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PV production 2013: an all-Asian affair

2 There was mixed news for PV manufacturers in 2013. Demand shifted away from the traditional European markets, which had little impact further up the value chain but a marked change on the inverter landscape. Bloomberg New Energy Finance reports on 2013 production of polysilicon, PV cells, modules and inverters.

- Global PV installation was approximately 38.7GW (DC) of modules and 32.9GW (AC) of inverters in 2013.
- Bloomberg New Energy Finance has tracked 31.5GW of module production, 227,000 tonnes of polysilicon, and 33.3GW (AC) of inverter production. The rest was produced by companies which declined to disclose production and were not individually estimated.
- Module outsourcing was much more significant in 2013 than in 2012, because in H2 2013 many tier 1 module makers were running at very high capacity utilisation to meet demand. They outsourced production to tier 2 or even tier 3 companies, which made modules under their brand. This makes data collection more difficult than in previous years, as companies are reluctant to disclose details and there may be of double counting. Companies producing modules entirely through partners, such as SunEdison (NYSE: SUNE) are not included here.
- The largest PV cell and module maker in 2013 was Yingli (NYSE: YGE), which produced 3.2GW of modules and 2.6GW of cells. GCL Poly (HKEX: 3800) led polysilicon producing 50,440 tonnes, and in inverters, SMA Solar Technology (Deutsche Boerse: S92) produced 5.4GW (AC).
- Thin-film leaders Solar Frontier and First Solar (Nasdaq: FSLR) produced 2.5GW in 2013, or 6.5% of the global module market, steady on 2012.
- The year 2013 saw the market become slightly less fragmented, with market share of the top 10 crystalline silicon (c-Si) cell manufacturers and module makers increasing by three percentage points and two percentage points respectively. Polysilicon manufacturers bucked the trend, with the top 10 declining by 3%. Inverters remained steady year-on-year.
- China continued to dominate the value chain for the seventh year running, producing 26.9GW of modules (69.5% of the market) and 23.1GW of c-Si cells. Chinese polysilicon makers also had a good year, producing 82,000 tonnes, or 36% of world supply.
- Inverter production shifted away from Germany to China, which produced an estimated 9.2GW (AC) in 2013. The shift was primarily due to the 25% decline in production by industry leader SMA Solar Technology and a preference for local products in the Chinese market. Japanese inverter makers also had a bumper year thanks to the booming local market.
- Distributed inverter architecture had a market share of 3.6% in 2013, down from 4.4% in 2012. Total shipments were up by 60MW (AC). Enphase (Nasdaq: ENPH) continued to be the largest micro-inverter manufacturer with 355MW produced. The largest optimiser manufacturer was privately-held SolarEdge, which produced an estimated 450MW (AC).

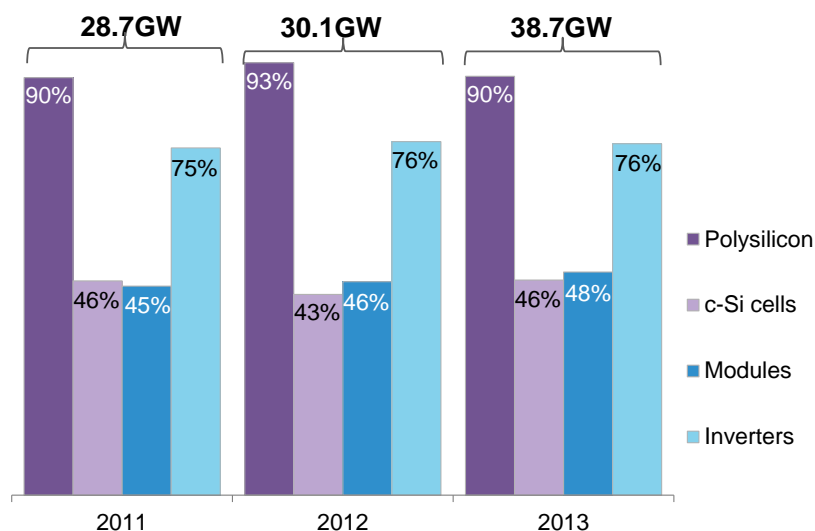
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The top 10 cells and module makers each have just under half the global market, while polysilicon and inverters are more concentrated industries.

1. 2013 – UNLUCKY FOR SOME?

The year 2013 saw some easing of the oversupply which has ruined margins for polysilicon, cell and module makers. There was, however, increased competition in the inverter market (for demand analysis see [Q1 PV Market Outlook](#)). Inverter makers saw increased pricing pressure, changes in product mix and geographic shifts. Top-10 concentration ratios remained steady for cells, modules, and inverters (Figure 1). Polysilicon concentration ratios also fell over 2013 as smaller players, particularly in China, came back online.

Figure 1: Market share of top 10 manufacturers by year (%)



Source: Company reports, Bloomberg New Energy Finance estimates and enquires Note: Global demand here in DC, including inverter production.

1.1. Ahead of the pack

In polysilicon, Chinese manufacturer GCL Poly (HKEX: 3800) rose to the top spot. The company beat former market leader, Korean OCI (Seoul: 010060), by producing 50,440 tonnes. Chinese Yingli remained the largest cell and module producer in 2013. SMA Solar Technology (Deutsche Boerse: S92) continued to be the largest inverter producer in 2013, although the company's production fell by 25% over the period.

