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Harnessing Your Rooftop

A guide to photovoltaic projects in commercial buildings in CEE

December 2024

Contents

Introduction

Welcome to our joint CBRE and CMS report on the introduction to photovoltaic solutions in commercial buildings in CEE

The adoption of photovoltaic (PV) solutions in commercial buildings is experiencing significant growth across Central and Eastern Europe (CEE). The region is witnessing a robust expansion in solar energy production, driven by EU and national policies and market dynamics. This growth is creating a myriad of opportunities for commercial property owners to harness solar energy, reduce operational costs, and contribute to environmental sustainability. The space on the rooftops of commercial buildings is seemingly a low-hanging fruit for solar power harnessing. However, rooftop PV projects are accompanied by several technical, legal, and commercial challenges that need to be navigated effectively.

On a practical level, developing a PV project is a complex undertaking. Starting with choosing the right operating model, securing the title to the roof, arranging technical solutions, connecting to the grid, and ensuring a revenue stream through a power purchase agreement, each step involves careful planning and execution. This multi-faceted approach requires a deep understanding of both technical and legal aspects to ensure a successful and sustainable PV project.

Furthermore, we delve into how different CEE nations are approaching solar production at the national level. For more detailed information on the national regulations relevant for rooftop PV project in CEE, refer to the CMS CEE Expert Guide to Solar Panel Installation. This resource provides comprehensive insights into the legal and regulatory environments across different countries, helping stakeholders navigate the complexities of implementing PV solutions in commercial buildings.

And to help our readers better navigate through the technical terms used in PV projects, we provide a short jargon buster at the end of our report.

We hope you enjoy reading this report. If you would like to discuss any of its themes in more detail, we would welcome a conversation.

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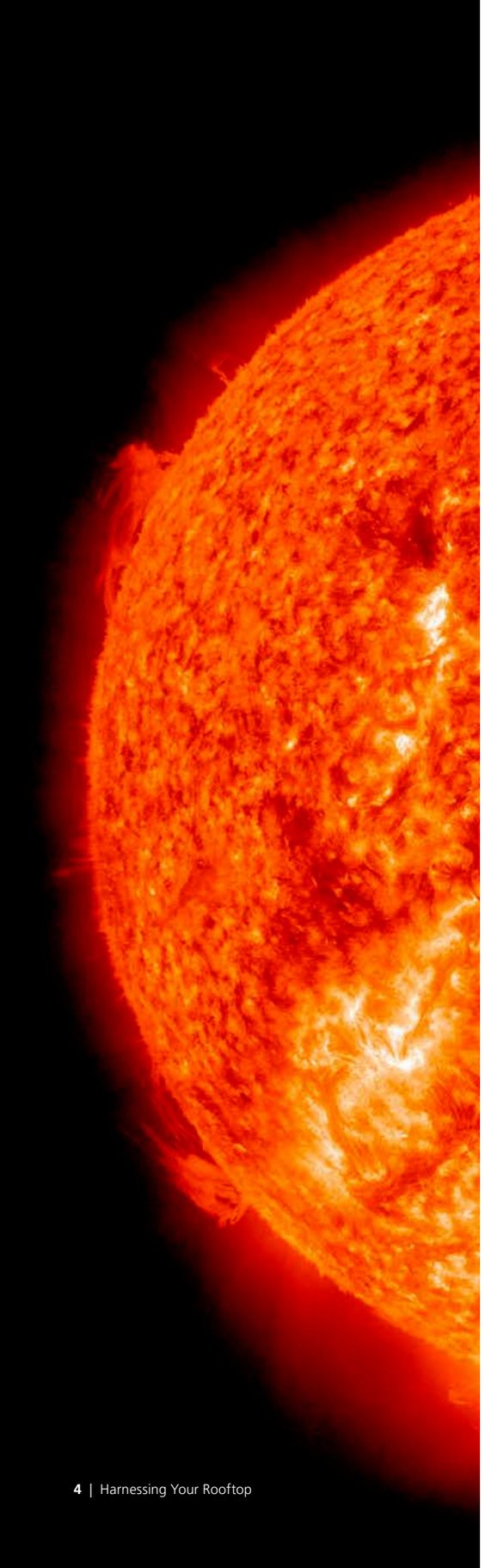


The solar opportunity

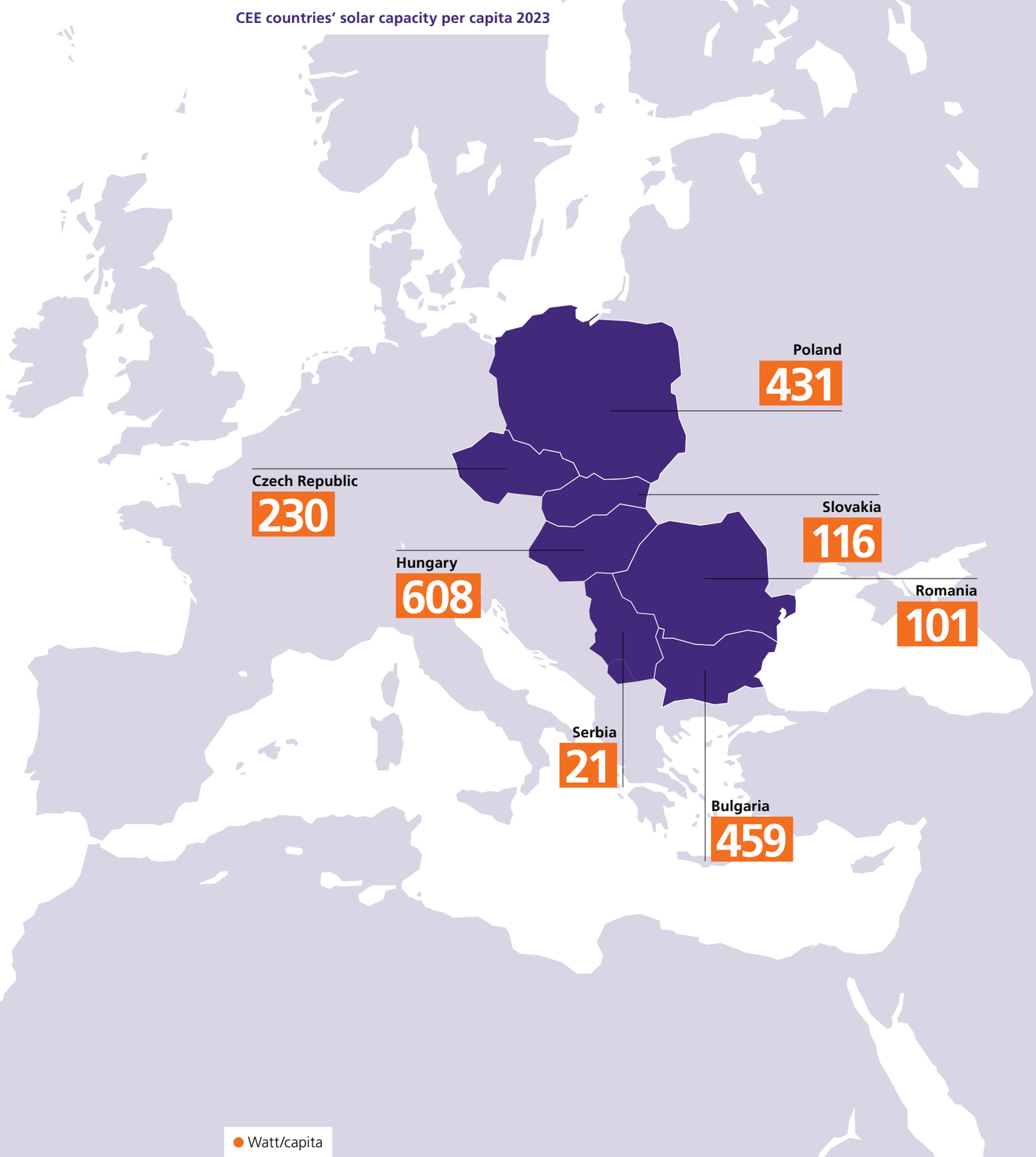
Apart from being instrumental in the decarbonisation of the electric power grid, the need for sustainable energy sources was brought into sharp relief by the disruption to the European energy grid that resulted from Russia's unprovoked invasion of Ukraine.

