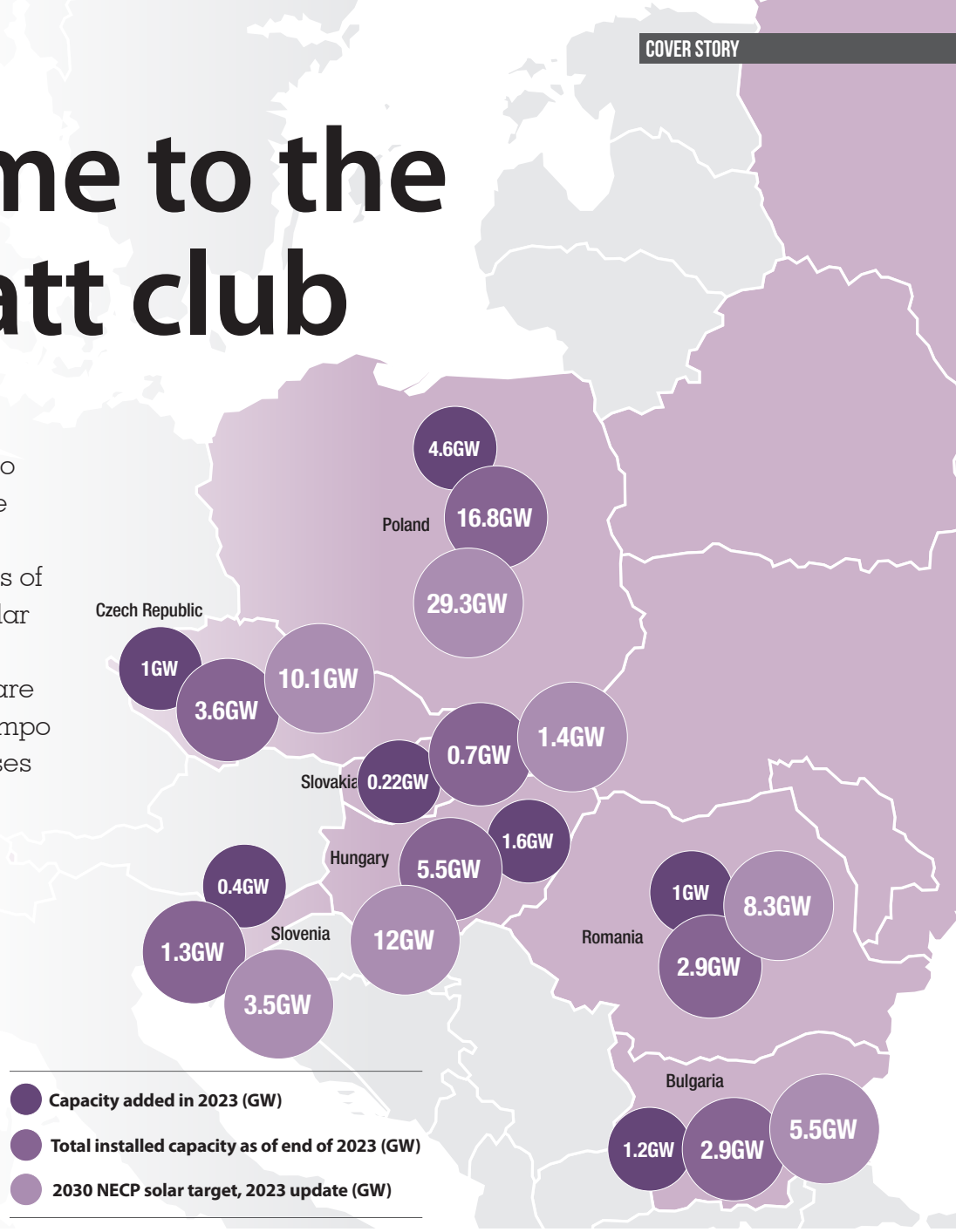
Welcome to the gigawatt club

Eastern Europe | Three of the five new European markets to hit 1GW of solar in 2023 were from the east. Will Norman looks at the shifting dynamics of Eastern Europe's leading solar markets, which like much of the continent's solar sector, are struggling to maintain the tempo as the 2022 energy crisis eases



Fourteen European countries installed 1GW or more of solar PV in 2023.

