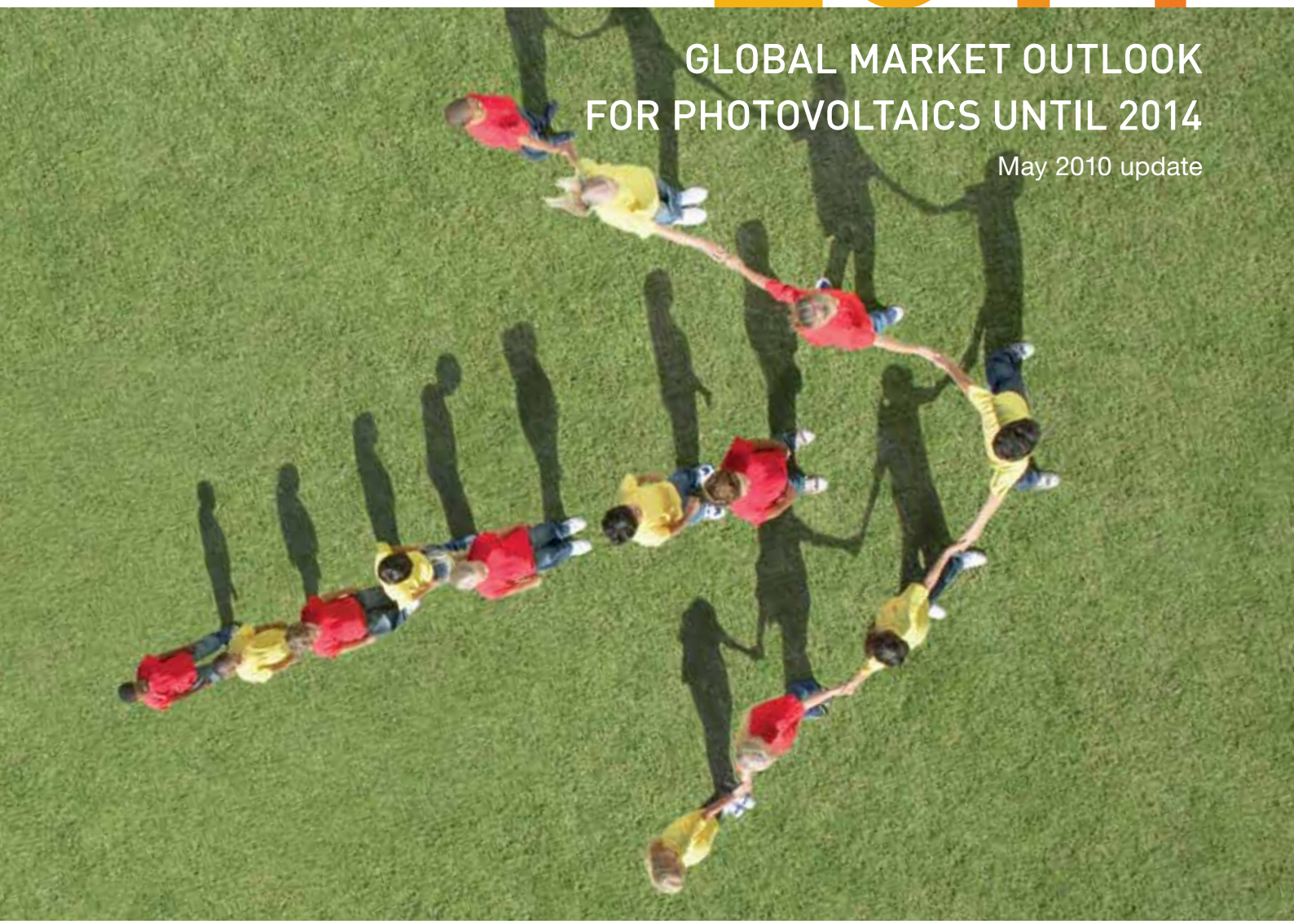
2014



GLOBAL MARKET OUTLOOK FOR PHOTOVOLTAICS UNTIL 2014

May 2010 update

EPIA

European Photovoltaic Industry Association

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INTRODUCTION

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The EPIA Global Market Outlook for Photovoltaics (PV) from 2010 to 2014 is a key publication for the PV sector. Based on an internal analysis of market data from industry members, national associations, government agencies and electric utilities, the figures presented in this edition were discussed during EPIA's annual Workshop on Market Potential and Production Capacity held in Rome in March 2010.

For years, EPIA has put a great deal of effort into observing and analysing PV markets. Thanks to its intimate contact with key players of the industry, national PV associations and its deep knowledge of PV policies and support schemes, EPIA market figures are a credible and authoritative source of short-term market forecasts as well as long-term scenarios. With the massive growth of the market, data reliability is becoming a crucial issue: industry players, electric utilities and policy makers must count on reliable data to orientate their decisions, launch investments or plan legislation updates. EPIA is advocating for the availability of quick, transparent and reliable market information and therefore encourages the adoption of effective monitoring systems.

Europe maintains leadership, with Germany as the World's largest market

With a cumulative PV power installed of almost 10 GW, including around 3.8 GW installed in 2009, Germany remains the World's largest PV market although the recently announced Feed-in Tariff (FiT) cuts are expected to significantly affect the development of the national industry in the long run. In the mid-term, Italy appears as one of the most promising markets with an additional 711 MW already in 2009. Besides high sun irradiation, the new *Conto Energia*, which is expected to be announced in spring 2010, would continue to support the strong momentum of the Italian market. Czech Republic shows an important growth in 2009 with 411 MW installed but, due to unsustainable support schemes, the market is expected to shrink significantly in 2011. Thanks to a strong political willingness, Belgium made its entry into the TOP 10 markets with 292 MW installed in 2009. Due to a revision of the financial support scheme early 2010, the market is, however, expected to slow down slightly in 2010. France follows with 185 MW installed in 2009, with an additional 100 MW installed but not yet connected to the grid. In spite of huge potential, this clearly demonstrates the importance for France to solve grid connection issues in order to allow the market to develop. In Spain, the set-up of a market cap in 2008, combined with the effects of the financial crisis, constrained the market to a very low 69 MW installed in 2009. Finally, Greece, Portugal and to some extent the U.K. are showing interesting potential for growth in 2010 and beyond.

Japan and USA as leading markets outside Europe

Outside Europe, Japan positions itself as the third largest market with 484 MW and shows an important growth potential thanks to favourable political support. The USA market finally took off significantly with around 475 MW installed in 2009 and appears as a potential leading market for the coming years. China and India are also expected to boom in the next five years with huge market potentials and impressive projects in the pipeline. Canada and Australia showed significant market development in 2009 and are open the way to the development of new markets. Brazil, Mexico, Morocco, Taiwan, Thailand, South Africa and many others are also seen as promising countries.

A bright future for PV

With the strong growth experienced in Germany and Italy in the first months of 2010 and in order to publish accurate numbers, EPIA revised its forecasts for 2010: the World PV Market could reach between 10.1 GW and 15.5 GW of new installations in 2010 under the Moderate scenario and the Policy-Driven scenario respectively, compared to 8.2 to 12.7 GW in the previous forecast. In the Policy-Driven scenario, the World annual PV market could reach up to 30 GW in 2014 based, of course, on favourable conditions established by policy makers, regulators and the energy sector at large.

While the announced world-wide PV production capacity would be sufficient to cover the expected evolution of the market in the coming five years, we could nevertheless see some temporary shortages due to high variations in the demand patterns which could occur. Inverters and, to some extent crystalline silicon capacities, could be used at a very high rate in the coming months in order to cope with the growing demand.

Given all the caution that such forecasts require, they still suggest a strong growth of the PV market and industry in the coming 5 years.

HISTORICAL PV MARKET DEVELOPMENT

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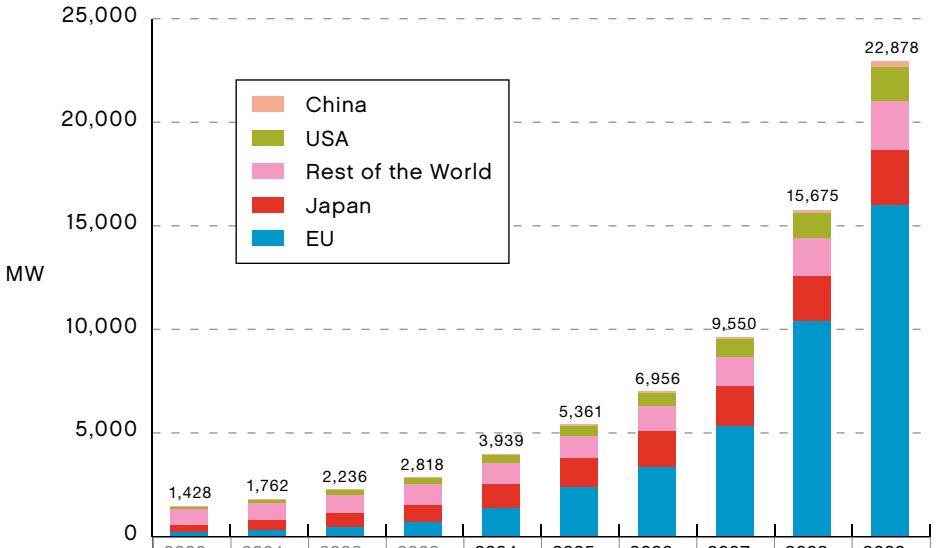
From the first space applications to the GW planned systems, more than 40 years have passed. The last decade has seen PV technology emerging as a potentially major technology for power generation in the World. The robust and continuous growth experienced in the last ten years is expected to continue in the coming years. By the end of 2008, the World cumulative PV power installed was approaching 16 GW and today, almost 23 GW are installed globally which produce about 25 TWh of electricity on a yearly basis.

Europe is leading the way with almost 16 GW of installed capacity in 2009, representing about 70% of the World cumulative PV power installed at the end of 2009 while Japan (2.6 GW) and the US (1.6 GW) are following behind. China makes its entry into the TOP 10 of the World PV markets and is expected to become a major player in the coming years.



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
China	19	30	45	55	64	68	80	100	145	305
USA	139	168	212	275	365	479	624	831	1,173	1,650
ROW	763	825	913	1,000	1,044	1,051	1,235	1,422	1,870	2,347
Japan	318	452	637	860	1,132	1,422	1,708	1,919	2,149	2,633
EU	189	286	429	628	1,334	2,341	3,309	5,279	10,338	15,943
Total	1,428	1,762	2,236	2,818	3,939	5,361	6,956	9,550	15,675	22,878

Figure 1 - Historical development of World cumulative PV power installed in main geographies

The annual market has developed from less than 1 GW in 2003 to more than 7.2 GW in 2009 in spite of the difficult financial and economic circumstances. After a 160% CAGR (Compound Annual Growth Rate) growth from 2007 to 2008, the PV market in 2009 continued to grow another 15% in 2009. While Germany reclaimed its leadership, many other markets have started to show significant development. South Korea and, in particular Spain, saw to the contrary their installation figures dropping.

