Europe's emerging solar markets

Credit: BayWa r.e.

Emerging Europe | With the need to accelerate its decarbonisation and further secure its electricity independence, Europe is at the crossroads to a faster growth in solar PV deployment. Jonathan Touriño Jacobo explores how Eastern and Southern European countries have emerged in that race as key players for the European Union to reach 740GW of solar capacity installed by 2030.

For a long time now the hottest markets to develop solar PV in Europe were Germany and Spain, followed by the Netherlands, France and Italy. In the East of the continent, Poland has seen a surge in solar PV in recent years and is expected to be one of the most important European markets in the near future.

If Poland might be the foremost emerging country from Eastern Europe, it is not the only one that is likely to be a driver for solar penetration across the European Union, with Romania and Greece coming on strong and with a great potential to drive Europe's decarbonisation at a faster pace.

In this 35th edition of PV Tech Power we will explore which are the emerging European markets, with a bigger focus in Southern Europe and dedicated features for Greece – one of the hottest solar markets currently in Europe –, Bulgaria and Poland. Hungary, Romania – which had its own feature in the previous issue –, the Czech Republic and other Balkan countries will also be explored here.

Regardless of the size for Southern European countries, the advantage they have to other countries in Europe farther north is their location and the fact that they have very strong merchant economies. "That's because the [electricity] load factors in these regions are really good, the further south you go, the better," says Panos Kefalas, senior associate for South Eastern European markets at consultancy Aurora Energy Research.

Obviously Greece and Romania are among the biggest markets both in terms of capacity, but also maturity. Greece joined the likes of Spain, Germany, Poland, the Netherlands or France in the gigawatt-scale club last year, when it added 1.34GW of solar capacity in 2022 alone and has now a total capacity of 5.5GW. In a report published last year by trade body SolarPower Europe that featured a market outlook for European countries, the Greek trade association Hellenic Association of Photovoltaics Companies (HELAPCO) expected the country to reach a cumulative solar capacity between 13.6GW and 16.3GW by 2030.

BayWa r.e.'s Witnica 64.6MWp solar park in Poland, sold to Irish Alternus Energy Group.

Many of these countries share similar challenges – from grid capacity bottlenecks to skilled workers shortages – but a major challenge Southern European countries such as Romania, Bulgaria and Hungary are facing is an increased cannibalisation.

Commercial Rooftop solar project built by HEC Solar in Bulgaria.

"What that means is that if you fill up Romania, Bulgaria or Hungary with solar capacity, the capacity of one country will directly affect the prices in another one. Meaning that a massive capacity increase in Bulgaria for example would not just reduce only the price there, if you have a lot of solar, but also in Greece and Romania," Kefalas says.

"This is because the correlation of solar production, even between different countries, especially in the sunny South is very strong. During the day you will feel the effects of extra solar generation from a neighbouring country, which will further collapse your prices and your revenues in a given hour," explains Kefalas.

However, Kefalas added that the threat of a cannibalisation of solar capacity between countries in the region would not be a 'deal breaker' for investors to be interested in going there, as the levelised cost of energy (LCOE) is still lower than the capture price. And even if at present the penetration of battery storage is still low and many of the countries lack a regulation about it, the fact that countries such as Romania and Hungary are expected to hold auctions for the technology, will be a positive factor for solar overall as it could kickstart co-located projects the be built and pushes up the capture price of solar, Kefalas says.

Greece's PPA market set to boom

With the Contracts for Difference (CfD) having been in place for a few years and now in a more mature state, securing one has been more complex with increased competitivity and lower prices, "which is good for the consumer" says Kefalas. However, he added that the auction held in September ended being undersubscribed for the first time. "Now banks are finally willing to consider merchant revenues for financing [a solar project], not just the government," adds Kefalas. The maturity of the market in terms of auctions and its consistency since 2018-19 opened opportunities to secure financing by signing power purchase agreements (PPAs).

And if less than two years ago financing a project through a PPA was a rarity, now banks are more inclined to finance projects which have a PPA signed for a solar PV plant. And the number of these will increase in the future. "Next year may be a very interesting year for PPAs," says Stelios Psomas, policy advisor at trade body HELAPCO.

