

PV Inverter Market Tracker Q3 2016

Lower inverter shipments in H2'16 to lead to challenging environment for suppliers

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Brief summary of current market situation

Global PV inverter shipments in the second half of 2016 are forecast to decrease by 15% from the first half.

- Due to a slowdown in Japan and China following FiT decreases; and to developers pushing out projects in the United States following the extension of the Investment Tax Credit in the United States
- Although PV inverter shipments are forecast to increase by 9% in 2017, IHS forecasts that there will be considerable price pressure across all power ratings in the next 6–12 months, given the short-term slowdown in global demand.

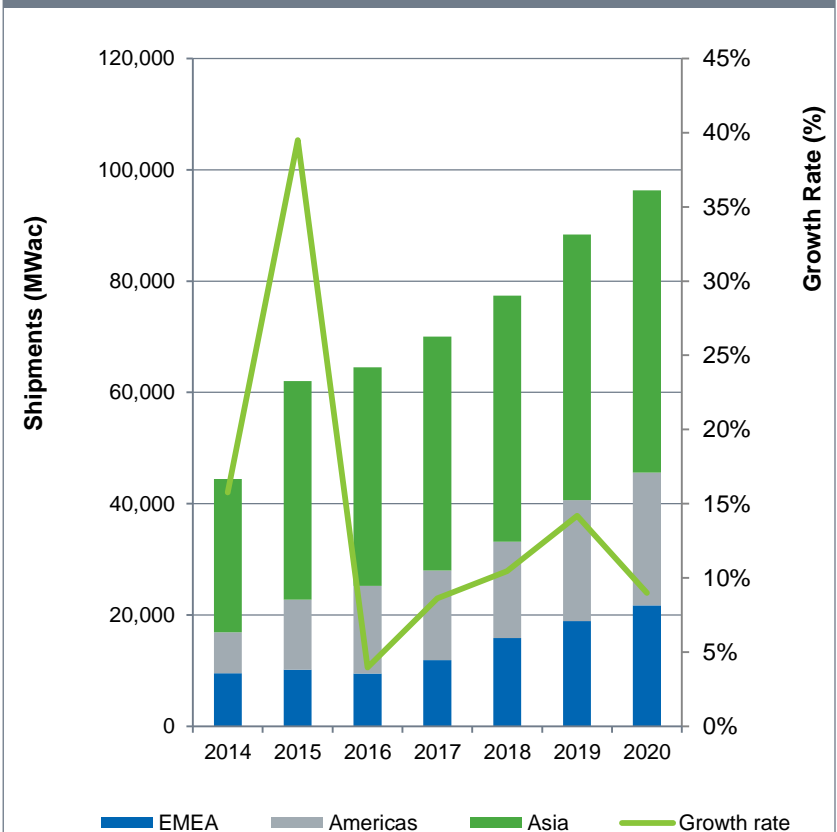
Most leading PV inverter suppliers have now released 1500V inverters expecting a surge in demand in 2017.

- For example, IHS forecasts that 1500V technology will account for over 50 percent of three-phase high-power (>99kW) inverter shipments in 2017 in the United States

Leading PV inverter suppliers continue to release new and updated three-phase string inverters targeting the commercial and utility-scale market.

- IHS forecasts over 9GW of three-phase string inverters will be shipped to the utility-scale market globally in 2016.
- This trend is being heavily driven by leading Chinese suppliers such as Sungrow and Huawei.

Global shipments by region



Source: IHS

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Changes to forecast

IHS has increased its 2016 global PV inverter shipment forecast by over 2.5 GW to 64.5 GW. Please refer to Table 2.77 in the Excel file for further information.

- This is mainly due to higher forecast inverter shipments in China following strong demand in H1'16.

From 2017 to 2020, IHS has decreased its shipment forecast for EMEA and increased its shipment forecast for the Americas.

- Softer demand in the United Kingdom, Germany, Eastern Europe, and the Rest of Africa region.
- Projects being pushed out from 2016 to 2017 and beyond in the United States.

From 2017 to 2020, the forecast changes in Asia are forecast to vary considerably year to year, because of rapidly changing policy in key markets, China and India in particular.

IHS has reduced its average inverter pricing in a number of key markets in Q3'16 compared to Q2'16.

- Inverter pricing was lowered in key markets such as Germany and Eastern Europe, because of reduced shipment forecasts and a continuing competitive market.
- In markets such as Japan, United States and China, strong competition is projected over the next 12–18 months as suppliers strive to maintain or grow market share. IHS notes that Japanese suppliers are at greatest risk, given that the average inverter price in Japan remains significantly higher than in other PV markets; and some of the domestic suppliers have relatively old inverters. Asian suppliers such as Delta, Sungrow and Huawei are gaining market share; leading western suppliers such as SMA are increasing their presence in Japan.