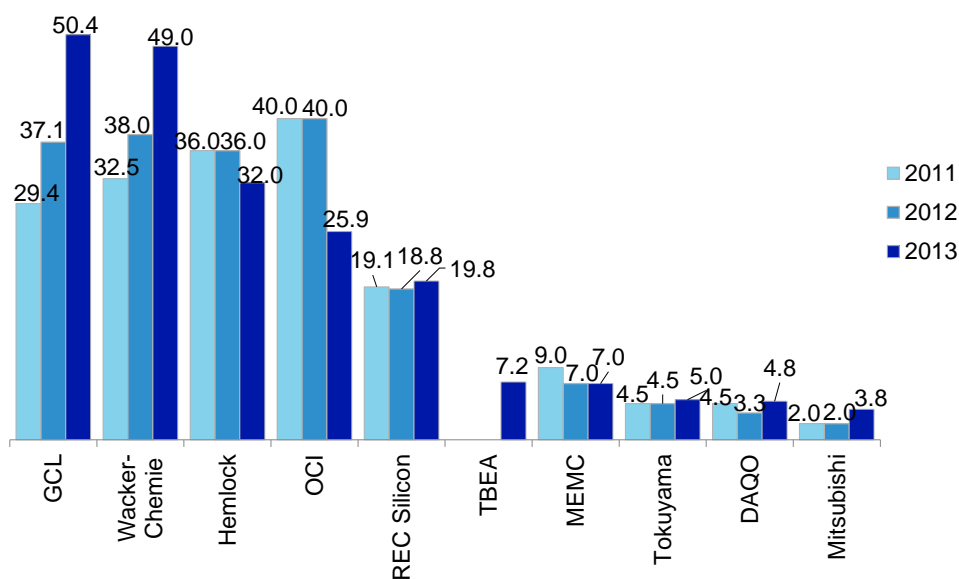
2. POLYSILICON

Polysilicon production in 2013 is estimated to be roughly 227,000 tonnes, 16% up on 2012.

2.1. Top 10 polysilicon manufacturers of 2013

The largest polysilicon manufacturer in 2013 was Chinese GCL Poly. The company produced 50,440 tonnes over 2013, with a capacity utilisation of 84%. The company had a 36% year-on-year increase in production, overtaking last year's top manufacturer OCI, which cut production by 14,095 tonnes on the back of low pricing for polysilicon and rising electricity prices in South Korea.

Figure 2: Top 10 polysilicon manufacturers 2011-13 (thousands of tonnes)



Source: Company reports, Bloomberg New Energy Finance estimates and enquiries

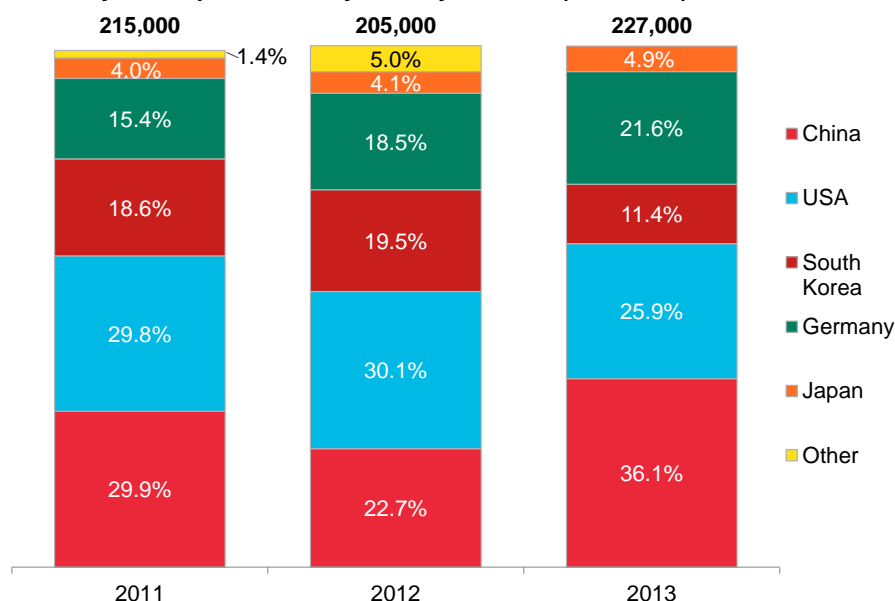
Chinese polysilicon makers increased production in 2013 on higher demand and prices, especially in the second half of 2013.

A newcomer to the top 10 list is Chinese transformer manufacturer TBEA Co (Shanghai: 600089), which produced 7,194 tonnes. Chinese LDK (NYSE:LDK) dropped out of the top 10 this year due to a halt in production, caused by the installation of hydrochlorination systems at its polysilicon facilities in Xiaocun and Mahong, and also the company's financial situation. As of April 2014, the company is in provisional liquidation proceedings and restructuring.

2.2. Geography of polysilicon production

China's share of global polysilicon production rose to 36.1%. This is partly due to import duties levied by China on US polysilicon from Hemlock, SunEdison and REC, although these duties do not apply to modules for export from China.