A provisional agreement was reached in March 2023 to raise the European Union's (EU) renewable target for 2030 to a minimum of 42.5% of final energy consumption, up from the current 32% target. The European Commission also proposed a Net Zero Industry Act, which will target domestic manufacture of up to 40% of Europe's clean energy technology deployment needs by 2030. The Act will cover eight technologies and simplify regulation, supported by existing funding streams. In January 2023, the EU adopted a Council regulation to accelerate the permit-granting process for renewable energy projects.

Western Europe has been a frontrunner in adopting renewable energy sources. Massive investments have been made in large-scale solar farms, both onshore and offshore. Declining costs of solar panels and installations make it an attractive and competitive option compared to conventional energy sources. As technology advances and economies of scale come into play, solar energy is becoming more cost-effective.

However, in Central-Eastern Europe (CEE) there is still room for improvement. According to the latest statistics published by the International Renewable Energy Agency (IRENA), solar capacity per capita is lower in CEE than in core Western countries: the ratio ranges from 20 W/capita in Serbia to 308 W/capita in Hungary.

CEE countries' solar capacity per capita 2023



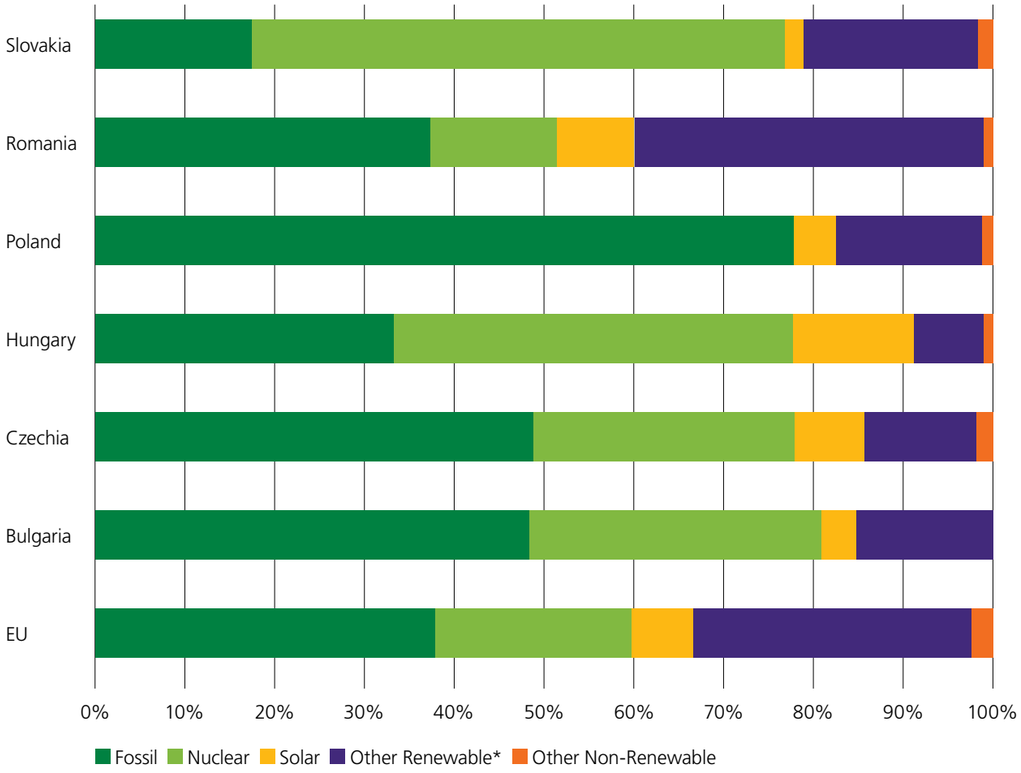
Source: Total installed capacity; The International Renewable Energy Agency (IRENA), Oxford Economics

Electricity production mix in CEE

Although the green agenda seems to have taken a back seat in 2024 due to disappointing industrial performance and political upheaval in Europe and overseas, the long-term trend of green transition in energy remains unbroken. There is a clear tendency in CEE to move away from fossils and incorporate renewables in the electricity mix—driven not only by sustainability but also by geopolitical imperatives.

Looking at electricity generation in CEE countries, however, it is clear that there is still a long way to go. In the region, fossil-fuel sources still take up the lion's share of the energy mix. This is particularly the case in Poland, where almost 80% of electricity comes from solid fossil fuels, manufactured and natural gases, and oil products—despite the massive efforts made in previous years. Everywhere else in the region, nuclear energy plays a vital role: Slovakia (59%) and in Hungary (44%) stand out and there are plans to expand these capacities even further. Among renewables, hydro is important in many countries, but solar capacities are expanding the most dynamically everywhere. Hungary excels with solar having a 13% ratio in total energy production, which is above the EU average of 7%.

CEE countries' electricity production split by categories



Source: Eurostat 2022
**Other Renewables include biofuel*

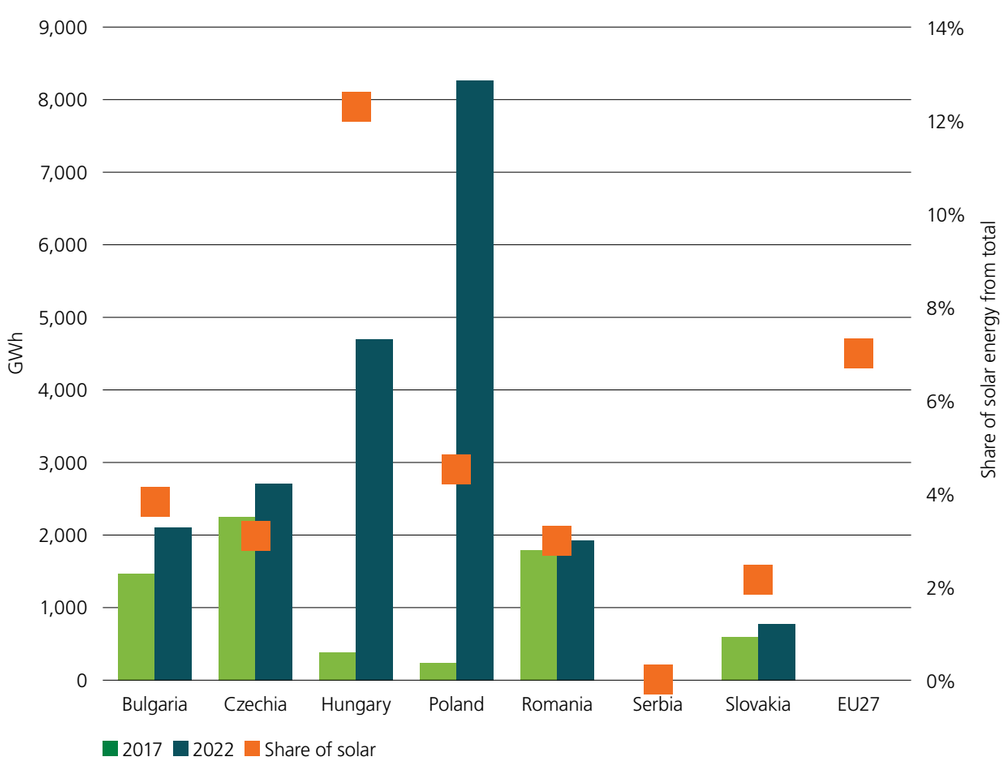
Photovoltaic electricity generation on the rise

Regarding photovoltaic energy generation, CEE countries have already come a long way. In 2024, solar capacity investment in CEE has seen significant growth, driven by increasing demand for renewable energy, government incentives, and EU funding. Countries like Poland, Hungary, and the Czech Republic are leading in solar installations, with policies aimed at expanding renewable sources to meet climate targets. Overall, the region is becoming increasingly attractive for solar investments.

The solar transition started earlier in some countries than in others: Bulgaria, Czechia and Romania had already developed a sizeable solar generation capacity by the mid-2010s. Other countries started this development later: Hungary and Poland both began slowly but have increased dynamically in the last couple of years.

