

Turkey takes the winding road to solar success

Market update | Turkey has around 5GW of installed solar capacity, but potential for much more. Ekin Inal and Chris Down explore the latest developments in Turkey's solar market and the regulatory reforms that could help PV take a much larger share of the country's energy mix

While it could be one of the world's leaders in solar power, Turkey has still not fully tapped its potential. It enjoys an average of 7.2 sunshine hours a day, almost two times that of Germany. However while Germany's installed capacity is over 40 gigawatts, Turkey only has 5GW of installed capacity. On the bright side, this untapped potential awaits domestic and foreign investors.

The Turkish solar market is traditionally divided into two segments. Licensed generation, which is done under a licence granted by the Energy Market Regulatory Authority (EMRA), applies to generation above 1MW of capacity. Generation below this capacity does not require a licence from EMRA and is also exempt from some other formalities such as establishing a legal entity in order to operate. Currently, almost the entire installed capacity comes from unlicensed generation.

For the last two years, the government has been taking action to promote solar power beyond the usual licensed-unlicensed dichotomy. The 1MW capacity threshold is still in place; however the two types of generation are being transformed. On the licensed front the government is attracting big players (developers, manufacturers) to large-scale solar power projects of 1GW (YEKA projects). On the other hand, unlicensed projects are getting smaller. A rooftop regulation was recently promulgated for installations of 10 kilowatt hours or less.

A brief look into the history of solar power

While solar power has been used for a long time for water heating purposes in Turkey, its use in power generation is relatively new. When the current feed-in rates were introduced to the Renewable Energy Law back in 2011, there came a huge interest for hydro and wind power investments.



It was only in 2014 when Turkey started tapping its solar potential (with unlicensed generation installations).

In 2013, EMRA announced for the first time that it would start accepting applications for licensed solar generation. The applications were for a nation-wide capacity of 600MW as set out under the renewables legislation. EMRA received an enormous interest from investors: 9GW of applications for 600MW of installed capacity. This oversubscription meant that multiple investors applied for the same substation and, as a result, required the opening of a tender process to determine the winning investor. The first tender was held in May 2014. In these tenders launched by the state-owned electricity transmission company, TEİAŞ, investors who offered to give the highest "contribution fee" (an amount per megawatt of capacity) were granted the right to apply for the licence. In some cases, the fees were as high as approximately 3 million Turkish Liras (per megawatt) (approximately US\$563,000). The price offered by the successful bidder needs to be paid within three years (at the latest) after the plant goes operational. Currently there are 12 licensed solar power plants with a total 82MW of installed capacity (out of 600MW) and 40MW more currently under construction. There are also 21 pre-licensed plants, including the YEKA project mentioned

Turkey has twice the solar potential of Germany, but only a fifth of the installed generation capacity

above. Each power generator (not only solar) is issued a preliminary licence during the pre-construction stage that will be replaced by a permanent licence at the beginning of construction.

Licensed renewable generators can benefit from the "renewable energy support mechanism" or "YEKDEM", introduced in 2011. This support mechanism encompasses feed-in tariffs and other incentives, including those granted for the use of domestically manufactured components. Power generators that wish to opt into the support mechanism for a particular year must apply to EMRA by October 31 of the preceding year. The support mechanism and the incentives thereunder will be applicable to those projects, which come online by 31 December 2020. Solar power plants are granted a feed-in tariff of US\$133 per megawatt hour. In addition to feed-in rates, renewable energy legislation provides for incremental price incentives for generators that use certain domestically manufactured mechanical and electromechanical components in their facilities. Incentives for using domestic components are available for five years after a project commences operations. If a photovoltaic plant were to obtain the maximum amount of domestic component incentive (by employing all domestic components listed in the legislation) the total feed-in rate could be as high as US\$200 per megawatt hour.

Unlicensed generation has moved at a much faster pace than the licensed generation. This is due to a creative interpretation of the unlicensed legislation. The legislation itself states that, as a general rule, power generated in an unlicensed facility must be used by the consumers to meet their own power needs and not primarily for trading. It allows them to sell only the excess power to the grid. Based on this general principle, investors moved

to set up multiple facilities (for instance 10 facilities each having an installed capacity of up to 1MW) within the same region with a view to selling the excess power to the grid. Normally a generator planning an installed capacity larger than 1MW would need to secure a licence from EMRA. The unlicensed legislation neither allowed nor prohibited this structure, and it could be implemented until legislative amendments in March 2016. These unlicensed facilities make up 99% of the total installed capacity.

