Photos: Tekno Group

Turkey's solar PV sector applies different licensing regulations to large-scale solar farms depending upon their size. Ostensibly, plants below 1 MW are 'unlicensed,' but there remain some regulatory hoops to jump through.

Coming home to roost

Turkey: The Turkish PV sector is expected to reach up to 1 GW of cumulative solar PV installations by the end of 2016, which is not exactly the most astonishing news given the country's acute need for power and its great solar resource. Nevertheless, it is an encouraging step. So, what are the factors that are going to drive or delay Turkey's PV take off?

According to data provided to **pv magazine** by Solarbaba, the Turkish Solar Energy Society, Turkey's cumulative capacity of PV at the end of last year was 248 MW. In 2015, Solarbaba said, the country added approximately 150 MW of new PV capacity, which is not a high amount but certainly exceeded the single-figure megawatts added in 2014.

In the first six weeks of 2016 an additional 46 MW of PV systems were installed, while "at the end of 2016 we expect to reach around 800 to 900 MW, with a low probability of 1 GW," the Solarbaba spokesperson added. So, however belatedly, the Turkish PV market appears to have kicked off.

The size of new PV plants

Important to remember in solar, particularly the Turkish market, is that the size of the plants matters. All of the installed PV plants in the country belong to the so-called unlicensed segment of the solar market, which refers to projects smaller than or equal to 1 MW each. Contrary to what the name perhaps hints, these unlicensed projects also need to obtain a number of permits, one of them being grid permission, before being built. However, the unlicensed projects do not need to apply for an electricity generation license.

"The potential unlicensed pipeline is around 1 GW," Andi Aranitasi, an Istanbul-based senior member of the Power and Energy team at the European Bank for Reconstruction and Development (EBRD) told **pv magazine**. A lot of

the unlicensed installations have been funded through the EBRD's TurSEFF programme, a credit line to Turkish banks for on-lending to SMEs that wish to invest in energy efficiency or renewable energy projects.

Auctioned projects: When will they get built?

In April last year, Turkey's electricity transmission company TEIAS tendered 302 MW of large-scale PV capacity, which was the last phase of a series of auctions totaling 600 MW of large-scale PV plants. The process has attracted heavy criticism because it took two full years to be completed after an auction call in 2013. Since then, there have been no plans announced for a second round of PV auctions.

Most likely, these projects will not be built quickly, Hannes Beushausen, Project Manager and Turkey expert for the consulting firm Apricum concludes. The main reasons are that although all projects will receive a feed-in tariff (FIT) of $0.133/kWh for 10 years, plus five year premiums for components (modules, construction, inverters and cells) manufactured in Turkey, they will also need to pay a one-time contribution fee per installed MW. This fee, which was the result of the tender process, proved to be prohibitively high for many licenses, said Beushausen. Consequently, financing these projects might prove to be rather difficult too, he added.

Mehmet Özenbaş, Assistant General Manager for Tekno Ray Solar, a Turkish developer with a local portfolio exceeding 20 MW of PV, agrees with Beushausen. "The license fees are affecting the timing of the installation for the auctioned projects, and we expect them to be installed some time in 2017 and 2018," Özenbaş said.

Specifically, tender license fees started at TRY 68,000 per MW and increased to TRY 2,920,000 per MW. This leads approximately to an average license fee of TRY 1,780,000 per MW, or $620,000. "Investors are waiting for the USD exchange rate to increase and so their investment in U.S. dollars will decrease down to $550,000 per MW," said Özenbaş, citing a further hurdle: Many of the tendered projects could not get their pre-technical specifics and pre-licenses for connection from the Energy Ministry Regulation Authority (EMRA).

According to information provided by the Tekno Group, licenses for the 600 MW tendered PV projects are held by both foreign and local investors. However, locals far exceed the international investors by an 80/20 split. Moreover, the consultancy work to prepare for submitting applications to tenders, as well as all the work done in the unlicensed fragment of the PV market, is carried out by local providers and developers, which demonstrates how Turkey slowly acquires PV market-specific skills and develops a local stakeholder network. This growth of solar competence is very positive for the industry.