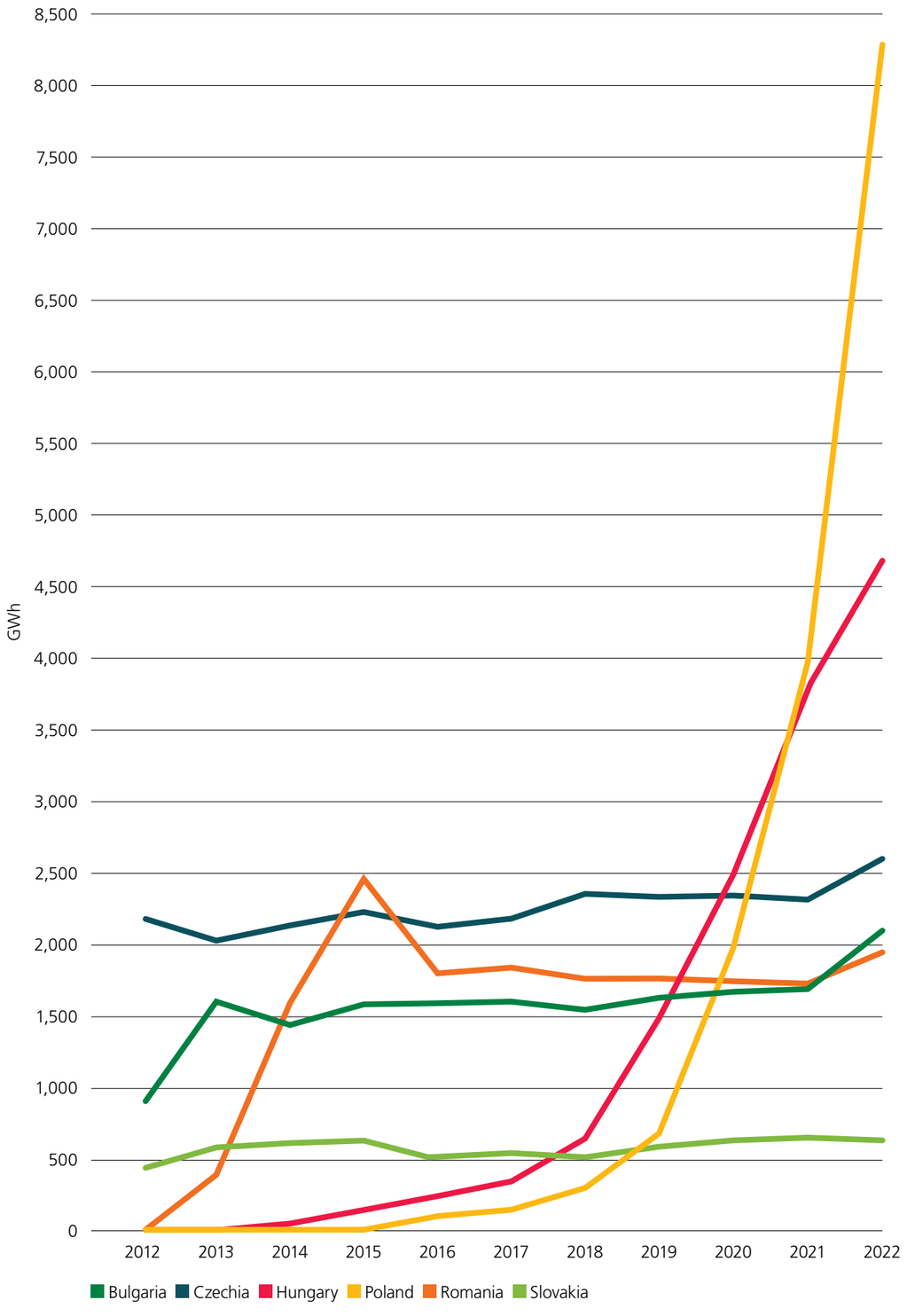
Solar electricity generation has increased in all countries over the last five years, albeit not at the same pace due to different policy directions. The largest capacity increases have been seen in Hungary and Poland, while the other countries have experienced more modest progress. Poland added over 8,000 GWh p.a. solar energy production to its energy mix, while Hungary has become the only country in the region so far with solar exceeding the EU average in its energy production mix.

CEE countries' PV electricity generation by country



Source: The International Renewable Energy Agency (IRENA) 2022

PV Electricity Generation in CEE



Source: The International Renewable Energy Agency (IRENA) 2022

The opportunities

Financial
Solar systems can reduce a building's reliance on grid supplied electricity by as much as 80% and in many cases offset electric bills by up to 95%, therefore lowering the tenant's cost of occupancy. Such savings are particularly crucial for triple net lease tenants. Lower energy costs and access to clean energy can encourage tenants to sign longer lease agreements and make the building more attractive to potential occupiers.

Environmental
Rooftop PV generates clean energy that offsets grid supplied electricity, the majority of which is produced by fossil fuel-burning power plants. The implementation of rooftop solar PV will result in reduced carbon emissions due to a cleaner energy supply.

Marketing
More companies have set net zero targets in recent years, putting pressure on other companies to adopt similar approaches. Solar PV can help to achieve these objectives and, thereby, avoid regulatory risk and promote a sustainable environment.

Social
Community solar can enable access to solar energy sources for multiple local community members such as small businesses, residential homeowners, renters and low and moderate income (LMI) customers.

Other benefits
Solar panels extend the lifespan of roofs by providing protection against natural elements such as rain, snow, debris and direct ultraviolet (UV) light. Moreover, if a building's owner is seeking to obtain a sustainability certification (BREEAM, LEED or similar), solar rooftop panels count towards several of the credit categories.

Source: CBRE, Solar Energy Opportunities in U.S. Industrial Real Estate, 2022

There is no better time than now?

Achieving net zero goals is impossible until buildings are entirely powered by renewable energy. The electrification of assets has become a priority for policy makers. For commercial property owners and occupiers, solar power generation is both an opportunity and a challenge.

A guideline in energy transition is that carbon reduction is more achievable when renewable energy is generated close to where it will be used. The following figure explains the types of clean energy that can be generated close to where it is used, unlike types such as hydropower and nuclear.

Types of clean energy that can be generated close to where it is used

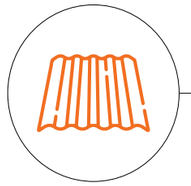
Energy	Up-front investment	Impact on reducing carbon emissions	Realistic for a commercial property?
Solar Harnesses the energy produced by the sun, even in cloudy weather.	$$	High	Yes
Solar thermal The energy harnessed from the sun is converted to heat instead of electricity.	$$$	Medium	Yes
Wind Large turbines harness the kinetic energy of the wind and convert it to electricity.	$$$$	Medium	No, rarely applicable for an individual site.
Geothermal Extracts heat from the Earth's interior using technology including wells and heat pump technology.	$$$	Medium	No, only ground source heat pumps.
Biofuels Organic materials including wood, charcoal, algae and manures produce heat and power. They create GHG emissions, but at lower levels than fossil fuels.	$$$$	High	Yes

Source: CBRE, Decarbonising Real Estate, 2023

On-site solar PV is a practical and commercially viable solution for real estate owners and occupiers. According to the International Renewable Energy Agency (IRENA), solar PV module prices have fallen by 90% since the end of 2009 (Power Generation Costs – International Renewable Energy Agency).

This reduction has boosted demand for solar, which has contributed to making it one of the most competitive electricity generation technologies in the EU, and one of the fastest-growing in renewable energy: from 52 GW of total installed PV capacity in 2011, the EU reached almost 160 GW in 2021 (European Commission, 2022). New solar PV technologies promise even higher energy conversion from sunlight, more energy efficiency, and lower costs for industry and consumers alike.

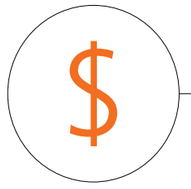
The Challenges of Roof Installations



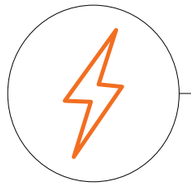
Roof Structure
The roof structure of industrial buildings may not always be designed to support the weight of solar panels. This can require additional engineering analysis and reinforcements to ensure the roof can safely support the added load.

