IEA INTERNATIONAL ENERGY AGENCY

2016

SNAPSHOT OF GLOBAL PHOTOVOLTAIC MARKETS

PVPS

PHOTOVOLTAIC
POWER SYSTEMS
PROGRAMME

Report IEA PVPS T1-31:2017

WHAT IS IEA PVPS

The International Energy Agency (IEA), founded in 1974, is an autonomous body within the framework of the Organization for Economic Cooperation and Development (OECD). The IEA carries out a comprehensive programme of energy cooperation among its 30 members and with the participation of the European Commission. The IEA Photovoltaic Power Systems Programme (IEA PVPS) is one of the collaborative research and development agreements within the IEA and was established in 1993. The mission of the programme is to "enhance the international collaborative efforts which facilitate the role of photovoltaic solar energy as a cornerstone in the transition to sustainable energy systems."

In order to achieve this, the Programme's participants have undertaken a variety of joint research projects in PV power systems applications. The overall programme is headed by an Executive Committee, comprised of one delegate from each country or organisation member, which designates distinct 'Tasks,' that may be research projects or activity areas. This report has been prepared under Task 1, which deals with market and industry analysis, strategic research and facilitates the exchange and dissemination of information arising from the overall IEA PVPS Programme.

The participating countries are Australia, Austria, Belgium, Canada, China, Denmark, Finland, France, Germany, Israel, Italy, Japan, Korea, Malaysia, Mexico, the Netherlands, Norway, Portugal, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, and the United States of America. The European Commission, SolarPower Europe, the Solar Electric Power Association, the Solar Energy Industries Association and the Copper Alliance are also members.

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978-3-906042-58-9 A Snapshot of Global PV (1992-2016)

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CONTENT

A SNAPSHOT OF GLOBAL PV: 2016, A NEW RECORD-BREAKING YEAR

IEA PVPS has distinguished itself throughout the years by producing unbiased reports on the development of PV all over the world, based on information from official government bodies and reliable industry sources. This fifth edition of the "Snapshot of Global PV Markets" aims at providing preliminary information on how the PV market developed in the last year. The 22nd edition of the PVPS complete "*Trends in Photovoltaic Applications*" report will be published after Q3 2017.

In 2016, the PV market broke again several records again and continued its global expansion, with a 50% growth bringing the market to at least 75 GW. After a limited development in 2014, and a 25% growth in 2015, the market continued its growth, with many regions of the world contributing to PV development.

This global growth hides many contrasting developments in various regions. In Asia, after a stabilisation in 2014 the Chinese PV market grew to around 15,2 GW in 2015 and to 34,45 GW in 2016. In the Americas, the US market doubled from 7,3 to 14,7 GW in 2016. In the land of the rising sun, the rapid growth of the Japanese PV market until 2015 was finally halted and the country reached around 8,6 GW.

Together with China and many other countries growing as established markets in the region, Asia leads now the PV market. Next to these two giants, other Asian markets have confirmed their maturity: Korea (850 MW), Australia (839 MW), Thailand (726 MW), the Philippines (756 MW) and Taiwan (368 MW) are now established PV markets. Many others are also developing such as Malaysia, which is showing signs of possible rapid PV development in the coming years, as well as in Vietnam and Indonesia. However, the picture couldn't be complete without India, whose installation number close to 4 GW once again reflects the positive outlook in this country. India could become one of the global PV market leaders in the coming years. Next to India, Pakistan seems promising with several hundreds of MW installed.

In the Americas, the growth of the US market (14,7 GW) is accompanied by Canada which decreased significantly (200 MW), Chile that grew significantly (746 MW) and, to a lesser extent, Mexico (around 100 MW) which is also progressing and should become a massive market in the coming years. Other Latin American markets are expected to develop, especially Brazil, in the years to come, while PV spreads in almost all countries in the region.

In Europe, after years of market decline followed by a growth in 2015, the market declined again mainly due to the slowdown in the UK market. Despite this, the UK established itself in first place in Europe for the third year in a row with around 2 GW in 2016. Germany beat most expectations with a stable market at 1,5 GW. France decreased its installation numbers below 0,6 GW while the Italian market, as all markets where feed-in tariffs were phased-out, stayed to a rather low level (373 MW), despite a regulatory framework that seems adequate and some progresses in 2016. Some medium-size European markets continued to progress, such as the Netherlands, or stabilized such as Switzerland and Austria, while others experienced a growth again (Belgium, Portugal). New smaller markets confirmed their growth, such as Poland and Sweden, but their installation levels remain below the 100 MW mark. Former GW markets continued to experience a quasi-complete shutdown, with between nothing and a few dozens of MW installed: Czech Republic, Greece, Romania, and Bulgaria, for instance.