The trouble with financing

Financing is invariably a challenge in developing solar markets, and Turkey is no exception, noted Beushausen. A major concern that financing institutions face is that FITs for Turkish projects are valid only for 10 years, so investors have to decide which revenues they assume the PV system can generate for at least the second half of a PV plant's lifetime. Who can say, for example, what the regulatory framework for selling PV power after the end of the FIT will be, or what the achievable prices at the spot market will stand at by that time, asked Beushausen.

With renewable energy projects, local banks are becoming willing to take risks, but this depends on the type of project or sponsor, EBRD's Aranitasi said. On the contrary, "local banks are often not keen to take the risk of completion of the project, but they often will take some operational risk," he added. "Lately, we are also noticing that for some renewable projects, especially the ones with turnkey EPC contracts (usually in wind), the local banks are starting to show appetite for some construction and completion risk, so there is a slow shift towards more risk taking, in our view," said Aranitasi.

The EBRD is also involved in financing solar PV projects in Turkey, either directly or indirectly. Thus, "most recently the EBRD has taken a 20% stake in the renewable energy arm of Turkey's Akfen Holding. The company has some 7 MW of operational solar and is cur-

AT A GLANCE

- Turkey could reach 1 GW of cumulative PV capacity by the end of 2016.
- Progress prior to this year has been slow, with issues pertaining to the smaller unlicensed segment, and auctioned projects.
- A growing appetite for local financing, matched by outside interest, is helping to grease the wheels.
- Relatively modest government solar targets are at odds with the groundswell of support for PV.

FITs in Turkey only have a 10 year lifespan currently, which can serve to deter would-be investors from backing some of the larger solar projects.

Turkey's official solar PV target for 2023 is just 5 GW, or 2.7% of the country's overall power capacity. Given that the country could end 2016 with 1 GW installed, and the excellent solar resource that the nation possesses, this goal is viewed in most quarters as too modest.

rently looking to add 60-70 MW of solar in the near future," revealed Aranitasi. But the bank is also financing the PV sector indirectly through the TurSEFF scheme, which supports small-scale solar projects. As of February 2016, the TurSEFF program has financed 45 MW out of Turkey's 300 MW total operating installed PV capacity, and another 104 MW financed by TurSEFF are currently under construction, Aranitasi said. Another indirect financing mechanism from the EBRD is the Turkey Residential Energy Efficiency Financing Facility (TuREEFF), which is a combination of long-term financial support to Turkish banks ($282.5 million from the EBRD) and technical advisory services to banks and homeowners (financed by a $10 million grant from the EU and Clean Technology Fund). TuREEFF mainly finances home energy efficiency but also renewable systems in buildings.

Finally, the bank is also planning to finance a 20 MW and a 7 MW PV project, through its MidSEFF programme. MidSEFF benefits renewable energy and resource efficiency projects in Turkey and has recently received a top up of €500 million in new financing ($556 million).

Rooftop PV

Naturally, the discussion now moves on to the rooftop PV sector. The main avenue currently for rooftop developments is via the unlicensed market, which at least in theory considers projects that aim to satisfy the power consumption needs of the investors. **pv magazine** has learned that the government is expected to update the unlicensed market regulations and announce (perhaps as soon as May this year) a revision, focusing on, among other things, rooftop PV applications. The revised regulations are expected to make 10 kW and lower installations much easier to complete.

Commenting on the news, Apricum reported that for larger projects, it understands there was a certain grid capacity allocated to the unlicensed market segment that is now almost fully subscribed. Apricum's information is that the government considers allocating extra capacity for these installations, but there will be a minimum requirement for self-consumption.

