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ENERGIZING THE ENERGY SECTOR IN CENTRAL-EASTERN EUROPE

Review of barriers on the path to efficient, dynamic, and green economy in Poland, Czechia, Slovakia, Hungary, Romania, Bulgaria, and Ukraine.

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***Main Abbreviations*:**
European Union – EU
Central and Eastern Europe/Central and Eastern European - CEE
Treaty on the Functioning of the European Union – TFEU
Treaty on the European Union - TEU
Electric Reliability Council of Texas, Inc - ERCOT
Emission Trading System - ETS
Transmission system operators – TSOs
Effort Sharing Regulation ESR
Small modular reactors - SMRs
European Investment Bank - EIB
Climate & Freedom Accord - CFA

* The report's policy proposals do not necessarily reflect all the views of experts from partner think tanks and institutions.

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Key takeaways

- **This paper aspires to change the way we think about climate policies.** The report's conclusions and public policy recommendations propose a fundamental reprogramming of climate policies toward greater market freedom and draw from "Climate and Freedom Accord" proposals formulated through a series of global working groups of think tanks and policy experts, convened by the Grace Richardson Fund since 2016.
- **This report was developed in response to the challenges of climate policies** and offers an overview and summary of investment barriers in the broader energy sector of selected CEE countries: Poland, Czechia, Slovakia, Romania, Bulgaria, Hungary, and Ukraine. It is based on information prepared by specialized think tanks from these countries.
- **The focus on CEE countries and their energy sector is due to the disproportionate burden imposed on them by climate policies.** Most of these countries, still heavily dependent on fossil fuels (notably Poland, with about 70 percent of its electricity coming from fossil fuels), have fewer resources than Western European countries to transition to a low-carbon economy rapidly.
- **To meet the climate targets, the energy grid, production, and distribution in the CEE countries require huge investments that governments cannot effectively orchestrate and deliver. Research shows that free and competitive markets decarbonize much faster than monopoly markets.** Data from 155 countries indicate that economic freedom reduces overall CO_2 emissions. Yet, the development of the energy market is increasingly dependent on large state-owned companies and monopolies, distorted by subsidies and regulations that raise the threshold for entry and the cost of doing business.
- **The conditions for private investment are worsening in the surveyed CEE countries**. The investment-to-GDP ratio is below the EU average for all countries except Hungary. At the same time, according to the Heritage Index of Economic Freedom, the space for private actors is declining there (except for Romania). While there is increasing pressure on public investment, intervention, and more regulation, climate policies of that kind will not deliver the expected results. This trend explains partially the low R&D investment levels in CEE countries. In 2022, EU research and development expenditures relative to GDP stood at 2.24 percent, lower than the previous year when it recorded 2.27 percent. On average, CEE countries contributed less than 2 percent of GDP to developing new technologies.
- **We have identified and listed 40 different barriers to investments in the energy sector of selected CEE countries.** The most common barriers are legal instability, bureaucracy, state control, regime uncertainty, revenue constraints, limited access to the grid, and limited access to land and taxes.[1]
- **The infrastructure underdevelopment is one of the biggest obstacles to the functioning of energy markets.** It reduces the ability to scale businesses, and locks business models within national boundaries, which facilitates the creation of oligopolies. Interconnections in the CEE region alone account for only 13 percent of the EU's internal interconnection capacity. CEE countries,

[1] For example, in Poland, barriers are tangibly delaying investment in nuclear power or the development of wind farms. Decarbonization is significantly delayed with a policy of interventionist support for the fossil fuel sector. Czechia and Romania are the freest countries among the analyzed ones, while Hungary and Bulgarian energy markets face obstacles in each or most of the identified categories.

have made significant improvements to their energy transition in recent years. The region covers roughly about 28.64% of the total EU population[2], 15% of the EU's GDP and 17% of the electricity demand, but still accounts for just 7% and 12% of EU wind and solar capacity, respectively.[3] Private actors should be incentivized to invest into infrastructure. It should not be seen as the exclusive domain of the state.

- **A comprehensive strategy for decarbonizing the economy based on private investment includes removing barriers and creating financial and tax instruments that redirect capital toward research and development, modernization, and expansion based on the latest energy-efficient technologies**. Each country must deal with its regulatory burdens, de-bureaucratize the economy, or streamline administration. Parallel to these reforms, tax changes should be implemented to make investing in PP&E (Property, Plant, and Equipment) more profitable in a way that incentivizes companies not only to maintain their current capacities but also to modernize and develop new projects. Subsidies of any kind should be abolished in an orderly and gradual manner.
- **The EU should reorient its climate policy and evaluate the actual efficiency of the ETS or CBAM and EU members should adjust their VAT rates.** There is a widespread impression that ETS is an efficient tool to reduce emissions, while it can be argued that it is only effective in shifting emissions from the EU to poorer countries. CBAM, on the other hand, is a protectionist measure that will only harm European consumers through higher prices. The countries should strive to set the lowest possible VAT rate required by the EU. The current EU's average standard VAT rate is 21.6 percent, so more than six percentage points higher than the minimum standard VAT rate required by EU regulation.
- **CEE countries should make a Pact for Freedom, under which they merge their economic policies related to the energy market so that Central and Eastern Europe becomes one big Special Economic Zone.** The goal would be to create a coherent, interconnected energy ecosystem aimed at reducing CO_2 emissions and similar, possibly non-restrictive regulations and tax solutions. This would make a common free energy market for at least 110 million people.
- **A signal that it is worth going in the proposed direction is that companies invest in energy even in unfavorable conditions.** As for now, 77 percent of companies from CEE countries say they are investing in business development. Private money accounts for nearly 70 percent of all investment spending on renewables.
- **More private capital in the energy sector and more market-oriented policies should create the potential for lower energy prices, which hit CEE citizens hard.** According to Eurostat data from 2022, energy poverty levels were significantly high in the CEE region compared to the EU average of 9.3 percent. Specifically, 22.5 percent of people in Bulgaria and 15.2 percent in Romania could not adequately heat their home.

[2] In 2023, the EU had a population of approximately 447 million people. The CEE countries were home to approximately 128 million people.

[3] In it together: the road to a cleaner, cheaper CEE power system, EMBER: https://ember-climate.org/insights/research/in-it-together-cee-power-system/#supporting-material (accessed 27.06.2024)

Introduction

Freedom can remarkably transform societies, lifting billions out of poverty and ushering in technological advancements previously deemed impossible. It also holds the potential to slow the rise in global temperatures. However, we must remove the regulations restricting it to achieve this. Data shows that the freer the economy, the faster decarbonization.[4] This principle is the core message of our report, which builds on Nick Loris's research in "Free Economies are Clean Economies".[5] We urge all stakeholders to delve into this insightful work.