In that same sense, the government has worked towards a more open market for developers to secure other means of funding their projects. Philipp Kunze, MD renewable project development in Greece at BayWa r.e., says: "The government has understood that auctions, public tariffs and CfDs are no longer necessary to fund these projects. And it has worked on setting up the right framework for these private PPAs to happen. The government just understood that less government intervention is necessary."

The Greek government recently submitted a PPA scheme to the EU that would help further accelerate investors' interest in the country. "We are still waiting for the approval of the European Union on the proposal made by the Greek government last year for the creation of the so-called green pool, which is a scheme working under the umbrella of the energy market exchange," adds Psomas.

This will facilitate PPAs and will bring producers and offtakers together. And they will also support it financially. The government will cover most of the expenses of an aggregator for balancing responsibilities, etc," says Psomas. This will also facilitate smaller companies to sign PPAs, similar to the European Commission electricity market reform design that also aims to give an easier access to small and medium business to sign PPAs.

Most importantly, and what might make signing a solar PPA more attractive now, is the fact that the government has made these one of the highest priorities for getting a grid connection. In the current scheme for connecting to the grid, long-term solar or wind PPAs get higher priority to secure a spot, says Kefalas.

Nearly 4GW of projects with PPAs have been given a priority from the Greek government, adds Psomas. "As far as I know, there are at least 5GW of projects that at least claim they have set a pre-agreement with some potential customers/offtakers. It seems that this market will thrive in the coming years."

The possibilities in terms of power purchase agreements do not end there, as they could also open a window towards virtual PPAs between countries in the coming years, says Kunze. "There are still some details missing. But you could theoretically also have a virtual PPA with a German offtaker, where we have a lot of clients, for example, that would be quite interested in buying electricity virtually."

This is just one aspect on how the Greek solar market is setting itself up as one of the key players in Europe for solar PV in the coming years, with power purchase agreements set to increase in the near future and showing how much of a mature market Greece has become. Another feature focused on this country can also be read in this edition of PV Tech Power.

PPAs are driving Romania's solar growth, waiting for CfDs

The solar market in Romania at the moment is on two tracks. With the Contract

for Differences currently delayed, many players have turned towards power purchase agreements to finance solar projects. "You can't just build a project and go to the spot market, because no bank will finance it," says Kefalas. Thus there is a higher activity in terms of PPA at the moment, which will start to get quieter due to developers awaiting to build their projects when the CfDs are released.

No matter what, Romania's solar activity is expected to accelerate in the coming years and it is unlikely to cease soon. "I think Romania is really at the brink of a second big wave of renewable penetration," says Kefalas.

The view is shared by Konstantinos Zygouras, chairman of EPC contractor Sunel Group – which is headquartered in Greece – who expects Romania to follow in the footsteps of Greece with project developments starting to increase from 2024 onwards.

"The infrastructure needs to be upgraded. But, in general, there is ability to connect to the grid and the consumption is there. Also there is the interconnection with the neighbouring countries. So in any case, there's not going to be any problem with connecting more and more projects in the future," says Zygouras.

The company partnered in April with renewables developer Ameresco to bid on 1.5GWp of solar PV and battery energy storage systems (BESS) across several markets in Europe. Greece and Romania make up between 25% and 35% of the total turnover, adds Zygouras.

For an EPC contractor, the major challenge at the moment is the lack of skilled workers, a problem that was first amplified with COVID-19 and now the war in Ukraine, says Zygouras, adding: "One problem that remains in most of these countries, is the availability of skilled workers and also experienced engineers."

Sunel's solution to attenuate this challenge has been to use the same subcontractors they have been working with for many years, and then managing everything locally in the company's centralised headquarters in Athens. This helps in terms of managerial resources, and workers that are not yet experienced, they can be supported by staff in Athens. The ease of free movement across the EU also helps moving workers from country to country and from project to project, if necessary.

