



Photo: Canadian Solar

The Samaca Farm project utilizes 320 Canadian Solar modules to power a farm located on Peru's pacific coastline. Peru has a policy framework in place for solar and meets several other conditions required for healthy pv growth.

A new year, a new dawn

Emerging markets: Energy investors are always on the lookout for new emerging markets that meet or exceed the industry's expectations. With the new year just begun, **pv magazine** examines some of the potential solar stars of 2017, and the conditions most likely to deliver strong growth.

The Climatescope report, published by Bloomberg's New Energy Finance (BNEF) unit in December, revealed that, for the first time ever, emerging markets have taken the lead in renewable energy investment. Specifically, the 2016 edition of the Climatescope report, which ranks emerging markets based on their ability to attract capital for low-carbon energy projects, finds that in 2015, for the first time, emerging markets invested \$154.1 billion in renewable energies, compared with \$153.7 billion invested by the 35 member nations of the Organization for Economic Cooperation & Development (OECD). "The growth rates in clean-energy deployment are higher in these

emerging-market states, so they are likely to remain the clean energy leaders indefinitely, especially now that three-quarters have established clean-energy targets," added Bloomberg. The latest edition of Climatescope evaluates 58 emerging markets in Africa, Asia, Latin America and the Caribbean, and also includes major developing nations such as China, India, Brazil, Chile and South Africa.

The report demonstrates that power generated via PV technology can now compete with fossil-fuel projects on price in some nations thanks to cheap solar PV, together with innovative business models and a new wave of entrepreneurs that increasingly promote off-grid and

mini-grid solutions. We also see developed economies moving into funding for green energies in emerging markets (with the exception of China, where virtually all capital is provided locally). Furthermore, two recently published reports by the International Renewable Energy Agency (IRENA) highlight that renewable energy in Latin America is booming thanks to the abundance of natural resource and good policy support, and that solar PV could soon become soon a game changer in African energy.

Amid such a market climate, PV investors are constantly looking for emerging markets that can meet and exceed expectations, ultimately developing a healthy



ACWA Power is responsible for the construction and operation of 170 MW of plants as part of the Noor project in Morocco, which generates power using both PV and CSP technologies.

PV sector. **pv magazine** examines the drivers that lead an emerging market to develop its solar sector satisfactorily, without collapse or unfulfilled promise.

Conditions for growth

“When we investigate whether or not an emerging solar PV market can prove to be fruitful, we examine which of a number of specific conditions are in place,” James Kurz, senior consultant at the Apricum consulting firm, which is headquartered in Berlin, told **pv magazine**. “These conditions include: a decent sized energy sector, and specifically high energy demand; high daytime peak loads; strong solar resource (e.g. good solar irradiation); political and economic stability in the country and the related availability of debt finance; policy frameworks for solar energy; and whether a country’s energy market has a negative energy balance. The last condition, added Kurz, applies very much to Middle Eastern countries, such as Morocco, Jordan, Egypt and Turkey, where renewable energy projects have picked up. Having said that, Kurz noted, given that the cost of PV energy is declining so deeply, even countries rich in fossil-fuels are taking note and begin-

ning development (e.g. in United Arab Emirates, Saudi Arabia and Algeria).

In a similar tone, Josefin Berg, senior analyst for the solar research group of IHS Markit, a global consultancy with research on various market sectors, said: “We determine whether a new market will emerge using an attractive index with 24 different parameters, including the macroeconomic factors, total market size potential, the profitability of PV (including the price paid for PV electricity, and comparison to other power prices), and the development maturity. This index helps us to assess markets over a longer time frame. But when looking at the coming 12 months, a thorough review of how supportive the market is for PV (e.g. feed-in tariffs, awarded tenders, net-metering schemes e.t.c.) and how advanced the pipeline is, will give a good indication of whether the market is likely to see rapid growth or not.”

Forecasting data

When looking at an emerging market, there are a number of different questions that can be asked in order to predict its future. If we are asking whether an emerging market will add a mean-

ingful amount of new capacity, then IHS Markit’s approach is sound. “We track more than 70 GW of planned PV capacity in emerging markets, project by project. We assess how advanced the project is in terms of permissions, power purchase agreements (PPAs) and financing commitment. The healthiest projects have already achieved financial close,” said Berg. If the question is whether an emerging market can establish a healthy and active PV sector, then perhaps the last set of information alone is not enough and further factors need to be considered.

A case that clearly illustrates this argument is Morocco, which is now beginning to develop its PV sector. Morocco’s public agency for renewable energies (Masen) told **pv magazine** that in November it signed a 20-year PPA with Saudi Arabia’s Acwa Power for the development of 170 MW of solar PV plants. The new PV capacity comprises a 70 MW photovoltaic plant located in Ouarzazate, a 80 MW plant located in Laayoune and a 20 MW plant located in Boujdour, said Masen. Acwa Power will be responsible for the development, construction and long-term operation of the three plants under a BOOT (Build, Operate, Own and



Photo: ABB

The solar impulse plane rests in a hangar in Mandalay. To the surprise of many analysts, Myanmar has impressed as an emerging pv market in 2016, beginning construction on the country's first large scale project.