Five of these were newcomers to the GW-scale club, and three of those five were in Eastern Europe.

Bulgaria, the Czech Republic and Romania all passed the 1GW mark in 2023, along with Poland which has been the leading light of Eastern European solar for some time.

There are some unifying factors across the region as we look out to 2030. Grids, unsurprisingly, feature heavily, as does distributed rooftop solar. The fairly universal increase in solar deployments following the outbreak of war in Ukraine has subsided in most of Eastern Europe as electricity prices have levelled off, so governments have had to become more proactive in encouraging uptake.

The biggest markets—Poland and Hungary—are undergoing changes and seeing their prosperous rooftop sectors begin to slow. In the former case, the utility-scale sector is poised to take over from distributed generation, whereas the latter is likely to see a quiet few years. Both the Czech Republic and Romania have booming distributed and sub-50MW sectors but face challenges at a larger scale.

Poland

The largest market in the region, Poland's solar sector has been driven since 2016 by favourable conditions for distributed, residential and rooftop installations. Data from the Energy Market Agency shows that Poland had over 1.3 million micro-PV installations—those under 50kW—as of the end of September 2023. These alone represent over 10GW of grid-connected PV capacity.

This massive uptake was driven by two things: a net metering scheme which gave favourable returns to prosumers exporting power to the grid, and the war in Ukraine. However, the proliferation of residential systems put strain on the distribution grid, which led the government to replace net metering with a less attractive net billing system.

This legislative change has seen interest in residential systems decrease. Trade body SolarPower Europe (SEP) said the share of new residential solar installations decreased from 71% in 2021 to 60% in 2022 and to around 30% in 2023.

As one star wanes, another begins to wax. The utility-scale sector in Poland has been growing as government auctions and a taste for corporate power purchase agreements (PPA) drive figures forward. Dariusz Mańka, director of legal and regulatory affairs at Poland's solar association Polskie Stowarzyszenie Fotowaltaiki, told *PV Tech* last year that there was a "constant growing need for large-scale PV" in the market and that PPAs offered an attractive model for developers and investors.

Government auctions were popular at their inception, but the price volatility that bolstered rooftop solar following the Ukraine war dampened the December 2022 auctions. Of the seven issued, only four auctions were settled. But 97% of the roughly 490MW of awarded capacity went to solar PV projects.

The utility segment in Poland is on the rise as tariffs for residential PV face a squeeze

Credit: Equinor

Market challenges

One challenge looms larger than any other for Poland's solar sector: the grid. SPE says in its market outlook that most of Poland's grid infrastructure is over 25 years old, and portions are even over 40 years old.

Beyond ageing infrastructure, there is simply a lack of it. As a result, the queue for a grid connection is increasingly drawn out – data on the queue times for utility-scale solar projects is currently impossible to verify, SolarPower Europe said, and likely exceeds the 1.5-year best-case scenario.

Furthermore, the connection process itself is "ambiguously and inefficiently regulated" and untransparent according to SPE, and has resulted in the national distribution system operator (DSO) issuing over 7,000 refusals for grid connection in 2022, mostly to renewables and distributed energy sources.

Market drivers and forecast

Political will is likely to sustain the growth of solar in Poland. The Polish government has introduced other favourable amendments to its Renewable Energy Sources (RES) Act. Specifically, the government announced measures to support hybrid RES installations and operational and modernisation support for projects.

Upgrades to the grid are also in the pipeline. Earlier this year, the transmission system operator (TSO) Polskie Sieci Elektroenergetyczne (PSE) announced a plan to invest PLN64 billion (US$16 billion) in new transmission lines by 2034. The TSO projects that the expansion and upgrades would allow 45GW of new solar PV access to the grid – 20GW of utility-scale and 25GW of rooftop projects.

The government has also introduced "cable-pooling," the ability for multiple renewable energy sources to share the same grid connection. This has the potential to increase renewable energy sources' access to the country's grid.