Roof Orientation and Tilt
For optimal energy production, PV panels should ideally be installed at a certain tilt and facing towards the sun. However, the roof orientation and tilt of industrial buildings may not always align perfectly with these requirements. Additional mounting systems or adjustments may be needed to optimise panel orientation.

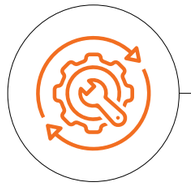
Shading
Industrial buildings may have obstructions such as HVAC equipment, vents, or nearby buildings that can cause shading on the PV panels. Shading can reduce the efficiency and performance of solar panels, so careful analysis of shading patterns and panel positioning is necessary to minimise this impact.



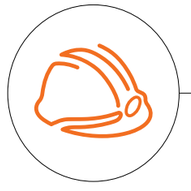
Wholesale electricity price
Dropping or fluctuation of electricity prices make robust financial modelling difficult and put profitability of some projects at risk.



Electrical Infrastructure
Industrial buildings may have different electrical setups and configurations. Ensuring proper electrical compatibility and designing a suitable wiring and connection system to integrate the solar panels into the existing infrastructure can be a challenge.



Maintenance and Accessibility
Industrial buildings often have large roof areas, which can make maintenance and accessibility for cleaning or repairs more challenging. Proper planning for maintenance access and designing efficient maintenance processes is important to ensure the optimal performance and longevity of the PV system.



Safety Considerations
Industrial buildings can have unique safety considerations, such as the presence of heavy machinery or equipment on the roof. Sufficient safety measures, such as guardrails or restricted access areas, should be implemented to protect workers during the installation and maintenance processes.

Making the project work

Connecting to the grid

Subject to national and regional regulations, securing grid connection is essential for the efficient use of electricity off-site use of electricity.
See page 16.

Selling the power

Power purchase agreements regulate the terms of the purchase and sale of electricity, on-site and off-site.
See page 16.

Title to use the roof

Depending on operating model and property ownership, the PV owner has to select a way to legally secure adequate title to use the roof.
See page 14.

National regulations

See CMS CEE Expert Guide to Solar Panel Installation for details on regulations on national level.
See page 16.

Operating models

Several operating models are available, depending on the buildings ownership, location of the production and the entity operating the PV installation.
See page 14.

Technical contracts

From installation to repair and maintenance, the project requires a robust set of technical contracts.
See page 15.

Operating models

Property owner or group company

One operating model of photovoltaic installations on the rooftops of commercial buildings is when the property and the PV installation is owned by the same entity or the entity is from the same group. In this model, the entity invests in the PV system and benefits from the electricity generated and savings, as well as any available incentives or subsidies. The entity may also sell excess electricity to the grid or the occupiers of the property. This model allows the entity to have full control over the design, operation, and maintenance of the PV system, as well as to enhance its environmental and social reputation. However, this model also requires a high upfront capital cost and there is a risk of technical or regulatory changes that may affect the performance or profitability of the PV system.

Tenant

— Typically known as the tenant-landlord model, the tenant leases the rooftop space from the property owner to install and operate a PV system. This can be an appealing option for long-term tenants who have a high energy demand, as they can directly use the electricity produced by the PV system, thus reducing their energy costs.

— The main advantage of this model for the tenant is the potential for significant energy cost savings, particularly if the property is located in an area with high electricity rates or ample solar resources.

Title to use the roof

Lease agreement

Leases are generally easier to establish than easements, often requiring only a contract between the parties, depending on local laws. On the other hand, they're also easier to terminate. As a lease is usually a personal right between the parties, it may not be registered on the property title and may not run with the property. In some countries, leases might not transfer if the property is sold and they terminate unless specifically allowed in the lease agreement. The terms and scope of the coverage of the lease can be materially similar to an easement regarding PV installations.

Easement

Easements are generally harder to establish than leases, often requiring registration on the property title, depending on local laws. On the other hand, they are also harder to terminate. As an easement can be registered on the property title and runs with the property, it's usually considered a stronger right. In some countries, leases might not transfer if the property is sold and they terminate unless specifically allowed in the lease agreement. The terms and scope of the coverage of the easement can be materially similar to a lease regarding PV installations.

Right to build

A right to build is a legal construct used in some jurisdictions, including the Czech Republic, where a non-owner can obtain the right to own a building or structure erected on someone else's land for a certain period of time. In the context of a rooftop PV system, this might involve the PV system owner (which could be a third-party company) obtaining a right to build the PV system on the roof of a building owned by someone else (such as a commercial property owner). The PV system owner would then own and operate the PV system, typically selling the electricity back to the property owner or to the grid.

Technical contracts

EPC contracts

The building owner or the tenant of the roof would typically procure the installation of the rooftop PV project based on an EPC (Engineering, Procurement and Construction) contract. EPC contracts represent the most common type of contract for the procurement of photovoltaic installations used in the private sector based on which the contractor usually delivers a complete (turnkey) rooftop PV solution to the employer.

While the main principals of EPC contracts are similar to those used in institutional construction contracts, for the energy facilities EPC contracts will also have some sector specific clauses. These include provisions regulating putting the project into operation (commissioning) and performing tests to confirm safe and reliable operation of the completed project or specific guarantees of the required level of efficiency ("performance ratio guarantee") or minim operational time during the agreed period (availability guarantee). In EPC contracts for PV projects, it is also common to agree a longer warranty period for certain parts of projects, such as bearing structures, solar modules, invertors and certain other equipment.

It is also crucial to have a contractually and technically secured interface with other providers, such as the co-operation of the contractor regarding the technical connection of the completed project to the grid or delivering operational manuals, and the training of personnel enabling the project to be operated by another party or the project owner itself.

O&M contracts

An O&M (Operations and Maintenance) contract is a type of agreement used in the photovoltaic industry between the project owner and the specialised O&M provider which outlines the terms and responsibilities for the ongoing operation, maintenance, and management of the PV project after it has been installed and commissioned by the EPC contractor.

The purpose of an O&M contract is to ensure the long-term performance, reliability, and efficiency of the solar rooftop installation as well as technical compliance with the requirements imposed by relevant laws, financing institutions and insurers. By engaging a specialised O&M contractor, the system owner can benefit from professional management and maintenance, which can extend the lifespan of the solar installation, optimise energy generation, and provide peace of mind that the investment is well-maintained over its operational life. When negotiating the O&M contract, the project owner should aim to agree on the contractual set-up motivating the O&M contractor to provide its services in the manner ensuring at least the minimum level of operational availability and performance of the project over a certain period of time. This can also include the requirement under the O&M contract to have available certain key spare parts, the obligation to continuously monitor the performance of the project, guarantee response times in the event of unexpected issues requiring urgent repair work, etc.

The O&M provider can be an independent third party or the same entity as the contractor under the EPC contract. From a practical perspective, it is usually

preferable and beneficial for the employer to agree with the EPC contractor that the contractor (or one of its affiliates) will also act as the O&M contractor at least for certain limited period of time after completing the work under the EPC contract. Such arrangement increases the probability of a smooth transition between the project phases. This also improves the owner's legal position in the event of warranty claims against the EPC contractor, as the EPC contractor may not be able to claim that potential defects in the project were caused by the owner's improper operation or lack of maintenance.

Connecting the project to the grid – Grid Connection Agreements

The project owner will often prefer that any power generated by the PV Plant is consumed on-site, i.e. in the area of the production ("on site" or "direct wire" solutions).

The project owner will prefer that any power for which there is no off-take "on-site", can be supplied to the local or national distribution grid.

While certain key principles of the regulation of access to the public grid are set by EU legislation, the grid connection framework is subject to national legislation and may differ depending on the jurisdiction in which the project is located. A solution which works in one country may not work in another. Additional rules are also set by the distribution system operators (DSOs), who operate the grid in certain area, such as an industrial park (a local distribution network) or in a wider region.

Generally, the DSO must act in a non-discriminatory manner and connect the project to the grid as long as this is technically possible, there is enough capacity of the grid, and the project owner compensates the respective part of the costs related to grid connection. In some countries, a PV project can benefit from rules granting a preferential right of renewable projects to be connected to the distribution grid.