Transfer) scheme, while financing for the projects seems to have received an adequate response so far. Is this enough for Morocco to develop a sustainable PV sector? The answer is no. Morocco does not have a feed-in tariff or other alternative scheme in place, and appears to promote specific projects alone. Although these projects are welcome, they are not sufficient to create an active PV sector similar to Jordan's, for instance. Therefore, the more general set of conditions (or index) referred to previously is a better way to evaluate a country's solar PV dynamism.

The element of surprise

A common question among investors is whether recent surprise events can eclipse the value of the previous set of conditions defined as necessary for a new solar market to emerge successfully. **pv magazine** pointed out the cases of Argentina and Peru to James Kurz, arguing that Argentina has quite often in recent years become economically and politically unstable. In Peru, the construction of a 180 MW PV project by Italy's Enel Corporation currently under way could be viewed as a sign that big corporations are willing to accept a

degree of risk in new markets, despite the seemingly adverse conditions.

"It is true that Argentina has run solar PV auctions and put a policy framework in place, but we should bear in mind that nothing has been installed yet and that the projects which won the auctions have not reached financial closure yet", stated Kurz.

The case of Peru differs, he added. The country had started to implement a few small PV projects prior to auctioning the big 180 MW plant, thus we can argue that Peru acquired some initial experience, said Kurz. In addition, Peru has put a good policy framework in place and is also a very stable country politically, with a reasonably healthy outlook based on GDP per capita data. Of course, large corporations have their own strategies for assessing investment risks, and are often the first to move in to emerging markets, Kurz noted, "but overall in the case of Peru and elsewhere we see that the basic conditions for the development of an emerging market are present. It doesn't necessarily mean that all conditions set out earlier need to be present, but most of them need to apply for a new market to grow."

For Apricum, China was a surprise to some degree, because it grew even faster than expected. So, while the firm saw 30 GW in one year as a possibility around 2019/2020, there is a chance 30 GW was installed in 2016 alone.

For Berg, of IHS Markit, the greatest surprise is Myanmar, where construction has begun on a large scale project, defying the expectations of many analysts in the region. This project alone will be large enough make Myanmar one of countries in the region with the largest growth in pv capacity this year, Berg noted.

Forecasts that deliver

India and Jordan are two more cases where the solar PV markets developed as Apricum had projected, based on the conditions the firm takes into consideration.

For India, Kurz also pointed out that there are some country-specific factors that boost the solar PV market. These are the country's massive size, which creates opportunities; the atmospheric pollution, which the government wants to reduce via developing clean energies; and that India's Government sees the PV sector as a major part of its greater industrialization strategy.

The invisible drivers for growth

The most difficult drivers for growth to identify in emerging markets are the local politics that shape the sector's fortune. This was made clear a year ago, when First Solar's technical director for Europe, Karim Asali, a Jordanian, cited in a discussion about Jordan's stellar solar PV progress (Jordan has established a sustainable PV market for both domestic and large-scale systems, see p.22) all of the conditions that Apricum lists for an emerging solar market to grow.

However, it also added that a vital reason for Jordan's solar sector success is EDAMA, a local Jordanian non-profit business association that campaigns in favor of the country's green economy. Asali argues that in the early days of renewable energy development in Jordan, EDAMA was instrumental in narrating a clear and persuasive discourse in favor of the renewable energy industry, persuading key stakeholders within the country's policy-making system. Of course, Asali added, EDAMA's arguments made sense because all the necessary conditions for the development of renewable energies

(the conditions that Apricum has listed too) are present in Jordan. But Asali was positive that without EDAMA's policy effort, the country would not have been a first mover.

Another case that illustrates the significance of domestic politics is Israel. Israel's renewable energy policy is currently experiencing a U-turn, which was initiated following the general elections in March 2015. At the start, it appeared that solar had totally lost the policy game. Leading figures of the Treasury, who were blocking the development of solar PV in Israel due to financial reasons, were transferred to the ministry of national infrastructure, energy and water resources. But suddenly, the same people who earlier stalled the industry started to engage with it, because they saw the impressive technology cost reduction. Eitan Parnass, founder and director of Israel's Green Energy Association, confirmed that this is the case, although he added that the new targets stemming from the Paris Agreement helped as well. Nevertheless, Israel is about to publish the final details of a new 1 GW tender for solar PV capac-

ity that will be confirmed in early 2017. Israel's policy U-turn is due to overall conditions and cost reduction, but also due to the dynamics of local politics.

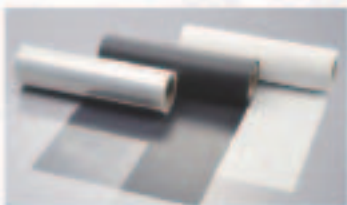
Finally, Algeria's cabinet reshuffle a few months ago has also created hope. For the first time ever, Algeria's energy minister comes from the electricity sector and not the oil and gas sectors, which are the backbone of the country's economy. Noureddine Bouterfa, former CEO of state-owned utility Songaz, is an advocate of independent power producer (IPP) projects and higher domestic energy prices.

Domestic politics dynamics, like those described in Jordan, Israel and Algeria, are hard to identify and include in forecasting analyses. However, although such factors do not often find their way into consulting reports, they are the ones that drive policy-makers to decide in favor of or against the solar PV industry. Growth can often appear in unexpected places, and for this reason, the hunt for the strongest emerging pv market, both in 2017 and beyond, will always offer some surprises. ♦ Ilias Tsagas

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