At the Warsaw Enterprise Institute's initiative, researchers from think tanks in Poland, Czechia, Slovakia, Bulgaria, Romania, Hungary, and Ukraine have identified the barriers facing private companies in the broadly defined energy sector. These barriers include bureaucracy, regulations, mandates, subsidies, perverse tax policies, state ownership, and interventions like price caps or artificially created markets such as the Emission Trading System (ETS). Rooted in national and EU policies, these obstacles must be removed, reduced, or redesigned to achieve a zero-carbon economy. However, eliminating barriers alone is not enough. We must also create the right incentives for capital to flow in the desired direction. To this end, our report draws on the Climate & Freedom Accord, a proposal for an international free market agreement on climate and sustainable development, which emerged from working groups convened by members of the Climate & Freedom International Coalition.[6,7]

The challenge is significant, as evidenced by the current per capita GHG emissions in these countries: 8.1 tons per year in Poland[8], 9.3 tons in Czechia, 6.1 tons in Slovakia, 6.8 tons in Bulgaria, 3.7 tons in Romania, 4.4 tons in Hungary and 3.6 tons in Ukraine. Each country has a unique path to zero emissions, with Poland and Czechia facing the most significant challenges due to their historical reliance on fossil fuels. Achieving a zero-carbon economy will be more challenging for these nations than wealthier countries, as they are still among the poorer parts in Europe when measured by GDP per capita. A green economy should encompass not only reduced CO_2 emissions but also cleaner air, water, forests, and more sustainable use of natural resources. Unfortunately, the EU climate policy is formulated in a way that does not sufficiently consider the ability of the free market economy to go green and reduce CO_2 emissions into the atmosphere. There is no denying that climate policies place a strong emphasis on investment in clean technologies. However, they often do so in the wrong way, or at least in a suboptimal way, based on the belief that it is up to the government to identify the desired investments and then finance them preferentially. This arbitrary choice distorts the market allocation of capital, directing it not where it will yield the highest return but where officials want it. Meanwhile, the simple observa-

4 Bjørnskov, Christian, *Economic Freedom and the CO_2 Kuznets Curve* (January 8, 2020). Available at SSRN: https://ssrn. com/abstract=3508271 or http://dx.doi.org/10.2139/ssrn.3508271 "The available data from 155 countries observed in five-year periods between 1975 and 2015 indicate that economic freedom not only reduces overall CO_2 emissions but also shifts the top point of the EKC to the left. As such, the evidence suggests that the transition to lower emissions technology appears at an earlier stage in economically free societies."

5 Loris, Nick, 2021. "Free Economies are Clean Economies: A study of the correlation between economic freedom, limited government, open markets, private property rights, and environmental performance around the world." Available at: https://www.c3solutions.org/wp-content/uploads/2021/04/Free-Economies-Are-Clean_Economies.pdfment,

6 https://cleantaxcuts.org/wp-content/uploads/climatefreedomaccord-straw-230202.pdf.

7 https://cleantaxcuts.org/wp-content/uploads/cfic-bullets-eng-v3-2pg-240321.pdf.

8 Data for all the countries mentioned: Per capita CO_2 emissions, https://ourworldindata.org/grapher/co-emissions-per-capita (accessed 28.05.2024).

tion that is the starting point of our report is that lowering the cost of new investment increases the tendency to deploy the latest technologies more quickly. These technologies, in turn, tend to be cleaner and more efficient. It is tough to determine in advance which of the millions of ideas entrepreneurs constantly come up with will bring about the desired changes to the greatest extent, so it is essential to remain calm and refrain from prematurely resolving these issues with policy instruments. If humanity had followed experts' predictions at the end of the 19th century regarding the future means of transportation, it would never have invented an airplane. Instead, all the investments would have gone into financing balloons.

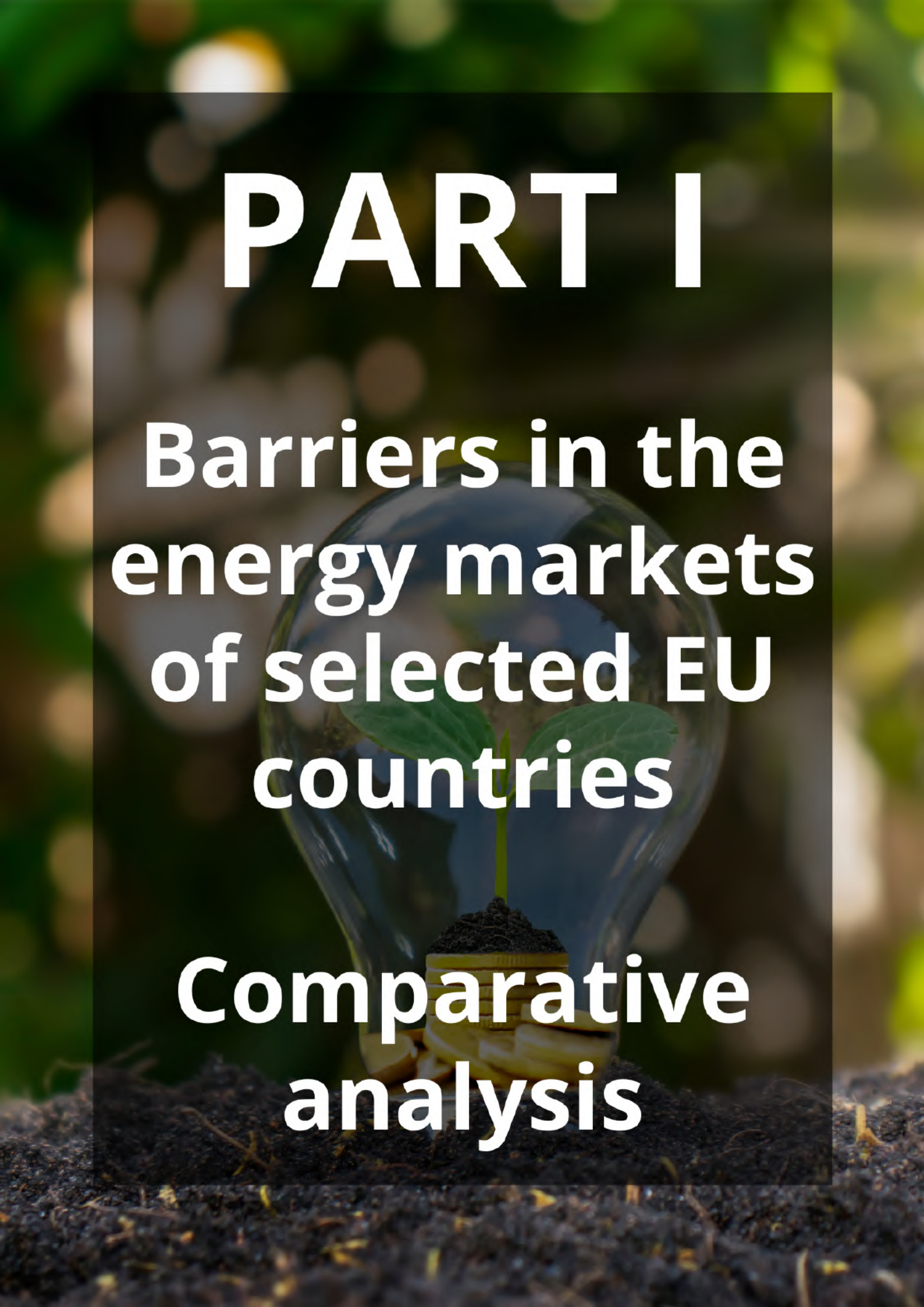
Policymakers must embrace the uplifting truth that making new investments cheaper creates a general trend toward decarbonization. This logic applies across the economy. However, in this report we focus exclusively on energy and related sectors. The green transition in this sector could be accelerated primarily by producing and delivering energy from "clean" sources such as solar, wind, hydro, biomass, biogas, biomethane, geothermal, or - last but not least - nuclear. Unleashing the full potential of private investment in the energy sector will be a sign of taking climate change seriously, as the overall low-carbon energy mix is the sine qua non for any sector of the economy to be truly green.