IHS has increased its forecast for 1500V technology for all three-phase inverter power classes.

- 2017 is forecast to be the breakout year when 1500V inverter shipments are expected to exceed 10GW, as numerous inverter suppliers are expected to begin shipping in volume.

IHS has increased its forecast for three-phase low power (≤ 99 kW) shipments in utility-scale installations over the forecast period.

- Key markets where the shipment forecast was increased were the United States, Germany and China.

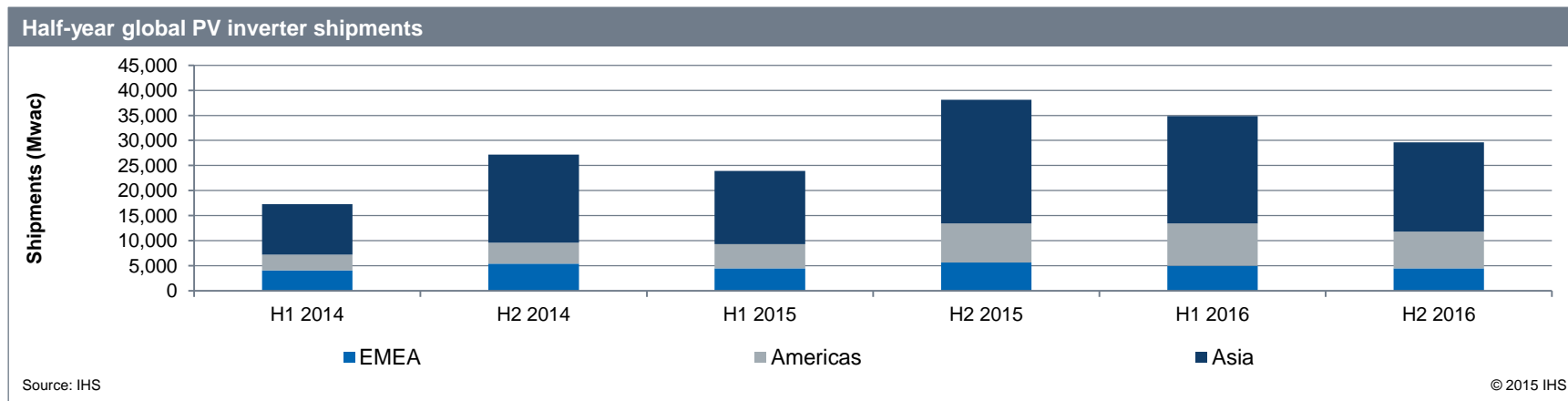
H2 2016 shipments forecast to slow down

Record global shipments of PV inverters were recorded in the first half of 2016.

- This was driven by the normal seasonal rush to install in markets such as the United Kingdom, India and Japan.
- However, in China there was an exceptionally large Q2 due to a surge of shipments ahead of a FiT reduction in July.

Shipments of PV inverters are forecast to decrease by 15% in H2 2016 from H1 2016.

- Normally, PV inverter shipments increase in the second half of the year, as China and the United States prepare to install large ground-mount PV systems in particular.
- However in 2016, lower FiT pay-outs in China and long payment terms have meant market uncertainty in this the biggest market in the second half of 2016. Given that the FiT may be reduced further in Q2'17, it is expected that inverter shipments will increase in Q4'17.
- Following the extension of the Investment Tax Credit in the United States and rapidly decreasing module prices, many projects have been delayed in the United States into 2017.



Increased price competition in China, Japan and the United States to limit global inverter revenue growth

Global revenues to reach \$6.7 billion in 2020.

- This is a \$422 million reduction from the Q2'16 forecast.
- This is primarily due to intense price pressure in core PV inverter markets such as China, Japan and the United States.

Asia will account for 40% of global revenues in 2020.