The rights outlined above can be limited for technical reasons, such us if there is lack of capacity of the distribution facilities or if connecting a particular project would threaten the safe operation of the distribution grid.

Power sale – Power Purchase Agreements

A Power Purchase Agreement (PPA) is a contract between a power producer and a power purchaser under which the producer agrees to sell electricity to the purchaser at an agreed price for a certain period of time. The choice of the type of PPA will depend on a number of factors such as size of the project, volume of power which can be consumed "on-site", operating model of particular project, etc.

Guarantees of Origin

A Guarantee of Origin (GoO) is a certification mechanism used in the European Union to track and document the origin of electricity generated from renewable energy sources. It provides transparency and ensures that consumers can verify the renewable nature of the electricity they are purchasing. Each GoO represents a specific quantity of renewable electricity (typically measured in kWh or MWh).

In essence, when electricity is generated from renewable sources, the producer can apply for GoOs from the relevant local authority. These GoOs are then electronically registered and stored in a central database, ensuring their traceability and preventing double-counting or misuse. Once a GoO is issued for a certain amount of renewable electricity, it can be traded separately from the physical electricity itself.

Consumers or companies that want to claim that they use renewable electricity can purchase GoOs equivalent to their consumption from certified renewable energy producers. By doing so, they can support renewable energy production and demonstrate their commitment to sustainability and environmental responsibility.

Permitting and licencing

Naturally, any material construction works will be subject to construction permitting processes. In addition, further authorisations or licences will be required for the commission and operation of the power producing facility. The respective permitting requirements vary in different countries.

For more specific information on permits required for respective jurisdictions, please see the local chapters of CMS CEE Expert Guide to Solar Panel Installation.

Country reports: Shining light on photovoltaic solutions across CEE

The country reports provide an overview of the current state and future prospects of renewable energy sources, especially solar power, in six CEE countries: Bulgaria, the Czech Republic, Hungary, Poland, Romania, and Slovakia. Each report highlights the similarities and differences between these countries in terms of their energy mix, consumption, production, exports, targets, policies, incentives, challenges, and opportunities for renewable energy development.

All of these CEE countries have a lower share of renewable energy sources in their overall energy mix than the EU average of 22%. Bulgaria and Poland have the lowest shares, with 15% and 17% respectively, while the Czech Republic, Hungary, Romania, and Serbia have slightly higher shares, ranging from 18% to 24%. The most widely used renewable source of energy in these countries is hydropower, followed by solar, wind, and biomass. However, the share of solar power is increasing rapidly in some countries, such as the Czech Republic, Hungary, and Romania, due to various factors such as cost reduction, technological advancement, environmental awareness, and government support.

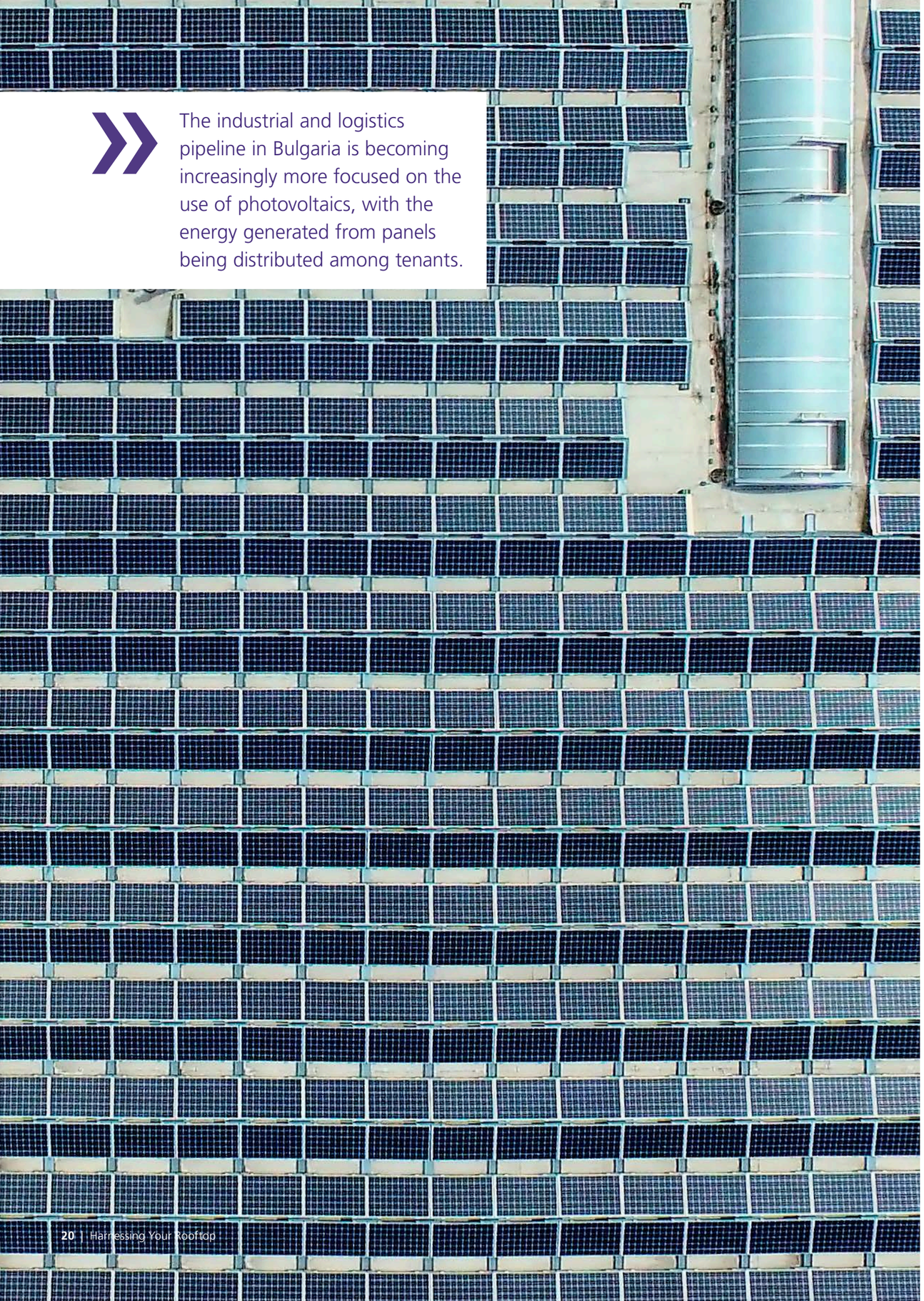
Each country relies mostly on fossil fuels, especially coal and gas, for its energy production and consumption, which poses significant challenges to energy security, efficiency, and sustainability. However, some are also investing in nuclear energy, including Bulgaria, the Czech Republic, Hungary, and Romania, to diversify their energy sources and reduce their dependence on imports and emissions. Serbia is planning to open its first nuclear block by 2033, while Poland is aiming for six nuclear blocks by 2040. The role of nuclear energy in the energy mix varies from country to country, with Hungary having the highest share of around 50%, followed by the Czech Republic and Romania with around 30%, and Bulgaria with around 20%.

National targets and strategies have been set to increase the share of renewable energy sources in the countries' energy consumption and production by 2030, in line with the EU energy goals and the Paris Agreement. However, the level of ambition and progress varies significantly across the countries. Bulgaria has a target of at least 27.09% renewable by 2030, the Czech Republic has a target of 30%, Hungary has a target of 12,000 MW of solar capacity, Poland has a target of 23%, Romania has a target of 10 GW of solar capacity, and Serbia has a target of over 30%. Some countries have also adopted longer-term visions for 2040 and 2050, such as the Czech Republic, Poland, and Serbia, which include further reductions in fossil fuel use and emissions, and increases in renewable and nuclear energy sources.

Each country has implemented or is planning to implement various policies, programmes, and incentives to support the development of renewable energy sources, especially solar power, in its market. These include financial subsidies, feed-in-tariffs, tax benefits, net metering, simplified permitting procedures, modernisation funds, and energy efficiency schemes. However, some countries also face barriers and challenges, such as grid limitations, administrative burdens, legal uncertainties, market fluctuations, social acceptance, and environmental impacts. Therefore, the countries need to address these issues and create an enabling environment for renewable energy investments and innovations.