This report goes beyond mere advocacy for deregulation; it provides a pragmatic blueprint for harnessing the power of the market to address one of the most pressing challenges of our time—climate change. By examining the intricate web of barriers that stifle innovation and skew market dynamics in the energy sector, we offer a clear, evidence-based strategy for policymakers to facilitate private sector contributions to the green transition. Drawing from diverse perspectives across Central Europe, the insights presented underscore the critical need for a paradigm shift from government-driven mandates to a more liberalized market environment that can naturally evolve to meet the demands of today's economy and tomorrow's environment.

The report consists of two parts. The first provides a comparative analysis of barriers in the energy markets of Poland, Czechia, Slovakia, Bulgaria, Romania, Hungary, and Ukraine, as well as indications of desirable reforms. Part Two contains reports on the countries mentioned, prepared by partner think tanks and the law firm Kochanski & Partners. The reports are the main—yet not the only—input for the comparisons presented in Part One.

The first chapter presents the energy market characteristics in the seven countries studied. It describes the fundamental differences between them, comparing the degree of liberalization, the dependence on fossil fuels, and the degree of development of renewable energy capacity. The second chapter presents an in-depth comparative analysis of the barriers to investment and development faced by private capital in the energy sectors at the national level and as a result of the solutions adopted by the EU. The chapter also discusses the impact of current restrictions on achieving climate goals and the efficient functioning of markets in general.

The third chapter outlines the Climate & Freedom Accord proposals, as well as the benefits of bottom-up market reforms. It presents policy proposals for the countries studied for implementation at national and regional levels. It also guides policymaking at the European level as an alternative to the currently dominant approach. In line with the Climate & Freedom Accord, the chapter also discusses the main problems associated with private financing of investments in the energy sector, describing tax and market liberalization proposals that could significantly facilitate raising investment capital.



PART I

Barriers in the energy markets of selected EU countries

Comparative analysis

1. The Hard Path. Energy markets and investment challenges in the light of CO_2 emission-reduction goals

- ***Climate neutrality by the mid-21st century is believed to be crucial in limiting global warming to 1.5 degrees Celsius above pre-industrial levels to avoid the worst effects of climate change.***
- ***The CEE countries covered by this report have less ambitious CO_2 emission reduction targets than Western European countries, yet they may struggle to meet these modest targets. For example, in Poland, almost 70 percent of the power production is still coal-based.***
- ***Infrastructure neglect is one of the biggest obstacles to the functioning of the expected energy market. It reduces the ability to scale businesses, and locks business models within national boundaries, facilitating the creation of oligopolies. Interconnections in the CEE region alone account for only 13 percent of the EU's internal interconnection capacity.***
- ***Modern economies are a mix of liberal and statist elements, often in conflict. This struggle results in harmful policies that hinder effective climate action. For a successful climate policy, massive private capital involvement is crucial. This necessitates deregulation and denationalization, allowing the market to allocate resources efficiently and drive the transition to a low-carbon economy.***

The Challenge

European climate policy poses an unprecedented challenge to global economies. For the first time in history, a non-economic indicator—the level of CO_2 emissions —is driving the need to profoundly change the way all the world's economies function.

While economists have understood the concept of externalities since the 19th century, it is only in recent decades that the link between human economic activity, particularly within a capitalist system reliant on fossil fuels, and the increase in average global temperatures has been recognized. This temperature rise, caused by the accumulation of CO_2 and other greenhouse gases in the atmosphere, is not neutral—it adversely affects humanity and nature. Consequently, the primary objective of international policies, as seen in agreements such as the UN Framework Convention on Climate Change (1992), the Kyoto Protocol (1997), and the Paris Agreement (2015), is to reduce CO_2 emissions.

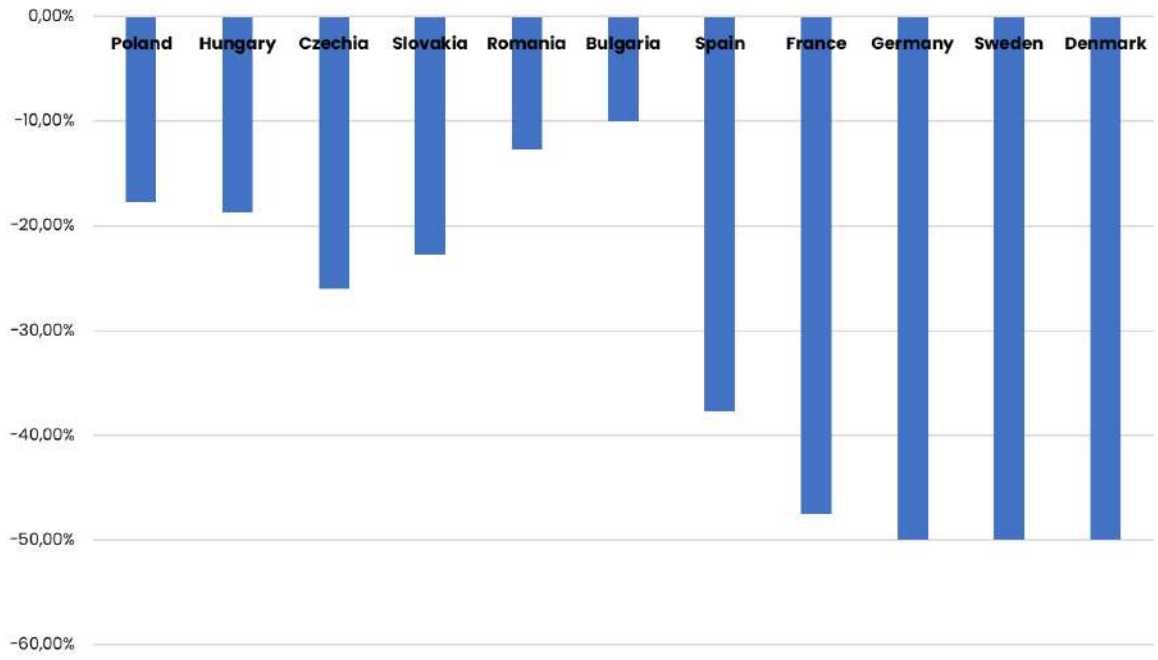
The EU has ambitious climate plans. But will they work?

By 2030, the EU aims to reduce greenhouse gas emissions by at least 55 percent from 1990, an update from the previous 40 percent reduction target. By 2050, the EU aims to transform into a modern, resource-efficient, and competitive economy with zero net greenhouse gas emissions, decoupling economic growth from fossil fuel use. That is the goal, because achieving climate neutrality by the mid-21st century is crucial for limiting global warming to 1.5 degrees Celsius above pre-industrial levels, thereby avoiding the worst effects of climate change.