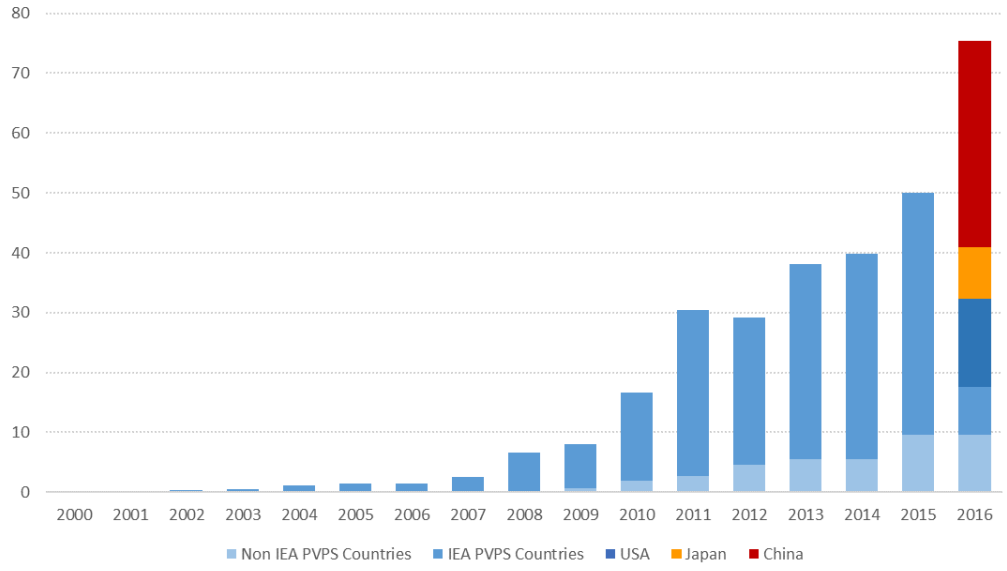
In the Middle East, Turkey installed 583 MW for the very first time, while Israel remained the very first country in terms of cumulative installed capacity with 130 additional MW installed in 2016 and a total capacity approaching the first GW. Following the tenders, the first dozens of MW have been installed in the UAE (Dubai, Abu Dhabi) and Jordan in 2016; thus showing that there is ample activity foreseen in the region. While these super-competitive tenders have a minority share in the global PV market, they show how competitive PV has become.

In Africa, South Africa became the first African country to install close to 1 GW of PV in 2014. In 2016, it grew again with around 500 MW installed. Algeria installed about 50 MW last year but launched a tender for 4 GW. Many countries have announced projects, with Egypt leading the pace (5 GW have been announced) but so far, most installations have been delayed or simply are still in the project evaluation phase.

Overall, these developments raised the global PV market for the first time to at least 75 GW, a significant increase from 2015 numbers where 50 GW were connected to the grid. Such absolute growth has been unseen since 2011, the last major growth year. With a positive outcome in all regions of the world, PV has now reached 1 GW of regional penetration on all continents, and much more on the leading ones.

The year 2016 was a year of records, and the global installed capacity is only one of them. 24 countries have passed the GW mark and the 300 GW mark has been crossed in 2016, with at least 302 GW producing electricity at the end of the year. Six countries had more than 10 GW of total capacity, four more than 40 GW and China alone represented 78 GW. Germany, which used to lead the rankings for years, lost its place in 2015 and now ranks third (41,2 GW), with Japan second (42,8 GW) and the USA fourth (40,3 GW). With more than 103 GW of total capacity, Europe is now significantly behind the Asian leader that has at least 144 GW and much more to come.

FIGURE 1: EVOLUTION OF ANNUAL PV INSTALLATIONS (GW - DC)



2016 HIGHLIGHTS

Preliminary reported market data shows a significantly growing market in 2016. At least 75 GW of PV systems have been installed and connected to the grid in the world last year. While these data will have to be confirmed in the coming months, some important trends can already be discerned:

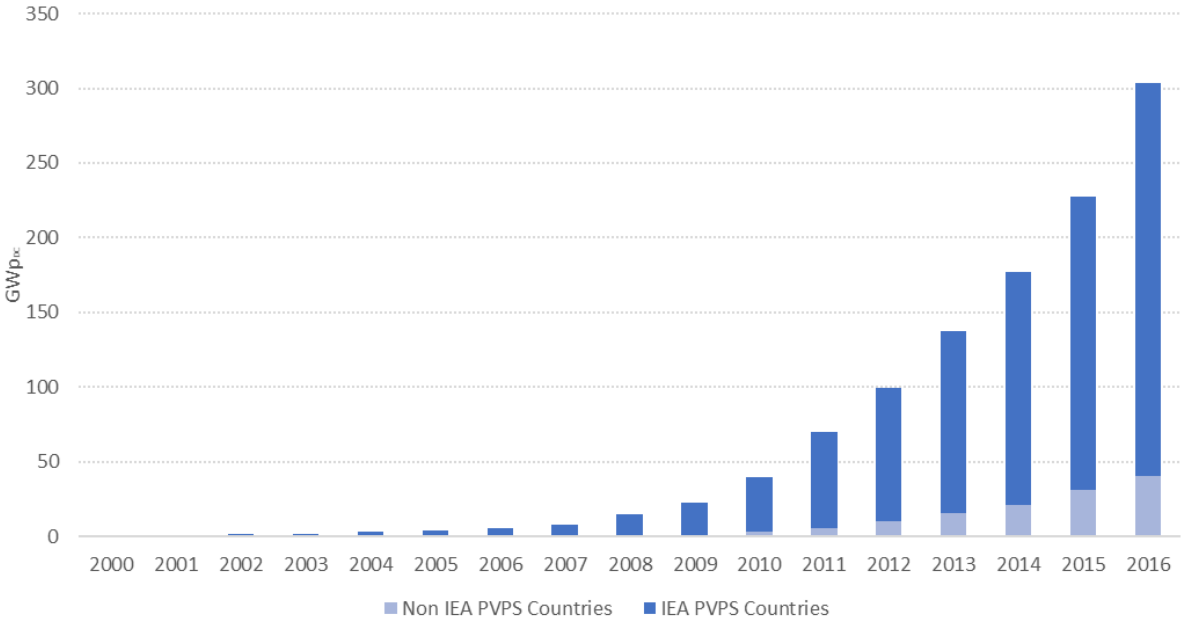
- The global PV market grew significantly, to at least 74,4 GW in 2016. With non-reporting countries, this number could grow up to 75,4 GW, compared to 50 GW in 2015. This represents a 50% growth year-on-year. The 1 GW comprise non IEA PVPS markets countries such as most African and unreported Latin American countries or Pakistan.
- This is the first time in years that a global market growth happens with two major contributors declining (Japan and Europe), which shows the strength of the growth in China.
- Asia ranks in first place for the fourth year in a row with around 67% of the global PV market, up from 60% last year. Outside of China, the global PV market grew from 35 to 40 GW.
- China reached 34,54 GW in 2016, and is the leader in terms of total capacity with 78 GW.
- Japan ended its growth cycle and starts a 20% decline with around 8,6 GW installed and connected to the grid in 2016.
- The market in Europe has declined again after a rebound in 2015. From 7 GW in 2014 to around 8 GW in 2015, it fell to around 6 GW in 2016. The largest European market in 2016 was the UK again with around 2 GW, followed by Germany (1,5 GW) and a declining French market (0,56 GW).
- The US market increased again to 14,7 GW, with large-scale and third-party ownership dominating.
- India progressed significantly to around 4 GW, doubling the installation level from 2015.
- Emerging markets continued to contribute to the global PV development in 2016: South Africa (509 MW), Chile (746 MW), Mexico (100 MW), Turkey (583 MW), Thailand (726 MW), the Philippines (756 MW), and more.
- The MEA markets experienced growth, thanks to South Africa, Algeria, Israel and Turkey, as well as several Sub-Saharan countries.
- In the top 10 countries, there are now six Asia-Pacific countries (China, Japan, India, Korea, Australia, the Philippines), two European countries (UK and Germany) and two countries in the Americas (the USA and Chile).
- The level to enter the top 10 in 2016 was around 746 MW, up from 600 MW in 2015.
- Honduras, Greece, Italy, Germany and Japan now have enough PV capacity to theoretically produce respectively 12,5%, 7,4%, 7,3%, 7,0% and 4,9% of their annual electricity demand with PV.
- PV represents around 1,8% of the global electricity demand and 4% in Europe.
- 24 countries had at least 1 GW of cumulative PV systems capacity at the end of 2016 (one reached this level in 2015) and six countries installed at least 1 GW in 2016 (compared to nine in 2013).

HOW MUCH PV CAPACITY IS PRODUCING ELECTRICITY IN THE WORLD TODAY?

The total installed capacity at the end of 2016 globally amounted to at least **303 GW**. The 25 IEA PVPS countries represented 265 GW of cumulative PV installations together, mostly grid-connected, at the end of 2016. Additional countries that are not part of the PVPS programme represent at least 35,7 additional GW, mostly in Europe: the UK with 11,6 GW, The Czech Republic with 2,1 GW (stable in 2016), Greece with 2,6 GW (stable in 2016), Romania with 1,3 GW and Bulgaria with 1 GW (stable in 2016). Following these countries, India has installed more than 9 GW and Taiwan more than 1 GW. Many other countries have installed PV systems but none have reached the GW scale. While other countries around the world have reached various PV installation levels, the total of these remains hard to quantify with certainty. At present, it appears that 298,6 GW represents the minimum installed by end 2016 with a firm level of certainty. Remaining installations account for some additional 4,5 GW installed in the rest of world (non-reporting countries, off-grid installations, etc.) that could bring the overall installed capacity to around than **303,1 GW in total**.

China now leads the cumulative capacities with 78,0 GW, followed by Japan (42,8 GW), Germany with 41,2 GW and the USA (40,3 GW). Italy (19,3 GW) ranks fifth and the UK sixth with 11,6 GW. All other countries are below the 10 GW mark, with India at 9 GW, France at 7,1 GW, Australia at 5,9 GW and Spain at 5,4 GW.

