

FIT Auction Trends for PV Power Generation

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1. Recent clearing prices are roughly double the international average

Japan revised Feed in Tariff (FIT) in April 2017 to Photovoltaic (PV) system price above a certain scale based on auctions. Up to now, eleven auctions have been held. The capacity of the PV systems offered for bidding, the price cap, and its disclosure or non-disclosure have been reviewed several times. The most recent auction, the eleventh, was held with a price cap of 10.25 yen/kWh (disclosed in advance) for facilities with a capacity of 250 kW or more.

The supply price trends from the first auction held from September to November 2017 through the most recent auction, the eleventh, indicate that the price has halved in the roughly three-year period from a weighted average of 19.64 yen/kWh at the first auction to 9.99 yen/kWh at the eleventh (Fig. 1). Further, the price was 12.98 yen/kWh (for 500 kW or higher) at the fourth auction held in FY2019, which was below the generation cost target of NEDO's solar power generation development strategy of 14 yen/kWh through FY2020.

Though declining, however, Japan's supply price remains high at more than double the global average bidding price for PV¹ (3.72 €/kWh). Despite having the world's third largest installed PV capacity, Japan's bidding price for PV is indeed high compared with just 6.79 €/kWh in Europe (2020 average), where irradiance tends to be lower than in Japan. With its total FIT surcharge expected to exceed 4.5 trillion yen in FY2030², Japan needs to reduce its PV generation costs efficiently.

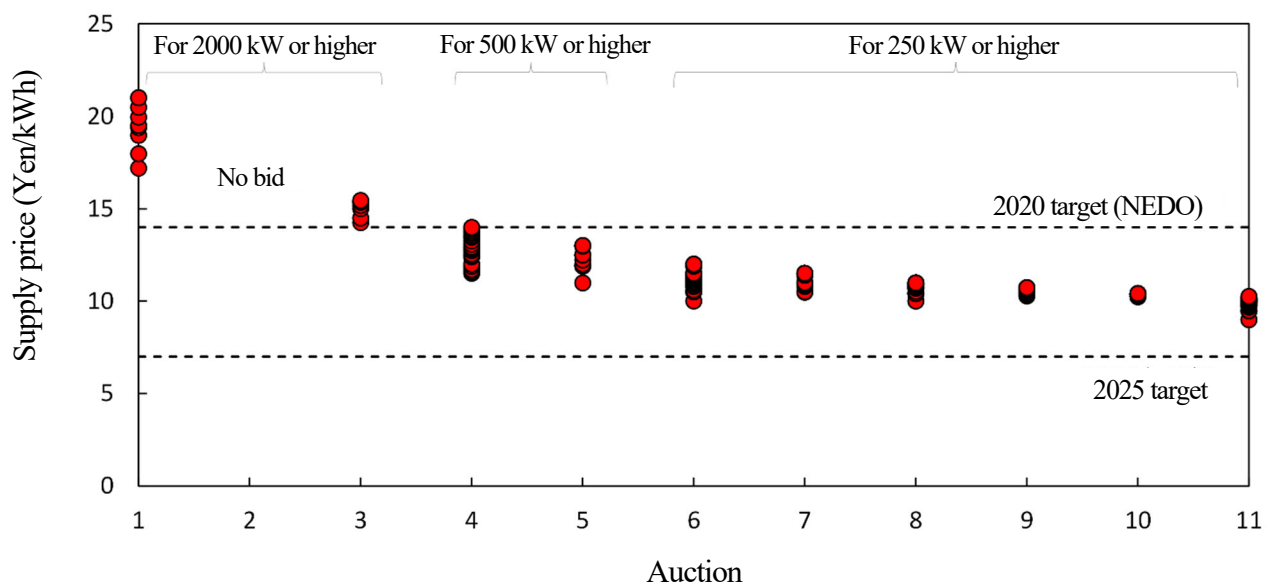


Fig. 1 Trends in supply prices at PV FIT auctions [yen/kWh]
(estimate based on various results from the bidding system based on the Act on Special Measures Concerning Procurement of Electricity from Renewable Energy Sources, OCCTO)