However, the EU green transition is not progressing as smoothly as policymakers had hoped, which may necessitate even more ambitious targets soon, and probably a change of strategy. Despite a 2 percent reduction in greenhouse gas emissions in the EU since last year, annual emission reductions will need to double to meet the 55 percent reduction target by 2030. Achieving

these targets will require significant efforts to reduce emissions across all economic sectors. This underscores the critical need for liberalizing the energy market to meet these ambitious climate goals. We can spur innovation and efficiency by removing regulatory barriers and fostering a competitive market environment, enabling a smoother and more effective transition to a low-carbon economy. The EU's 2030 climate target is set at a collective level, but within this framework, individual EU Member States have specific national targets for reducing greenhouse gas emissions under the Effort Sharing Regulation (ESR).

Chart 1. Planned greenhouse gas emission reductions in 2030 in relation to their 2005 levels in selected EU countries, determined under Article 4(3) of the Effort Sharing Regulation



Source: *Effort sharing 2021-2030: targets and flexibilities - European Commission (europa.eu).* https://climate.ec.europa.eu/eu-action/effort-sharing-member-states-emission-targets/effort-sharing-2021-2030-targets-and-flexibilities_en (accessed 28.05.2024); Ukraine, not being an EU member, is not included in the chart. Yet it has set its own CO_2 emission reduction target at 65 percent in greenhouse gas emissions by 2030 as compared to 1990. Nationally Determined Contributions Registry, https://unfccc.int/NDCREG (accessed 28.05.2024).

This report covers Poland, Hungary, Slovakia, Czechia, Romania, Bulgaria, and Ukraine. However, the most ambitious targets within the EU are set for the Western European countries. National targets are calibrated based on GDP per capita and the specific circumstances of each country. Notably, the planned phase-out of coal in the energy sector in Central and Eastern European (CEE) countries varies, with deadlines ranging from 2023 in Slovakia to 2049 in Poland. Natural gas is viewed as a transitional energy source providing flexibility, but its use must be limited over time or supplemented with hydrogen, CO_2 capture, and other advanced technologies. This stresses the need for the liberalization of the energy market to allow private competition to spur innovation and ease the transition that CEE countries soon have to make.

Despite this diversity in climate targets, poorer countries will not be relieved of the energy transition burden.[9]

A Table 1 below summarizes key economic indicators for CEE countries related to energy, thus helping better understand the challenge ahead. There is still a huge number of people at risk of poverty, and incompetent energy policies can drive them into poverty.

[9] Additionally, CEE countries must comply with EU-wide policies, such as the 2035 ban on the sale of internal combustion engine cars. Most importantly, these countries may struggle to meet their modest targets due to various domestic constraints. Pressure from the leading countries in climate action will increase for slower-moving countries to accelerate their efforts, thereby underscoring the urgent need for liberalization to effectuate this acceleration.

Table 1. Key socio-economic indicators for CEECs related to energy (2020, 2021 or 2022 data)

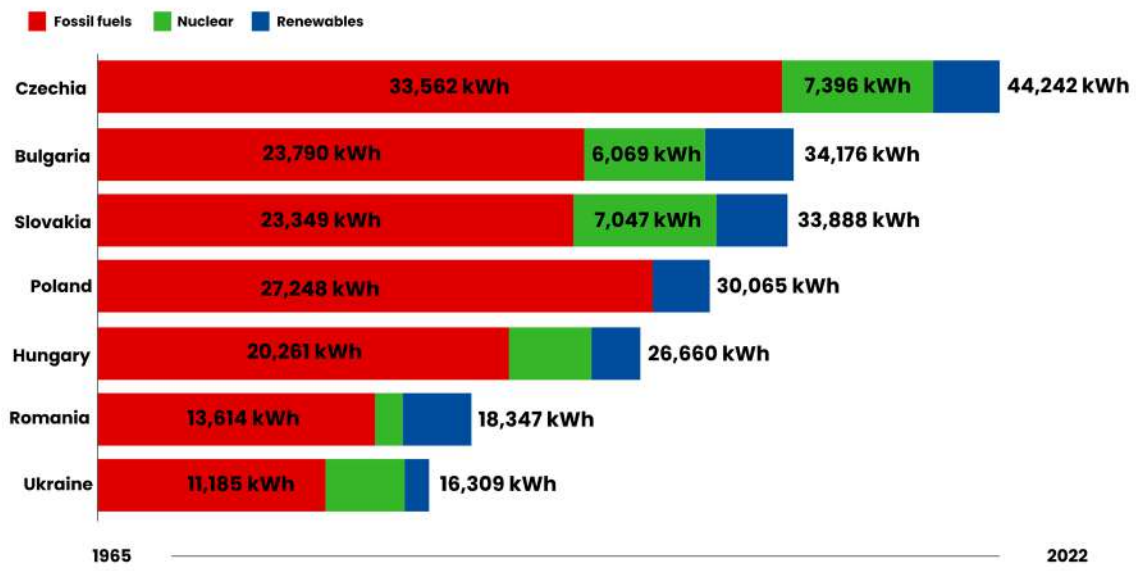
	EU	BG	CZ	EE	HU	PL	LV	LT	RO	SK	SK
People at risk of poverty or social exclusion (as % of the population) in 2021	21,7%	31,7%	10,7%	22,2%	19,4%	16,8%	26,1%	23,4%	34,4%	15,6%	13,2%
GDP per capita (€ per habitant)	27 880 €	6 950 €	18 020 €	16 490 €	13 690 €	13 760 €	12 970 €	14 820 €	9 610 €	15 920 €	21 310 €
GHG emissions (tonnes per capita) in 2020	7,5	7,2	10,6	8,7	6,5	10	5,6	7,3	5,7	6,8	7,6
RES (as % in gross final energy consumption) in 2020	22%	23,3%	17,3%	30,1%	13,9%	16,1%	42,1%	26,8%	24,5%	17,3%	25,0%
Electricity prices for HH (€/MWh, incl. Taxes) in 2022 - S1	252,5	109,3	305,9	205,6	94,8	146,4	131,2	149,7	236,2	179,6	139
Energy imports dependency (% of gross avaiiable energy) in 2021	55,6%	36,1%	40%	1,4%	54,1%	40,4%	38,3%	73,3%	31,6%	52,6%	48,6%
Share of industry contribution to GDP (World Bank, 2021)	22,8%	20,8%	30,3%	23,1%	24,3%	27,9%	19,9%	25,3%	27,8%	28,2%	28,5%

Source: Author, *based on Eurostat Country Facts,* World Bank.

Mix We Have vs. Mix We Dream of

Progress towards the CO_2 reduction targets set by the Paris Agreement and earlier initiatives remain inadequate, as highlighted by Bjorn Lomborg in his book "False Alarm." Despite decades of global efforts, most energy consumption in the countries concerned still relies heavily on fossil fuels, as illustrated in the chart below. This situation is unlikely to change rapidly under current policies.