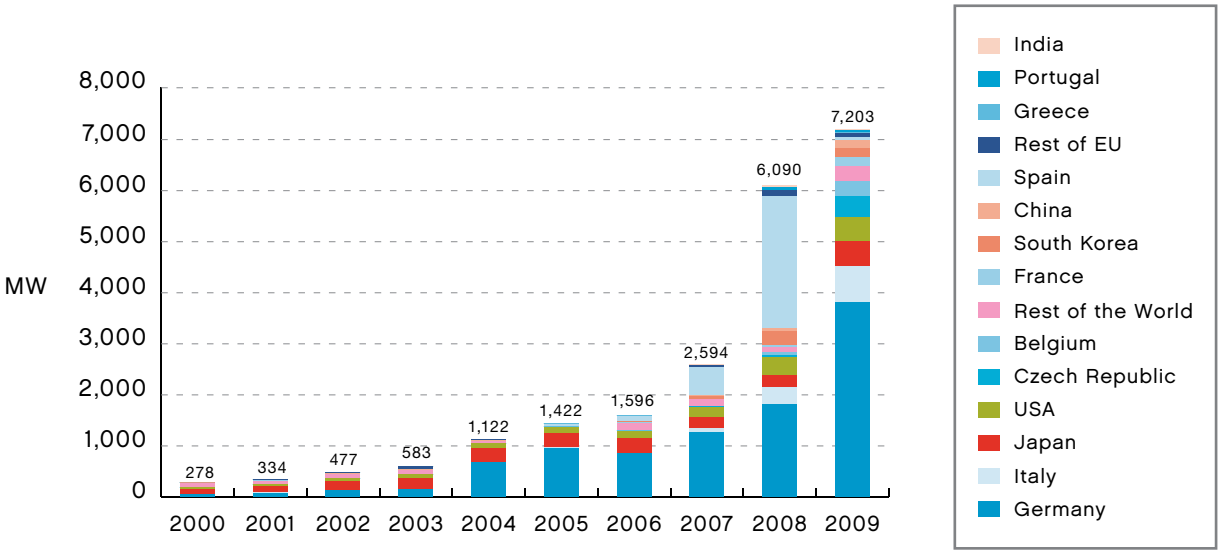


Figure 2 - Evolution of the World annual PV market 2000-2009

PV MARKET OUTLOOK

3

The PV market in 2009

Despite the economic crisis, the PV market has continued to grow by almost 15% in 2009 compared to 2008 and the total power installed in the World raised by 45% up to 22.9 GW.

This progression in 2009 is mainly due to the development of the German market which almost doubled in one year from 1.8 GW in 2008 to around 3.8 GW installed in 2009, representing more than 52% of the World PV market.

Besides the development in Germany, other countries continued their progression in 2009. The Italian market installed 711 MW, making it clearly the second largest market world-wide.

The market also developed significantly outside Europe with 484 MW installed in Japan and 477 MW (including 40 MW of off-grid applications) in the USA.

Czech Republic and Belgium made impressive progress in 2009, with 411 MW and 292 MW installed, respectively. Given the size of those countries and the fast PV deployment, it is likely that this development cannot be sustained at such a pace in the coming years.

Major developments were seen in France with 285 MW installed, 185 MW of which were already connected. Canada and Australia are emerging while South Korea failed to repeat the numbers of 2008.

In the South of Europe, Portugal and Greece, two promising markets with huge potential, have delayed their kick-off, waiting for a more favourable context.

The World leader in 2008, Spain, went down from 2,600 MW to only 69 MW in 2009, experiencing the combined effects of the financial crisis and the heavy regulatory market CAP which was set up in 2008.

China appears as a new player in 2009 with about 160 MW installed, and India with around 30 MW. In these countries, the long-term development of the market has, nevertheless, still to be confirmed.

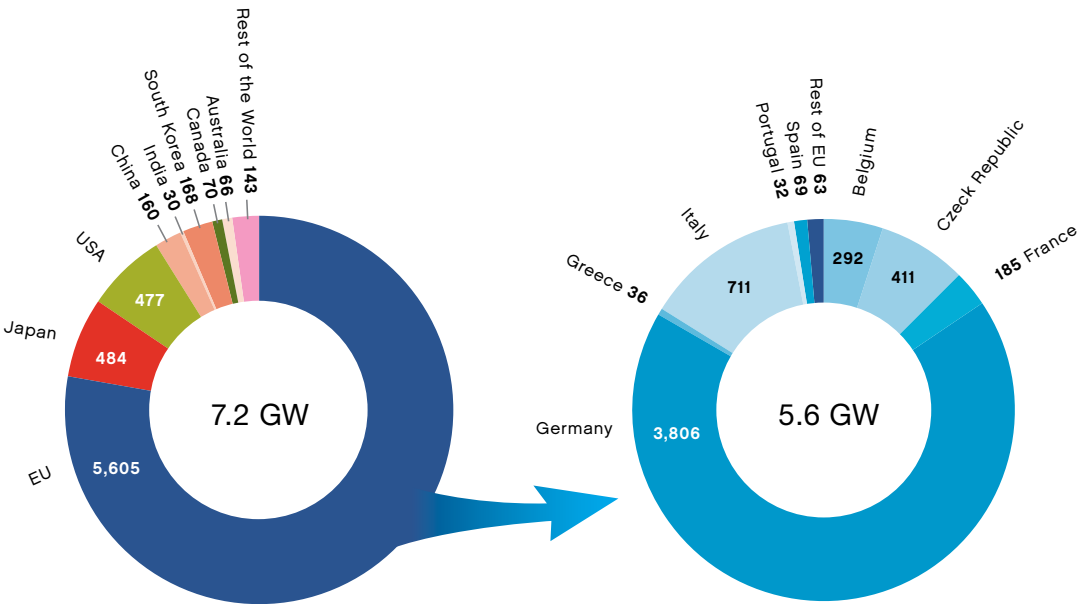


Figure 3 - World and European PV markets in 2009 in MW

The European Union represented 5.6 GW or 78% of the World PV market in 2009. And in Europe itself, the German market clearly dominates with 68 % of the EU market. The emergence of Italy as a major market for PV, combined with the ramp-up of France and the impressive growth of the Czech Republic and Belgium, compensated the slowdown of the Spanish market.

One major change in 2009 is the emergence of new markets outside Europe, with Canada and Australia starting to develop while Japan and the USA show both a significant potential in becoming new GW markets in the coming years.

Market forecasts until 2014

As evidenced in the EPIA SET For 2020 study (**www.setfor2020.eu**), PV could provide up to 12% of the EU electricity demand by 2020 provided specific boundary conditions are met, and be competitive with other electricity sources in as much as 76% of the EU electricity market by 2020, in the absence of any form of external price support or subsidy.

In the current pre-competitive phase, PV market deployment is, to a large extent, dependent on the political framework of any given country. Support mechanisms are defined in national laws. The introduction, modification or fading out of such support schemes have profound consequences on PV markets and industries.

In March 2010, EPIA completed an extensive data collection exercise from among a highly representative sample of the PV industry, electric utilities, national associations and energy agencies.

Based on the cross-checking of data and the consolidation of complementary market projection methods, EPIA has derived 2 scenarios for the future development of the PV industry.

***The Moderate scenario*:** This scenario is based on the assumption of a 'business-as-usual' market behaviour which does not assume any major enforcement of existing support mechanisms but takes into account a reasonable follow-up of the FiT aligned on the systems prices.

***The Policy-Driven scenario*:** In this scenario, EPIA expects the follow-up and/or introduction of support mechanisms, namely Feed-in Tariffs, accompanied by a strong political will to consider PV as a major power source for the coming years. This must be accompanied with a removal of non-necessary administrative barriers and a streamlining of grid connection procedures.

Under these two scenarios, the study analyses, on a country basis, the historical development of the PV market, existing support policies, their attractiveness and expected developments, administrative procedures in place, national renewable energy objectives and the potential for PV.

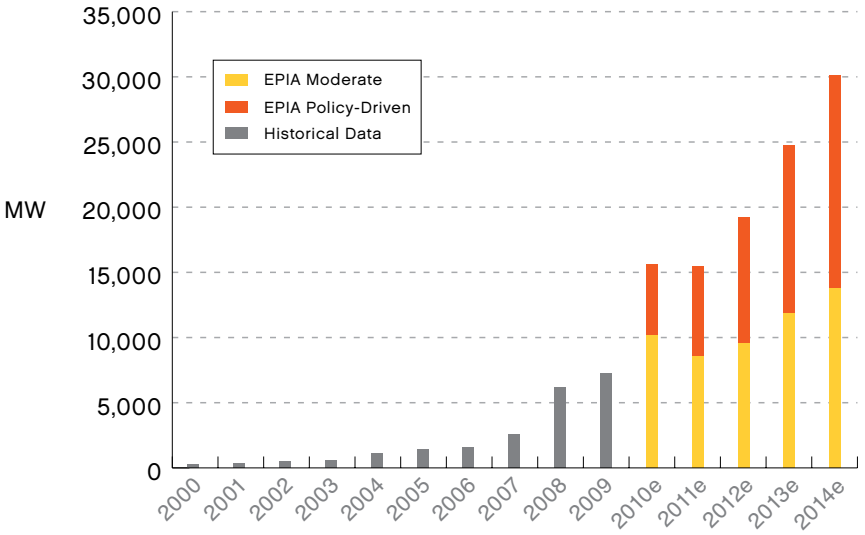


Figure 4 - Moderate and Policy-Driven scenarios

In the Moderate scenario, the European market could experience a rise up to 8.2 GW in 2010 followed by a return to less than 6 GW in 2011 and 8 GW in 2014. For the time being, it is believed that the German market will not repeat its forecast 2010 figures in 2011, reducing that way the market size in Europe. In the Policy-Driven scenario, Europe could install as much as 11.5 GW in 2010 and up to 13.5 GW in 2014, after a slowdown in 2011 and 2012.