FIGURE 2: EVOLUTION OF PV INSTALLATIONS (GW-DC)



MAIN REGULATORY CHANGES

COMPETITIVE CALL FOR TENDERS

In 2016 many countries continued to introduce competitive call for tenders to grant power purchase agreements (PPA, another name to quality feed-in tariffs). This was the case in most regions. The following countries introduced significant tenders that should lead to installations in the coming years: Abu Dhabi and Dubai in the UAE again surprised many by reaching extremely low PPAs (below 0,03 USD/kWh). France and Spain tendered or promised to tender several GW. Algeria, Iran, Pakistan, India, Israel, Mexico, Turkey, Zimbabwe and other countries are proposing competitive tenders to grant PPAs. France has been using this way of granting PPAs to medium-to-large scale PV systems for some years already, including from commercial installations. Germany has decided to opt for tenders for large-scale PV from 2015 onwards that were granted with low PPAs. Spain has announced renewable energy tenders that might be won by solar for the first time. The Netherlands and Brazil have also set up reverse auctions in which PV is trying to find a place to compete. While this method has not yet fully proven that it can ensure a smooth and sustainable PV market development (it contributed to 180 MW in the Netherlands in 2016), it brings with it the possibility of controlling the electricity mix development and has shown how low the cost of PV electricity could go under constraints. For instance, Abu Dhabi awarded PPAs at the beginning of 2016 as low as 24 USD/MWh, a record-low level without financial incentives, beating the UAE's (Dubai's) previous record. Whether all these plants will be built remains to be seen. In China, the "Top Runner" program (tender with qualified PV modules favouring high efficiency modules, for both multi and mono-crystalline technologies) contributed to 5,5 GW of installations in 2016.

SUPPORT POLICIES EVOLUTION

Next to calls for tenders which have developed significantly in the last years, the number of countries using feed-in tariffs remained relatively stable. In general, emerging markets are selecting tenders as a way to grant PPAs, and the distributed segments benefit from self-consumption schemes such as net-metering or net-billing. Few countries are stepping directly in the self-consumption regulations that apply to set-up clear measures for valuing exported electricity. Countries that adopted a quota system with green certificate trading are diminishing. Korea, Romania, Australia and, to a certain extent, Belgium and Sweden are still using this support scheme to incentivize PV. Several countries are now supporting PV through a combination of incentives, including capital expenditures, tax breaks and other policies.

In many countries, a combination of policies is in place, combining national or federal policies, with regional ones and in many cases at municipal level.

ELECTRICITY SYSTEM INTEGRATION

Europe and the USA favour the market integration of renewables, including solar PV. While this is more a recommendation in the European Union than a compulsory decision, several countries are modifying their support schemes in order to make them more "market compliant." Consequently, Germany and the UK, for instance, have introduced feed-in

premiums with a variable premium that compensates for the variations of electricity market prices. This situation has started to be translated in several other countries.

STORAGE DEPLOYMENT

Germany supports storage through financial incentives for prosumers, which has led to a significant share of new residential PV installations with storage units. In Australia, several thousands of units were installed in 2016, mainly in the residential segment. In other surveyed countries, such developments haven't been reported at the same level.

RETROACTIVE MEASURES

In 2016, the situation of existing PV plants didn't experience significant retroactive measures. The most important changes took place in the last years in Spain: it imposed retroactive measures to PV system owners arguing about difficult economic conditions. These measures reduced in some cases the revenues of PV system owners by 50%. In Italy, in order to reduce the impact of PV on the electricity consumers, the government imposed a decrease of the FiT level compensated by an increase of the payment years. Other countries also applied retroactive measures that reduced the level of financial support or changed the conditions applying to already existing PV systems. Bulgaria, Romania and the Czech Republic have discussed or applied such measures in the last three years, often with the consequence of destroying investors' confidence and bringing down the PV market. In the south of Belgium, retroactive measures were integrated in the law granting green certificates, which legally allowed a decrease of the number of year during which the certificates were granted. These measures, sometimes legally justified, have significantly decreased the confidence of investors.

GRID FINANCING AND ADDITIONAL TAXES

In Belgium, the region of Flanders imposed a grid connection tax in 2015 aimed at compensating for the losses in grid revenue linked to the existing net-metering scheme. This same question has been raised by policymakers and grid operators in several countries but led to few concrete policies. In the USA, several debates took place with regard to the compensation of net-metering policies, with the consequence of establishing either caps to net-metering or adding small additional fees in some states. Other countries such as Italy (but not implemented) and Spain (with its famous sun tax) have either set up or discussed additional taxes on solar PV systems. In Germany, the decision has been taken to force prosumers to pay a significant percentage of the levy paid by electricity consumers to finance renewables incentives, even on the self-consumed part of the PV electricity. Such payment has been refused in France for prosumers, which shows the variety of positions with regard to PV taxation.

FROM PRODUCERS TO *PROSUMERS*

The idea that PV producers could be considered as "prosumers" – both producers and consumers of energy – is evolving rapidly and policies are being adapted accordingly in several countries. The most popular policies are called "Net-metering" policies and are adopted in a

growing number of countries, with different definitions. The genuine "net-metering" which offers credits for PV electricity injected into the grid, have previously supported market development in the USA, Canada, Denmark, The Netherlands, Portugal, Sweden, Korea and partially in Belgium. Many countries around the world are either discussing its introduction or a variant through self-consumption. Therefore, self-consumption is becoming a major driver of distributed PV installations, often completed with a feed-in tariff for the PV electricity in excess.

ANTI-DUMPING AND LOCAL CONTENT POLICIES

The anti-dumping and anti-subsidy policies that have been undertaken in Europe and the USA against Chinese manufacturers have been followed by similar policies from Chinese authorities, for instance for American polysilicon. Many other countries stepped into these policies in order to protect their local industry. But after five years of anti-dumping policies, the return to a fair market appears in sight.