Figure 3: Polysilicon production by country, 2011-13 (% , tonnes)



Source: Company reports, Bloomberg New Energy Finance estimates and enquiries, Note: Geography determined by company headquarters, not manufacturing capacity location.

Europe lost one of its two major polysilicon companies – former Norwegian-headquartered REC – after it split into two. Its polysilicon division REC Silicon (Oslo: REC) is now headquartered in the US, while its wafer, cell and module unit REC Solar (Oslo: RECSOL) is based in Singapore. The reduction in US output is due to Hemlock's production. The company does not disclose production, but we estimate it fell from 36,000 tonnes in 2012 to 32,000 tonnes in 2013 as it reduced output on low prices.

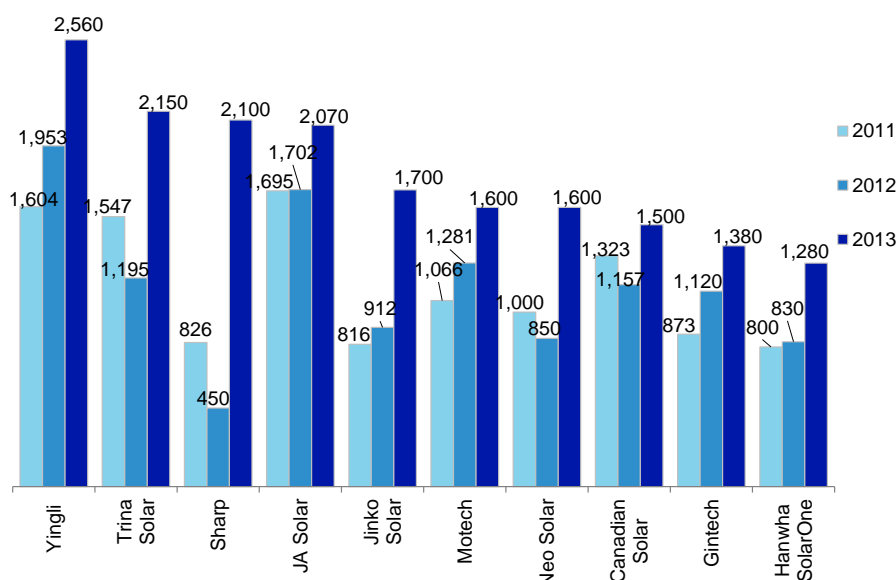
3. CRYSTALLINE SILICON CELLS

Total production of crystalline silicon cells in 2013 was about 35GW, with the rest of the PV demand satisfied by thin-film products. This was an increase of 7.6GW from 2012.

3.1. Top 10 c-Si cell manufacturers of 2013

Yingli was the top cell maker in 2013, producing 2,560MW of c-Si cells over 2013 equating to a 31% year-on-year increase in production. However, like many of the top manufacturers, it brought in cells from outside to make its modules – partly on cost grounds, and partly due to the ongoing trade case with the US.

Figure 4: Top 10 c-Si cell manufacturers 2011-13 (MW)



Source: Company reports, Bloomberg New Energy Finance estimates and enquiries

Taiwanese cell manufacturers profited from US import tariffs on Chinese cells

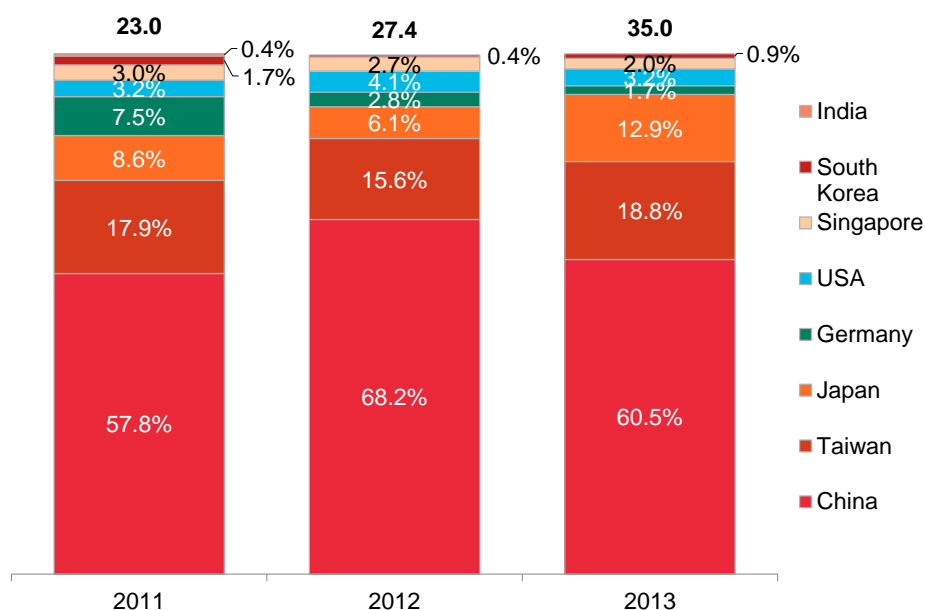
The top 10 did not include former manufacturing giant Suntech, which filed for bankruptcy in 2013 and was bought by peer Shunfeng Photovoltaic (Hong Kong: 1165) (see [Creditors dispute details as Suntech finds buyer](#)). Neo Solar Power (Taiwan: 3576) made a reappearance in the top 10 thanks to an 87% increase in production. The company, like most Taiwanese cell manufacturers, has benefitted from the [ongoing trade dispute between the US and China](#), which means that Chinese module manufacturers get around this by making modules with Taiwanese cells and shipping them to the US. The US is now considering anti-dumping duties against Taiwanese cells as well.