A segment that will need a bigger focus is the rooftop solar market, where Romania – along with Bulgaria – are the least developed. In both instances this is due to both countries not providing any interesting subsidies for it. However, with the increased appetite in utility-scale, residential solar could get a push too in the coming months. Proof of that was shown from the Romanian government at the beginning of 2023 when it announced a reduction in the value-added tax (VAT) for solar PV modules from 19% to 5% in order to boost self-consumption uptake in the country.

Poland's accelerated shift to solar

Poland's key policy driver for the growth of solar PV and renewables altogether comes from 'Energy Policy of Poland until 2040' (PEP 2040) which is currently updated. "The new version of the document is supposed to accelerate the energy transition to renewables to ensure national energy security. Looking ahead to 2040, the goal is that half of the electricity generation in Poland comes from renewable sources. In 2030, the share of renewable energy in gross final energy consumption should be at least 23% and no less than 32% in electricity – mainly wind and PV," says Artur Marchewka, managing director at BayWa r.e. Polska.

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Moreover, of all the countries in the EU, Poland is the most dependent on coal, which accounted for more than 70% of its energy mix in 2021, according to state body Energy Market Agency (ARE). Potential for renewables – both solar and wind – to cover for the closure of coal plants in the years to come is important.

With more than 11GW of solar PV capacity installed, the technology accounts for 10% of the energy mix, when only three years earlier the share was at less than 1%, according to SolarPower Europe. Poland is expected to reach at least 25GW of installed solar capacity by 2030.

The pace at which the country has added solar capacity has quickly put it only behind Germany and Spain in terms of added annual capacity. And it is expected to continue to be at the forefront of the EU countries in the years to come, staying among the biggest five markets for several years.

Similar to what is happening in Greece, the market in Poland has matured enough for projects being able to secure funding outside of government subsidies or without the need to go through an auction. "In recent years, it has become common to build more and more solar parks without subsidies. In 2020, we were able to develop the country's first large-scale subsidy-free solar plant – a 64 MWp-park in Witnica, close to the German border between Poznań and Berlin. The commercial success of the project was possible due to a VPPA with HeidelbergCement, a vertically integrated building construction materials company," says Marchewka, adding: "PPAs are becoming more and more popular recently."

Czechia's unique capex investment

The Czech Republic's main driver currently for solar PV is its investment subsidies, and the country was the first one having the European modernisation fund active, which was launched by the EU to help 10 member states meet their energy targets. Two rounds of subsidies for utility-scale projects have so far been launched for almost 400 ground-mounted power plants allocated. This approach is quite unique in comparison with other markets in Europe as in the end, the subsidy constitutes more a capital expenditure (capex) rather than an auction or a feed-in-premium.

"Investors come with projects and if the project fulfils certain criteria, the ministry issues a preliminary agreement to pay out if the project is then connected," says Jan Krcmar, president of the Czech Solar Association.

The inconvenience of not having any solar tenders in the country is that it forces developers to seek investment through power purchase agreements (PPAs) if they are not successful in securing the government's capex investment.

However a lot can still go wrong adds Krcmar, as projects still need to go through securing land, grid access and project development, and the size of the projects that applied for the government's subsidy scheme varies from a few hundred kilowatts up to 50MW.

Ground-mounted is not the only segment in the country that is trying

to accelerate the growth of solar PV in Czechia. Through the national recovery and resilience plan launched last year, more than 6,000 applications were submitted for the commercial rooftop market. These subsidies were already implemented before Russia's invasion of Ukraine, says Krcmar.

So far the only implementation that has been done is targeted towards the residential rooftop market which raised building permit limits for panels from 20kWp to 50kWp, while the requirement for an energy license has been raised from 10kWp to 50kWp.

It will cover about 1,000 projects, and companies will not have to apply for a building permit below these limits. But it's nothing like Germany where you have go-to zones and a fixed compulsory percentages of land allocated to wind and solar," adds Krcmar.

The association has lobbied the Czech parliament to implement more policies aimed at accelerating the adoption of renewables in the country, such as having renewables projects above 1MW to be considered of public interest and implementing quicker procedures when it comes to changing the zoning plan of a project.