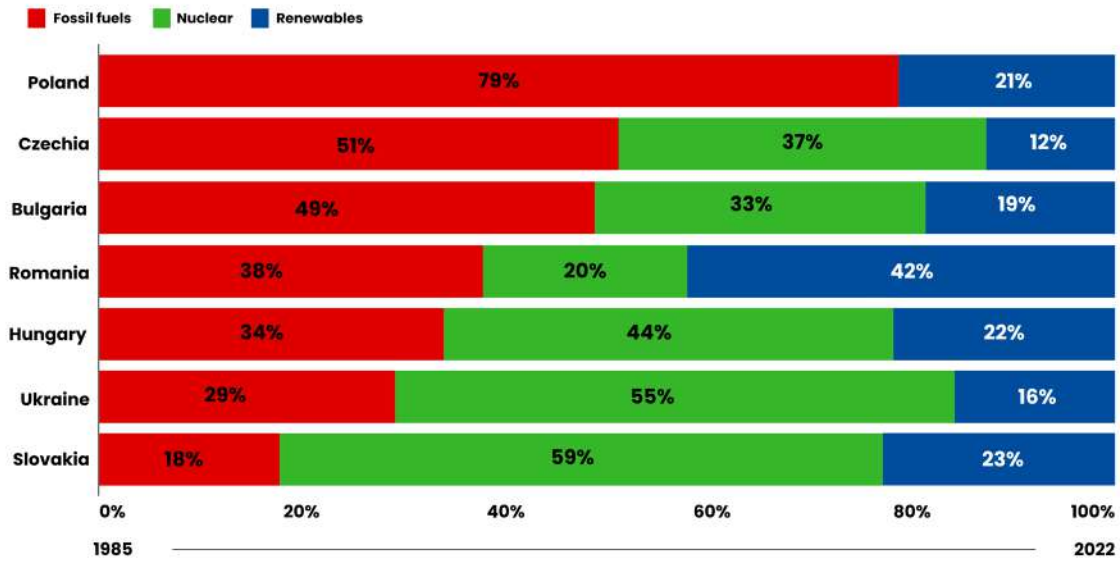
Chart 2. Per capita Energy Consumption by Country, 2022, source: Our World in Data



Source: *Energy Mix. Explore global data on where our energy comes from, and how this is changing,* https://ourworldindata.org/energy-mix (accessed 28.05.2024).

Current energy policies are predicated on the notion that altering the structure of consumption requires not only influencing it but also setting ambitious production targets to limit consumer choice. This reflects a top-down planning approach. However, liberalizing the energy market could provide a more effective path towards achieving these targets by fostering competition and innovation. Focusing on electricity production is crucial since electricity, rather than gas or oil, will primarily power future technologies, from electric vehicles to household appliances. As shown in the chart, countries like Poland, Czechia, and Bulgaria face significant challenges in the transition.

Chart 3. Per capita electricity generation by source, 2022, source: Our World in Data



Source: *Energy Mix. Explore global data on where our energy comes from, and how this is changing,* https://ourworldindata.org/energy-mix (accessed 28.05.2024).

Diverse Energy Sources in Central and Eastern Europe: The Case for Liberalization

The countries studied in this report show significant differences in their energy sources and ambitions. Some are evidently more optimistic than others, as evidenced by more ambitious goals. Key to Slovakia and Hungary's high ambitions is their reliance on nuclear energy. Except for Poland, all these countries utilize nuclear power, facilitating their energy transition.

Nuclear energy

Slovakia's five nuclear reactors supply 59 percent of its electricity, with new capacity recently added. Hungary's single nuclear power plant, with four reactors, produces 44 percent of its electricity. Ukraine, if it joins the EU, would benefit from its 15 operating nuclear reactors, which provide 55 percent of its electricity. Czechia (6 reactors), Bulgaria (2 reactors), and Romania (2 reactors) also rely significantly on nuclear energy.

Poland has long discussed building a large nuclear reactor, but it has pushed its expected completion beyond 2040. Meanwhile, small modular reactors (SMRs) are a promising alternative, attracting private investment for use in power generation, industry, and district heating. However, political obstacles have stalled these plans. Less restrictive landscape could accelerate the deployment of SMRs, providing a flexible and efficient energy source.

In 2023, **wind energy** will account for 19 percent of the EU's total electricity consumption. Another 8 percent came from **solar energy**. In total, renewable energy sources accounted for 42 percent of the energy mix. The CEE region covers about 20 percent of the EU's population and territory, 15 percent of the EU's GDP and 17 percent of its electricity demand, but still accounts for only 7 percent and 12 percent of the EU's wind and solar capacity, respectively.

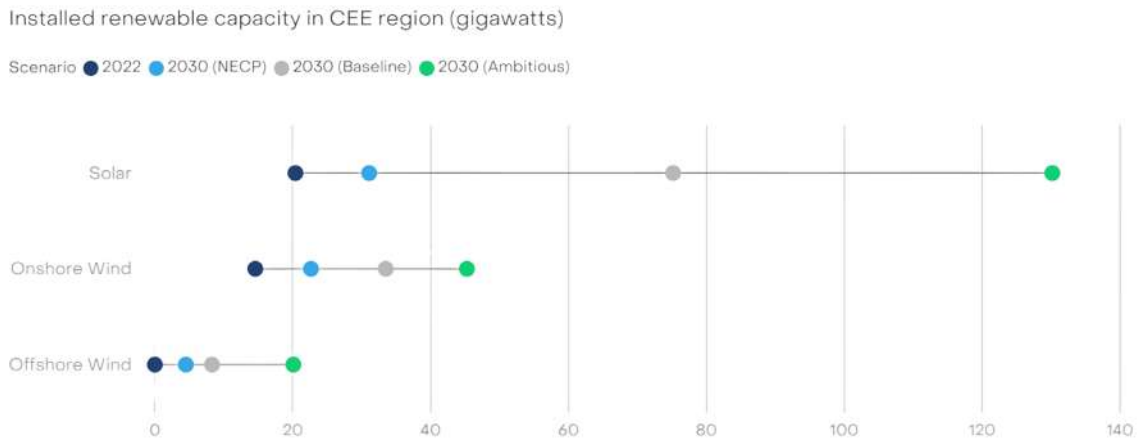
Hungary is a leader in solar energy, with 18 percent of its electricity generated from solar in 2023. Bulgaria has seen a tripling of its solar PV capacity since October 2022, achieving a 12 percent share of total generation by October 2023. Legislative landscapes in Romania and Czechia

support renewable energy communities and prosumers. In Poland, the number of prosumers has surged, anticipating a significant increase in photovoltaic capacity. It is estimated to grow even 8 times in the entire region.

The current policy aims to increase the solar capacity of CEE to 75 GW by 2030, up from 20 GW. According to favorable industry forecasts, an ambitious scenario could see this rise to 130 GW. Similarly, onshore wind power could expand rapidly, reaching 45 GW by 2030 if supportive policies are implemented.

Onshore wind power in CEE could also grow much faster than in the baseline scenario if the right policy conditions are in place, potentially reaching 45 GW in 2030. In Czechia, the wind industry indicates a potential of 1.6 GW, 50 percent more than the government target of 1 GW.

Chart 4. CEE countries could increase wind and solar six times by 2030



Source: 2030 NECP = National Energy and Climate Plan targets, 2030 Baseline = latest national targets and low industry forecast extrapolation, 2030 Ambitious = national studies and high industry forecast extrapolation.

In Czechia, the wind industry sees potential for 1.6 GW, exceeding the government's 1 GW target. Hungary could unlock 1.5 GW of halted onshore wind projects by revising restrictive legislation. Poland could release 5 GW of wind capacity by adjusting setback rules. WindEurope statistics[10] indicate a record 16.2 GW of new wind capacity in the EU for 2023, mostly onshore. Germany leads with 3.9 GW, while Poland adds 1.2 GW. However, other CEE countries lag behind, with no new wind plants in Bulgaria, Czechia, Hungary, or Slovakia in 2023, and only 72 MW in Romania.