Poland met and exceeded its NECP for solar in 2022, which SPE said was because "the technology wasn't on the radar at the time of writing the NECP". Despite this, solar is expected to continue to grow, though at a lesser rate than in recent years. Poland is forecast to connect 25.1GW in 2024-2027.

Czech Republic

In 2023, the Czech Republic re-entered the ranks of GW-scale solar markets for the first time in 13 years.

As with much of the region, the war in Ukraine and the ensuing energy crisis triggered a resurgence in the Czech solar market. This came alongside a simultaneous revival in subsidies for residential solar in 2021 and a scheme to support business-to-business solar projects in 2022 under the EU's Recovery and Resilience Fund (RRF).

As such, Czechia's boom period is driven by the residential sector, which shows no signs of slowing down. During the first half of 2023, almost 45,000 new projects were commissioned; 95% of them are below 10kW.

Market challenges

Utility-scale solar is stagnant in Czechia. Some projects are getting over the line, but the wider picture is rather static. SolarPower Europe estimates that 13 projects above 1MW were installed in the first half of 2023, most of them on rooftops. The Czech Solar Association said that of the roughly 170,000 installed PV systems in the country as of the end of last year, roughly 150,000 are rooftop installations.

Large-scale energy storage projects are currently not permitted in Czechia, something which SolarPower Europe says "has been blocked by some fossil fuel companies". A change to this would likely aid the rollout of utility-scale solar.

Market drivers and forecast

Czech industry is expected to play a major role in the fortunes of the solar market in 2024 and 2025. Heavy industries such as steelworks, the automotive sector and chemical plants all have obligations to decarbonise, and the EU has allocated at least CZK150 billion (€6 billion) for projects aimed at reducing the impact of the decarbonisation of industry in Czechia and facilitating the shift towards renewable energy by 2030. Moreover, this funding could actually increase as the Modernisation fund from which it comes is linked to the price of CO2 emissions certificates, SolarPower Europe said.

The Czech power mix also includes a relatively large nuclear and coal presence. While nuclear capacity will ultimately be expanded, nothing is expected before 2038, and coal plants are increasingly becoming unprofitable. Renewables – led by solar in terms of both cost and ease of deployment – will be needed to account for growing electricity demand.

In its optimistic forecasts, SolarPower Europe sees the Czech Republic installing around 2.5GW of solar annually. This requires the current barriers for utility-scale projects to be removed and a number of other scenarios, including legislation around energy sharing that would unlock solar power for the large number of Soviet-era apartment blocks. A "realistic" projection sees between 1.2-1.4GW installed a year and a pessimistic outlook sees relatively flat growth from now until the end of the decade.

Hungary

Hungary's star has been rising fairly consistently since 2017. Favourable policies for small-scale projects drove significant demand for residential and commercial systems below 50kW, whilst larger ground-mount systems rose steadily from 1.4GW in 2020 to 3.28GW in October 2023.

Then, like its Eastern European neighbours, the energy price spike following the war in 2022 triggered a rapid uptake in small-scale solar. This coincided with the government's decision to ban its feed-in-tariff scheme for residential installations, which saw demand spike as people looked to install solar in the two weeks before the scheme ended.

However, the inflexion point might have been reached for the country's growth. The spike in capacity ahead of the feed-in-tariff ban has subsided, and SolarPower Europe observes that "order books of residential PV systems have significantly decreased" over the last year. Moreover, grid capacity is being used up, and the

projections for new utility-scale PV sites are getting less positive.

Market challenges

Grid infrastructure raises its head again here. Hungary's updated NECP seeks 12GW of solar by 2030, but the grid is close to reaching capacity. SolarPower Europe estimates that it has not been possible to get a grid connection for a project over 50kW since April 2021, with the capacity online since then either already allocated or dedicated to the large rise in rooftop systems.

Ádám Szolnoki, president of the Hungarian solar association MANAP, has said that grid application reforms were delayed until mid-2023, which led to fewer permits being granted. Of the roughly 1.5GW large-scale permits granted in 2023 (3.9GW were submitted), almost all were for 2028-29.