Another regulation that is currently being discussed is the implementation of a law regulating agrivoltaics (agriPV) which could be a boost for the country. "We have a lot of fruit growers who have problems now in this current climate, and agriPV could really help them. This could be a potential big driver," says Krcmar.

Currently the main driver for solar PV growth in the country comes almost entirely from residential rooftop installations, which accounted for nearly 95% of capacity added in 2022, according to Krcmar, while the rest came from commercial rooftop. The current year should see an increase in terms of commercial rooftop with the first ground-mounted solar projects achieving commercial operation.

"The big boom, hopefully, in terms of ground-mounted projects should come next year and the year after that. Because the projects are now being developed," says Krcmar. This is due to projects receiving the government's subsidy have five years to be built, and thus the first batch of utility-scale projects are set to be operational in the coming years.

Political instability in Bulgaria is slowing solar's growth

Of all the countries covered, Bulgaria is probably the one with the most uncertainty at the moment in terms of potential for renewables, let alone solar PV.

Most of the installed solar capacity in Bulgaria in the past years came from ground-mounted and commercial installations, while residential rooftop is almost non-existent. However, authorities in the country are looking to introduce a support scheme for 10,000 small residential installations of up to 10kW in a move that could kickstart interest in residential solar.

The country has yet to face a similar boom than its neighbouring countries Greece and Romania. But solar is slowly taking off. In 2021 the country added 100MW of solar capacity, while last year it increased by almost sixfold to 580MW, says Rumen Petrov, board member and secretary-general of trade body Bulgaria Solar Association. "The very high price of the electricity last year pushed the market for solar plants."

Credit Chint Solar

It's only a question of time before the solar PV market blooms, as there are nearly 20GW of capacity to be added in the next three years, according to Petrov. All this solar capacity is currently waiting to get its application approved in order to get grid connection.

Due to the dynamic of the energy market in Bulgaria, short term contracts – of one year – are being favoured for the offtake of solar projects, says Petrov.

Probably one of the major issues in Bulgaria is unrelated to the solar industry in itself, as it is about the political instability the country has faced since 2021 with five elections in over two years, and with the latest one in early April 2023. This instability has made more complicated to pass new renewable legislations or reforms of the Renewable Energy Act that could give a bigger push for solar PV to grow in the country. Currently passing of that act is not expected to happen before the autumn, according to Petrov. More on the subject in this edition of PV Tech Power from Vladimir Tabutov, CEO of HEC Solar and former deputy of the Energy Commission of Bulgaria.

"However, it's worth mentioning that what makes it attractive, is that it starts from zero. Practically. There's a huge space, once you remove two or three coal plants, and there's a need for the capacity, it opens up huge opportunities for everyone," says Kefalas of Aurora Energy Research. And unlike neighbouring countries, the grid in Bulgaria has not yet faced the same levels of saturation.

Another problem that is currently slowing down the pace at which solar projects are completed comes down to the slow process of which building permits and grid connection permits are handled in Bulgaria. "The application for grid connection should be answered from the distribution electricity company within one month, but in practice, they're answering three to five months later. And it's almost the same with municipalities in terms of building permits," says Petrov.

However, a positive development that is expected to accelerate the growth of renewables in the country is the effect of the Recovery and Resilience Plan (RRP), says Kefalas. "There will be auctions to support 1.4GW of renewables by 2026. And this will be co-located with 350MW of storage." Kefalas adds that solar will most likely be the dominant technology for the auctions.

In Bulgaria's plan submitted to the

European Union, the country aims to invest €1.7 billion (US$1.87 billion) towards accelerating the deployment of renewables, electricity storage and interconnection capacities. The European Bank for Reconstruction and Development (EBRD) is working with the Bulgarian government to support the implementation of the reforms needed to boost renewables deployment.

Due to the nature of the projects being funded through the RRP, the projects will need to be delivered in strict time scales. "For the first time after nearly seven years or so, we will see some more potential for renewable capacity in Bulgaria to be installed," adds Kefalas.

These fundings will be necessary to kickstart interest in renewables in Bulgaria as merchant projects still have difficulty in securing funding from banks as they do not trust the current environment, according to Kefalas.