For 2010, EPIA expects the World PV market to grow up to around 10.1.GW under the Moderate scenario. Under the Policy Driven scenario, the World PV market could reach around 15.5 GW, up from 8.2 GW and 12.7 GW respectively in our previous estimates. EPIA foresees the World market to reach 13.7 GW by 2014 under the Moderate scenario. For the Policy-Driven scenario, the annual market is expected to reach 30 GW by 2014.

Regional distribution

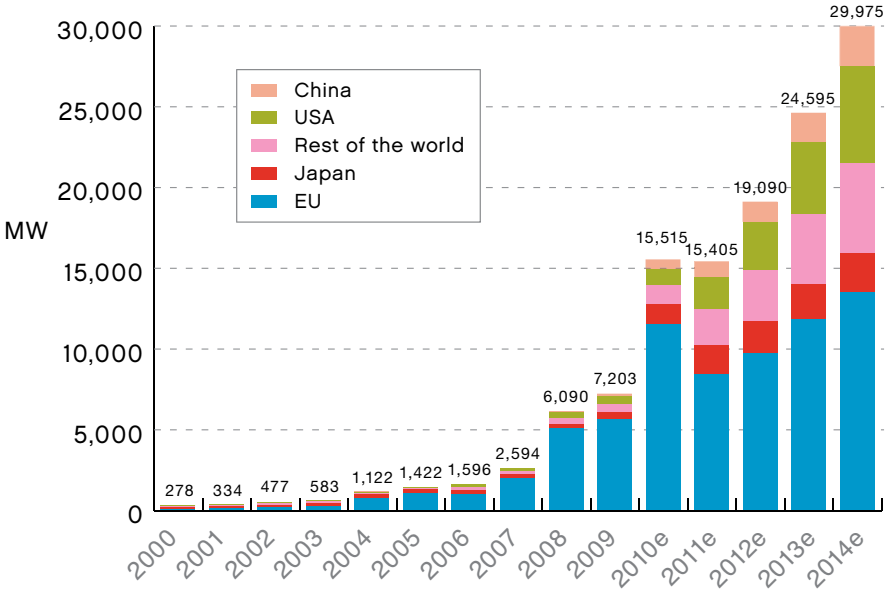


Figure 5 - Regional PV distribution in the World (Policy-Driven scenario)

Detailed Global market outlook until 2014

Country	Type	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Belgium	EPIA Moderate	18	50	292	140	160	200	220	240
	EPIA Policy-Driven				200	220	240	260	280
Bulgaria	EPIA Moderate	0	2	7	15	40	60	80	100
	EPIA Policy-Driven				20	100	150	200	250
Czech Republic	EPIA Moderate	3	51	411	900	100	130	150	175
	EPIA Policy-Driven				1,000	425	450	475	500
France	EPIA Moderate	11	46	185	500	540	580	620	660
	EPIA Policy-Driven				700	860	1,100	1,200	1,300
Germany	EPIA Moderate	1,271	1,809	3,806	5,000	3,000	3,000	4,000	4,000
	EPIA Policy-Driven				7,000	4,000	4,000	5,000	5,500
Greece	EPIA Moderate	2	11	36	100	125	145	165	190
	EPIA Policy-Driven				115	250	400	450	585
Italy	EPIA Moderate	70	338	711	900	950	1,000	1,100	1,200
	EPIA Policy-Driven				1,500	1,250	1,500	1,750	2,000
Portugal	EPIA Moderate	14	50	32	70	75	80	85	90
	EPIA Policy-Driven				100	150	180	220	250
Spain	EPIA Moderate	560	2,605	69	600	500	550	605	675
	EPIA Policy-Driven				650	750	820	940	1,060
UK	EPIA Moderate	4	6	10	20	80	150	200	250
	EPIA Policy-Driven				40	100	200	350	500
Rest of EU	EPIA Moderate	16	92	46	45	100	200	300	400
	EPIA Policy-Driven				190	300	650	950	1,250
Total EU	**EPIA Moderate**	1,969	5,060	5,605	**8,190**	**5,670**	**6,095**	**7,525**	**7,980**
	EPIA Policy-Driven				**11,515**	**8,405**	**9,690**	**11,795**	**13,475**
China	EPIA Moderate	20	45	160	160	250	300	400	600
	EPIA Policy-Driven				600	1,000	1,250	1,800	2,500
India	EPIA Moderate	20	40	30	50	100	150	200	250
	EPIA Policy-Driven				300	500	700	900	1,500
Japan	EPIA Moderate	210	230	484	700	900	1,000	1,100	1,200
	EPIA Policy-Driven				1,200	1,800	2,000	2,200	2,400
USA	EPIA Moderate	207	342	477	600	1,200	1,500	2,000	3,000
	EPIA Policy-Driven				1,000	2,000	3,000	4,500	6,000
Rest of the World	EPIA Moderate	168	373	447	380	400	480	590	700
	EPIA Policy-Driven				900	1,700	2,450	3,400	4,100
Total Non-EU	**EPIA Moderate**	625	1,030	1,598	**1,890**	**2,850**	**3,430**	**4,290**	**5,750**
	EPIA Policy-Driven				**4,000**	**7,000**	**9,400**	**12,800**	**16,500**
Total World	**EPIA Moderate**	2,594	6,090	7,203	**10,080**	**8,520**	**9,525**	**11,815**	**13,730**
	EPIA Policy-Driven				**15,515**	**15,405**	**19,090**	**24,595**	**29,975**

Figure 6 - Regional PV distribution in the World (Policy-Driven scenario)

Europe

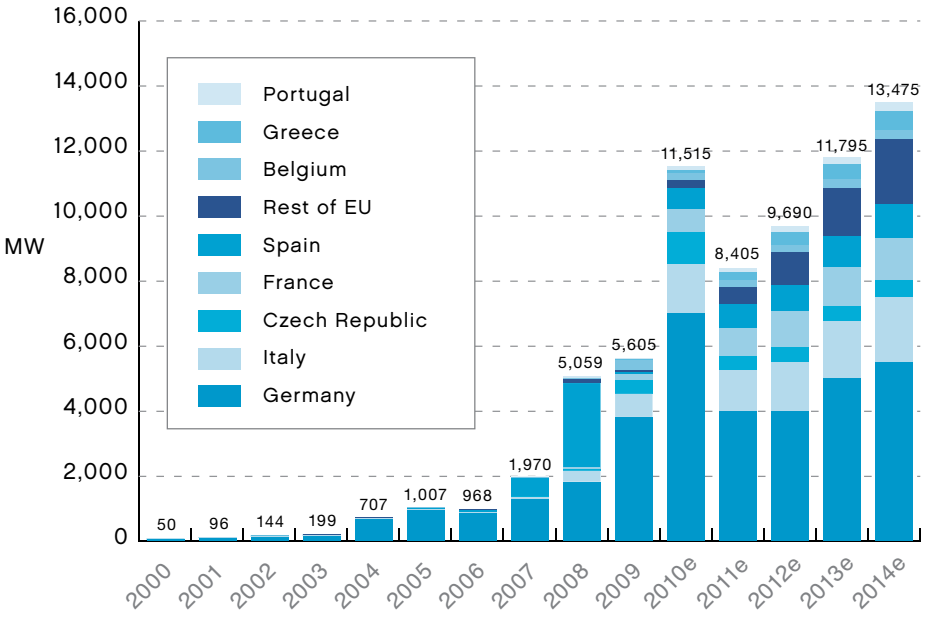
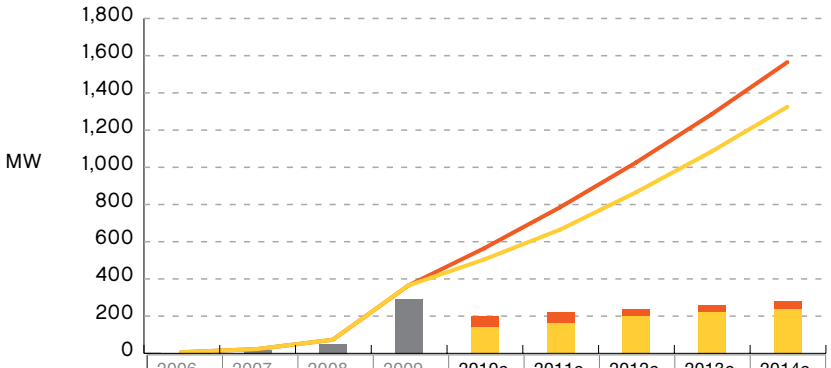


Figure 7 - Regional distribution by country in Europe - Policy-Driven

• Belgium

The strong growth of the Belgian market in 2009 was well above expectations. With 292 MW installed, this places the country sixth in the World ranking. With its specific institutional context (energy is a regional competency shared among three regions), Belgium should be treated as at least two (for the two main regions) separate markets with specific incentives; the Flemish market alone reached 251 MW in 2009, benefiting from a well-designed Green Certificates scheme (which actually works as a Feed-in Tariff), combined with additional tax rebates and electricity self-consumption. Well-developed in the household and commercial segments, the Flemish market is nevertheless expected to decrease in 2010 due to the foreseen tariff decrease. In Brussels and in the Walloon region, the market reached 3 MW and 38 MW, respectively – restricted to household systems lower than 10 kW mainly - sustained by the same tax rebates and self-consumption schemes as in Flanders, with a complex yet generous Green Certificates Trading's scheme. In this case, the price of the certificates varies on an exchange market, constrained by minimum and maximum prices. Other financial incentives in Wallonia were suppressed in 2009, amid stop-and-go discussions among policy makers that have slowed down the market.

EPIA expects the total market to range between 240 MW and 280 MW of newly installed capacities in 2014, while the 2010 market should reduce to a more sustainable 140 to 200 MW.

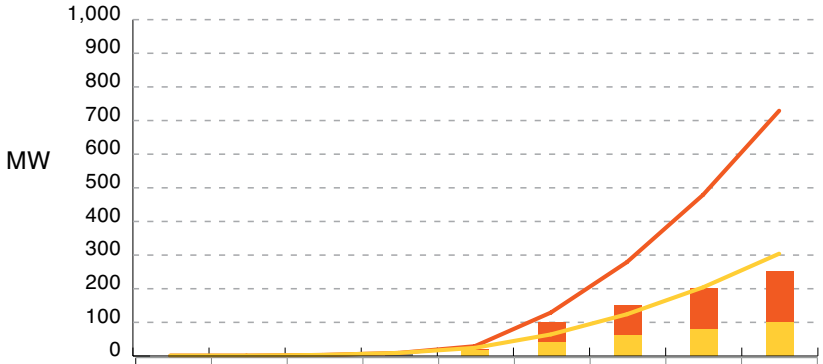


		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	2	18	50	292	140	160	200	220	240
	EPIA Policy-Driven scenario					200	220	240	260	280
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	4	21	71	363	503	663	863	1,083	1,323
	EPIA Policy-Driven scenario CUM					563	783	1,023	1,283	1,563

Figure 8 - Belgian Market History and Forecast until 2014

• Bulgaria

With a good irradiation level, a strong Feed-in Tariff and a multi-GW pipeline of potential projects, the lack of PV deployment in Bulgaria can be explained by discouraging administrative procedures and heavily complex grid connection schemes. With less than 7 MW installed in 2009, the PV market could reach between 100 MW and 250 MW in 2014 if appropriate measures to streamline administrative procedures and simplify the grid connection are taken. It must be noted that the ground-mounted segment could be threatened by environmental policies before having even really started.