All of the countries have witnessed an increase in the demand and supply of solar power in different sectors, such as residential, commercial, industrial, and public services. The residential sector is particularly active in installing solar panels on rooftops to generate electricity and reduce energy bills, as well as to participate in the prosumer model of selling excess energy to the grid. The commercial and industrial sectors are also embracing solar power to meet their energy needs, reduce operating costs, and demonstrate their commitment to sustainability. Large commercial buildings, factories, and businesses are installing solar power systems to offset their electricity consumption and achieve energy efficiency targets. The industrial and logistics sector is becoming more focused on the use of photovoltaics, with the energy generated from the panels being distributed among tenants. The public services sector is also adopting solar power to provide clean and reliable power to rural and underserved communities, as well as to public facilities such as schools and hospitals.

In conclusion, renewable energy sources, especially solar power, have a significant potential and role to play in the energy transition and transformation of the six European countries. However, the countries also face various challenges and opportunities that require concerted and coordinated efforts from the government, the private sector, as well as civil society, to overcome. The countries can learn from each other's experiences and best practices, as well as from the EU and other international partners, to accelerate the development and deployment of renewable energy sources and achieve their energy and climate goals.



The industrial and logistics pipeline in Bulgaria is becoming increasingly more focused on the use of photovoltaics, with the energy generated from panels being distributed among tenants.

Bulgaria

In 2023, Bulgaria's use of renewables accounted for 20% of the overall energy mix, up from 15% in 2022. Solar surpassed gas and hydropower electricity generation in 2023 to become the third largest source of energy generation. This trend has continued into 2024.

Despite the notable increase in the renewable energy share, the country is lagging behind the EU average, which saw an increase. According to Reuters, by June 2024 50% of the energy produced EU was from renewable sources. Bulgaria relies mostly on coal and nuclear energy, which accounted for two-thirds of the total energy produced in 2023. The most widely used renewable source of energy in 2023 was solar (7.73%) surpassing hydropower (7.72%) for the first time. Wind and biomass accounted 3.75% and 0.45% of the total energy mix, respectively. Bulgaria has a national target of at least 27.09% renewable by 2030 (source Ensto-E).

The production of electricity in 2023 decreased by 27% compared to the previous year mostly due to the reduction of the coal produced energy. The country had the highest per capita production in 2022 in Southeastern Europe, but even relative to 2021, the total energy produced was 12.1% less. The reduction of coal produced energy further decreased Bulgaria's net exports from 12,195 GWh in 2022 to 3,300 GWh in 2023 (based on figures from the National statistical institute). Notably in May 2023, the country became a net importer for the first time in the last 30 years.

According to the Electrical Systemic Operator, the countries to which Bulgaria exported the most in 2023 were Romania, Serbia, North Macedonia, Turkey and Greece. However, at the beginning of 2024 the picture changed dramatically as Bulgaria became a net importer. This is because additional capacities now consist mostly of coal produced energy, which has almost stalled as it is not price competitive compared to other energy sources and local businesses prefer to import energy from Romania, Greece and Serbia.

According to the National Statistical Institute, in 2023 the total energy produced was 33,300 GWh which is some 27% lower than the year before. Bulgaria was still a net exporter with 3,300 GWh leaving the country. However was a huge 73% drop from 12,195 GWh the year before. While solar is now the third major source of electricity production in the country's energy mix, the share of less competitive coal is still high and energy from neighbouring countries has become more attractive to local businesses. The YTD data to July 2024 suggest that Bulgaria has only 333 GWh of net exports to date with a negative balance in the cold winter months. In terms of energy consumers in the country, the largest consumption groups include Transport (34%), Industry (28%), Households (24%), Services (13%) and Agriculture (0.13%).

Solar and wind energy is picking up but the pace is lagging behind neighbouring countries, especially Romania and Greece, which are become more competitive. At the same time, Bulgaria is struggling to decide about the coal energy, as this sector employs a large number of people and a decision to scale this back would not be popular.

Nevertheless, recent amendments have been made to the Law on Energy from Renewable Sources, whose aim is to reduce the administrative burden on investors who wish to develop Renewable Energy Storage production. More specifically, it is envisaged that installers and household users will be able to participate in the production, consumption and sale of excess energy owing to contact centres, which will provide the necessary information for this kind of system.

However, for commercial users, there is no cap on their own use energy capacity. Hence, solar panels for 3kWp or 200kWp can be fitted. If the business won't be able to use the energy and would like to sell it to the grid, the storage option represents an attractive one. Unfortunately for now, funding is on a capital allocation basis and once absorbed, it is not available to further applicants. There are currently discussions and draft legislation to allow funding for energy storage for businesses which will make investments in renewable capacities even more popular.

For more on information on the **Bulgarian PV legal framework**, please visit the cms.law website **here**

Czech Republic

The development of renewable energy sources in the Czech Republic saw significant growth last year. In 2023, the Czech Republic installed 35,000 photovoltaic power plants with a total output of 320 MW, marking a year-on-year increase of 10.8%. The average size of power plant is also gradually increasing. However, the Czech Republic has long lagged behind in producing electricity from renewable sources.

In 2023, renewable energy sources accounted for approximately 15% of total energy consumption, including contributions from biomass, solar, and hydropower. Last year, the share of solar and wind power plants in the total volume of electricity produced in the Czech Republic was 4.2%, significantly below the EU average of 23%.

In October 2023, the Czech government adopted a climate-energy plan. The plan sets out an outlook for developing the energy industry until 2030; the share of renewable energy sources in total consumption should rise from 15% to 30% by 2030. Solar and wind energy, in particular, should drive growth. In the longer term, nuclear energy should also be strengthened, especially by constructing up to four new nuclear units. The plan also confirmed a move away from burning coal by 2033.

» The proportion of renewables in the Czech Republic's energy mix is relatively small, with fossil fuels dominating. As of 2023, fossil fuels accounted for 53.6% of the total energy consumption in the Czech Republic. However, this situation is expected to change with the new climate-energy plan.

Looking ahead, energy consumption indicates a gradual shift towards more sustainable energy sources. An increase in electricity consumption can be expected with the development of electromobility, as well as the electrification of industry and the heating sector. In addition, a significant decrease in energy consumption and a reduction in electricity production from coal are predicted. These changes should be largely offset by increased electricity production from renewable energy sources. Heat pumps, photovoltaics, and wind power plants should drive the development of renewable energy sources.

The Czech Republic is increasingly focusing on renewable energy projects. This is supported by financial incentives for the construction of such projects, speeding up the process of obtaining all necessary permits, and ensuring that the electricity generated by these projects is collected. In order to support the construction of renewable energy plants. There is also the Modernisation Fund, from which funds can be drawn for, among other things, the production and use of electricity from renewable sources. One of the programmes financed by the Modernisation Fund is to support new non-fuel renewable energy sources.

For more on information on the **Czech PV legal framework**, please visit the cms.law website **here**

Hungary

Solar energy has become a key element in the Hungarian energy mix and contributes 13% to total energy production, while other renewables play a smaller role in the Hungarian electricity mix than the EU average. A green revolution has been unfolding since the energy price crisis in 2021, and this is expected to continue in the years ahead. The country still relies on energy imports, as around 25% of the total 48,000 GWh consumption is covered by imports from neighbouring countries.

Fossil fuels, and in particular Russian gas, play a decisive role in the Hungarian energy mix: the government is committed to reducing this exposure via increasing solar capacity and closer co-operation with neighbouring countries, especially Romania. A new nuclear power plant (Paks 2) will replace the old one and hence will not increase further the share of nuclear in the energy mix from its current level of around 50%.

Hungary has seen a massive jump in FDI in highly energy-intensive industries like electronic vehicle production plants and EV battery factories as the country has a clear aim to become the largest EV manufacturing hub in Europe (compared to the size of its economy). Total national energy demand could increase by up to 45-50% by 2030, which will create a massive challenge for production facilities and also require sizeable investments in the grid.