Although exempt from a number of formalities, unlicensed facilities must still obtain approval from the distribution company in the relevant region for grid connection and system usage, and secure land use rights and environmental clearance. They can sell the excess power to the local distribution company at the applicable feed-in rate of US\$133 per megawatt hour. The local component incentive no longer applies to unlicensed generation after a legislative amendment in 2016. They are also not allowed to enter into bilateral power purchase agreements (PPAs) to sell excess power.

Current state

As briefly explained above, Turkish solar power is exploring new ways of generation beyond the typical licensed-unlicensed categories. The licensed generation has been taken to a new level with the YEKA (renewable energy resource areas) investments. Legislation passed in October 2016 sets out the legal framework to streamline the process of allocation of publicly or privately-owned land for large-scale renewable energy projects. The first tender under this legislation was launched in March 2017 for a 1GW solar power plant in Karapınar Resource Area. The winning bidder undertook, in addition to the generation facility, to set up a solar cell and module manufacturing facility, and to conduct R&D activities. The tender started with a ceiling feed-in rate of US\$80 per megawatt hour. The winning bid was US\$69.9 per megawatt hour. The facility will sell electricity over this feed-in rate for a period of 15 years.

The government expressed its eagerness to continue with more YEKA projects and announced a second YEKA, this time covering three regions with a total capacity of 1GW. The ceiling feed-in rate was US\$65 per megawatt hour and the power purchase agreement would have a term of 15 years. However this tender

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was cancelled in January 2019 two weeks before the deadline for bid submission, reportedly due to lack of interest. We expect this would give the authorities the opportunity to revisit the project conditions and re-launch a new tender, or tenders.

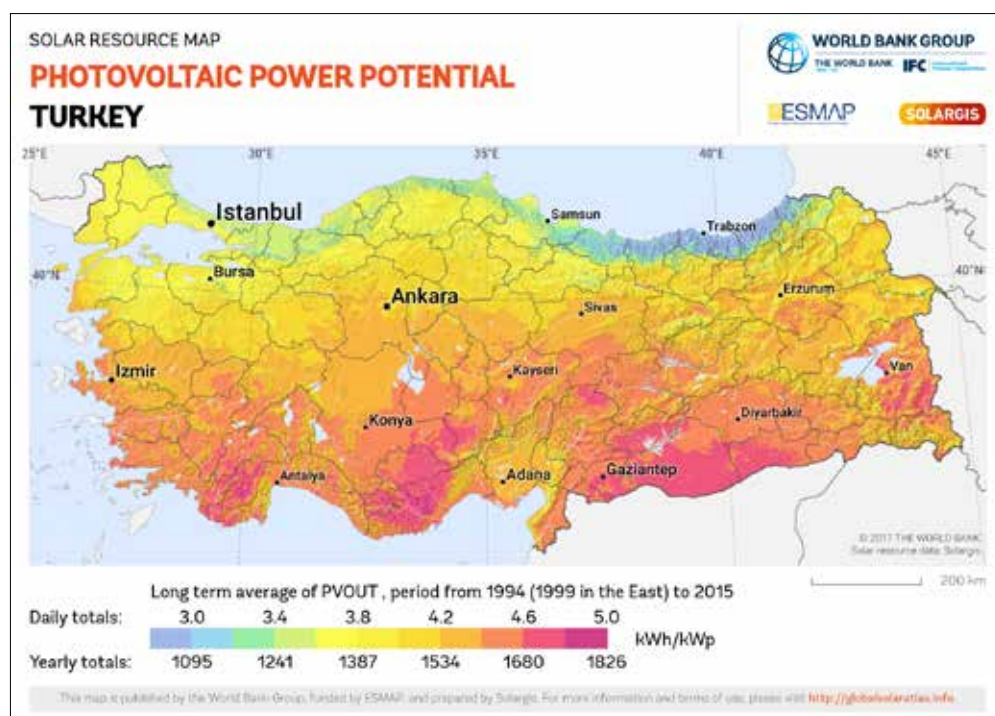
On the unlicensed front, efforts have focused on returning the unlicensed legislation back to its original purpose: production for self-consumption. Indeed, in March 2016, the legislation was amended to explicitly state that no legal entity or individual (including entities under their direct or indirect control) may have more than 1MW of unlicensed installed power capacity within a transformation station. Therefore, investors will no longer be able to establish separate special purpose vehicles, each holding a separate unlicensed project to be operational in a substation. Unlicensed generation facilities,

which secured a call letter (letter issued by the local distribution company allowing the facility to connect to the grid) prior to 23 March 2016 (the date when the amendments became effective), are exempt from this restriction. There may still be room for investment in unlicensed projects if they hold call letters issued before March 2016.

