PV market evolution until 2020: The long quest for competitive PV

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ABSTRACT
The global PV capacity reached 177GW at the end of 2014, and by 2020 the PV Market Alliance forecasts that 630GW of PV could be installed. The entire value chain of the PV industry needs accurate data and a clear vision of how markets could develop in the future in order to avoid repeating past mistakes, and especially the damaging price war that led to a dramatic industry consolidation. The question of PV market evolution will be acute in 2015 and 2017, which will represent the next two important milestones for PV development: for the first time in years, the PV industry could approach its production capacity limits.

Introduction

In January 2015 the PV Market Alliance announced that the global PV market reached close to 40GW in 2014. That figure was later confirmed by the International Energy Agency, while several observers of the PV market continued to bet on a 45GW market, which was never confirmed. This optimistic trend in the PV industry has a tendency to hide the truth and to drive investments in the wrong direction. In the last five years, many decisions have been taken on the basis of the false idea that the PV market could experience a double-digit (or triple-digit) growth every year: Chinese investments which dramatically increased production capacity until 2012 were a clear example of market overestimation that led to dramatic consequences for the entire PV industry.

> "Forecasting an industry that is policy dependent will clearly always involve uncertainties."

In order to avoid repeating the mistakes of the past, the entire value chain of the PV industry needs accurate data and a clear vision of how markets could develop in the future. Forecasting an industry that is policy dependent will clearly always involve uncertainties. Political decisions have always driven the energy sector and will continue to frame it; the rise of prosumers will not transform a strategic industry into a simple consumer's playing field.

An incentives-driven market

If the policy influence on PV market development is looked at more closely, it will be noticed that in 2014 more than 85% of the global PV market was still driven by feed-in tariffs, tax breaks and similar schemes. On the assumption that incentivized self-consumption schemes (including net-metering ones) are also policy dependent, this figure rises to more than 95%. Projects that are popping up everywhere in the world these days rely on political acceptance of

