnersdorf – Landau in der Pfalz – Salching – Don Benito – Ribaforada – Chiclana de Segura – Bušanovice – Deurne – Bern – Neubukow – Eging am See – Jüchsen – Les Borges Blanques – Magdeburg – Ampfing – Terque – Alcolea del Rio – Rasch – Napa, CA – Madrigal de las Altas Torres – Buan – Haag – Miguelturra – Trinidad – Aldeamayor de San Martin – Penas de San Pedro – Celadas – Middelkerke – Fitero – Baden–Baden – Tapfheim – Weiden – Valdesaz – Twenty–nine Palms, CA – Espejo – Llucmajor – Kublank – Veenendaal – Holýšov – Golmes – Haunsfeld – Villafranca – Nottuln–Appelhülsen – Hanford, CA – Alcudia – Cantera de Son Toni Amer – Edertal – Montearagón – Pueblo, CO – La Ola, HI – Monterey, CA – Alcolea de Tajo – Santa Paula, CA – Heanam – Jerez de la Frontera – Murchante –Quadix – Aldover – La Gineta – Wilton, CA – Ypres – Los Angeles, CA – Vestenbergsreuth – Valdecarabanos – Grosselfingen – Campillo del Rio – Sanlucar la Mayor – Carmona – Hartheim – Röckersbühl/Kittenhausen – Fustiñana – Casar de Caceres – Duisburg – Blythe, CA – Calera y Chozas – Wilmington, NC – La Roda – Moreno Valley, CA – Woodland, CA – Goldach – San Bernardino, CA – Oroville, CA – Tudela – Santa Rita, CA – Blythe, CA – Lakewood, CO – Gerbach – Rancho Bernardo, CA – Alcala de Guadaira – Palau d'Anglesola – Juncosa – Ehekirchen – Guarromán – Napa, CA – Beuna – San Joaquin Valley, CA – Cloverdale, CA – Albacete – Sonoma Mountain Village, CA ...

▲ *Largest Asian PV power plant, Sinan, Southern Jeolla province, Korea, constructed in 2008 (courtesy: Conergy)*

Solarpark Waldpolenz, Brandis, Germany – largest German PV power plant.
Constructed in period 2007-2008, finalized in December 2008 (courtesy: juwi Holding) ▼

More information, regional charts and maps available in »Extended Edition« ...

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