How much of this investment will be developed in the CEE region? Currently, 2/3 of the European wind energy is installed in only six countries (Germany, Spain, UK, France, Sweden, Turkey). CEE countries are seemingly missing.

CEE countries have indeed made significant strides in their energy transition over recent years. However, their renewable energy targets still lag behind the EU average. The sluggish development of wind, solar, and nuclear energy, combined with high reliance on fossil fuels, threatens energy security, economic competitiveness, and living costs in the CEE region. Liberalizing the energy market is essential to spur innovation and investment in developing wind, solar, and nuclear energy. This approach can reduce reliance on fossil fuels and greenify coal-heavy energy production while seeking efficiency gains to minimize waste and pollution.

Infrastructure

The dream of private investment in the energy sector among CEE countries hinges significantly on infrastructure. Currently, interconnections within the CEE region account for 13 percent of the EU's internal interconnection capacity despite their crucial role in reducing electricity prices and curtailments. Addressing these infrastructure gaps through market liberalization can spur innovation and investment to transform the energy landscape.

The existing infrastructure shortfalls present severe challenges.[11] Energy market liberalization can also promote cross-border exchanges currently limited to operators. Companies in countries with higher energy prices often seek to purchase cheaper energy from abroad, but cross-border purchases are generally restricted. A liberalized market would allow countries with production gaps in green energy to import it periodically, benefiting industrial plants that strive to equip themselves with renewable energy sources.

On the consumer side, digital tools for managing energy demand elasticity (Demand Side Response, DSR) are still in their infancy in CEE countries. Advancing these technologies for large industrial plants and individual consumers could significantly improve energy efficiency and reduce reliance on fossil fuels. A liberalized market can improve grid management and reduce energy waste, lowering costs and increasing system reliability.

Accelerating the development of battery technologies is crucial. Batteries can stabilize the energy system, storing excess energy generated during peak sunlight or wind periods for use when conditions are less favorable. However, the high cost of energy storage remains a barrier. Long-term energy storage is even more challenging, with solutions like hydropower, biomethane, and green hydrogen still in development. Investing in these technologies is risky without

[10] Szurowska, Maria, *Europa wiatrakowa dwóch prędkości*, https://biznesalert.pl/morska-energetyka-wiatrowa-farmy-wiatrowe-na-morzu-offshore-wind-europe-raport-opoznienie-europa-srodkowo-wschodnia-polska, (accessed 28.05.2024).

[11] For example, in April 2023, the Czech Transmission System Operator (ČEPS) had to shut down about 400 megawatts (MW) of solar capacity—roughly one-sixth of the country's total photovoltaic capacity—to ensure system balance. By September 2023, Poland faced an 8-gigawatt (GW) surplus of electricity production, managed partly by emergency exports but still requiring a forced reduction of 1-2 GW of solar generation. These situations lead to power losses and necessitate the constant generation of baseload power, typically from coal and nuclear plants, which is inefficient and inflexible.

appropriate incentives, which a liberalized market could provide.

The aging infrastructure in CEE countries, much of it built during the communist era, significantly slows progress.[12] Reducing regulatory barriers and creating a competitive environment can attract private investment contributing significantly to infrastructure upgrades and the implementation of new technologies.

Energy infrastructure inefficiencies pose a significant obstacle to the liberalization of national energy markets. Power grids, considered natural monopolies, are primarily owned and managed by public institutions. To fully capitalize on liberalization, national regulatory authorities must eliminate or effectively monitor these monopolies. Ensuring fair access tariffs for producers wanting to connect their power plants to the grid is essential. This includes electricity grid access tariffs that transmission system operators (TSOs) and distribution system operators (DSOs) charge those producers who want to connect their power plants to the electricity grid. Regarding grids as "natural monopolies," it is worth noting that Chile has privatized portions of their grid. Chile has extensively privatized its electricity transmission networks. Approximately 80% of Chile's transmission networks are owned and operated by private entities.[13,14]

The Toolkit

The energy transition in CEE countries is critical for meeting European and global climate goals and establishing a resilient energy system for future generations. Decision-makers are tasked with achieving this ambitious goal, but the question remains whether the right strategies are employed. Market liberalization could be the key to ensuring these objectives are met effectively and sustainably.

Who's Business Is It?

The CEE countries analyzed in this report are experiencing faster GDP growth than the EU average. However, they face significant challenges due to deepening demographic decline.[15] To sustain their current economic development, these countries need to achieve substantial productivity increases. This requires careful design of climate policies to avoid stifling productivity growth. Policymakers should focus on making energy production more efficient and less labor-intensive, rather than simply creating more jobs through the energy transition.

Governments cannot sustainably lower energy prices by decree without negatively impacting the entire market. Instead, they should create a conducive environment for private investment and innovation. This approach ensures that the energy transition is less capital- and labor-intensive, making clean energy sources more economically viable than traditional "dirty energy." This is because, the market guarantees a better allocation of finite resources and redistributes labor and capital more efficiently than if the government dictates.

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12 For instance, much of Romania's electricity distribution network dates back to the 1960s and 1970s and is in dire need of replacement. In Poland, investment in the generation, transmission, and distribution of electricity and district heat up to 2030 is estimated at EUR 53 billion, according to the Polish Energy Policy (PEP2040 - now being updated by the new government). According to EY and Polish estimates, modernization costs for transmission and distribution networks will exceed EUR 110 billion by 2040.

13 InvestChile Insights - eBook Series, Energy Raport: https://investchile.gob.cl/wp-content/uploads/2021/04/03ebook-energia-eng-.pdf

14 Additionally, the ERCOT (Electric Reliability Council of Texas) example highlights a critical point: the grid operator should not also be a power generator. This separation is crucial to promote a fairer and more competitive market environment.

15 CEE Energy Outlook Warsaw, January 2024, Where do national commitments lead? https://future.orlen.pl/content/dam/internet/future-orlen/pl/en/ORLEN_outlook_EN.pdf (accessed 28.05.2024).

Chart 5. CEE countries could increase wind and solar six times by 2030

Source: Derski, Bartłomiej, *Hurtowe ceny prądu w Polsce w 2023 należały do najwyższych w UE,* https://wysokienapiecie.pl/96099-ceny-pradu-w-polsce-w-2023-najwyzsze-w-ue/ (accessed 28.05.2024).

Geopolitical turbulence is making the situation more challenging and politically sensitive. Market prices in the energy market have been extremely volatile over the past three years, and medium-term projections show that the volatility between seasons and between peak and off-peak prices will remain high or even increase. This is partly due to new renewable energy installations and the cost dynamics of CO_2 emissions, but also to the increasing importance of the Day-Ahead Market (DAM)[16] in the decisions of consumers in the region, the progressing market integration in the EU, increased interconnection capacity, etc.

If we really think that the green transformation of the economy is a necessity, it is not enough to wait for politicians to develop transformative ideas. The transition should facilitate the development of businesses across various sectors of the economy, from heavy industry to digital services. A diversified approach to the future energy mix in the CEE countries should include renewable energy sources and technologies, the intensive development of nuclear power plants, which are already a crucial element of energy security in some countries, and emerging energy technologies that will be invented and commercialized in the future.