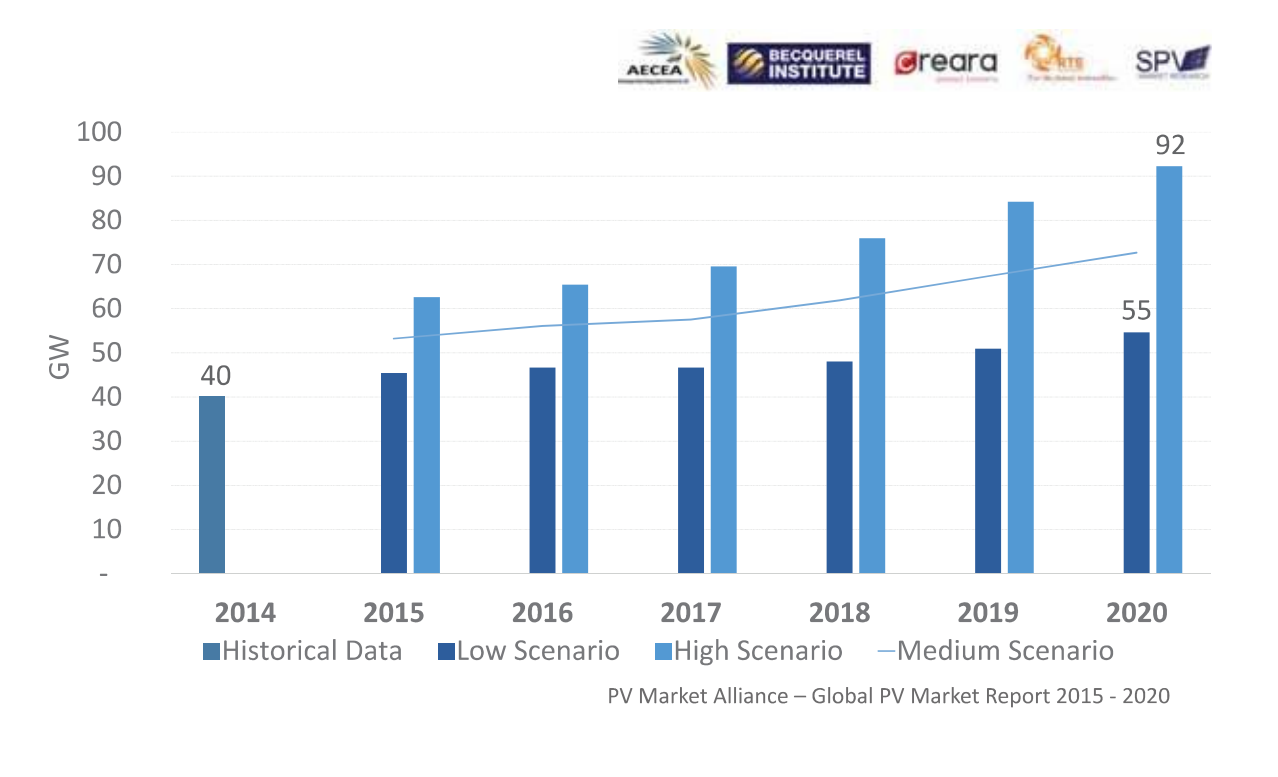

Figure 1. Global PV market evolution 2014–2020.

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PV development and, in many cases, on politically organized PV development through tenders or similar regulations.

These aspects of PV development should make all of us extremely humble when we try to forecast the future development of PV. In 2014 three countries where PV development is highly policy dependent achieved two-thirds of all installations: China, Japan and the USA. The deployment of PV in these three countries is the simple consequence of policy decisions that can be modified any time. Of course, we can put money on the increasing awareness of policymakers regarding the need to transition to a low-carbon economy. History has shown us, however, that nothing is ever guaranteed.

In that respect the forecasts for the coming years can vary significantly one way or another depending on the probability associated with negative policy decisions affecting the PV sector. The PV market should reach at least 50GW in 2015 in a reasonable scenario, and could reach 70 to 90GW in 2020 under conditions of positive development in all major regions, including the long-awaited Indian market (Fig. 1).

Six blocks

The global PV market can be split into six groups of countries, with different evolutions and challenges: China, Japan (and similar countries), North America, Europe, India and the remaining emerging PV markets. These six groups should be individually scrutinized and studied using various tools and from different points of view; how these countries influence market development will be seen below.

Perspectives for development

The year 2015 started with the recognition of an expected growth globally. The probability of seeing the market climb up to 50GW is rather high, and exceeding this level will depend mainly on the ability of China to fulfil expectations. With Europe stabilizing, or at best slightly growing, the potential for growth is globally important, since most large markets are expected to progress, and in some cases significantly.

But will we see a market above 50GW in 2015? Starting from around 40GW in 2014, this means we are looking for an additional 10GW. Some of these gigawatts could be expected from the US market, while a large part of additional installations could come from India and, of course, China. The latter installed close to 8GW of PV plants in H1 2015, according to the official figures, and would have to install 10GW in H2 in order to reach 17.8GW. But how would it be possible to achieve much more than 50GW in 2015?

The answer lies in the ability of emerging markets (especially India) to contribute significantly to market growth in 2015. In 2014 the contribution from emerging PV markets – including South Africa, Chile, Thailand, Malaysia, Mexico and Turkey – amounted to less than 3GW. One must recognize that adding 10GW represents a tremendous effort, given the relatively low speed at which emerging markets are growing.

After 2015 the next important milestone for the PV sector will be 2017. The uncertainties remain high from 2017 onwards because of high expectations from emerging markets, including India. Moreover, established markets – such as the USA, Japan and China – could be difficult to forecast after 2017 because of expected or possible policy changes. The fate of the US market, of course, will depend on how the transition from the current ITC programme will stabilize, decrease or push the market to boom. Since the US market is now completely dependent on the ITC (rightly or wrongly), forecasting its development from 2017 consists in assessing the chances of all candidates in the next presidential election – something markedly different from the PV market. However, it can be simply estimated that in the *medium* term, the conditions for a long-term uptake of PV in *some* US states will be met, and the market will find a way to continue developing, most probably driven initially by prosumers. In addition, according to the RTS Corporation estimates, the Japanese market should start to decline from 2017 onwards, which could make 2017 a really challenging year.