		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	0	0	2	7	15	40	60	80	100
	EPIA Policy-Driven scenario					20	100	150	200	250
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	0	0	2	8	23	63	123	203	303
	EPIA Policy-Driven scenario CUM					28	128	278	478	728

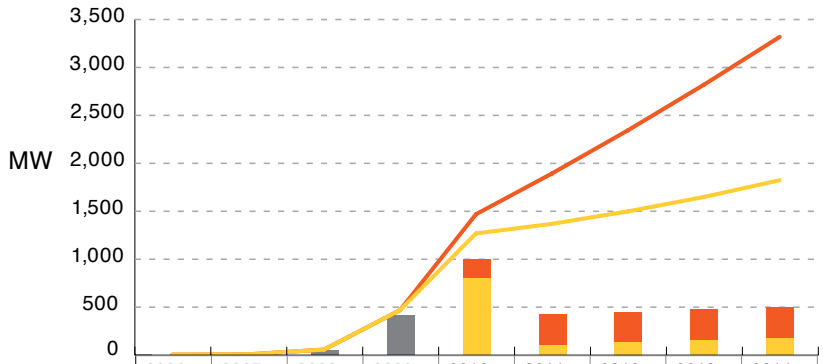
Figure 9 - Bulgarian Market History and Forecast until 2014

• Czech Republic

The combination of generous FiT and simple administrative procedures led to the booming of the Czech market in 2009, with 411 MW installed. Due to the price decline last year and the incentives review expected only in 2011, market growth could continue in 2010 at a hardly sustainable pace.

EPIA expects the 2010 market to top 1 GW of newly installed capacities if nothing is done in the meantime to slow the market to a more reasonable level. The fast growth gave no time to the local industry to develop and could severely damage PV's image in the country. At the beginning of 2010, some local stakeholders were trying to slow the market using grid limitation issues and other justifications that could damage future growth. Without an adequate reaction from policy makers, EPIA expects the market to collapse at the latest beginning of 2011 and to remain below 175 MW installed until 2014. A market collapse in 2010 could not be excluded given the context when closing this publication.

However, a good political support could help to stabilise the market at sustainable levels for the coming years.



		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	0	3	51	411	800	100	130	150	175
	EPIA Policy-Driven scenario					1,000	425	450	475	500
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	1	4	54	465	1,265	1,365	1,495	1,645	1,820
	EPIA Policy-Driven scenario CUM					1,465	1,890	2,340	2,815	3,315

Figure 10 - Czech Market History and Forecast until 2014

• France

With its well-designed Feed-in Tariff for Building Integrated PhotoVoltaics (BIPV), the French PV market is dominated today by BIPV applications for residential and commercial applications. The FiT revision that occurred in January 2010 strengthened the conditions to apply for the highest BIPV tariffs to avoid abuses.

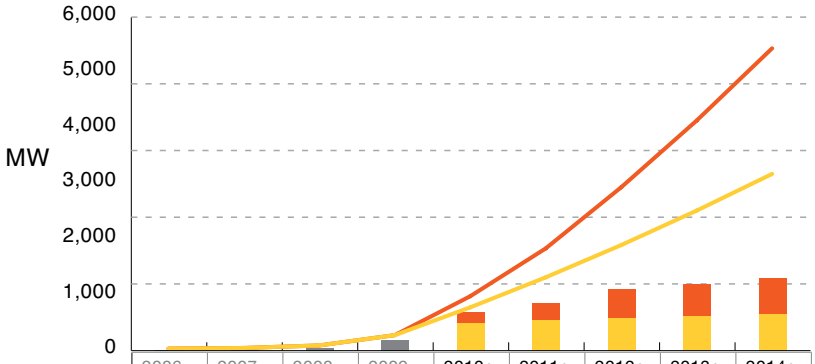
For ground-mounted systems, the French law introduces a correction coefficient that takes the difference of irradiation into account. Depending on the latitude, the northern regions can receive up to 20% of additional FiT in comparison with southern regions.

In order to keep the return of PV investments within sustainable boundaries, EPIA advises revising the tariffs in due time to accompany the price reductions and avoid any risk of speculative market overheat as started to be observed in the last months of 2009.

In 2009, 285 MW were installed but only 185 MW were connected to the grid due to long and slow administrative procedures. This situation has lasted for at least two years now and could put the brakes on PV deployment in France. Assuming this situation could finally be resolved in 2010, expectations for the 2010 French market top between 500 MW and 700 MW installed.

In the Moderate scenario, the French market could reach 660 MW of new installations in 2014. In the Policy-Driven scenario and with a simplification of administrative procedures, the market could grow to 1.3 GW installed and connected to the grid in 2014. Under this scenario, the French PV market would become a leading country in the deployment of PV energy in Europe and world-wide.

Moreover, the focus on BIPV, with stringent rules, is likely to support the development of innovative rooftop products and specific building applications.



		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	8	11	46	185	500	540	580	620	660
	EPIA Policy-Driven scenario					700	860	1,100	1,200	1,300
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	30	41	87	272	772	1,312	1,892	2,512	3,172
	EPIA Policy-Driven scenario CUM					972	1,832	2,932	4,132	5,432

Figure 11 - French Market History and Forecast until 2014

• Germany

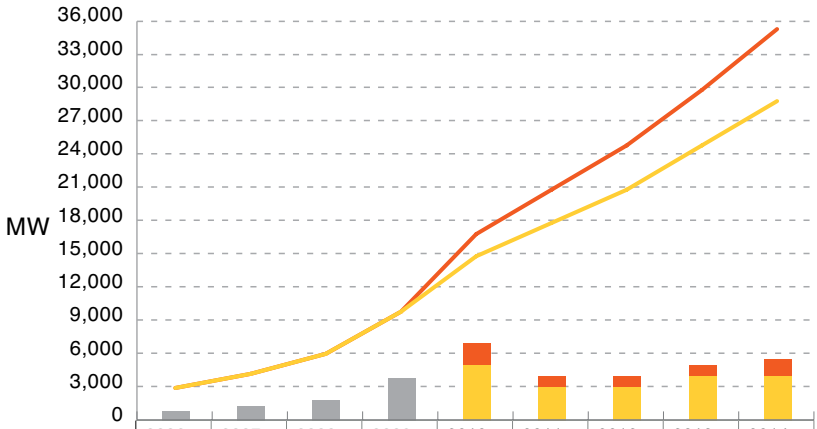
Germany regained its number one position as the largest PV market world-wide in 2009. The combination of a proven FiT scheme, good financing opportunities, a large availability of skilled PV companies, and a good public awareness of the PV technology, largely contributed to this success. The revised figures from the German *Bundesnetzagentur* show a market of 1.8 GW in 2008, and 3.806 GW in 2009, following a significant rush in the last month of 2009.

Once an exemplary support mechanism in Europe, the German Feed-in Tariff remains however a privileged scheme allowing sustainable market and industry development. The reinforcement of the net-metering premium which was voted and will come into force in July 2010 with the EEG (FiT law) revision, could further contribute to the sustainable deployment of PV applications for households.

After the January FiT decrease, the German parliament finally voted in the additional decrease that will happen in July. With 16% decrease for rooftops, 11% for reconversion areas, 15% for the other installations and no more feed-in tariff for PV installations on agricultural land, the new law is expected to considerably affect the market in the coming years. In addition, the "Corridor" concept (that adapts the FiT annual decrease to the market size of the previous year) was modified in an attempt to better control the market growth.

According to the latest information, the German PV market could reach between up to 5 and 7 GW in 2010, and come back to around 3 GW to 4 GW annually from 2011 onwards. EPIA estimates that the market could stabilise in the 3 to 5 GW annual installations level by 2014, if the present support scheme is maintained, with adequate FiT decreases in line with the expected price decrease. The balance between segments will change in the coming years due to the halt of installations on agricultural lands. The self-consumption measures could favour local consumption for households and commercial buildings.

The intense political debate about the Feed-in Tariff decrease was closed at the time of publication and the new EEG law was voted. The substantial FiT decrease could jeopardise the development of the German industry, shifting the market to non-European low-cost manufacturers and potentially destroying jobs by thousands in the German industry. However we estimate that the possible EUR 100 million of subsidies for PV research in Germany is a step in the right direction to ensure the competitiveness of the European PV industry in the coming years.

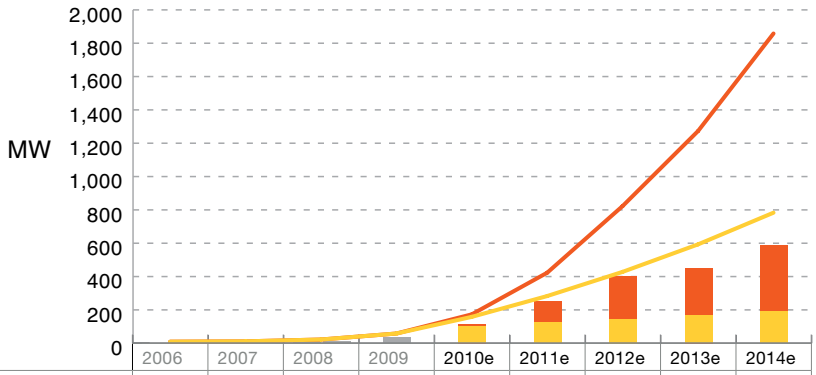


		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	843	1,271	1,809	3,806	5,000	3,000	3,000	4,000	4,000
	EPIA Policy-Driven scenario					7,000	4,000	4,000	5,000	5,500
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	2,899	4,170	5,979	9,785	14,785	17,785	20,785	24,785	28,785
	EPIA Policy-Driven scenario CUM					16,785	20,785	24,785	29,785	35,285

Figure 12 - German Market History and Forecast until 2014

• Greece

On top of a very good irradiation, Greece benefits from one of the most favourable FiT across Europe. With more than 3.5 GW of PV projects in the pipeline, Greece has been expected to play a leading role for the development of PV for a long time. However, project developers are overwhelmed by bureaucracy and administrative and regulatory uncertainty, which explains why few projects were implemented in 2008 and 2009. It is likely that the effects of the major economical crisis in Greece, combined with those barriers, could once again delay the market ramp-up. After the 36 MW installed in 2009 and a market of around 100 MW in 2010, EPIA expects, depending on the scenarios, the market to reach between 200 MW and around 600 MW in 2014.