The government wants to exploit the country's natural potential in renewable energy production and has recently increased its target for solar power plant capacity. A strategic goal is to increase overall PV capacity to 12,000 MW by 2030 from 6,500 MW as of mid-2024. This target is ambitious; however, 2023/24 is set to see an impressive new record in the expansion of solar power plant capacity in the country. While a couple of years ago the capacity expansion was driven by large solar parks, in recent years households have taken the largest role in the green energy transition as a result of higher utility prices and one-off incentives.

In the case of large solar farms, further expansion seems certain, and the total installed capacity might increase to 6,000 MW in the next five years, according to an estimate by MVM, the national electricity provider. However, to increase solar capacity further, the grid needs to be upgraded. Investment in PV capacity is ongoing practically in every major industrial park.

» The Hungarian government helps companies to install modern solar systems with financial support, tax and fee discounts. Domestic industrial energy storage capacity could increase twenty-fold within two years thanks to the awarded tender funds, according to MVM, the national energy provider.

The Hungarian industrial real estate market has a high degree of concentration, with only a handful of major players present at multiple locations across the entire country. These landlords aim for a special settlement mechanism with NAVIR, the national grid operator, so they can feed in electricity produced in one park in the country and use that surplus in another location. This requires close cooperation between the state-run network operator and developers. Due to market characteristics, most of the industrial occupiers in regional locations are active in manufacturing and hence electricity costs are a significant element in their operations. Many occupiers are willing to make significant PV investments, together with or independently from the landlord, in order to cut electricity costs.

For more on information on the **Hungarian PV legal framework**, please visit the cms.law website **here**

Poland

Poland mostly relies on conventional energy sources such as fossil fuels (coal, oil and natural gas), which constitute 79% of the national energy mix. As opposed to many other EU countries, nuclear energy is not available. Renewable energy sources cover 21% of Polish energy production, of which 1.7% is hydropower and 7% is solar. Other renewables, accounting for 13.5%, are mostly made up of biogas and biofuel. The Polish share of renewable in the energy mix is therefore slightly below the EU average of 22%.

Solar photovoltaic electricity generation has increased significantly over the last decade. In August 2024, it reached 19.7 GW (a 28% annual increase) and the photovoltaic capacity was ca. 500 W per capita, the third highest in the CEE region. The share of PV electricity in the total renewable energy pile is 62%. Poland has declared an increase in the share of renewable energy sources in final energy consumption. However, by 2033 Poland also wants to open its first nuclear unit, aiming for six units in the future.

Coal consumption in the domestic economy is projected to decrease so that by 2030 it will constitute no more than 56% of total electricity production. Further decreases in subsequent years are also projected, so that by 2040 coal should be withdrawn from individual heating. Currently, the government is working on new goals, which should result in an acceleration of the transformation, the main aim of which is to strive for decarbonisation based on a diversified energy mix.

Due to growing ecological awareness, the demand for solutions that reduce greenhouse gas emissions is growing. This mainly affects commercial and private markets. The market, including real estate, must therefore adapt to the needs of customers. In 2022, private consumers were responsible for the 60% photovoltaic power increase in the country. Due to, among other things, the method of settling energy surpluses and cost optimisation, the auto-consumption rate is very high. Households also receive financial subsidies for such installations.

The challenge for Poland is a relatively quick energy transformation. In 2023, Poland witnessed a 1% decrease in household energy consumption. At the same time, the domestic supply of primary energy is also decreasing. This is mainly due to the recorded decline in the mining of fossil energy raw materials, although the development of renewable energy sources is accelerating.

For more on information on the **Polish PV legal framework**, please visit the cms.law website **here**

In 2024, Romania's photovoltaic market has seen remarkable growth. The country is set to significantly boost its installed PV capacity, with projections estimating an increase to around 4 GW by the year's end. Romania aims to achieve a total of 11.1 GW in photovoltaic capacities by 2030, with 6.1 GW in solar parks and 5 GW in rooftop installations.

Romania

Solar energy is currently a prominent topic in Romania, poised for rapid growth due to increasingly stringent construction laws mandating high energy performance with near-zero consumption, alongside rising energy costs. According to data from the statistics office INS, the power generated by Romania's solar installations, including prosumers, increased by 63% year-on-year to 1.67 TWh, accounting for 6.1% of total electricity output in the first half of the year. This is a significant rise from the 3.4% share in the same period in 2023.

The photovoltaic market in Romania began developing 14 years ago. By the end of the first half of 2024, approximately 3.2 GW had been installed nationwide, with 1.63 GW in industrial parks and 1.61 GW in prosumer capacities. Initially, the market saw a promising start with small projects launched across the country. However, this growth was temporarily hindered when subsidies for both photovoltaic parks and wind generation facilities were halted. With electricity prices remaining relatively stable and low, there was little incentive for market players to invest in renewable sources. But from 2022 onwards, as electricity prices rose significantly, investors renewed their interest in developing photovoltaic parks.

According to I&L developers active in Romania, they have already identified the need of tenant companies to have on-site renewable energy generation that reduces their environmental impact. Thus, for projects under development landlords include photovoltaic systems as part of their standard offers, while owners of existing/ older projects try to identify ways to finance the installation of upgrades.

The country's modern industrial stock reached at 7.6m sq. m. and it can offer multiple green solutions for users. Unfolding the real development potential in obtaining green energy, one of the most accessible solutions are rooftop solar PVs, due to the generous surfaces of I&L project roofs. The most anticipated advantage of solar PVs is lower costs, as they can reduce a building's reliance on grid-supplied electricity by up to 80%. In addition, rooftop solar PVs can be the solution for another challenge on the local market: the legislative difficulties encountered by PV projects on agricultural land. The structural limitations of older buildings, which currently cannot support rooftop PV systems, will be improved to enable the installation of these systems. We expect that all new buildings will be designed to support PV systems on their roofs.

Current legislation permits the use of photovoltaic systems to meet electricity needs and supply surplus energy to the grid, transforming users into prosumers. Excess energy can be stored and used when direct supply is unavailable, thanks to the energy usage compensation scheme in place until 2030. Additionally, Romania's National Energy Regulatory Authority (ANRE) has approved a new grid auction mechanism for connecting new power plants over 5 MW, which will take effect on 1 January 2026.

It is expected that the compensation scheme for individuals and legal entities will not continue after March 2025, and at the same time there will be a scheme for vulnerable individuals on low incomes. Currently, there are several state aid schemes for companies and legal entities (to instal PV systems on rooftops), and the expectations are that the impact of this aid will be seen in 6-12 months.

Other incentives include the continuation of the Casa Verde Fotovoltaice 2023 programme, with subsidies for 80,000 applicants, the RePowerEU programme with grants worth EUR 1.1 billion, the electrification of transport, as well as motivation among businesses to use solar panels to lower costs and achieve good environmental, social and governance (ESG) score, which is important to obtain financing.

For more on information on the **Romanian PV legal framework**, please visit the cms.law website **here**

Slovakia

Slovakia is making significant strides in harnessing the potential of renewable sources of energy, especially solar power. The Slovakia solar energy market has experienced rapid growth in recent years, driven by various factors such as government initiatives, increasing environmental consciousness, and favourable regulatory policies.

The Slovakian government has implemented various initiatives such as net metering and simplified permitting procedures, to promote solar energy adoption, including financial incentives, feed-in-tariffs, and tax benefits. The cost of solar panels has dropped significantly over recent years due to advancements in technology, economies of scale, and increased competition, all of which have made solar energy more affordable and accessible for consumers.

Slovakia has rural areas with limited access to electricity. Solar energy can play a vital role in providing clean and reliable power to these underserved communities. Off-grid solar installations and microgrids can bridge the electricity gap and promote rural development.

The residential sector represents a significant market segment for solar energy adoption. Homeowners are increasingly installing solar panels on rooftops to generate electricity and reduce their energy bills.

Commercial and industrial establishments are embracing solar energy to meet their energy needs, reduce operating costs, and demonstrate their commitment to sustainability. Large commercial buildings, factories, and businesses are installing solar power systems to offset their electricity consumption and achieve energy efficiency targets.