During their best year (2011), European markets contributed 23GW of PV installations. Since then, the market has declined 75%, and less than 7GW were installed in 2014. The European markets are expected to stagnate and possibly grow again before the end of the decade, powered by lowered prices and new business models. So far, however, the market has been kept relatively low by the stagnation of electricity consumption, the opposition to renewables in many countries from incumbent players, and the lack of appetite from policymakers for innovative regulations that could unlock PV deployment. Several markets in Europe nevertheless present conditions conducive to renewed growth, but neither investors nor potential prosumers are responding positively. It is expected that it will take years to overcome the negative image that the PV industry acquired in some countries following the bubbles of previous years. In addition, the recognition of the complexity of integrating PV electricity into PV markets is not helping to secure a stable long-term perspective of revenues while the European Commission and several states are pushing for more market integration. The situation can be summarized quite easily: in a policy-dependent sector, the lack of political support at the crucial moment is clearly not helping PV leap into a new development phase in Europe. In that respect, the future of PV in many European countries remains uncertain: many markets that once boomed out of control now have to cope with the disastrous image created by the PV bubble. On account of this, most are not announcing short-term generalized redevelopment.

Solving the competitiveness equation

The super-competitive bids seen in several countries in 2014 and 2015 have highlighted the rapid decline in PV system prices and the subsequent decline in electricity generation cost (LCOE). For PV, the competitiveness battle, however, is far from being won. A few years ago, I used to be the first to criticize the European association of conventional utilities (Eurelectric), which was claiming that PV would become competitive once it could be competitive with the wholesale price of electricity on the market – or, in other words, demonstrate an LCOE below 4 eurocents/kWh. Several years later, we are forced to accept that neither the grid parity (or 'socket parity') nor the more elaborate 'dynamic grid parity' (considering the present value of increasing retail prices) concept has unlocked a post-FiT PV market. On the contrary, most markets that are transitioning from a FiT-driven PV economy (such as Germany or Italy) to a competitiveness-driven PV market are experiencing huge difficulties in keeping themselves afloat. Furthermore, the prospect of adding electricity storage cost to already uncompetitive PV systems appears as an additional threat to that quest for competitiveness.

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The assessment of competitiveness is relatively easy and depends on several straightforward factors, including the level of solar irradiation, the system cost, the expected OPEX costs, the cost of capital, and finally the reference to which the PV LCOE will be compared.

For prosumers, the road to competitiveness starts with the grid

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parity concept; however, the question of the fair remuneration of the excess PV electricity quickly comes to the table. By definition, net-metering systems are a disguised way of granting feed-in tariffs at the retail electricity price level. The competitiveness for prosumers will therefore depend on their ability to valorize PV electricity in the face of retail electricity prices (minus fixed grid costs and some taxes) and to obtain a fair remuneration. That fair remuneration can be estimated as the value of solar PV electricity on electricity markets, taking into consideration all services provided by PV, from the energy-only value to the additional value of some ancillary services. Such a value can be hard to estimate, but it is certain that PV will have to compete with the market value either at the time of PV production or when the PV plus its storage unit can be sold on the market. In the first case, the value will be quite low, and is expected to decline with additional PV capacities producing at the same time. In the second case, the sale of electricity will occur when the market price is the highest, but the LCOE of the combined PV and storage unit will be much higher than that of a PV plant considered on its own. Looking at countries where PV penetration has significantly increased in recent years, one must admit the target price considered is very low and in no case higher than 5 eurocents/kWh.