3.2. Geography of c-Si cell production

China-based companies produced 60.5% of c-Si cells in 2013, down from 68.2% in 2012. Most of the slack was picked up by Japan-headquartered manufacturers who increased their ratio from 6.1% to 12.9% (equating to an increase of 2.3GW). However, in many cases they probably

outsourced to elsewhere in Asia. Taiwan increased its market share by 3.2 percentage points in 2013.

Figure 5: c-Si cell production by country headquarters, 2011-13 (% ,GW)



Source: Company reports, Bloomberg New Energy Finance estimates and enquiries Note: Geography determined by company headquarters, not manufacturing capacity location.

European Commission measures against Chinese cells had little visible benefit for European manufacturers

European and US manufacturers lost market share of one percentage point and 0.8 percentage points respectively. China remains competitive on price despite the August 2013 [undertaking](#) between its manufacturers and the European Commission that set a minimum import price of EUR 0.56/W for Chinese modules. The price proved to be too low for European manufacturers to sell at a profit. Indian, Korean and Malaysian producers have been the most significant beneficiaries, and now offer the lowest prices. The Minimum Import Price is rumoured to have been reduced to EUR 0.53/W on 1 April 2014, although there is no official confirmation available. German manufacturer Conergy (Deutsche Boerse: CGYK) filed for bankruptcy in July 2013, although its Frankfurt factory was bought out by Chinese Chint Group (brand name Astronergy). German leader SolarWorld (Deutsche Boerse: SWV), which brought the trade case, reduced production by 3.3% from 608MW in 2012.

One major location not appearing here for actual manufacturing is Malaysia - where German-headquartered Hanwha Q-Cells and Greece-headquartered Recom have capacity. Neither of these firms disclosed actual production for 2013.

4. MODULES

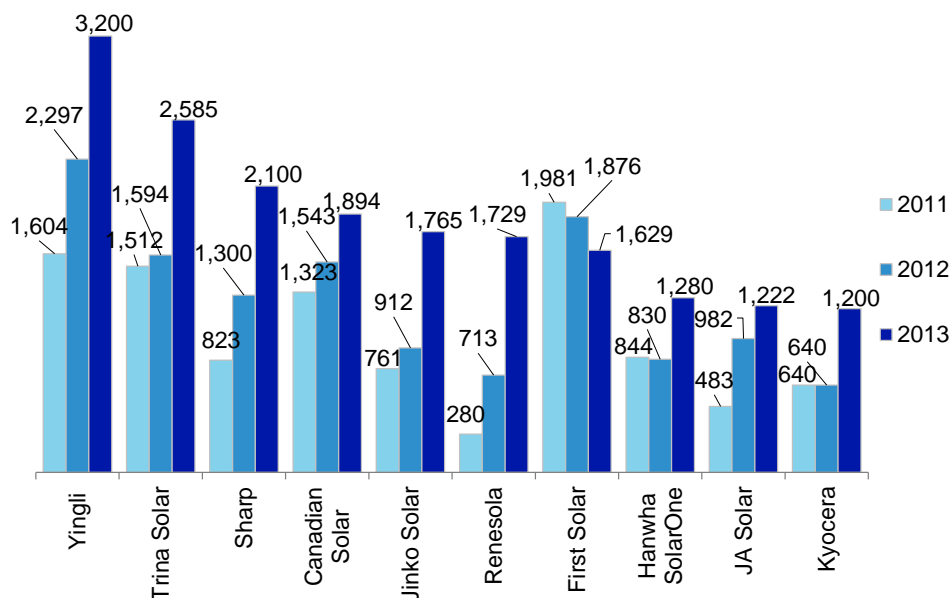
Total global demand for modules was 38.7GW in 2013, up 8.6GW from 2012. The majority of this was satisfied by c-Si products, with only 3.7GW coming from thin-film products. Thin-film leaders Solar Frontier and First Solar produced 2.5GW in 2013, or 6.5% of the global market, steady on 2.5GW in 2012.

4.1. Top 10 module manufacturers of 2013

Of the top 10 module makers, seven (Yingli, Trina, Canadian Solar, Jinko, Hanwha SolarOne, JA Solar, and Renesola) have their primary operations in China, and have increased production significantly from 2012. This is partially due to the strong domestic market, which accounted for 35% of Yingli's sales in 2013.

Reappearances to the top 10 include two Japanese manufacturers – Kyocera (Tokyo: 6971) and Sharp (Tokyo: 6753). Both companies made a strong re-entry on the back of high demand from the Japanese market, and outsourcing production, and were placed fourth and sixth respectively.

Figure 6: Top 10 module manufacturers 2011-13 (MW)



Source: Company reports, Bloomberg New Energy Finance estimates and enquiries

Disappearances from the top 10 include Suntech, Chinese Hareon Solar Technologies (Shanghai: 600401), and US-headquartered SunPower (Nasdaq: SPWR). Hareon Solar Technologies and SunPower were placed just outside the top 10, with production of 800MW and 1,134MW respectively. For the first time, all the top 10 manufacturers produced over 1GW of modules each.