Several countries adopted specific measures aiming at favouring the local content of PV components over the last years. Started by the province of Ontario in Canada, it has continued with Italian, French or Turkish regulations aiming at promoting their local industry. Measures blocking the market for foreign producers have disappeared while those adding some incentives for local producers have been continued.

THE TOP 10 COUNTRIES IN 2016

In the major evolutions, six of the top 10 markets for PV in 2016 have installed at least 1 GW of PV systems (down from seven in 2014). Looking at the total installed capacity, 24 countries are entering the 1 GW club, only one more compared to 2015.

As mentioned earlier, capacities for the few countries that report PV installations in AC power, have been converted in DC power to facilitate comparison. This can lead to discrepancies with official PV data in several countries such as Canada, Japan and Spain.

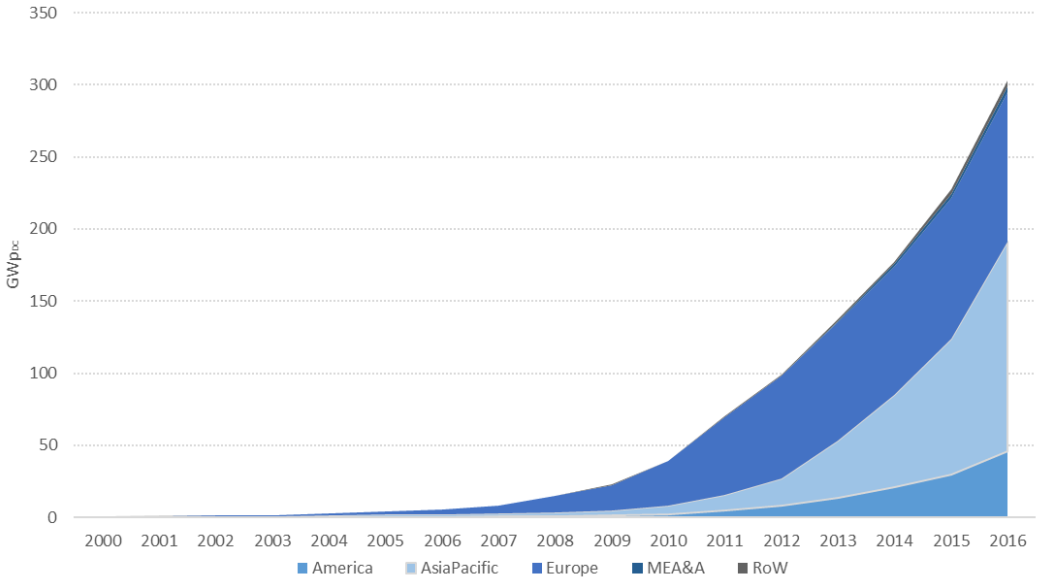
TABLE 1: TOP 10 COUNTRIES FOR INSTALLATIONS AND TOTAL INSTALLED CAPACITY IN 2016

	TOP 10 COUNTRIES IN 2016 FOR ANNUAL INSTALLED CAPACITY				TOP 10 COUNTRIES IN 2016 FOR CUMULATIVE INSTALLED CAPACITY		
1	China	34,5 GW		1	China	78,1 GW	
2	USA	14,7 GW		2	Japan	42,8 GW	
3	Japan	8,6 GW		3	Germany	41,2 GW	
4	India	4 GW		4	USA	40,3 GW	
5	UK	2 GW		5	Italy	19,3 GW	
6	Germany	1,5 GW		6	UK	11,6 GW	
7	Korea	0,9 GW		7	India	9 GW	
8	Australia	0,8 GW		8	France	7,1 GW	
9	Philippines	0,8 GW		9	Australia	5,9 GW	
10	Chile	0,7 GW		10	Spain	5,5 GW	

EVOLUTION OF TOTAL INSTALLED PV CAPACITY PER REGION

While Europe represented a major part of all installations globally, Asia's share started to grow rapidly in 2012 and this growth was confirmed in recent years. Now Asia represents around 48% of the total installed capacity and this percentage shall continue increasing in the coming years. Europe represented the same level as Asia with 42% in 2015 but fell to 34% in 2016. The Americas grew to 16%, while the 2% remaining cover the MEA region. Figure 3 shows the absolute share of cumulated PV installations in four regional market segments.

FIGURE 3: EVOLUTION OF REGIONAL PV INSTALLATIONS (GW - DC)



AC & DC NUMBERS, GRID-CONNECTED AND OFF-GRID

PVPS counts all PV installations, both grid-connected and off-grid when numbers are reported. By convention, the numbers reported refer to the nominal power of PV systems installed. These are expressed in W (or Wp). Some countries are reporting the power output of the PV inverter (the device converting DC power from the PV system into AC electricity compatible with standard electricity networks) or the grid connection power level. The difference between the standard DC power (in Wp) and the AC power can range from as little as 5% (conversion losses, inverter set at the DC level) to as much as 50%. For instance, some grid regulations in Germany limit output to as little as 70% of the peak power from the PV system. Most utility-scale plants built in 2016 have an AC-DC ratio between 1,2 and 1,5. Canada, Chile, Japan (since 2012) and Spain report only AC numbers officially. The numbers indicated in this report have been transformed to DC numbers to maintain the coherency of the overall report.