A positive development has been the promulgation of new rules applicable to rooftop (and façade) installations of up to 10 kilowatt hours in January 2018. These rules aim to facilitate solar power installations for households. The application process is less burdensome and less costly compared to larger unlicensed generation facilities. The rules provide for an even simpler process for installations of up to 3 kilowatt hours. Excess energy generated from rooftop and façade installations may be also sold to the grid for a period of 10 years, however at the reduced tariffs announced by the government in June 2018 (and not at the applicable feed-in rate of US\$133 per megawatt hour).

What does the future hold for Turkish solar?

Turkey is very much dependent on imported fossil fuels. From environmental concerns to issues around supply security, this constitutes a major point of concern for the government. As part of its strategic plans, the government promotes the use of more “domestic and renewable” energy resources. In that respect, it is high time to benefit from what solar power has to offer.



Turkey’s huge solar potential offers the country a chance to wean itself off imported fossil fuels

Credit: SolarGIS

While solar power will help Turkey cut its hefty energy bill, protect environment and ensure supply security, it will also contribute to the advancement of a value-added manufacturing industry and job creation. Last but not least, the rooftop installations will pave the way for cheaper, decentralised power generation by households and businesses.

Investment costs of solar power have dropped significantly over the last years. While many sector representatives might have questioned the low solar prices a few years ago, the decreasing trend shows that these prices are in fact sustainable. The Turkish market also benefits from the lower investment costs.

There are two issues worth noting on financial matters: one is the uncertainty around the YEKDEM mechanism. The government announced that YEKDEM would be discontinued after 2020. The feed-in rates have been a good driver for the lenders to finance renewable projects. Although the development costs have dropped significantly, they are still mostly denominated in foreign currency and it remains to be seen how the lenders will evaluate their credit processes after 2020. That said, certain sector representatives believe that the market could sustain itself even without the feed-in rates, provided that the applicable rules are amended to cut bureaucracy and facilitate the power sales by, including, net metering mechanisms and PPAs.

The other potential issue is the amended foreign exchange legislation (not solar/renewable specific), which restricts the foreign exchange borrowing by Turkish investors. In an effort to curb the foreign exchange exposure of Turkish residents, the government introduced certain restrictions on foreign currency loans borrowed by Turkish residents both from local and foreign banks. Under the amended rules, save for certain exceptions, foreign currency income is a prerequisite to obtain foreign currency loans. A specific exception is made for renewable investments, which allows investors to borrow foreign currency loans up to 80% of the total feed-in rate payments for the remaining feed-in period. The calculation methodology is not very clear and there is also no guidance as to what will happen after 2020 when there will be no feed-in rate support. That said, such investors may still benefit from other (non-renewable specific) exemptions under the amended rules, such as having an existing foreign currency exposure of US\$15



Credit: Hive Energy

million or more. In addition, no restrictions apply to Turkish lira financings.

The recent rooftop regulation is a positive development for the 'prosumers'. Since the practice is still new, it would be advisable for the government to provide some incentives for rooftop installations, including tax exemptions/cuts for the electricity sold, grants, less or no application fees, domestic component incentives and reduced bureaucracy. We expect that households and small businesses will benefit from this regulation. If they gain sufficient popularity and the legislation is permitting we can expect to see investors investing in portfolios of residential and commercial rooftop installations.

YEKA projects should continue. However, rather than launching very large projects of 1GW, sector representatives propose smaller capacities between 10 and 20MW, which are easier to finance and complete.

The government is currently working on draft legislation on unlicensed generation. This draft has provisions on monthly net metering, a mechanism called for by the sector representatives for a long time. Once the sector and the authorities become familiar with the mechanism, an annual net metering could be easier to implement. The draft legislation, however, still has the prohibition on bilateral agreements, which should be removed.

Future investments into solar power would be incomplete without energy storage facilities. Storage facilities will

Turkey's solar sector has called for a focus on projects of between 10 and 20MW rather than much larger projects of <1GW

intensify the competitive edge of solar, by making it a fully reliable resource, and help stabilise the electricity prices by feeding the stored power back to grid when the prices are high.

Finally, Turkish solar power offers great potential for the manufacturing industry. Although there are local module manufacturers, there is much room for cell, feedstock, ingot and wafer manufacturers. Indeed, the government announced in April 2018 a project-based US\$34 billion incentive package for high-technology projects. Out of the 23 projects that were granted incentives, one project will manufacture solar cells and ingots and another project will manufacture electricity storage facilities.

Authors

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