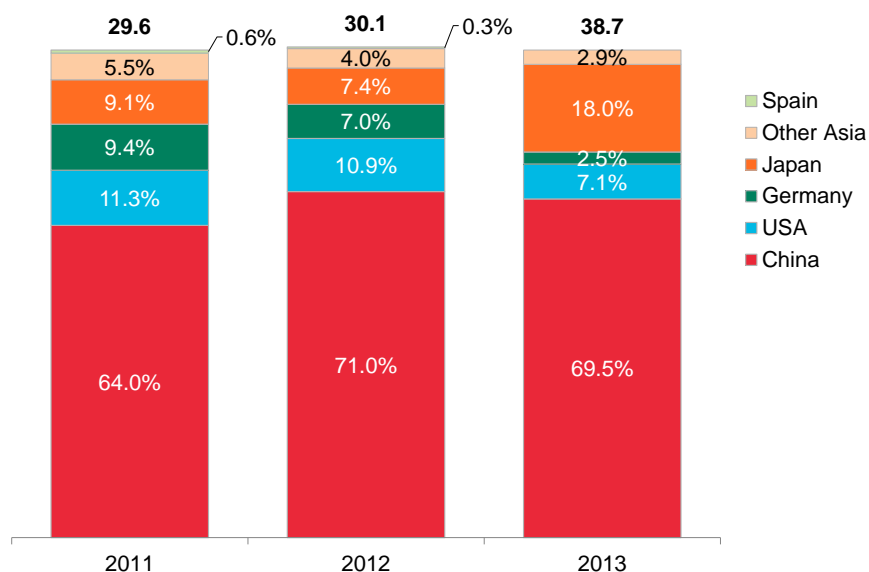
After several years where PV manufacturers had severe overcapacity, some began to outsource production again in 2013.

4.2. Geography of module production

Chinese-headquartered companies dominated module manufacturing again, with 69.5% market share. An increase in outsourced or OEM¹ manufacture makes this increasingly difficult to track, and most of the tier 1 Chinese manufacturers also provided OEM services. The largest increase in production came from Japan, whose market share went up from 7.4% in 2012 to 18% in 2013. Some of this was externally manufactured by other Asian brands for Japanese manufacturers. Strong demand from the Japanese market and a preference for locally-produced equipment meant that Japanese manufacturers produced 4.7GW more modules than in 2012.

¹ An OEM (Original Equipment Manufacturer) produces a product for a second company, which sells that product under their own brand (eg Foxconn for Apple). OEM is also used as an adjective and occasionally as a verb.

Figure 7: Module production by country 2011-13 (%GW)



Source: Company reports, Bloomberg New Energy Finance estimates and enquiries, Note: Geography determined by company headquarters, not manufacturing capacity location

5. INVERTERS

Global installation of PV inverters stood at 32.9GW (AC) in 2013, up 7.3GW from 2012. The majority of this was satisfied by conventional² – ie, string and central – products, with only 3.6% coming from distributed³ (ie, microinverter, optimiser, ACPV) products.

5.1. Top 10 inverter manufacturers of 2013

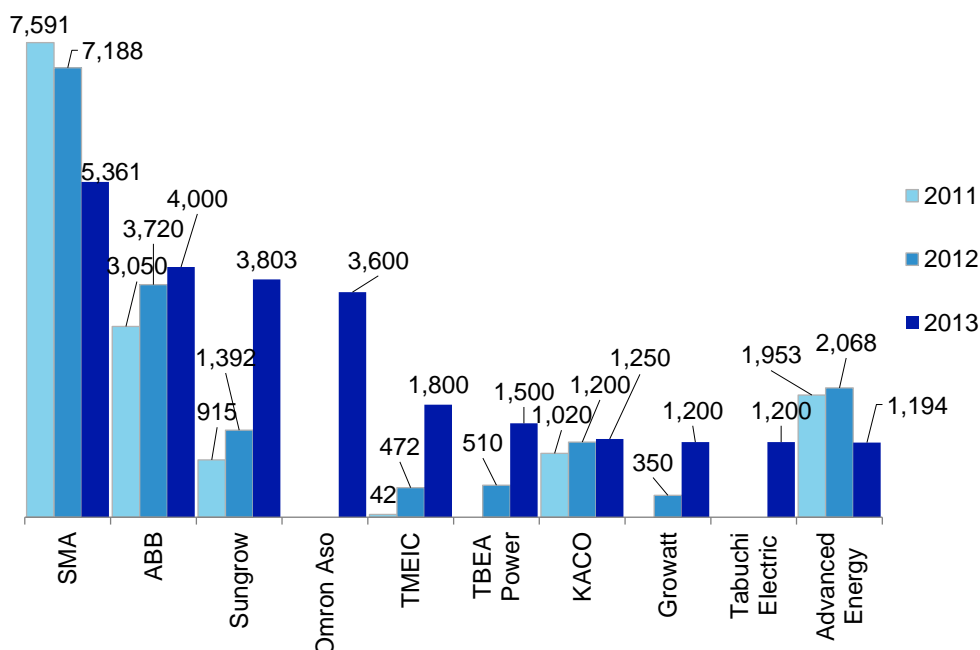
In the inverter segment, SMA Solar Technology (Deutsche Boerse: S92) continued to lead the market. However, the company's production declined by 25% and with that, the market share by 12%, due to a shift in demand away from Europe, to Asia. The two new largest markets for 2013, China and Japan, are known for high barriers to entry for foreign players.