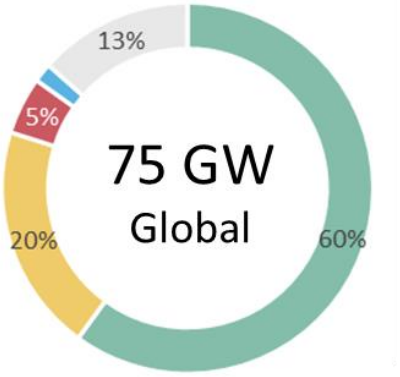
Global PV Market 2016

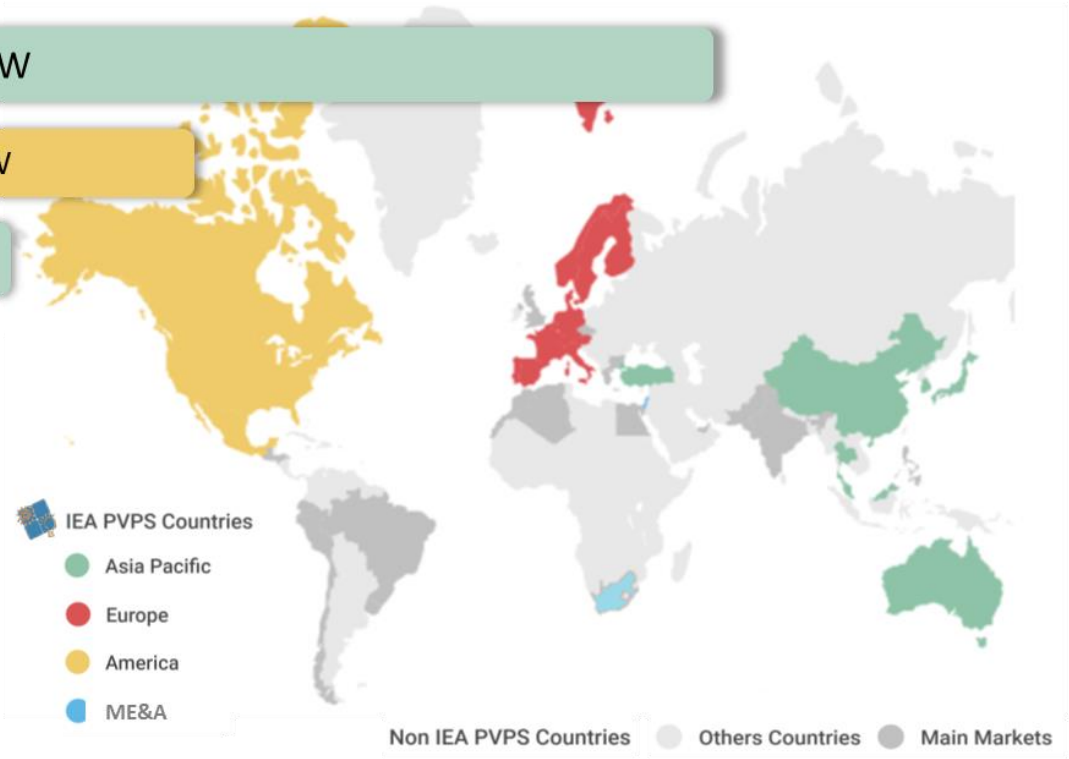
TOP PV MARKETS 2016

1st CHINA 34,54 GW

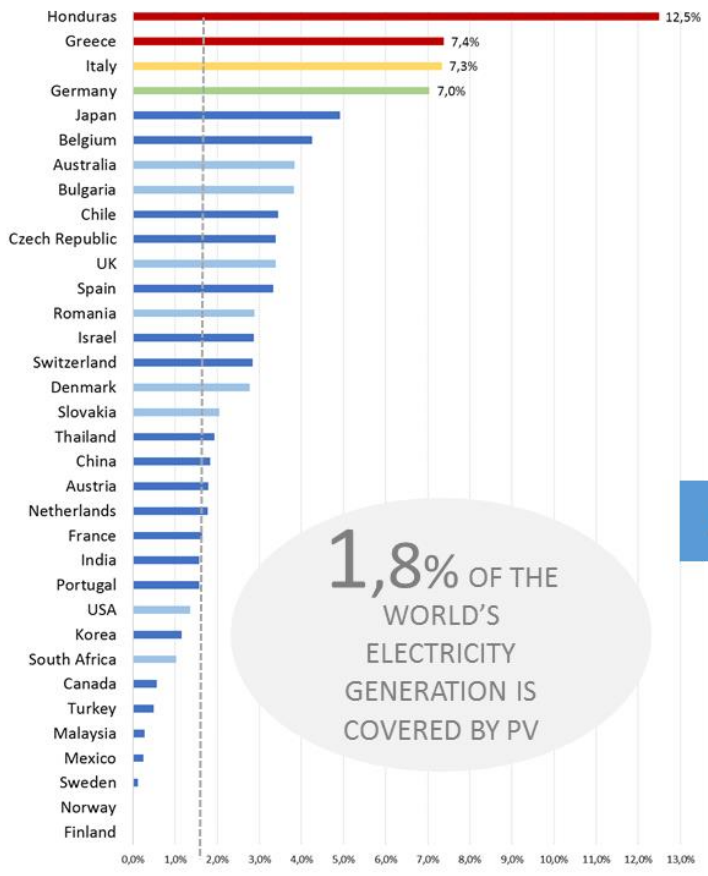
2nd USA 14,72 GW

3rd JAPAN 8,6 GW





2016 THEORETICAL PV PRODUCTION



1,8% OF THE WORLD'S ELECTRICITY GENERATION IS COVERED BY PV

303GW has been installed all over the world by the end of 2016

China is the world's 1st PV market

24 countries had at least 1GW of cumulative PV capacity at the end of 2016

16 countries installed at least 500MW each in 2016

SOLAR PV PER CAPITA 2016 Watt/capita

1st GERMANY 511

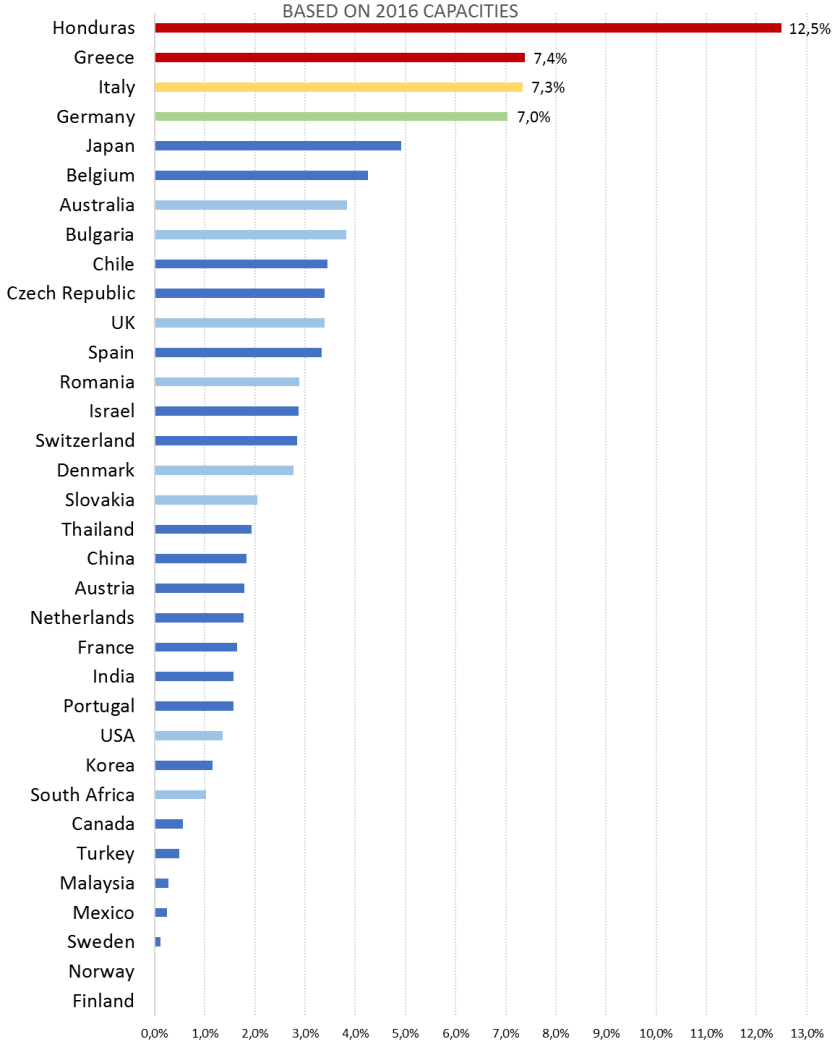
2nd JAPAN 336

3rd ITALY 322

ELECTRICITY PRODUCTION FROM PV

PV electricity production is easy to measure for a power plant but much more complicated to compile for an entire country. In addition, the comparison between the installed base of PV systems in a country at a precise date and the production of electricity from PV are difficult to compare. A system installed in December will have produced only a small fraction of its regular annual electricity output; systems installed on buildings may not be at optimum orientation, or may have partial shading during the day; and/or the weather in 2016 may not have been typical of the long-term average. For these reasons, the electricity production from PV per country as shown below estimates what the PV production could be based on the cumulative PV capacity at the end of 2016; close to optimum siting, orientation and average weather conditions.

FIGURE 4: NATIONAL PV PENETRATION IN % OF THE ELECTRICITY DEMAND BASED ON 2016 CAPACITIES



In several countries, the PV contribution to the electricity demand has passed the 1% mark with Honduras in the first place with 12,5%, Greece in second place with close to 7,4%, Italy third with an estimated 7,3% and the overall European PV contribution amounting to at close to 4 % of the electricity demand of Europe. Japan reached almost the 5% mark in 2016 (4,9%). China reached 1,6%. Figure 4 shows how PV theoretically contributes to the electricity demand in key countries (IEA PVPS and others), based on the PV capacity installed by the end of 2016. Since these numbers are estimates based on the total capacity at the end of the year 2016, they can slightly differ from official PV production numbers in some countries. These numbers should be considered as indicative aiming at comparing different situation in different countries rather than official data.