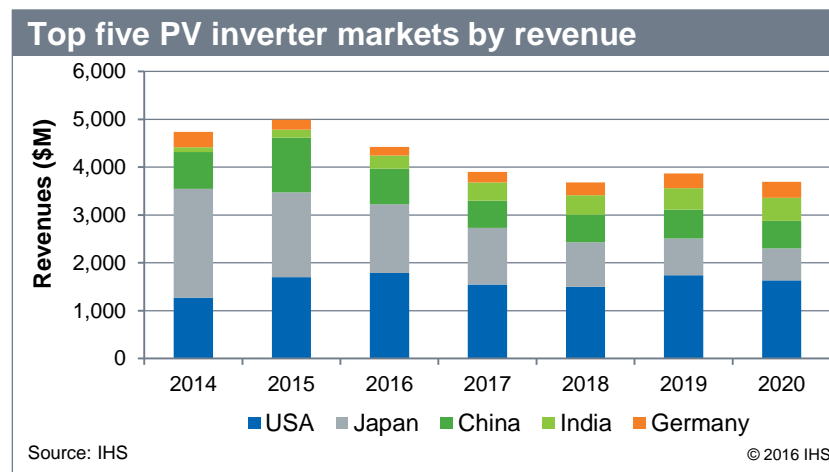
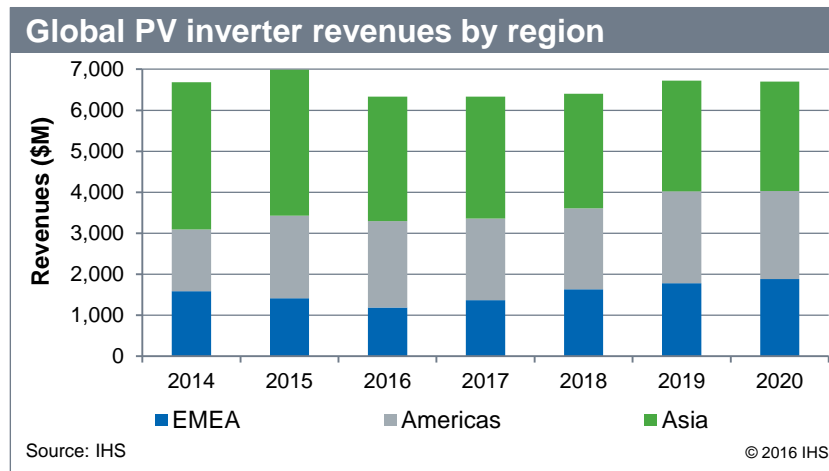
- Key markets such as China, India and Japan account for the majority of revenues in this region.

The United States will remain the leading market by revenue in 2020, reaching over \$1.6 billion.

- As a result, numerous inverter suppliers are continuing to enter the market.
- Leading Japanese suppliers such as Omron and Tabuchi are pushing hard to break into the market.

The Indian market is forecast to grow from \$270 million in 2016 to just under \$500 million in 2020.

- As a result, numerous inverter suppliers are continuing to enter the market, particularly from Asia, such as TBEA, Sungrow, Huawei and Hitachi.



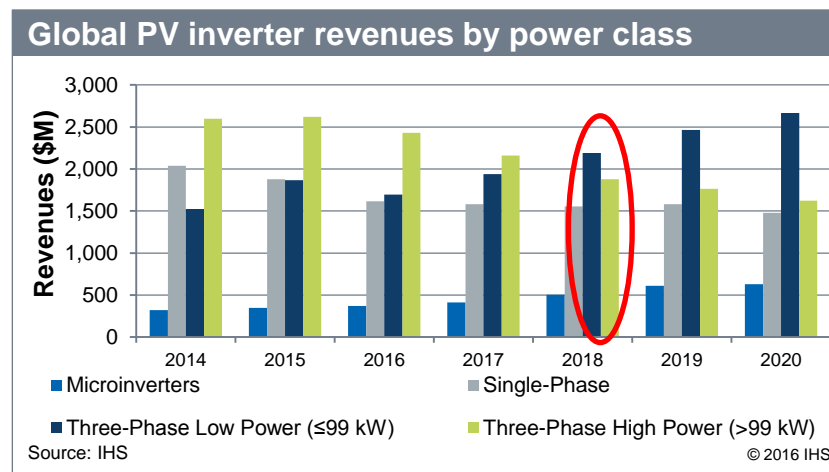
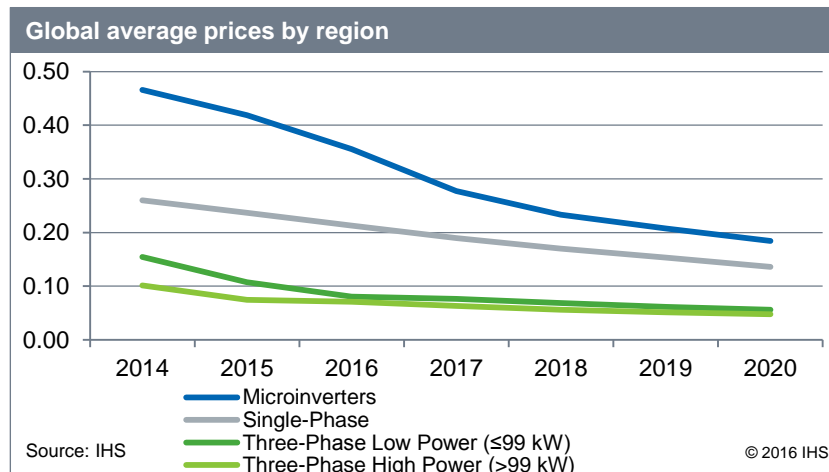
Three-phase low power inverter revenues to eclipse high power in 2018