Slovakia has seen an increase in the installed capacity in the last three years. The increase between 2021 and 2022 especially pushed the BAU scenario curve significantly higher. Nevertheless, should the annual average growth rate in 2020–2022 continue, the expected installed capacity in 2030 will be 672 MW, an overall increase of only 99 MW. Thus, the years leading up to 2050 would see only an additional new 247 MW installed, amounting to a total capacity of 919 MW. Notwithstanding this, the scenario is prone to changes resulting from political and economic events. Rising energy prices, new reserved capacities for renewables, and a few incentive schemes, among other factors, are likely to result in new large-scale solar PV plants being built in Slovakia, significantly increasing the installed capacity in the coming years. Therefore, should the latest trend of increased installed capacities be followed, the curve might gradually continue to rise. In 2022, solar PV capacity rose by 28 MW, marking the highest annual increase since 2011 and setting the current installed capacity at 573 MW.

In line with the 2050 Pathways Explorer model, Slovakia should aim for an installed capacity of solar PV of at least 7,500 MW. This 2050 target would ensure that the country would fulfil its climate obligations, especially when it comes to ensuring climate neutrality. To stay on track, Slovakia needs to implement a total of 2,855 MW in solar PV plants by 2030. Hence, this scenario requires clear action by the Slovak Government and the preparation of an enabling investment environment that would allow for a rise in new solar PV capacities.

For more on information on the **Slovakian PV legal framework**, please visit the cms.law website **here**

PV business jargon buster

Term	Definition
Array	A solar array is a collection of multiple solar panels or modules connected to increase the electrical output. Solar arrays are scalable and can be designed to meet specific energy needs, ranging from small residential systems to large utility-scale solar farms.
Biomass	Organic material that comes from plants and animals, and which is a renewable source of energy when used as fuel. Biomass can be used directly via combustion to produce heat, or indirectly after converting it to various forms of biofuel. It is considered a renewable source of energy because its inherent energy comes from the sun, and it can be replenished in a short time.
Capacity Factor	The ratio of actual electricity produced by a generating unit for the period considered to be the maximum possible electricity it could have produced if operated at full capacity during the same period.
Conventional Energy	Refers to energy sources that are widely used and traditional, including fossil fuels (coal, oil, and natural gas), nuclear energy, and large-scale hydroelectric power. These sources have been the backbone of the global energy supply but are associated with environmental challenges, such as greenhouse gas emissions and other pollutants, leading to a shift towards renewable energy sources.
DSO (Distribution System Operator)	An entity responsible for operating, maintaining, and developing the distribution network in a specific area and ensuring the security of electricity supply. DSOs play a crucial role in integrating renewable energy sources into the local distribution networks, especially as these sources become more decentralised.
EPC (Engineering, Procurement, and Construction)	A form of contracting arrangement used in the renewable energy industry, where the EPC contractor is responsible for all the activities from design, procurement, construction, to commissioning and handover of the project to the end-user or owner. This model is often used for large-scale solar and wind projects.
Energy Storage	Technologies that allow for the storage of energy produced at one time for use at another. This is particularly important for renewable energy, as sources like solar and wind are intermittent and may not produce sufficient electricity at times of peak demand.
Feed-in Tariff (FiT)	A policy mechanism designed to accelerate investment in renewable energy technologies by providing investors with remuneration (payment) above the market rate for the electricity they produce.
GoO (Guarantees of Origin)	A tracking mechanism for green electricity that provides information to electricity customers about the source of their energy. GoOs are issued to energy producers for each unit of renewable electricity generated and can be sold independently of the physical electricity, allowing consumers to certify the green origin of their purchased energy.
Green Certificates/ Green Tags	Another term for RECs, these certificates evidence that certain electricity has been generated from renewable energy sources. Each certificate represents a specific amount of electricity produced and delivered to the power grid from a renewable energy resource.
Grid Connection	The process of connecting a renewable energy generating system (like solar panels or wind turbines) to the electrical grid. This involves technical, legal, and regulatory considerations to ensure that the connection is safe and complies with grid standards and policies.
Inverter	A device that converts the direct current (DC) electricity produced by solar panels or other renewable energy sources into alternating current (AC) electricity that can be used by household appliances and fed into the electrical grid. Inverters are a critical component of solar energy systems, enabling the integration of solar power with the existing electrical infrastructure.
kWh (Kilowatt-hour)	A unit of energy that measures the amount of electricity used or produced over time. In the context of renewable energy, kWh is often used to quantify the electricity generated by a solar panel or solar array over a certain period (daily, monthly, annually).
kWp (Kilowatt Peak)	A unit of measurement that represents the peak power output of a solar panel or solar array under standard test conditions. kWp is used to rate the maximum amount of power that the system can produce under optimal sunlight and temperature conditions.

Term	Definition
Local Distribution Network	The part of the electricity distribution system that delivers electrical power from the grid to the final consumers (residential, commercial, industrial). It includes infrastructure and equipment like transformers, cables, and meters required to distribute electricity at lower voltages.
Microgrid	A local energy grid with control capability, which means it can disconnect from the traditional grid and operate autonomously. This can be useful for integrating various sources of distributed generation, especially renewable energy sources.
Net Metering	A billing mechanism that credits solar energy system owners for the electricity they add to the grid. For example, if a residential customer has a solar PV system on their home's roof, it may generate more electricity than the home uses during daylight hours. Net metering allows consumers to use that excess electricity anytime, instead of when it is generated.
Nuclear Energy	A form of energy produced through nuclear reactions, primarily fission, where heavy atomic nuclei split into smaller fragments, releasing a large amount of energy. Nuclear power plants use this energy to produce electricity, offering a high-capacity, low-carbon source of power that can provide base load electricity, albeit with concerns around radioactive waste, safety, and high capital costs.
O&M (Operations and Maintenance)	Refers to the ongoing services required to ensure that a renewable energy installation, such as a solar farm or wind turbine, operates efficiently, safely, and reliably over its lifespan. O&M activities can include routine inspections, preventive maintenance, repairs, and performance monitoring.
Off-Site Renewable Energy	Refers to renewable energy generated at a location different from where it is consumed. The electricity is then transmitted from the point of generation to the point of use, often through the purchase of renewable energy certificates (RECs) or via a PPA.
On-Site Renewable Energy	Generation of renewable energy (e.g., solar, wind) at the site where it will be used. This can include solar panels on the roof of a building to directly power it, reducing dependence on the grid.
Operator	In the context of renewable energy, an operator is the entity responsible for managing and operating an energy generation facility, such as a solar park or wind farm. The operator handles day-to-day activities to ensure optimal production, safety, and compliance with regulations.
PPA (Power Purchase Agreement)	A contract between an electricity generator (provider) and an electricity purchaser (buyer). In the context of renewable energy, PPAs often involve the sale of electricity generated from renewable sources such as solar or wind farms.
Panel/Module	In solar energy, a panel or module refers to a single piece of equipment that consists of multiple solar cells connected to convert sunlight into electricity. Solar panels/modules are the basic building blocks of a solar energy system.
RECs (Renewable Energy Certificates)	Market-based instruments that represent the property rights to the environmental, social, and other non-power attributes of renewable electricity generation. One REC represents one megawatt-hour (MWh) of electricity generated and delivered to the electricity grid from a renewable energy resource.
Solar Energy	Energy derived from the sun's radiation. It is harnessed using various technologies, most commonly photovoltaic (PV) panels and solar thermal systems, to generate electricity or heat. Solar energy is abundant, renewable, and sustainable, making it a key component in the transition to a cleaner energy future.
Solar-as-a-Service	A business model in the solar power industry that allows customers to use solar energy without having to make a large upfront investment in solar panels or systems. In this model, a service provider installs solar panels on the customer's property at no initial cost.
Total Installed Capacity	The total installed capacity of photovoltaics refers to the maximum amount of electricity that all installed photovoltaic (PV) systems can generate under optimal conditions. This capacity is typically measured in megawatts (MW) or gigawatts (GW) and represents the peak output that the systems are designed to achieve.
Wind Energy	Energy obtained from the movement of wind across the Earth's surface. Wind turbines convert this kinetic energy into mechanical power or electricity. Wind energy is renewable, widely distributed, and produces no greenhouse gas emissions during operation, contributing to its growing role in sustainable energy systems.

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