In this regard, the competitiveness of PV for prosumers will hardly be reached by selling electricity on the market, but rather by increasing the self-consumption ratio of the installation, provided the complete retail price can be recompensed (which is far from being guaranteed). The countries where the price of retail electricity is quite high – for example, Germany, Denmark, Belgium, Italy and islands powered by GENSED – could be considered the low-hanging fruits of prosumers' competitiveness.

For utility-scale PV, the situation is similar: the sale of electricity to a local company is almost identical to the case of self-consumption by prosumers. Without self-consumption, the remuneration of the electricity that is injected into the grid will depend on either the price on the local electricity market or the average price of alternative electricity sources. The first countries where utility-scale plants could be competitive will therefore be those with a rather costly electricity mix at the time of PV production. In a nutshell, the upshot is that utility-scale PV will only develop without incentives in these countries, and will require incentives and guaranteed long-term PPA in others.

Who bears the risks?

If we accept the fact that 95% of the PV market to date remains policy dependent, and that the *real* competitiveness of PV has not yet been reached, forecasting the PV market consists in analysing the ability of the PV industry to offer products and services that will cope with existing regulatory frameworks and the limited competitiveness of PV solutions in today's energy world.

One element should be mentioned: the most competitive winning bids seen for tenders in 2014 and 2015 were achieved because of an extremely low cost of capital and often a high debt ratio. One must therefore admit that these projects will be risk free and that investors will be remunerated at a very low level. But any observer of the recent developments in the PV industry knows that PV is far from being a risk-free investment these days. Uncertainties linked to quality or to behaviour in hot and humid climates, or simply political uncertainties, should be associated with some risk premiums that are not reflected in these tenders. In this respect, the question of the real competitiveness of PV solutions in *normal* cases (and not emblematic tenders) remains more complex than it appears. The perspectives of non-incentivized market development should therefore be carefully assessed.

Industry evolution

The question of market evolution in the future is rather an important one, because for the first time in years, the PV industry could approach its production capacity limits. According to official numbers published by several observers of the PV industry, the production capacities could be as low as 40GW or higher than 60GW. Of course, such a wide estimate does not help much in taking the right investment decisions. In that respect, a future expected market increase should (or should not) trigger investments in new production capacities. As we have seen in the past, in several countries the uncertainties remain high for years to come; moreover, while the PV industry generally loves optimistic forecasts, this should not hide the challenges it is currently facing, and will face in the future

> "Forecasting the future of the PV market will be crucial in the coming years."

One of these challenges is the question of the evolution of existing production lines in order to move to higher efficiencies. The announcements in recent months of upgrades towards PERC or similar concepts show that the heaviest part of the consolidation is coming to an end, and companies are returning to profitability and envisaging the future. In that respect, correctly forecasting the future of the PV market will be crucial in the coming years, so that the right investments in the PV value chain can be identified. The quest for higher efficiencies, as well as improving the reliability of all components, will be extremely important.

Forecasts

When all these points are considered, if the most optimistic scenario is uncertain, the most pessimistic one would imply a market stagnation in the coming years at a level of around 50GW. This scenario assumes that the development of PV in an established market would decrease, while the growth of emerging markets would take longer than expected.

The most probable scenario, however, given the global economic situation, consists in a moderate growth that would bring the global PV market from the 40GW attained in 2014 to 50GW in 2015, and to 70GW in 2020. PV could, of course, grow more rapidly than this anywhere in the world under the right incentives and framework conditions, and this is what we would all like to see. The conditions are complex, however, and competitiveness requires complex conditions as well; these intricacies, coupled with the fact that countries where PV is beginning to develop experience different economic and social conditions from those in the pioneering countries, could delay the expected PV deployment.

About the Author

Gaëtan Masson is the director of the Becquerel Institute, the operating agent of the IEA-PVPS Task 1 research programme and the vice-president of the EU PV technology Platform. The PV Market Alliance, publisher of the Global PV Market Report, is a partnership between Becquerel Institute, Creara, AECEA, RTS Corporation and SPV Market Research.

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