Leading Chinese inverter manufacturer Sungrow (Shanghai: 300274) is in third position. The company increased production dramatically, producing 3.8GW of inverters, up 173% on 2012. The company sold 92.3% of its product to the Chinese market, which was the largest in 2013.

Japanese and Chinese inverter manufacturers had a good year thanks to a strong domestic market.

² Products which aggregate DC produced off the string/array and converts it to AC. For these inverters, used without DC-DC optimisers, maximum power point tracking is achieved at the array or string level.

³ Products where maximum power point tracking is achieved at the module level.

Figure 8: Top 10 inverter manufacturers 2011-13 (MW, AC)

Source: Company reports, Bloomberg New Energy Finance estimates and enquiries Note: Historic ABB figures include Power-One production data and an estimate for how much was produced in the same year. Similarly, historic advanced energy industries figures also have RefuSQL figures for 2011 and 2012

New entries into the top 10 include two Japanese companies: Omron (Tokyo: 6645), and Tabuchi Electric (Tokyo: 6624). Both have benefitted from the boom in the Japanese market.

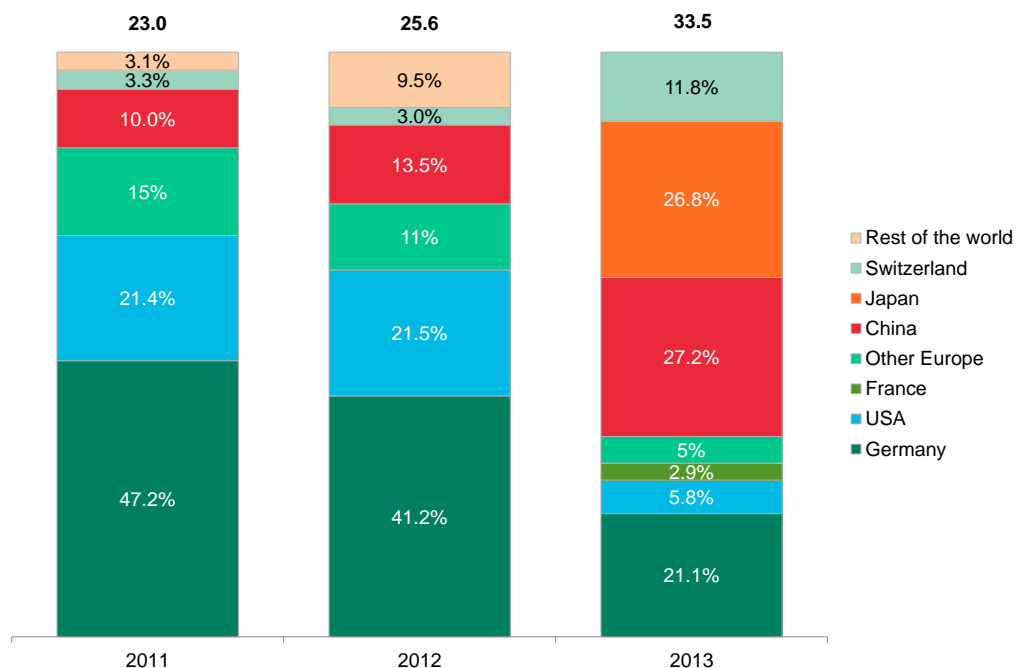
Disappearances from the top 10 include European players Fronius, Danfoss and SolarMax, which have not significantly expanded into new markets as European demand declined.

The year 2013 was marked by a significant number of inverter acquisitions: SMA bought Chinese Jiangsu Zeversolar, Swiss power equipment maker ABB bought Power-One, and Advanced Energy bought Refusol (see [PV Inverter market consolidation](#)). In 2012, the six companies were able to cover more than half the market with their combined production, but in 2013 the conglomerates would only cover only 32% of the market (see forthcoming review of SMA).

5.2. Geography of inverter production

With SMA Solar Technology's 25% decrease in production, Germany lost market share to Chinese manufacturers, who grew massively over 2013 accounting for 27.2% of the market. This was driven by a low price market and a preference for locally produced products.

Figure 9: Inverter production by country 2011-13 (% ,GW, AC)



Source: Company reports, Bloomberg New Energy Finance estimates and enquiries, Note: Geography determined by company headquarters, not manufacturing capacity location. For this historic production at RefuSOL is in Germany for 2011 and 2012, and Power-One is US in 2011 and 2012.