Three-phase low power inverter revenues to reach \$2.2 billion in 2018 and exceed high power revenues for the first time.

- Three-phase low power inverters are the default type for commercial installations, which are forecast to double from 20GW in 2016 to 40GW in 2020.
- Three-phase string inverters increasingly used globally in utility-scale installations
- Most leading suppliers have updated their three-phase low power (≤ 99 kW) portfolio, especially those that are applicable to the ground-mount market.
- In particular, numerous Chinese suppliers, such as Sungrow and Sineng (apart from Huawei), have now released new three-phase string inverters targeted at utility-scale installations.
- Another driver of this trend is that, where, such as in Europe, utility-scale projects are typically less than 20MW, string inverters are forecast to gain market share from central inverters.

Microinverters are forecast to increase shipments over the forecast period to reach over 3 GW in 2020.

- Provided that microinverter prices can fall rapidly to reach \$0.18 per watt to narrow the price gap with single-phase inverters, which they are primarily competing against.



1500V inverter shipments to take off in 2017

IHS has significantly raised its forecast for 1500V inverter shipments following recent primary data collection.

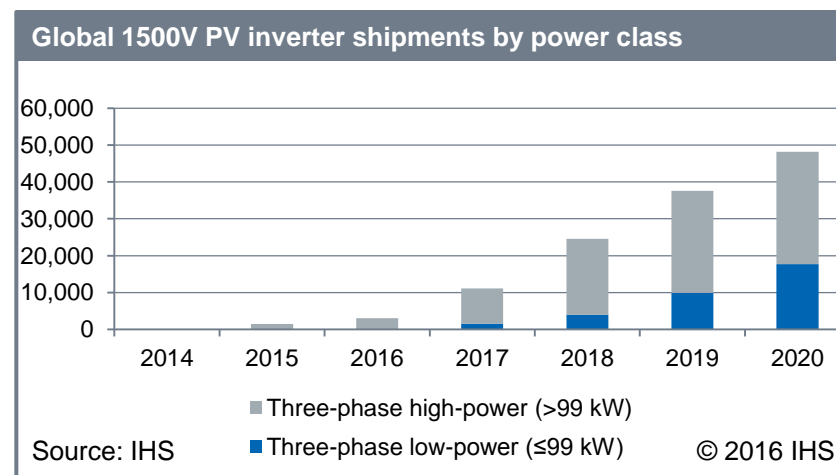
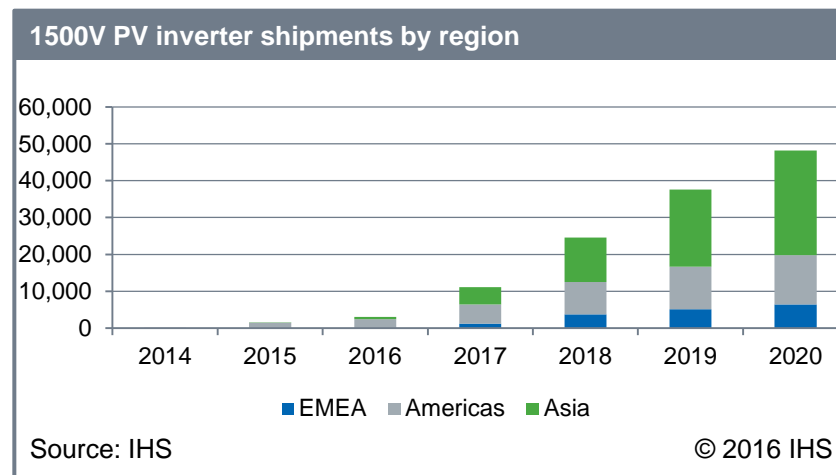
- Due to a surge in PV inverter suppliers releasing or shipping 1500V products as leading EPCs request this technology to reduce total PV system prices.

IHS forecasts that the United States will remain the key market for this technology in 2017 and that this market will rapidly adopt this new technology.