16 Energy trading on the Day-Ahead Market takes place the day before the next day on which physical delivery of electricity takes place. This means that energy sellers have to estimate as much as possible one day in advance the amount of energy they will be able to deliver to the system and then offer the best price for it so that their offer is accepted. Each day is divided into 24 hourly quotations (settlement periods) in which Exchange members can buy and sell electricity. The primary commodities are electricity and natural gas. Day- Ahead trading refers to the trading of electricity for the next day on the Polish Power Exchange (POLPX) in Warsaw, on EPEX Spot in Paris (the spot market of the European Energy Exchange), on EXAA in Vienna (the Vienna Commodity Exchange in Austria) and other national exchanges or on the OTC market (over-the-counter trading) through OTC contracts.

However, achieving this requires the right tools.[17] The phase-out of fossil fuels in CEE will not happen overnight, but an optimal set of tools can significantly accelerate the process.[18] The same applies to climate policy. One of the key lessons from economics is that the private sector operates more efficiently than the public sector, and that top-down planning in the economy often yields poor results. Central planners have rarely succeeded in achieving their development goals and have often impoverished the people.

This raises the question of the economic system in the countries studied in this report. Modern economies are mixed in nature, with varying degrees of state participation and involvement across different sectors. In the analyzed cases, liberal and statist tendencies are constantly at war, resulting in a harmful combination.

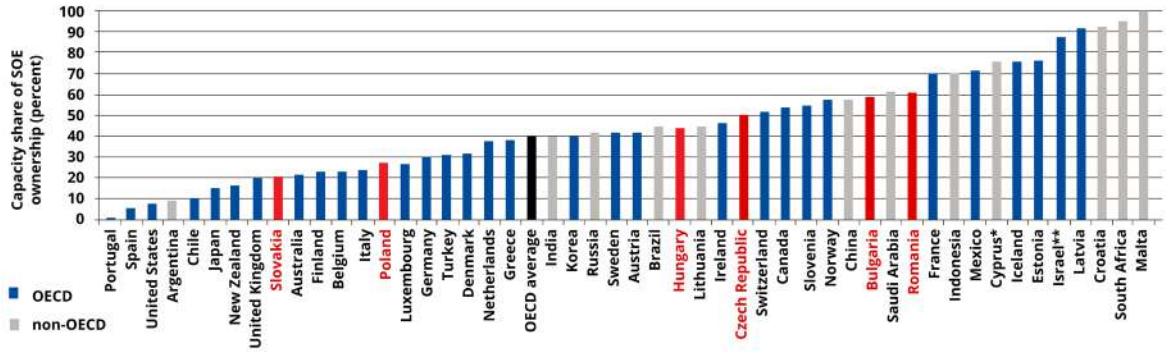
The energy transition in the CEE region is a massive financial effort, and it seems impractical to implement it solely based on a subsidy system. Subsidies can even divert production away from the most rewarding directions. Therefore, significant involvement of private capital is necessary. What drives this involvement? Broadly speaking, liberalization and free markets. This implies deregulation and denationalization.[19]

17 Ludwig von Mises, a prominent Austrian economist, argued that economics should be a value-free, purely descriptive discipline. A good economist can show decision-makers which methods will lead to the successful realization of their stated goals, and which will not.

18 The relatively slow pace of this process also allows us to count on the further development of technologies that can make the burning of fossil fuels climate-neutral, such as Carbon Capture, Utilization and Storage.

19 As shown in the chart, only Poland and Slovakia fall below the OECD average. However, due to the lack of recent data and significant changes in Poland's statist approach since 2014, the current situation may differ.

Chart 6. Share of state-owned enterprises (SOEs) in power generation capacity across selected countries in 2024



Source: OECS (2018), State-Owned Enterprises and the Low Carbon Transition, based on OECD data and World Electric Power Plant Database.

Liberalization of the energy and gas market in countries covered here was conducted in different periods, however, the general picture shows a more or less unified model. The primary distinction among these countries lies in the extent of private capital involvement in key infrastructure, such as large production facilities, distribution networks, and electricity and gas trading.

Slovakia: A Model of Commercial Participation

Slovakia presents an intriguing example of substantial commercial actor participation in the energy market. The involvement of private capital has driven efficiency and innovation, enhancing the market's overall performance.

Romania: Emerging Regional Leader

Romania is on the path to becoming a regional leader in energy and gas market potential. The active role of private players is unlocking significant development opportunities, positioning Romania as a key player in the regional energy landscape.

Ukraine: A Market in Transition

Ukraine's market liberalization is recent and ongoing development, complicated by war-related expenditures. Despite these challenges, foreign actors are expected to play a crucial role in Ukraine's energy transition, bringing in necessary investments and expertise.

Poland: Transitioning to the Green Deal

Poland faces a longer journey from fossil fuels to the Green Deal compared to other countries. Nevertheless, it has made considerable progress and shows significant potential for further sustainable investment development. Poland's commitment to green energy is evident in its ongoing efforts to transition from coal and other fossil fuels.

Hungary: Decarbonization Framework

In Hungary, the National Energy Strategy 2030 and the National Energy and Climate Plan provide a solid framework for decarbonization. However, there is a noticeable imbalance in the proliferation of renewable energy sources (RES). While biogas and geothermal energy have grown, photovoltaic systems and wind power have not been fully developed, mainly due to political reasons. Hungarian energy producers frequently cite the challenges posed by the EU Emissions Trading System (ETS) as a significant issue. One of the primary issues is the rising cost of carbon allowances, which has steadily increased operational expenses for energy companies reliant on fossil fuels.[20]

Czechia and Bulgaria: Liberal Tendencies

Both Czechia and Bulgaria exhibit strong liberal tendencies in their energy policies. However, these are sometimes compromised by mechanisms such as subsidies and episodic price caps. Despite these distortions, both countries continue progressing towards more liberalized and competitive energy markets.

One cannot forget the EU when discussing energy policies and market freedom. According to Article 4(2)(i) of the Treaty on the Functioning of the European Union[21], the energy market is an area of shared competence between

[20] For example, the Mátrai Erőmű power plant has struggled financially due to the high costs associated with purchasing carbon allowances. The implementation of the ETS emissions trading system in Hungary has resulted in significant restrictions on connecting new photovoltaic installations above 50 kW since May 2022, causing substantial delays and increased investment costs. These restrictions were only partially lifted in September 2023. There has been a significant increase in connection and transmission fees, which have risen by 2 to 6 times since 2020, increasing investment costs and reducing the profitability of new energy projects.,

[21] *Treaty on the Functioning of the EU*, https://eur-lex.europa.eu/EN/legal-content/summary/treaty-on-the-functioning-of-the-european-union.html (accessed 28.05.2024).

the EU and the member states. This means that while the EU has a significant regulatory role, member states also retain substantial control over their national energy markets.[22] Member States regulate a given area of shared competence to the extent that the EU has not exercised or decided to stop exercising its competence.[23] Bearing in mind the values of the EU expressed in Article 2 of the Treaty on European Union (TEU)[24], which include the EU's respect for the rule of law, it should be understood that the EU institutions act within the powers entrusted to them in the Treaties without violating their boundaries.[25] The above determines the expediency and legal consequences of the adoption by the EU, numerous in recent years, of legislation in the field of energy.