Given its vicinity with Greece, the country could clearly learn from what the government in Greece has done in terms of auctions for renewables and stating a clear target to decarbonise its electricity, especially given how unambitious its national energy and climate plan (NECP) is in terms of solar PV capacity, with a target of a mere 3.2GW by 2030. The cumulative installed capacity at the end of 2022 was of 1.5GW. A recent report from trade body SolarPower Europe expects Bulgaria to reach the target by 2025.

Hungary's double-hedged interconnection capacity

The activity in Hungary in the past two years has been quite low, says Kefalas, however the possibility that the government might reintroduce development of wind technology could help bolster the appetite in renewables, which was primarily driven by solar PV. At the end of 2022 Hungary had 3.9GW of total solar capacity installed.

Traction for solar PV is still lagging compared to other countries, despite launching the Metár auction a year and a half ago that attracted significant interest at the beginning, however, the latest auction ended up undersubscribed.

The current issue with projects not being funded through government subsidies is that Hungary set in place a 31% supplier income tax that affects any project that is not subsidised. "This means that if you secure a tariff for €50/MWh in the Metár auction, you're exempt from that. Now, if you want to sign up a PPA, you have to include a 31% extra cost in your calculation," adds Kefalas. For that same reason, so far not many PPAs have been signed as it makes it more complicated to secure an offtaker.

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Hungary's power system, meanwhile, could be a major obstacle for faster adoption of renewable energy generation. Hungary is a massive net importer of electricity, which makes them dependent of neighbouring countries and can trigger high costs if these countries have a low renewable penetration. Currently Hungary has 8GW of interconnectors with surrounding countries and does not require much balancing capacity or energy storage, as opposed to other countries in the region, according to Kefalas.

This could open the door for cross-border PPAs between Hungary and other European countries that might have better economics, lower financing costs and better load factors among others to rather develop a solar plant there and then sell the power produced in Hungary, a country with an important industrial activity. Kefalas warns that some constraints might apply in terms of how much cross-border capacity can be exported through PPAs.

Within its own borders, Hungary still faces a major challenge with its grid capacity, which was in such a bad state that it stopped accepting any grid connection last year, according to Kefalas. "The grid connection in Hungary is extremely important for the development of solar."

In order to improve the grid strength, new projects submitted in the Metár auction would need to have 10% of the capacity co-located with storage.

Other countries in the Balkans

Irrespective of the size capacity of any of the other countries in the Balkans (such as Croatia or Serbia), Kefalas does not expect them to reach a similar potential as Greece, Romania or Poland. Currently both Croatia and Serbia are more focused on wind power.

Serbia is about to launch its first renewable auction seeking 400MW of capacity, however, solar technology has not been included. It is only seeking wind power, despite solar having good potential in the country, according to Kefalas.

In the case of Croatia, Hungary's situation of being a major net importer of electricity could be beneficial to attract developers and investors in Croatia to build solar plants in the country and later export the capacity to the neighbouring country, due to load factors being better in Croatia than in Hungary.

"In terms of fundamental economics, it would make more sense to overbuild in Croatia and export to Hungary," adds Kefalas. However, this would need to take into consideration the threat of price cannibalisation which would be one of the major challenges in the region once more solar projects become operational.

Zygouras adds that even though at the moment Sunel is not looking to expand but rather solidify its position in the markets it is present, moving to Bulgaria, Croatia or Serbia would not be an issue, but would depend on the needs of the customer. "We're more customer orientated, if a good customer has a project in Bulgaria, we'll go there and construct for him. If they have a project in Serbia, we'd do the same. But going directly to a certain market and start building projects is not part of our strategy."

Overall most of the countries in Southern Europe still have a lot of progress to make in terms of accelerating the deployment of solar PV across the region. Greece, Romania and Poland farther north have managed to get to a more mature stage in terms of solar deployment and in the coming years are expected to enter the top ten in terms of capacity deployed in Europe.

While all the countries covered here differ significantly in the degree that renewables have penetrated the respective overall power generation mix, all will require a much bigger effort in order to meet decarbonisation targets and contribute towards the European Union's stated target of 740GW of installed solar PV capacity by the end of this decade. ■