MANAP also wrote an open letter to the Hungarian energy minister expressing concerns about the financing model for residential solar tenders. It said that the market was becoming less competitive and efficient as the restrictive new financing model – which has proved popular for consumers – pushes out small- and medium-sized businesses.

Market drivers and forecast

Hungary will likely meet its NECP targets, but the brakes have likely been put on its rapid growth. The aforementioned rooftop legislation and lack of grid capacity will combine to slow down deployments in 2024 and beyond.

For utility-scale, most of the projects due in 2024 have already been granted grid access, so SolarPower Europe predicts that around 600-700MW of new capacity will come online. Into 2025 and beyond, however, the situation is far less certain. The government announced a 440MW grid-scale energy storage tender in February this year which is designed to open up access for more renewable energy to the grid.

The residential sector has already slowed down and that looks set to continue. Future growth will rely on residential solar-plus-storage taking off as the government has announced an incentive scheme for residential co-located projects, though details are yet to be clarified.

Romania

Romania's solar forecast hinges on political action more than most countries in the region. Last year saw it become another Eastern European success story, as it breached the 1GW annual installation mark for the first time and installed 308% more than the previous year. The main increase was in the distributed generation sector which went from 417MW to 1.16GW over the year.

The government has taken several actions to streamline and promote solar. Its contracts for difference (CfD) scheme launched in September 2023, seeking 1GW of projects in its first tender, and permitting reforms for both utility-scale and distributed solar projects have streamlined the grid access process. Utility-scale projects under 50 hectares (roughly 40MW) have seen their permit times reduced from 18 to six to 12 months, and distributed projects under 400kW are able to obtain their documentation within a month.

Market challenges

However, large-scale projects on over 50 hectares are currently beleaguered by permitting issues. According to Irene Mihai, policy officer of the Romanian Photovoltaic Industry Association (RPIA), the Ministry of Agriculture and Rural Development (MARD) has incited an "arduous process" for gaining permits for large solar sites.

Regardless, a number of very large sites are in the pipeline in Romania. Notably a 600MW facility from Romanian renewables developer Econous Green Energy and the mammoth 1,044MW planned by Rezolv Energy. This latter project would incorporate elements of agrivoltaics and battery energy storage and may prove an interesting test case for the future of large-scale projects in Romania if it reaches operations.

Market drivers and forecast

Panos Kefalas, research lead expert – Southeastern Europe at Aurora Energy Research told *PV Tech Power* he expects Romania to be on the "front lines" of solar in Eastern Europe in the next two years. "Romania finally has the CfD auctions underway… So that's already an easy way for investors to go for solar, because Romania does not yet have the massive saturation [of other grids] so even standalone solar will survive there."

Most forecasts agree that Romania is set for sustained development in its PV sector because of the current conditions created by favourable political decisions. But there are still some questions over regulations – particularly for large projects – and the pervasive need to adapt and build out the grid to accommodate more renewables.

Bulgaria

Bulgaria is the sunniest place on this list, and that's reflected in its solar market outlook. From 2020-2023, it nearly tripled its deployed capacity, and its national trade association predicts that capacity to more than double again by 2030. It is forecast to meet its NECP target in 2024. Summer 2023 saw solar account for 41% of the total energy mix on multiple occasions. Industries are increasingly seeking solar PPAs to decarbonise their operations and benefit from its low levelised cost of electricity (it's the cheapest form of energy available in Bulgaria) – continued awareness and interest will only increase the market's allure in the coming years.

Notably, Greek project developer Mytilineos announced a plan for 500MW of solar in Bulgaria in April 2024 as part of a wider 2GW, €2.2 billion (US$2.39 billion) regional commitment.

The country's Association for the Production, Storage and Trading of Electricity (APSTE) expects growth of 450-750MW of new solar capacity each year over the next three to four years, indicating it will easily meet its revised NECP target of 5.2GW. However, APSTE also notes that concerns over grid-connection capacity in the coming years as more PV comes online could prompt a tightening of the requirements of financing institutions and drive investment in energy storage. ■

With its enviable resources, Bulgaria's solar market is starting to lift off

Credit: Sunotec