		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	1	2	11	36	100	125	145	165	190
	EPIA Policy-Driven scenario					115	250	400	450	585
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	7	9	20	56	156	281	426	591	781
	EPIA Policy-Driven scenario CUM					171	421	821	1,271	1,856

Figure 13 - Greek Market History and Forecast until 2014

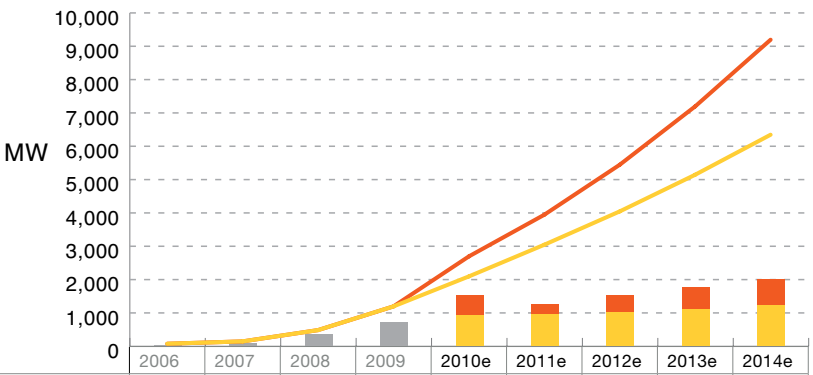
• Italy

Besides high sun irradiation, Italy offers a very attractive support scheme, mixing net-metering and a well-segmented FiT. In January 2009, the Italian government extended the net-metering (*Scambio sul posto*) to PV systems up to 200 kW. This means the PV system owner can value the electricity he produces himself at the same price as the electricity he consumes traditionally from the grid. If, over a time period, there is an excess of electricity fed into the grid, the PV system owner gets a credit (unlimited in time) for the value of the excess of electricity. This measure can be considered as quite attractive for the residential, public and commercial sectors. On top of the value of the electricity itself, the PV system owner also gets a premium FiT on the total electricity produced by the PV system. Under the current FiT propositions made for the new *Conto Energia*, EPIA expects a continuous growth of the Italian PV market, possibly reaching the GW mark in 2010, under the grace period of the current *Conto Energia*.

The future growth of the market will depend on the streamlining and harmonisation of administrative procedures, combined with an adapted decrease of the FiT in the third *Conto Energia* to cope with the expected price decrease. EPIA also expects, due to high electricity price, that residential grid parity during peak load hours could be approached already in 2011 or 2012 in the South of the country.

With 711 MW installed in 2009, Italy took the second place in Europe and in the World and could become the second GW market in 2010. According to the latest market development in the country, EPIA expects the market to reach 1.5 GW and even possibly up to 2 GW. EPIA retains 1.5 GW as its Policy-Driven target for 2010 (up from 1.2 GW in its previous estimate) at the time of closing that publication. In EPIA's Policy Driven scenario, the market could grow to up to 2 GW in 2014.

The higher tariffs for building integrated PV systems (BIPV) also supports the development of innovative products and applications for roof mounted systems.

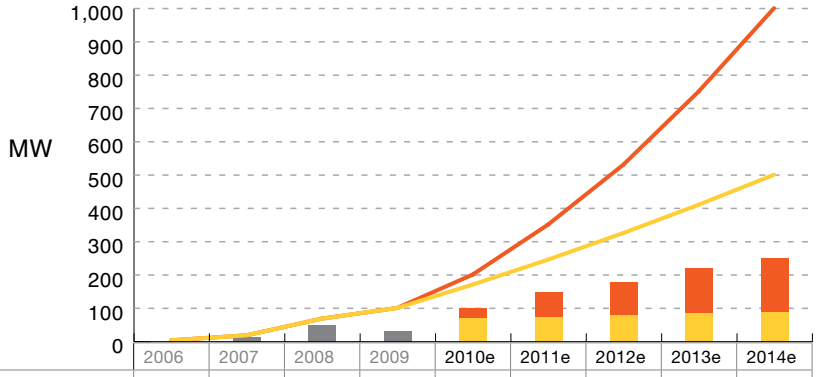


		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	10	70	338	711	900	950	1,000	1,100	1,200
	EPIA Policy-Driven scenario					1,500	1,250	1,500	1,750	2,000
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	47	117	456	1,167	2,067	3,017	4,017	5,117	6,317
	EPIA Policy-Driven scenario CUM					2,667	3,917	5,417	7,167	9,167

Figure 14 - Italian Market History and Forecast until 2014

• Portugal

Despite high sun irradiation, PV in Portugal has grown timidly over the past few years, mainly with several large-scale PV plants and some MW of micro-generation installations. If Portugal sets an appropriate support scheme for the widespread use of PV, EPIA believes that the Portuguese market could install up to 250 MW annually by 2014 in its Policy-Driven scenario.



		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	0	14	50	32	70	75	80	85	90
	EPIA Policy-Driven scenario					100	150	180	220	250
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	3	18	68	100	170	245	325	410	500
	EPIA Policy-Driven scenario CUM					200	350	530	750	1,000

Figure 15: Portuguese Market History and Forecast until 2014

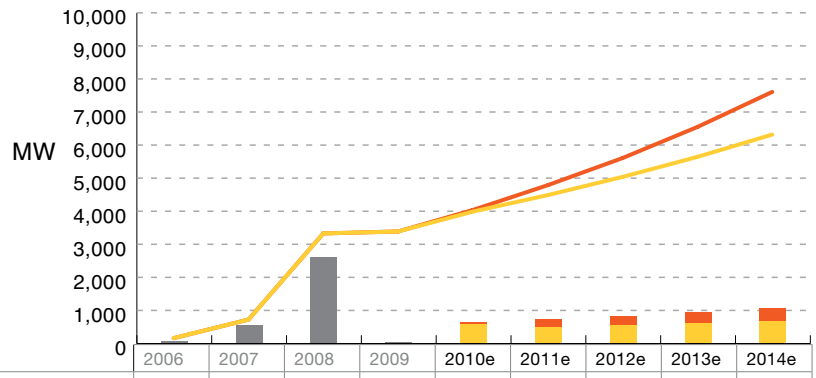
• Spain

World leader in 2008 with 2,600 MW installed, the Spanish market went down to a very low 69 MW installed in 2009. The explanation can be found in the complex administrative procedures and delays related to the new CAP, combined with the prices decline that pushed many developers to delay their already approved projects and the effect on financing due to the economic crisis.

The 2009 market remained concentrated in the large commercial and ground-mounted systems, with little place for households in the CAP. In a Moderate scenario, the market could reach about 700 MW in 2014. In the Policy-Driven scenario, EPIA expects that removing such a barrier could help developping the households market and drive installations up to 1 GW in 2014.

The expected decrease in the Feed-in Tariffs in 2010 could delay the market recovery but EPIA expects a 600 MW market in 2010 with many installations coming from the allocated projects from 2009.

Spain already experienced power generation overcapacities due to the electricity demand decline related to the economic slowdown. Despite high sun irradiation and PV potential, this has led the government to reduce the potential for PV and other renewable energy sources, which limits *de facto* the high potential of this market for the coming years.

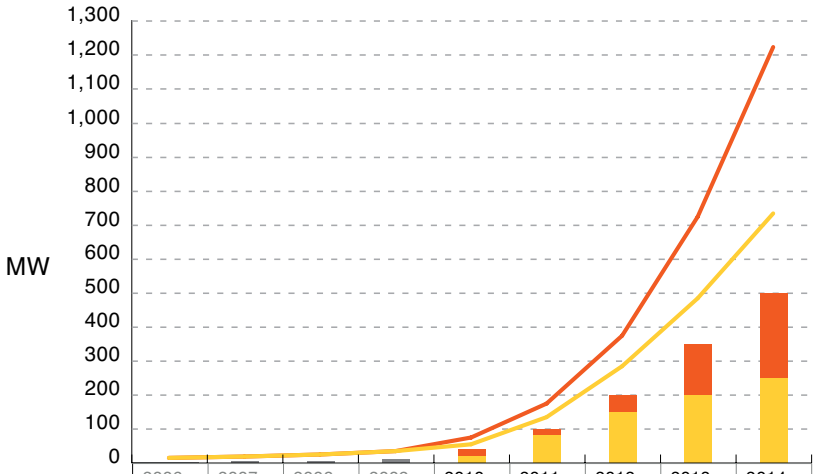


		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	88	560	2,605	69	600	500	550	605	675
	EPIA Policy-Driven scenario					650	750	820	940	1,060
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	151	712	3,317	3,386	3,986	4,486	5,086	5,641	6,316
	EPIA Policy-Driven scenario CUM					4,036	4,786	5,606	6,546	7,606

Figure 16 - Spanish Market History and Forecast until 2014

• The United Kingdom

The introduction of a new Feed-in Tariff in the U.K. in 2010 could boost the deployment of PV in the country. With a sufficient irradiation in the South that can be compared with Belgium or northern Germany, the conditions for a market startup are completed; a market which development will fundamentally depend on the policy support put in place. EPIA expects the market to reach between 20 and 40 MW in 2010 and up to 250 MW in 2014 in a Moderate scenario. The potential could be higher with strong political support and we could see up to 500 MW of yearly installations in 2014 under a Policy-Driven scenario.



		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	1	4	6	10	20	80	150	200	250
	EPIA Policy-Driven scenario					40	100	200	350	500
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	14	18	24	34	54	134	284	484	734
	EPIA Policy-Driven scenario CUM					74	174	374	724	1,224

Figure 17: The UK's Market History and Forecast until 2014

2010-2014 forecasts and the "SET For 2020" targets

The SET For 2020 study (**www.setfor2020.eu**) released by EPIA in 2009 identifies 3 possible PV deployment scenarios by 2020 that represent the real potential of this technology.

The Baseline scenario envisages a business-as-usual case with 4% of the electricity demand in Europe ensured by PV in 2020.

The Accelerated Growth scenario (6% of the demand) takes into account the maximum PV growth in Europe without major changes in the electrical infrastructure.