CONCLUSION AND FUTURE PROSPECTS IN PVPS COUNTRIES

Solar PV technology continued to expand in 2016 thanks to the rapid development in China, America and India. The 50% growth reported in 2016 came from these countries, with disparities in other markets. Japan and Europe contributed less than in 2015 and emerging countries contributed in the same way. In other words, the global PV market outside of China grew by 5 GW to 40 GW while China drove the global numbers up to at least 75 GW. Once driven by financial incentives in developed countries, PV has started to progress in developing countries, answering a crucial need for electricity. Whereas in several developed countries, PV comes in direct competition with existing plants from incumbent utilities and in emerging countries, PV already helps to satisfy a growing need for energy in general and electricity in particular, pushed by declining prices.

In that respect, the super-competitive tenders seen in many countries around the world are sending a clear sign to policymakers that the most competitive PV installations can now compete with most fossil and nuclear sources of energy. In times for policy uncertainties in several key countries, the progresses achieved in 2016 contributed to raise the awareness of PV's potential.

Today PV has become a major actor in the electricity sector in several countries. Globally, close to 375 TWh, or 375 billion kWh will be produced in 2016 by PV systems installed and commissioned until the end of December 2016. This represents about 1,8% of the electricity demand of the planet, though some countries have reached rapidly significant percentages.

Around 302 GW of PV are now installed globally, at least 50 times higher than in 2006. The total PV capacity was multiplied by 4 in only 5 years while the market was multiplied by more than 50 in 10 years.

Finally, with declining prices in the last few years, PV has appeared on the radar of policymakers in charge of energy policies in numerous countries and plans for PV development have increased rapidly all over the world. With dozens of countries developing PV now, and much more to come, the globalisation of PV is now a reality.

Among PVPS countries, several Asian countries have announced their intention to continue developing PV, but the market size remains the question. In the USA, the policy choices of the new administration will have consequences on the PV market in the coming years, but the extent is unknown. In Europe, the picture is more contrasted with a complex process of transitioning from the current financially supported markets to a more competitive PV market. In emerging countries, the potential for solar PV deployment is gigantic, but so are the challenges. All these elements considered together could propel the future PV market to new heights but under the condition of continuous support.

SYNTHESIS TABLE

Table 2 compiles preliminary information valid as of 30 March 2017. PVPS countries' data are issued by national experts. Data related to non-IEA PVPS countries are estimates that have been delivered by the Becquerel Institute in Belgium, RTS Corporation in Japan, the Ministry of Energy of Taiwan, and several Latin American associations thanks to UNEF, the Spanish PV association. Data for some IEA-PVPS countries may still be updated by national authorities. In particular, data for Belgium, Canada, Korea, the Netherlands and Sweden are not definitive but official estimates. Updated data will be published in the next edition of the complete report *"TRENDS 2017 In Photovoltaic Applications."*

Solar yield data has been provided by member countries or GIS data providers.

Electricity production is a **theoretical calculation** based on average yield and the PV installed capacity as of the **31 December 2016**. Real production data could differ due to differences in irradiation across the countries themselves and the characteristics of the PV power plants considered.

TABLE 2: ANNUAL AND CUMULATIVE INSTALLED PV POWER 2016

	PVPS Countries Other countries	ANNUAL INSTALLED CAPACITY		CUMULATIVE INSTALLED CAPACITY		
1	China	**34.54**	**GW**	**78.07**	**GW**	
2	USA	**14.73**	**GW**	**40.3**	**GW**	
3	Japan	**8.6**	**GW**	**42.75**	**GW**	Est.
4	India	**3.97**	**GW**	**9.01**	**GW**	Est.
5	UK	**1.97**	**GW**	**11.63**	**GW**	Est.
6	Germany	**1.52**	**GW**	**41.22**	**GW**	
7	Korea	0.85	GW	**4.35**	**GW**	Est.
8	Australia	839	MW	**5.9**	**GW**	
9	Philippines	756	MW	0.9	GW	
10	Chile	746	MW	**1.61**	**GW**	
	Thailand	726	MW	**2.15**	**GW**	
	Turkey	584	MW	832	MW	Est.
	France	559	MW	**7.13**	**GW**	Est.
	South Africa	536	MW	**1450**	**MW**	Est.
	Netherlands	525	MW	**2.1**	**MW**	Est.
	Italy	373	MW	**19279**	**MW**	
	Switzerland	250	MW	**1640**	**MW**	Est.
	Canada	200	MW	**2715**	**MW**	Est.
	Belgium	170	MW	**3422**	**MW**	Est.
	Austria	154	MW	**1077**	**MW**	Est.
	Mexico	150	MW	320	MW	Est.
	Israel	130	MW	0.91	GW	Est.
	Denmark	70	MW	0.9	GW	Est.
	Sweden	60	MW	175	MW	Est.
	Portugal	58	MW	513	MW	
	Spain	55	MW	**5.49**	**GW**	Est.
	Malaysia	54	MW	286	MW	
	Norway	11	MW	26.7	MW	
	Finland	10	MW	15	MW	Est.

Electricity consumption data has been provided by official authorities. In most cases, 2015 or older data have been used when 2016 data was not yet available.

(GW-scale numbers in bold)

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