Appendices

Appendix A: Top manufacturers, 2013

Table 1: Top 10 polysilicon manufacturers by production, tonnes

Company	Country	Production (tonnes)	Market Share (%)	Change in market share from 2012	
GCL Poly	China	50,440	22.7	4.62	↑
Wacker-Chemie	Germany	49,000	22.0	3.51	↑
Hemlock	USA	32,000	14.4	-3.16	↓
OCI	South Korea	25,935	11.7	-7.84	↓
REC Silicon	USA	19,764	8.9	-0.27	↓
TBEA	China	7,194	3.2	n/a	
MEMC	USA	7,000	3.1	-0.27	↓
Tokuyama	Japan	5,000	2.2	0.05	↑
DAQO	China	4,805	2.2	0.53	↑
Mitsubishi	China	3,058	1.4	0.73	↑

Source: Company reports, Bloomberg New Energy Finance estimates and enquiries

Table 2: Top 10 c-Si cell manufacturers by production, MW

Company	Country	Production (MW)	Market Share (%)	Change in market share from 2012	
Yingli	China	2,560	6.61	0.12	↑
Trina Solar	China	2,150	5.56	1.59	↑
Sharp	Japan	2,100	5.43	1.50	↑
JA Solar	China	2,070	5.35	-0.30	↓
Jinko Solar	China	1,700	4.39	3.03	↑
Motech	Taiwan	1,600	4.13	-1.36	↓
Neo Solar	Taiwan	1,600	4.13	1.31	↑
Canadian Solar	China	1,500	3.88	0.04	↑
Gintech	Taiwan	1,380	3.57	-0.15	↓
Hanwha SolarOne	China	1,280	3.31	0.55	↑

Source: Company reports, Bloomberg New Energy Finance estimates and enquiries

Table 3: Top 10 module manufacturers by production, MW

Company	Country	Production (MW)	Market Share (%)	Change in market share from 2012	
Yingli	China	3,200	8.2	0.6	↑
Trina Solar	China	2,585	6.7	1.4	↑
Sharp	Japan	2,100	5.4	1.1	↑
Canadian Solar	China	1,894	4.9	-0.2	↓
Jinko Solar	China	1,765	4.6	1.5	↑
Renesola	China	1,729	4.5	2.1	↑
First Solar	USA	1,629	4.2	-2.0	↓
Hanwha SolarOne	China	1,280	3.3	0.6	↑
JA Solar	China	1,222	3.2	-0.1	↓
Kyocera	Japan	1,200	3.1	1.0	↑

Source: Company reports, Bloomberg New Energy Finance estimates and enquiries

Table 4: Top 10 inverter manufacturers by production, MW (A)

Company	Country	Production (MW)	Market Share (%)	Change in market share from 2012	
SMA	Germany	5,361	16.3	-11.8	↓
ABB	Switzerland	4,000*	12.2	-2.3**	↓
Sungrow	China	3,803	11.6	6.2	↑
Omron Aso	Japan	3,600	10.9	Unknown	
TMEIC	Japan	1,800	5.5	3.7	↑
TBEA	Japan	1,500	4.6	2.6	↑
KACO	Germany	1,250	3.8	-0.9	↓
Growatt	China	1,200	3.6	2.2	↑
Tabuchi Electric	Japan	1,200	3.6	Unknown	
Advanced Energy Industries	USA	1,194	3.6	-4.5 [∞]	↓

Source: Company reports, Bloomberg New Energy Finance estimates and enquiries Note: * indicates a BNEF estimate ** In this case, we use Power-One and an estimate for ABB's historic production for a comparison of market share. [∞]Here, we use Advanced Energy Industries and RefuSOL's numbers combined for 2012.

Appendix B: Polysilicon manufacturers, 2013

Table 5: Polysilicon manufacturers by production, tonnes

Company	Country	2012 Production	2013 Production
China Silicon	China	Unknown	2,700
DAQO	China	3,568	4,805
GCL Poly	China	37,055	50,440
Hemlock Semiconductor	USA	36,000	32,000*
MEMC Electronic Materials	USA	7,000	7,000*
Mitsubishi	Japan	2,000	3,800
OCI	South Korea	40,000	25,935
Osaka Titanium	Japan	2,000	2,300
REC Silicon	USA	18,790	19,764
Renesola	China	3,695	3,058
TBEA	China	Unknown	7,194
Tokuyama	Japan	4,500	5,000
Wacker-Chemie	Germany	38,000	49,000
Other Chinese manufacturers	China	Unknown	13,803

Source: Company reports, Bloomberg New Energy Finance estimates and enquiries Note * indicates a BNEF estimate

Appendix C: c-Si cell manufacturers , 2013

Table 6: c-Si cell manufacturers by production, MW

Company	Country	2012	2013
Aide Solar (Jiangsu Aide Solar Energy Technology Co)	China	40	80
Big Sun Energy Technology	Taiwan	90	140*
Canadian Solar	China	1,157	1,500
China Sunergy (CEEG Nanjing)	China	417	577*
Eging PV Technology Co Ltd	China	800	628*
ET Solar	China	250	240*
E-ton	Taiwan	160	240
Gintech	Taiwan	1,120	1,380*