¹ International Energy Agency, Average auction prices for solar PV by region and commissioning date, 2016–2022

² Kenji Asano, Hideaki Obane, "Estimate on the Installed Capacity and Purchase Price of Renewable Energy in 2030," Socio-Economic Research Center publication Y19514, 2020

2. Awarded capacities have fallen below auctioned capacities in seven of 11 auctions so far

The purpose of the auction system is to reduce costs efficiently by securing opportunities for competition and facilitating price competition. However, if we compare the total capacity offered at the first to the eleventh auctions and the capacities that were awarded, the awarded capacities were lower than the auctioned capacities in seven of the 11 auctions. In particular, bids were placed for only 10% of the auctioned volume at the seventh auction (Fig. 2). Moreover, though the total capacity of bids placed was larger than the auctioned capacity and counted 81 bids in total at the tenth auction, many bidders were placing multiple bids, and the number of actual participants was just 45 companies.

Unlike offshore wind power in which plants have to be installed at designated sites, PV generation operators have a lower risk of losing business to competitors in areas which they are planning to develop. This allows them to place bids at relatively high prices, and if they lose, to try again at the next auction. As such, when bids repeatedly fall short of auctioned volumes, the situation tends to create an incentive to place bids at prices as close to the price cap as possible. Indeed, a comparison of the weighted average of the highest bidding prices and the clearing prices shows that the highest bidding prices were extremely close to the clearing prices at all eleven auctions (Fig. 3). This suggests that the bidding prices have been declining so far not because of cost reductions induced by competition, but because the price cap itself has been declining. To reduce costs through competition going forward, it will be important to revise the system, such as expanding the scale of eligible generation facilities and changing the auctioned volume.

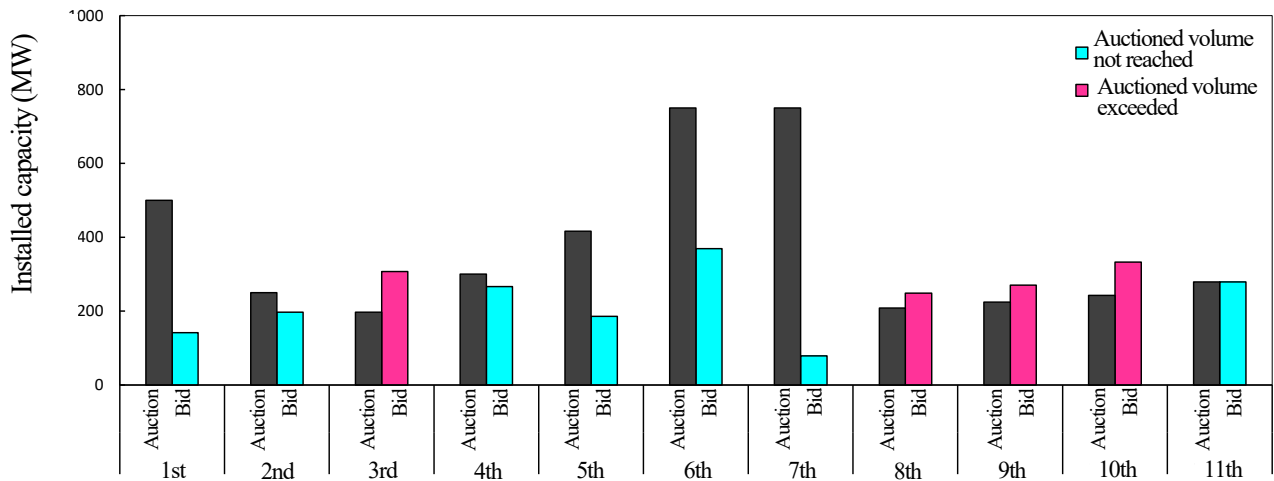


Fig. 2 Auctioned volume versus total volume of bids placed [MW]