- However, over the forecast period IHS forecasts that Asia will overtake the Americas in 1500V shipments.
- IHS forecasts that China and India will switch quickly to this technology given that many of the western suppliers and Chinese suppliers have released 1500V inverters.

IHS forecasts that just under 60MW of 1500V three-phase low-power (≤ 99 kW) inverters will be shipped in 2016.

- Because of numerous suppliers such as Huawei, Sungrow and Yaskawa-Solectria releasing new 1500V string inverters in the United States.
- IHS forecasts that many of these suppliers will install on some test sites with key suppliers in Q4'16 to persuade customers to move to this technology from 2017 onwards.



Chinese suppliers dominate Q2 rankings following huge shipments in China

Six out of the top ten suppliers in Q2'16 were Chinese following a huge surge in shipments in China.

- Due to the rush to install before the FiT cut in July.
- As a result, over 10GW of inverters were shipped in Q2'16 with the top six suppliers accounting for most.
- In particular, Huawei and Sungrow continue to dominate the domestic market by a considerable margin.

Leading western suppliers relied on large utility-scale solar markets such as United States and India in Q2'16.

- SMA, TMEIC and GE continued to report large shipments in the United States in Q2'16.
- ABB and TMEIC reported large shipments in India in Q2'16.
- IHS notes that competition will intensify in both the United States and India as Chinese suppliers seek large utility-scale markets following the unseasonal lack of demand in China in Q3'16 following the FiT decrease.

Quarterly global market shares
Shipments (MW)

Rank	Company Name	Q1 2016	Q2 2016	Change (%)
1	Huawei	6.8%	20.0%	13.2%
2	Sungrow	11.7%	16.3%	4.7%
3	SMA	12.4%	8.2%	-4.1%
4	Wuxi Sineng	5.3%	6.1%	0.8%
5	TMEIC	12.1%	5.1%	-7.0%
6	ABB	8.1%	4.4%	-3.7%
7	TBEA SunOasis	3.4%	4.0%	0.6%
8	Kstar	<2.0%	3.9%	-
9	Chint Power	2.1%	2.6%	0.4%
10	General Electric	<2.0%	2.6%	-

Source: IHS

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Suppliers reassessing manufacturing locations

Given the intense price pressure in the PV inverter market, numerous leading PV inverter suppliers have moved or consolidated their manufacturing plants for PV inverters.

- In Q2' and Q3'16, leading Western suppliers such as ABB, GE and SMA moved manufacturing capacity from the United States.
- The main reasons for these closures were that many of these suppliers have existing manufacturing capacity in Europe or China that was not being fully utilized and being run as efficiently as possible. By running these plants at higher utilization rates, it will be likely that suppliers can remain competitive in the meantime.

However, many suppliers have additionally opened new manufacturing capacity in locations of lower labour cost.

- For example, ABB and TMEIC both opened plants in India, given their already existing strong presence in this market.

Many of the leading inverter suppliers are concentrating manufacturing capacity in certain key regions such as China, India, Europe and the United States.

- In the next two years, IHS expects that many inverter suppliers will establish manufacturing capacity in new emerging markets such as the Middle East, Latin America and Southeast Asia.

PV inverter suppliers closing manufacturing plants

Company	Announcement date	Manufacturing location
ABB	Jun-2016	USA
GE	May-2016	USA
SMA	Aug-2016	USA and South Africa

Source: IHS

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PV inverter suppliers opening new manufacturing plants

Company	Announcement date	Manufacturing location
ABB	Sep-2016	Estonia & India
TMEIC	Aug-2016	India

Source: IHS

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Inverter suppliers struggling with intense price pressure

Given the intense price pressure in the PV inverter market, numerous leading PV inverter suppliers have announced reductions in their staff numbers or consolidation of their operations.

- In recent quarters, Enphase has faced stiff competition from leading inverter suppliers such as Fronius, SMA and SolarEdge in its key market of the United States. As a result, it has outlined an aggressive path to growth recovery, which includes aggressive price decreases of its microinverters, through releasing next-generation models and increasing its share of key European markets such as France and the Netherlands and in Asian markets such as Australia.
- Similar to SMA, Kaco has relied heavily on its domestic and core European markets. Following the slowdown in these markets, it has reduced its staff. It is currently aiming to grow its share of key markets such as South Korea, the Middle East, and the United States.

Examples of inverter suppliers reducing workforce

Inverter supplier	Announcement date	Details
Enphase	Sep-2016	Enphase cuts 11% of its workforce.
Kaco	Jul-2016	Kaco announced it will lay off 80 employees at the company's headquarters in Neckarsulm, southern Germany.

Source: IHS

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