And third, once those barriers are lifted and specific boundary conditions are met, ***the Paradigm Shift scenario*** targets up to 12% of the EU electricity consumption from PV by 2020.

EPIA has compared the PV market forecasts until 2014 with these 3 scenarios. The result of this comparison has shown the following:

- The Moderate scenario for PV until 2014 could miss the 4% target (SET For 2020's Baseline scenario). However the difference in market performance to close the gap is limited and some policy changes could easily allow reaching the 4% target in 2020.
- The Policy-Driven scenario for PV until 2014 could overtake the 6% target in 2020 (the Accelerated Growth scenario) far from the 12% potential (Paradigm Shift scenario).

The Paradigm Shift scenario would imply pushing towards an even stronger commitment of policy makers and the energy sector at large. The deployment in new markets (such as Turkey) and the improved deployment in existing markets will be necessary to follow the path to the 12% electricity production. In addition, while the Policy-Driven scenario forecasts for 2010 are above expectations to reach 12% in 2020, the gap will start to deepen from 2013 onwards – with insufficient installations to be able to follow the 12% path to 2020 – and will require significant measures to stimulate market development. In the Moderate scenario however, the targets of the Baseline scenario will not be reached, even if the gap remains manageable after 2014. All of this clearly indicates the importance of political support for PV during its pre-competitive phase, i.e. during the few years until grid parity will be progressively reached across geographies and market segments.

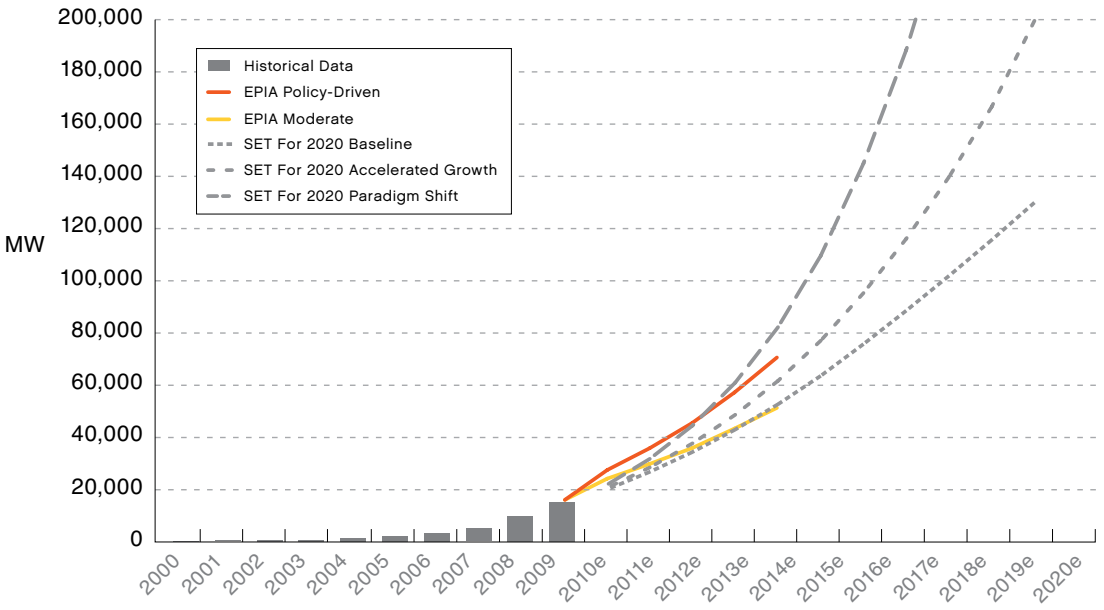


Figure 18 - Market forecasts compared to "SET For 2020" targets

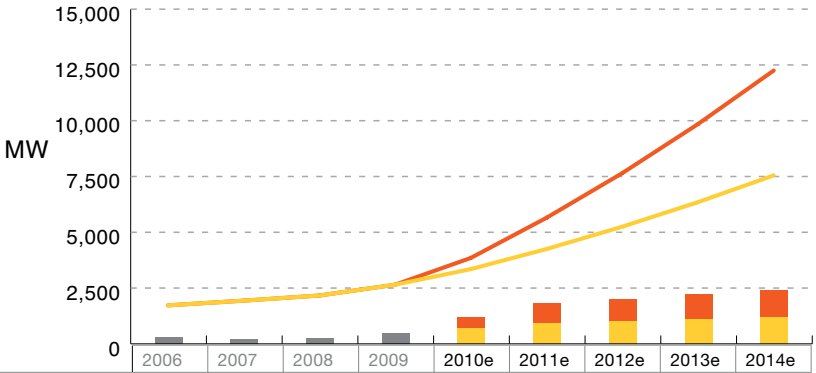
World leading markets

• Japan

With 484 MW installed in 2009, the relaunch of the Japanese residential PV programme, the launch of net-metering as well as support for local authorities and the private sector have been successful in dynamising the Japanese market.

EPIA expects Japan to become a GW market in 2010 already according to the Policy-Driven scenario and in 2012 in the Moderate scenario. Firstly, Japan has set ambitious objectives to reach 28 GW of installed PV power by 2020 and 53 GW by 2030. Secondly, PV technology is well-established and widely integrated in the building environment. In addition, large plants should start to complement the already existing and well-developed residential market.

Under the assumption of a coherent political framework to support the realistic targets, the market could reach between 1.2 GW in the Moderate scenario to 2.4 GW in the Policy-Driven scenario in 2014.



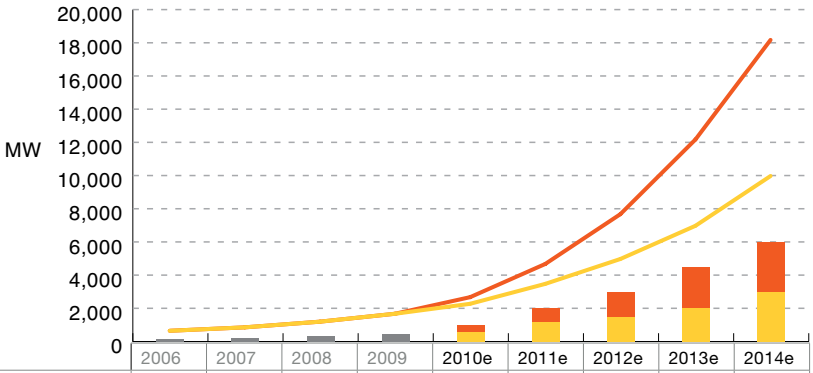
		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	287	210	230	484	700	900	1,000	1,100	1,200
	EPIA Policy-Driven scenario					1,200	1,800	2,000	2,200	2,400
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	1,708	1,919	2,149	2,633	3,333	4,233	5,233	6,333	7,533
	EPIA Policy-Driven scenario CUM					3,833	5,633	7,633	9,833	12,233

Figure 19 - Japanese Market History and Forecast until 2014

• USA

With many large ground-mounted projects in the pipeline, EPIA believes that the USA has started to become one of the top PV markets. With 477 MW installed in 2009 - 40 MW of which coming from off-grid installations - the year 2010 could see the market rise from 600 MW to a possible 1 GW of new installations. By 2014, the market could reach 3 GW installed that year in the Moderate scenario, while in the Policy-Driven scenario up to 6 GW could be installed. The difference between both scenarios originates from the market response to incentives in different states combined with the level of those support frameworks.

With the State of California leading the pace in 2009, the immense potential of the American territory and the strong commitment of President Obama regarding renewable energies, the USA could represent a GW market already by 2010.



		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	145	207	342	477	600	1,200	1,500	2,000	3,000
	EPIA Policy-Driven scenario					1,000	2,000	3,000	4,500	6,000
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	624	831	1,173	1,650	2,250	3,450	4,950	6,950	9,950
	EPIA Policy-Driven scenario CUM					2,650	4,650	7,650	12,150	18,150

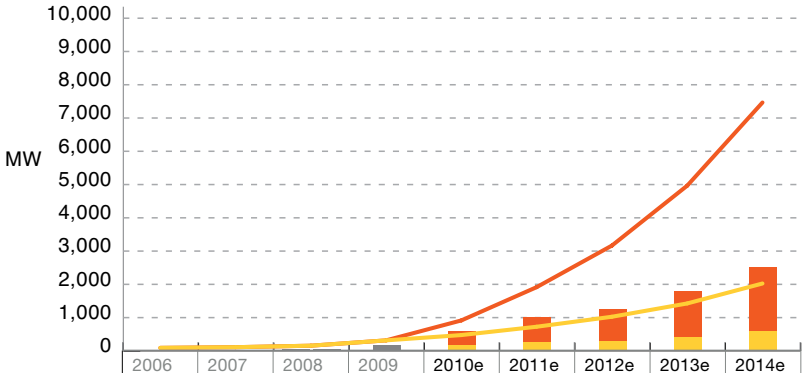
Figure 20 - USA Market History and Forecast until 2014

Emerging markets

- China

A major PV manufacturer, China was until recently almost totally absent of the World PV market. But with more than 12 GW of large projects in the pipeline, it could rapidly become a major market in Asia and in the World. With high irradiation levels and a surge in the electricity demand, the potential for PV in China is huge and depends mainly on government's decisions. According to the national energy plan of 2009, cumulative installed PV power is forecast to reach 20 GW at least in 2020, but the implementation details and the roadmap remain vague. At the time of publication, the Feed-in Tariff support was not yet announced.

According to Chinese industry associations and government agencies, the 2009 market reached about 160 MW installed. For 2010, the market could grow up to 600 MW installed in the Policy-Driven scenario, while in 2014 it could range between 600 MW and 2.5 GW of new installations.