Company	Country	2012	2013
Hanwha SolarOne	China	829.8	1280.3
Hareon Solar	China	818	1,200
Hyundai Heavy Industries	South Korea	0	300
JA Solar	China	1,702	2,070
Jinko Solar	China	912.4	1,700
LDK Solar	China	223.8	140*
Mosel Vitelic Inc	Taiwan	0	80*
Motech	Taiwan	1,281	1,600*
Neo Solar Power Corp	Taiwan	850	1,600*
Phono Solar	China		400
REC Solar	Singapore	746	714
Risen Energy Co Ltd	China	150	500
Shanghai Aerospace Automobile Electromechanical Co (SAAE)	China	Unknown	568.2
Sharp	Japan	450	2,100*
Solargiga	China	92	222
Solartech Energy Corp	Taiwan	320	620*
SolarWorld	Germany	608	588
SunPower	USA	925	1134
Suntech Power	China	1,500	800*
Tainergy Tech Co Ltd	Taiwan	Unknown	370*
Trina Solar	China	1,195	2,150
Topcell	Taiwan	Unknown	540*
Japanese companies	Japan	1,678	2,416.9
Unitech Printed Circuit Board Corp	Taiwan	Unknown	30*
Yingli	China	1,953	2,560*
Other and undisclosed	China	4,007	4,561*

Source: Company reports, Bloomberg New Energy Finance estimates and enquiries Note * indicates a BNEF estimate

Appendix D: Module manufacturers, 2013

Table 7: Module manufacturers by production, MW

Companies	Country	Type	2012	2013
Aide Solar	China	c-Si	55	100
Canadian Solar	China	c-Si	1,543	1,894
Centrosolar	Germany	c-Si	139	102*
China Sunergy (CEEG Nanjing)	China	c-Si	378	577
Conergy	Germany	c-Si	370	185*
Eging PV Technology Co Ltd	China	c-Si	800	628
ET Solar	China	c-Si	708	670
First Solar	USA	TF-Nonsilicon	1,876	1,629
Fuji Electric	Japan	TF Silicon		35
Hanwha SolarOne	China	c-Si	830	1,280
Hareon Solar	China	c-Si	1,148	800
Hyundai Avancis	South Korea	TF-Nonsilicon		5
Hyundai Heavy Industries	South Korea	c-Si	Unknown	300
JA Solar	China	c-Si	982	1,222
Jinko Solar	China	c-Si	912	1,765

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Kaneka	Japan	TF Silicon	Unknown	55*
Kyocera	Japan	c-Si	640	1,200
LDK Solar	China	c-Si	371	145*
Mitsubishi	Japan	c-Si	Unknown	500
Nexpower Technology Corp	China	TF Silicon	60	35*
Undisclosed Chinese manufacturers	China	c-Si	1,731	7,245
Phono Solar	China	c-Si	400	400
REC Solar	Singapore	c-Si	746	820
Renesola	China	c-Si	713	1,729
SANYO Panasonic	Japan	c-Si	Unknown	675*
Shanghai Chaori Solar Energy Science & Technology	China	c-Si	680	130
Sharp	Japan	c-Si	1,300	2,100
Sharp	Japan	TF Silicon	Unknown	107
Solar Fabrik	Germany	c-Si	103	85
Solar Frontier	Japan	TF-Nonsilicon	586	900
Solargiga	China	c-Si	7	286
Solarian	Germany	TF-Nonsilicon	Unknown	2
SolarWorld	Germany	c-Si	608	588
SunPower	USA	c-Si	925	1,134
Suntech Power	China	c-Si	1,750	800
Trina Solar	China	c-Si	1,594	2,585
Undisclosed Japanese manufacturers	Japan	TF Silicon	50	1100
Undisclosed Japanese manufacturers	Japan	c-Si	1,598	4,961
Yingli	China	c-Si	2,297	3,200
Zhejiang Sunflower	China	c-Si	360	265
Zhongli Talesun Solar	China	c-Si	514	583
ZNShine	China	c-Si	Unknown	550

Source: Company reports, Bloomberg New Energy Finance estimates and enquiries Note: * indicates a BNEF estimate

Appendix E: Inverter manufacturers, 2013

Table 8: Inverter manufacturers by production, MW (AC)

Company	Country	2012	2013
ABB	Switzerland	3,720	4,000*
Advanced Energy	USA	2,068	1,194*
CEHE	China	Unknown	800
Daihen	Japan	Unknown	700
Enphase	USA	325	355
Fronius	Austria	752	470
Ginlong (Solis)	China	Unknown	101
Growatt	China	350	1,200
Guan ya Power	China	500	300
Huawei	China	Unknown	932
Ingeteam	Spain	500	580
KACO	Germany	1200	1,250*
Meidensha	Japan	Unknown	300*
Mitsubishi Electric	Japan	Unknown	400*
Nisshin Electric	Japan	Unknown	525*
Omron Aso	Japan	Unknown	3,600*

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Company	Country	2012	2013
Samil Power	China	525	405
Schneider Electric	France	Unknown	983
Shindengen	Japan	Unknown	540
Siemens	Germany	525	525
SMA	Germany	7188	5,361
Other distributed manufacturers	USA	300	200
Solar Edge	Israel	320	450*
Sungrow	China	1391.98	3,803
Sunways	China	170	85
Tabuchi Electric	Japan	Unknown	1200
TBEA Power	China	510	1500
Tigo Energy	USA	200	200
TMEIC	Japan	472	1,800
Tranenergy	China	Unknown	80
Vacon	Finland	40	40

Source: Company reports, Bloomberg New Energy Finance estimates and enquiries Note * indicates a BNEF estimate For Advanced Energy, 2012 and 2013 data includes RefuSQL production, for ABB 2012 and 2013 data includes Power-One production.

ABOUT US

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