In fact, a self-consumption requirement exists now too, but investors often build two to four different projects together and near each other, totaling 1 MW capacity and far exceeding their power demand. Beushausen said that he expects the updated regulations to be stricter on this front. However, a good piece of news confirmed by Aranitasi is that Turkey's National Energy Efficiency Action Plan, for which the EBRD has been working with the government for a very long time, is set to be completed in April 2016.

"This plan includes self generation in the residential sector as well as the expansion of industrial unlicensed solar PV, which was already covered as a measure under the National Renewable Energy Plan (NREAP)," Aranitasi said.

Renewable energy goals

Turkey's NREAP, for which the government had also cooperated with the EBRD, was announced a year ago and aims to address issues such as project financial support, improvement of the legal framework, interconnection infrastructure enhancement, reduction of red tape, and development of new support mechanisms.

Asked whether the NREAP has impacted Turkey's energy policy and market, Aranitasi replied in the affirmative.

"The NREAP is meant to assist Turkey in achieving its long-term goals, specifically the 2023 targets, and it will therefore be more appropriate to assess its results over a longer period of time. Having said that, the initial results are already visible as of the 4.3 GW new capacity added in the course of 2015, of which just 23% (approximately 950 MW) was thermal."

According to data published by Turkey's Ministry of Energy and Natural

Resources, in 2015 the country added 2,229.46 MW of hydro capacity, 830.75 MW of wind and solar PV, 268.92 MW of geothermal, biomass and waste power plants, and 958.43 MW of thermal plants.

"In addition," Aranitasi said, "the EBRD is currently supporting the government of Turkey in addressing some of the key measures suggested under the NREAP, namely the preparation of the post-2020 renewable energy support mechanism and the streamlining of the renewable energy licensing regime. This would significantly contribute to achieving the 2023 renewable energy targets for Turkey."

Turkey's installed power capacity stands at around 70 GW and the government aims to install an additional 110 GW by 2023. The AKP-led government has said that 90% of the country's electricity in 2023 will be equally provided by gas, coal and renewable energy plants (30% each), while nuclear power will provide the remaining 10%. The official target for solar PV by 2023 is a mere 5 GW, or 2.7% of the overall projected power capacity.

Can solar make it?

The 5 GW of solar PV capacity target by 2023 is not a pipe dream – it can easily be achieved in Turkey, said Tekno Ray Solar's Özenbaş. The country simply requires some regulations to be loosened or enacted, he added. Such remarks appear an accurate reflection on the Turkish market.

According to Apricum's forecast model for Turkey, the country will have installed 1.4 GW (low case) to 4.5 GW (high case) of solar PV by 2020, an obviously wide range. "High uncertainty in the market translates to a huge difference between the low and the high case," said Beushausen. The analysts is convinced that Turkey could hit its 5 GW national target by 2023, "but only if they shift gears and increase clarity and speed." Beushausen is not alone is his call for increased clarity and similar concerns were shared by all market stakeholders that **pv magazine** contacted.

However, for a country with a great solar resource and immense need for electricity, it is actually rather irrational to have set such low targets for solar PV installations. On the other hand, although Turkey is prone to earthquakes, its policymakers have approved the development of a 4.8 GW nuclear power plant (the Akkuyu plant, financed by Russia, will have four nuclear reactors planned to be operational by 2023) and are eyeing the development of a second 4.6 GW nuclear plant to be built by a consortium comprising Japan's Mitsubishi and France's Areva. PV's ability to be deployed rapidly could see it blow past its nuclear ambitions.

Apricum's Beushausen thinks Turkey may be wary of what happened in some European markets, where PV installations increased too quickly and resulted in a boom and eventual bust.

Nevertheless, with today's PV technology proven and significantly less expensive, lessons learned from the international experience can help Turkey to design regulations that lead to a competitive and robust market. The Turkish network of PV stakeholders has been formed and is well and truly ready to upgrade the country's energy infrastructure. ◆

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