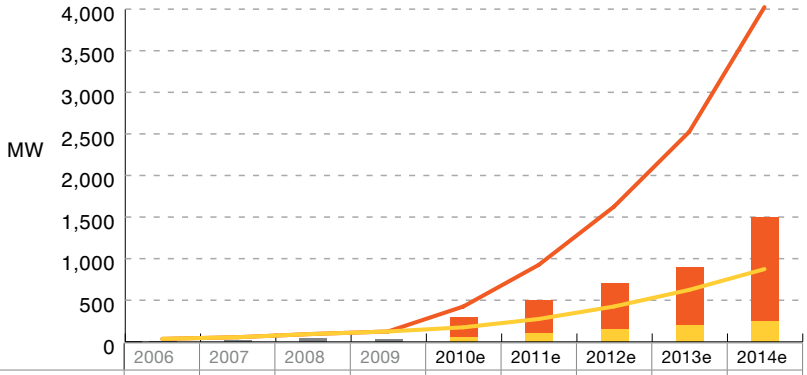


		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	12	20	45	160	160	250	300	400	600
	EPIA Policy-Driven scenario					600	1,000	1,250	1,800	2,500
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	80	100	145	305	465	715	1,015	1,415	2,015
	EPIA Policy-Driven scenario CUM					905	1,905	3,155	4,955	7,455

Figure 21 - Chinese Market History and Forecast until 2014

• India

Among the Sunbelt countries (located between 30 degrees North and 30 degrees South of the equatorial line), India has a specific role to play. With an increasing electricity demand and high irradiation levels, the country has definitively a huge potential for PV. The recent targets defined by the government (20 GW of PV in 2022) tend to favour the idea that this market could boom in the coming years. Starting from a low 30 MW installed in 2009, it could grow to 1.5 GW in 2014 in the Policy-Driven scenario and probably well beyond afterwards. The market size in 2010 will clearly depend on the political choices to possibly reach between 50 MW and 300 MW. Besides the National Solar Mission of 2009, the market expects much of the possible decision this year to define a long-term power purchase agreement that could definitively trigger PV deployment in India.



		2006	2007	2008	2009	2010e	2011e	2012e	2013e	2014e
Annual market (MW)	EPIA Moderate scenario	12	20	40	30	50	100	150	200	250
	EPIA Policy-Driven scenario					300	500	700	900	1,500
Projected cumulative PV power installed (MW)	EPIA Moderate scenario CUM	31	51	90	120	170	270	420	620	870
	EPIA Policy-Driven scenario CUM					420	920	1,620	2,520	4,020

Figure 22 - Indian Market History and Forecast until 2014

• Other Emerging Markets

The arrival of Canada with 70 MW installed and Australia with a 66 MW market in 2009 shows that the World PV market is moving ahead. While in 2007, a market of 15 MW was sufficient to enter the World TOP 10 markets, the tenth country in 2009 required 70 MW and this number should range from 140 to 200 MW in 2010. This clearly indicates the growth of new markets behind the German leader.

The South Korea case is more complex. After a good year in 2008, PV installations dropped to 168 MW in 2009 and the future of the market remains quite uncertain in 2010 and beyond, despite the country's potential.

In Europe, in addition to the markets developed here above, the Netherlands, Slovakia and Turkey are moving or showing a good potential in the coming years. Those markets are expected to range between 100 and 200 MW in a Moderate scenario, with up to 150 and 400 MW in a Policy-Driven scenario by 2014.

Outside Europe, the number of potential markets is quite huge and the political will to consider PV as a major power source will strongly determine the development of PV markets in these countries. EPIA believes in particular that markets such as Australia, South Africa, Brazil, Mexico, Egypt, Israël and Morocco, to name a few, offer substantial potential.

GLOBAL PRODUCTION CAPACITY OUTLOOK

4

Note: The data and figures of the supply analysis presented in this publication represent end of the year production capacities and not current production numbers.

To analyse the supply chain, EPIA took into consideration three types of figures: firstly, announced capacity, secondly, nameplate capacity and, finally, the actual production. Nameplate capacity is normally lower than the announced capacity due to non-realised expansion plans (for instance due to lack of financing) and/or production lines that became obsolete as technology has rapidly evolved and can no longer be competitive. Various reasons can explain why the current production numbers are lower than nameplate capacity: downtimes (maintenance, insufficient material and component supply), ramp-up phase or simply a lack of demand are the most common reasons.

This document focuses on the announced production capacities. Based on these, some interesting insights in industry developments can be deducted.

Regional distribution of production capacity in 2009

In 2009, the regional distribution of production capacities differed significantly depending on the type of product and its position in the value chain. C-Si cells and modules production capacity seemed to be dominated by Chinese and Taiwanese manufacturers (above 50% in both cases). European production capacity counted for almost 20% for c-Si cells and almost 30% for c-Si modules. In Japan, both figures are below 10% whereas the USA production counts for only 5%.

The picture is different when considering solar grade silicon production capacity with up to 40% in the USA, followed by Europe and China, both having similar levels of production capacity (almost 20%) and Japan and the rest of Asia (both slightly above 10%).

With respect to Thin Film production capacities, Europe leads with around 30%, whereas China, the USA, Japan and the rest of Asia (mainly Malaysia) each count for about 10 to 20% of Thin Film production capacities.

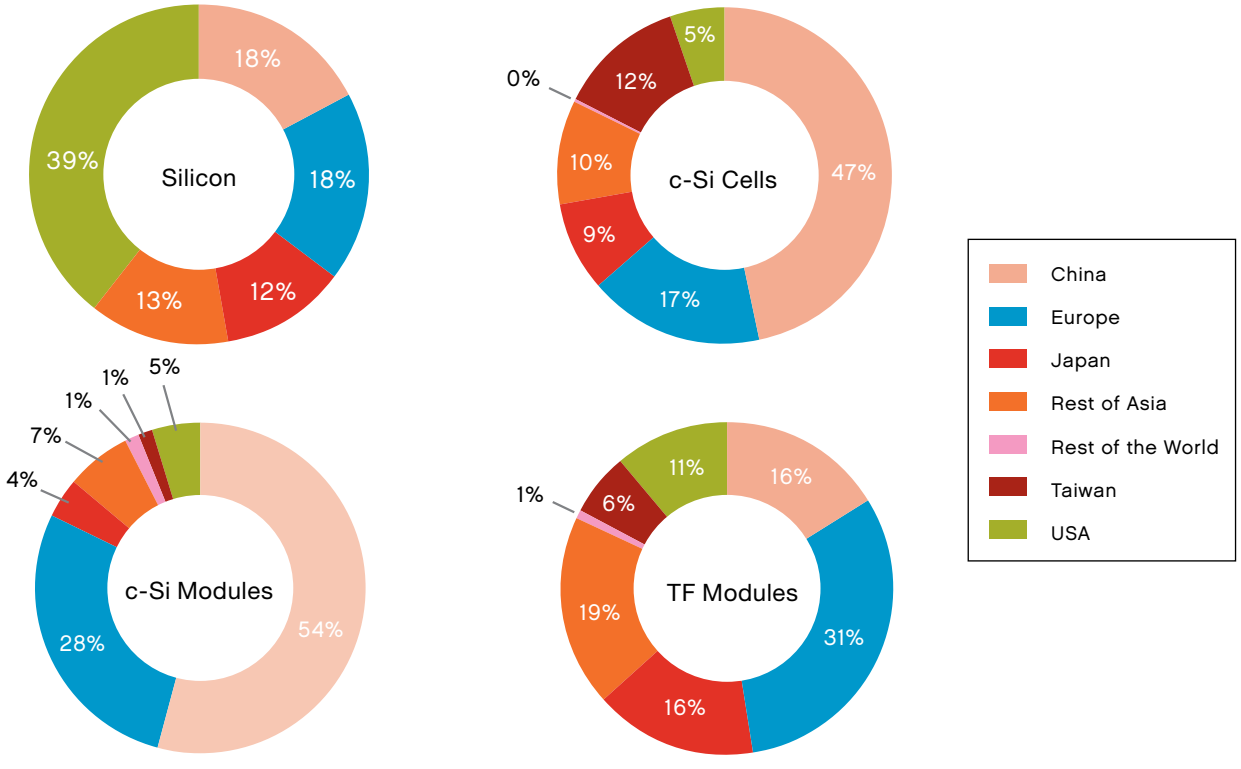


Figure 23 - Production of Silicon, c-Si cells, c-Si Modules and Thin Film modules by geographies in 2009

CAGRs across the PV value chain

EPIA expects the industry's production capacity to grow with a CAGR (Compound Annual Growth Rate) of around 20-30% for the period 2010-2014, depending on the segment within the value chain. The upstream segment (silicon production) is expected to have the highest growth with about 30%. This is because initial year-to-year growth rates (until 2011-2012) are higher, which is a direct consequence of the silicon shortage of the last years. C-Si cell production capacity as well as module (combined c-Si and Thin Film) production capacity is expected to grow with a CAGR of around 22% during the next 5 years.

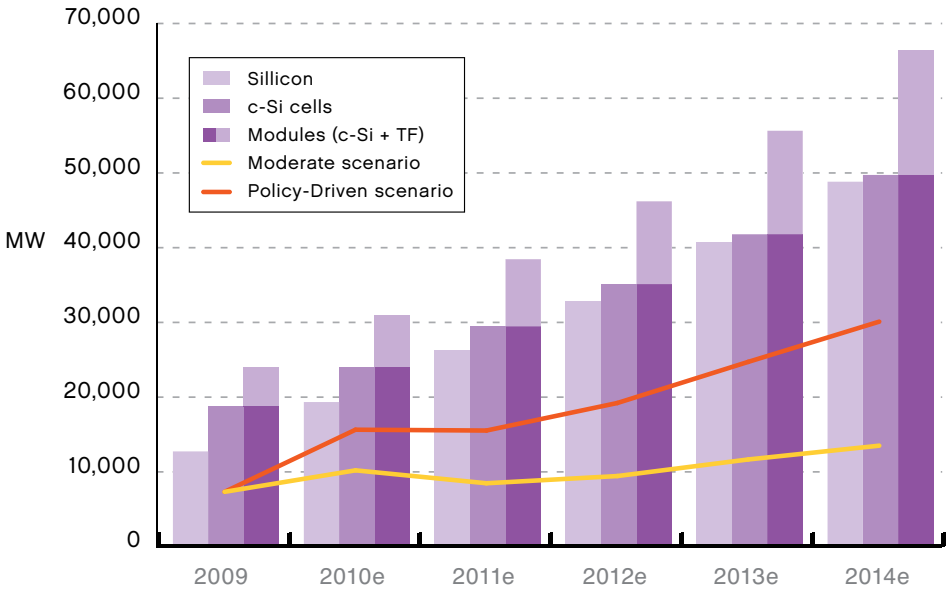


Figure 24 - Production Capacity vs. Market Outlook until 2014

(For the transition from tons to MW for silicon production, a conservative 9-10g/W has been assumed)

Technology development

The level of announced capacities in 2009 was around 24 GW. EPIA expects these announced capacities to grow by about 30% in 2010 after which the year-to-year growth rate will level off to about 20% during later years to reach above 65 GW in 2014. The CAGR for c-Si modules will be about 22% whereas for Thin Film modules it will be around 25%.

In 2009, the share of Thin Film in terms of capacity was around 22%. We expect this share to grow to 25% in 2013. While future capacity expansion of Si based Thin Film technologies will take place in China and Taiwan, other technologies' production capacities (CdTe, CI(G)S) are expected to remain in the EU, the USA and Japan.