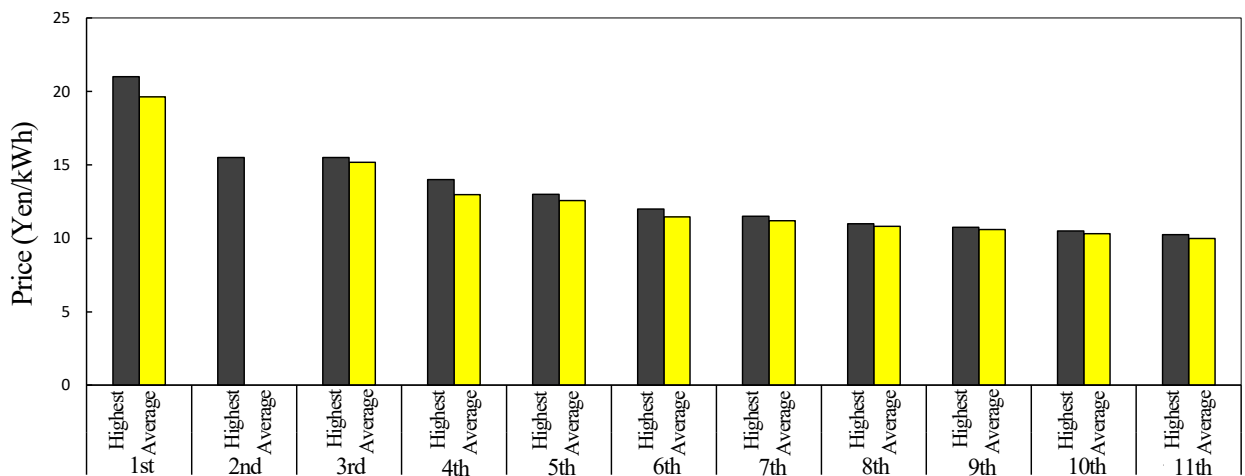


Fig. 3 Comparison of highest bids and clearing prices (weighted averages) [yen/kWh]

3. Future cost reductions must proceed simultaneously with siting guidance and ensuring reliability

As described earlier, the clearing price for the eleventh auction (9.99 yen/kWh, weighted average) was roughly double the global average bidding price and has not reached the 2025 target generation cost (7 yen/kWh) sought by the Japanese government. While further reductions in PV generation costs are desired, the following matters must also be considered.

First is the change in locations of PV plants. Utility PV plants have so far been installed largely in residential areas (not on buildings) close to the power grid to lower installation costs, or in forests and woods with low land prices. According to the Forestry Agency, approximately 90 km² of forests had been modified by 2019 to install PV systems³ under its forest development permit system. However, installation in residential areas and forests is set to face tougher regulations going forward based on amendments to municipal ordinances and positive zoning that the Ministry of the Environment has been planning in recent years. As such, it will be increasingly important to install PV panels in places that are less susceptible to regulations, such as rooftops of buildings. Meanwhile, PV panels installed on buildings will tend to be smaller in size and more complex to install compared to ground installations. Whether costs can be reduced for these locations will be key.

Second is ensuring reliability. While PV generation costs have fallen significantly in some cases, many PV system-related accidents have also occurred, such as PV panels being ripped off during typhoons and torrential rains. According to a survey by the Commerce Distribution and Industrial Safety Policy Group of the Ministry of Economy, Trade and Industry⁴, about 40% of the 79 installations surveyed did not have their calculated strength, did not meet their design basis wind speed, or their design basis wind speed was unknown. While not all inexpensive installations have issues, it is important to ensure reliability simultaneously when reducing costs.

As described above, given the expected changes in circumstances and the design requirements for PV systems going forward, there is no guarantee that PV power generation costs will continue to decrease as they have done so far; in fact, these factors could even drive up costs. It is hoped that the reduction of PV generation costs will proceed simultaneously with the siting guidance through municipal ordinances and zoning, as well as ensuring reliability.

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³ Forestry Agency, “*Forestry Agency’s Efforts regarding the Development of Forests to Install Solar PV Facilities,*” September 2021

⁴ Ministry of Economy, Trade and Industry, Commerce Distribution and Industrial Safety Group, Electric Power Safety Division, Strengthening Efforts to Ensure Safety of Solar PV Facilities