The share of Thin Film in terms of actual production was lower (slightly below 20%) and was mainly driven by CdTe production from one single company (representing above 70% of the total Thin Film module production in 2009). For other Thin Film technologies (and especially for Si based Thin Film) the production was significantly lower whereas production capacity was not (showing low capacity utilisation rates). The reason is that during the silicon shortage over the last few years, many companies invested in Thin Film production facilities. Manufacturers are still ramping up, optimising the production and/or struggling to get to the optimal cost structure to be competitive. This is especially challenging with much lower prices of polysilicon which result in lower prices for c-Si modules.

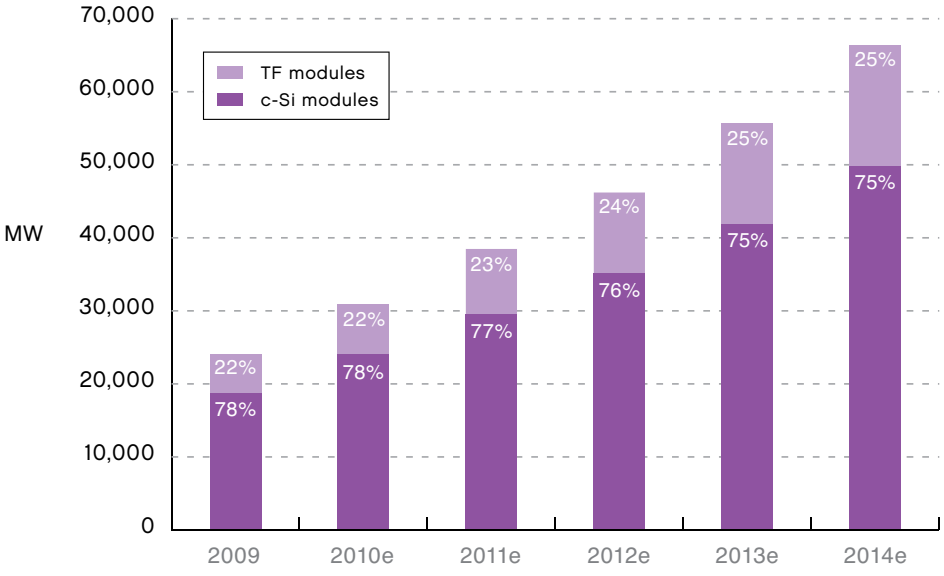


Figure 25 - Production Capacity Outlook – Crystalline and Thin Film technologies
(Technologies with market share below 0.5% are not represented)

CONCLUSION: WHEN SUPPLY MEETS DEMAND

5

As mentioned, the above analysis only holds for announced capacities; these figures differ from nameplate capacities and actual production but in any case give a very good understanding of industry trends.

The comparison between production capacity and market demand could lead to misinterpretations such as a large overcapacity, for instance. Therefore it is very important to understand the actual nameplate capacity (considering only those equipments and facilities which can run at competitive cost).

In the Policy-Driven scenario, the crystalline silicon supply chain could be utilised in 2010 at more than 90% of its capacities. This situation could lead to real shortages in the market due to specific failures in the chain, from electronic components of inverters to cell production.

Those supply aspects may distort the market dynamics. This was the case when the market experienced an inverter shortage during 2009 as there was a very high demand from the German market. This was not due to capacity but to material/component supply from other sectors (in this case the supply of transistors). In this regard, a close look should always be taken at material supply like semiconductors materials (especially for Thin Film), glass, silver, chemicals and gases, etc. However, in order to avoid cases of shortage or oversupply, it is of the utmost importance to ensure a stable and sustainable market demand so that the industry can foresee market growth and plan their capacity accordingly.

The demand for PV systems is heavily dependent on the general economic climate and most importantly on governments' support schemes. Sustainable Feed-in Tariffs, together with simplified administrative and grid connection procedures as well as priority access to the grid, are considered the way to ensure such stable and sustainable demand.

Introducing the PV Observatory

Based on a strategic recommendation of the SET For 2020 study, EPIA has started to develop a PV Observatory end of 2009. It analyses existing PV support mechanisms, administrative procedures and grid connection frameworks across European countries. This new report, which shall be available in the course of 2010, aims at providing further transparency on the markets and helping policy makers to decide on the most appropriate schemes to support the simultaneous long term development of sustainable industry and market.

DEFINITIONS

Annual PV power installed

Annual PV power installed (= annual PV market) refers to the difference of cumulative PV power installed between 2 consecutive years. Due to delays for installation and administrative procedures (for grid-connected systems), the annual PV power installed may differ from the annual shipments to a specific market. Note that according to EPIA's definitions, retrofit of end-of-life PV systems and second-hand PV market are not considered, but these quantities are still very marginal. EPIA has chosen this methodology to avoid double counting the same quantities.

BIPV

Building Integrated PhotoVoltaics. This refers to specific technologies that can integrate in buildings, often in replacement of conventional materials.

CAGR

Compound Annual Growth Rate - The year-over-year growth rate of an investment over a specified period of time.

Cumulative PV power installed

The cumulative PV power installed refers to the sum of grid-connected and off-grid cumulative PV power installed at a certain moment in time.

Feed-in Tariff (FiT)

A Feed-in Tariff is an incentive structure to encourage the adoption of renewable energy through government legislation. The regional or national electricity utilities are obliged to buy renewable electricity (electricity generated from renewable sources, such as solar PV) at above-market rates set by the government.

Grid-connected cumulative PV power installed

This refers to the total PV power installed which is connected to the grid and registered by the energy regulator at the end of the year.

Off-grid cumulative PV power installed

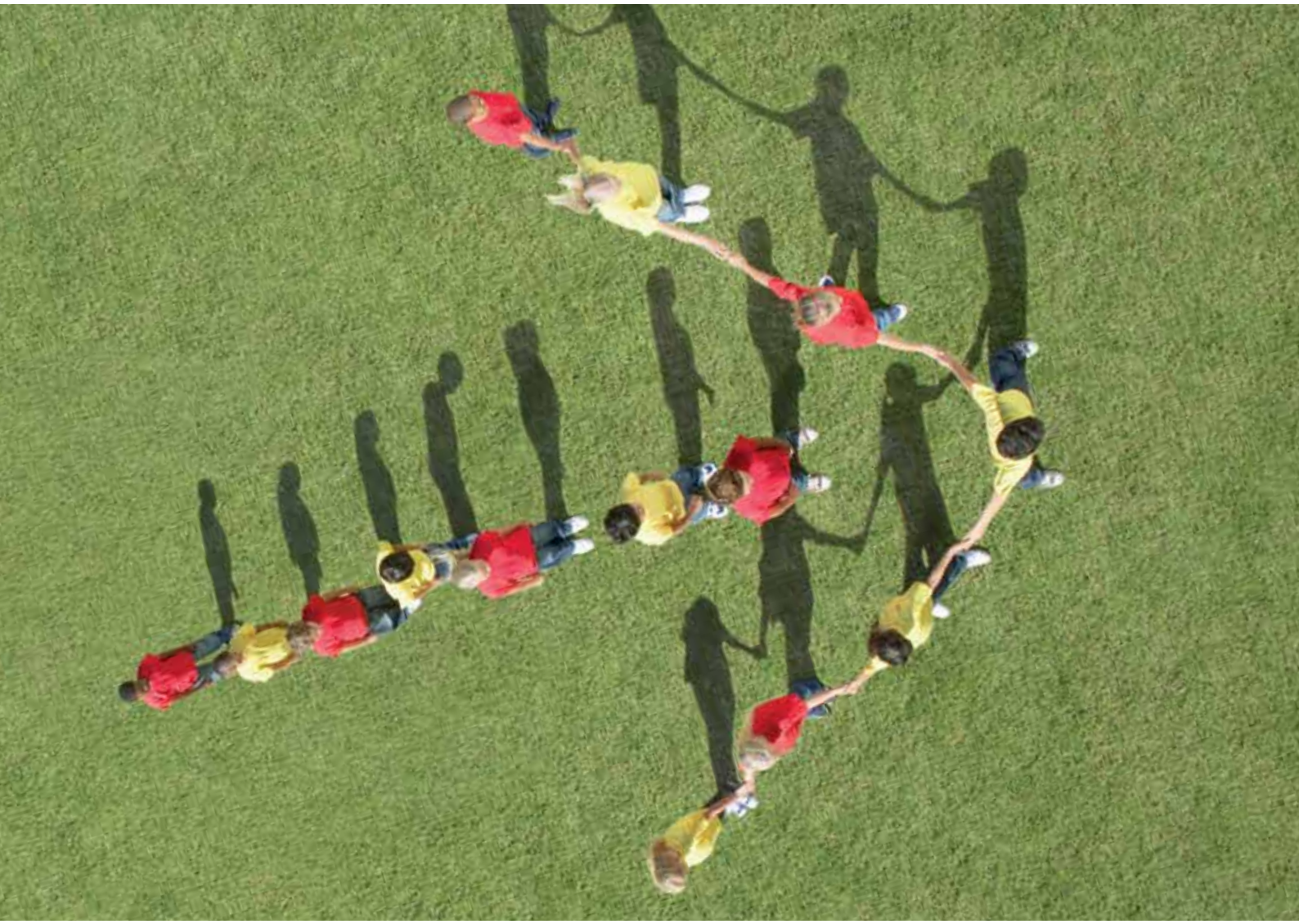
Off-grid cumulative PV power installed refers to the total PV power installed which is on purpose not connected to the grid at the end of the year.

PV power installed

PV power installed is measured in Wp (Watt peak) and refers to the nominal power under Standard Test Conditions STC (1000W/m²/year, 25°C, 1.5 AM). To ease the reading, EPIA voluntarily omits the "p" symbol for "peak". The reader should understand that **W**, **kW**, **MW** or **GW** stand for **Wp**, **kWp**, **MWp** or **GWp**.

Texts:
Eleni Despotou
Adel El Gammal
Benjamin Fontaine
Daniel Fraile Montoro
Marie Latour
Sophie Lenoir
Gaëtan Masson
Patricia Philbin
Pieterjan Van Buggenhout

The European Photovoltaic Industry Association is the World's largest industry association devoted to the solar electricity market. The association aims to promote photovoltaics at the national, European and world-wide levels and to assist its Members in the development of their businesses in both the European and in export markets.



European Photovoltaic Industry Association
Renewable Energy House
Rue d'Arlon 63-67, 1040 Brussels - Belgium
Tel.: +32 2 465 38 84 - Fax: +32 2 400 10 10
www.epia.org