In the priorities for action of the European Commission[26], under Article 17 TEU, it is clearly stated that the long-term goal of the EU is to become the first climate-neutral continent[27]. **The goal of climate neutrality determines the direction of EU legislation and thus the rules for the internal electricity market, which is made up of individual national energy markets. And for this reason, the energy market, as the most carbon-intensive sector of the economy[28], is considered to be the subject of special attention and interference from the EU public policies.** The above goal of achieving neutrality is now not merely political but also a legal obligation to which all EU member states are addressees.[29] As the goal of climate neutrality is defined by EU regulation, it is directly and uniformly applicable. It, therefore, becomes by law part of the legal order of EU member states.[30]

National Politics matter (for effective energy transition)

The importance of national politics in driving an effective energy transition cannot be overstated.

22 Kraśnicka, I., *Skutek krajowy prawa Unii Europejskiej* [in:] *Umiędzynarodowienie krajowego obrotu prawnego*, (ed.) I. Kraśnicka, W. Hryniewicka-Filipkowska, Białystok 2017, p. 142-144 (accessed 28.05.2024).

23 Cesarz, M. *Porządek prawny Unii Europejskiej* [in:] *Procesy integracyjne i dezintegracyjne w Europie* (ed.) A. Pacześniak, M. Klimowicz, Wrocław 2014, p. 182-183.

24 *Treaty on the Functioning of the EU*, https://eur-lex.europa.eu/eli/treaty/teu_2012/oj (accessed 28.05.2024).

25 Olechno, A., Przywora, B., Zaleśny, J., *Spór o granice kompetencji Unii Europejskiej – uwagi na tle orzecznictwa TSUE*, Studia Politologiczne, Warszawa 023, p. 105.).

26 Commission's political guidelines 2019-2024.

27 COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS The European Green Deal. (COM2019/640 final), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN (accessed 28.05.2024).

28 International Energy Agency, *Global CO_2 emissions by sector,* 2019-2022, Paris 2023.

29 Article 2(1) of Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 021 establishing a framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 (European Climate Law) (Official Journal of the EU. L. 2021 No. 243).

30 Cesarz, M., *op. cit.,* p. 188-189.

Current policies at both EU and national levels are pivotal not only in the development of climate policy but also in ensuring its effective implementation. While the EU has set ambitious targets and introduced various instruments to achieve them, it has also allowed member states considerable leeway in deciding whether their energy markets will lean towards statism or liberalization.

The CEE region is experiencing heightened political activity and a growing expectation for change due to the 2024 European Parliament election and within individual countries or regions. The political and economic interdependence of CEE countries with major international players such as the EU and the US underscores the significance of these electoral events in shaping the region's future.

Russia's aggression against Ukraine has prompted several countries in the region to reconsider their energy market strategies and focus on energy security.[31]

Political Landscape in Spring 2024

As we look ahead to the political conditions in spring 2024, it is clear that national politics will play a critical role in shaping energy policies and the broader energy transition.

- **Bulgaria:** A stable coalition government is focused on achieving key EU integration goals, such as joining the eurozone and attaining full Schengen membership. However, the European Parliament elections could challenge coalition unity and further European aspirations.
- **Czechia:** The government is grappling with low public support, high inflation, and challenges in the energy sector. Upcoming parliamentary elections, decisions on nuclear energy, and migration policy will significantly influence the country's policies.
- **Hungary:** The country is facing a difficult year politically and economically, and parliamentary elections will test the ruling party and Viktor Orbán. Hungary's EU Council presidency in the year's second half could present new opportunities for dialogue and cooperation with the EU.
- **Poland:** Prime Minister Donald Tusk's return to power has resulted in a broad coalition. The government's focus in 2024 includes local and the EU elections, unlocking funds from the National Recovery Plan, rebuilding EU dialogue, and updating strategic energy and climate documents.
- **Romania:** The government is preparing for fiscal reform amid economic challenges, with potential tax increases that might limit domestic consumption. Despite public protests, Romania continues to support Ukraine and align with the EU.
- **Slovakia:** After the 2023 elections, Prime Minister Robert Fico's new coalition faces presidential and EU elections in 2024. Managing coalition tensions and balancing relations between the EU and the Visegrad Group will be crucial. Planned public spending cuts and tax reforms aim to address the budget deficit.
- **Ukraine:** The ongoing war has devastated the country, with rebuilding costs reaching astronomical levels. Despite these challenges, Ukrainians remain determined to achieve peace and pursue EU membership and a green transition.

Conflicts at the borders of Poland, Slovakia, and Hungary with Ukraine over trade blockades and embargoes on agro-industrial exports highlight ongoing trade and political tensions. These issues also illustrate the significant burdens and costs EU member states face related to sustainable production under the Green Deal.

[31] The successful redirection of energy supplies has showcased the region's resilience and adaptability. Ongoing efforts to develop new sources of supply and invest in storage capacity are crucial for reducing reliance on Russian energy, achieving energy independence, and enhancing overall resilience. However, these initiatives impose significant financial demands on government budgets, making private investment indispensable for sustaining such an extensive investment campaign.

2. Why Doesn't It Flow? Comparing the barriers for the private capital, companies, and people in the selected energy markets

- ***It's estimated that at least $100 billion annually has to be invested into clean energy R&D to avert the negative impact of climate change. Private investments are crucial. Currently, 77 percent of companies from Central and Eastern Europe (CEE) report investing in business development, with private funds accounting for nearly 70 percent of all renewable energy investments.***
- ***The private investment climate is worsening in the surveyed CEE countries. The investment-to-GDP ratio is below the EU average for all countries except Hungary. At the same time, economic freedom is declining there (except Romania). At the same time, there is increasing pressure on public investment.***
- ***We have identified 40 different barriers to investment in the energy sector of selected CEE countries. The most common obstacles include bureaucracy, state control, regime uncertainty, revenue constraints, limited access to the grid, limited access to land, unfair government procurement practices, and high taxes. Among the analyzed countries, Czechia and Romania are the most open, while Hungary and Bulgaria face challenges in nearly all identified categories.***
- ***The impact of EU policies on private investment levels in CEE countries is contradictory. While the EU promotes market openness and integration, it also allows market-distorting programs. Additionally, the EU's Carbon Border Adjustment Mechanism (CBAM) tax on the carbon footprint of imports is expected to reduce the profitability of investments.***

This report has two main objectives:

1. Describe the barriers that stand in the way of private capital in the energy sector to make the green transition more effective than politicians.
2. Propose reforms that will remove them and spur investment.

In this Chapter, we're addressing the first goal.

The costs of non-competitive market and benefits of freedom

Researchers from the Copenhagen Consensus Center emphasize that investing in research and development of 'green energy' technologies is the most effective long-term strategy to combat climate change, recommending an annual investment of $100 billion. Such efforts can accelerate the transition to low-carbon energy sources. In addition, for every dollar spent on research and development of new energy technologies, about $11 worth of long-term damage from climate change can be avoided.[32]

However, these investments will not materialize without appropriate steps to make them profitable. A competitive market is crucial for this purpose. Competitive markets decarbonize faster than monopolistic markets because they lower costs, provide new innovators with easier market access, and allow consumers to demand newer, cleaner, cheaper, healthier, and more reliable electricity.

[32] Lomborg B., *Welfare in the 21st Century: Increasing Development, Reducing In-equality, the Impact of Climate Change, and the Cost of Climate Policies*, „Technological Forecasting and Social Change."

The negative impact of artificial barriers to entry has been a red thread running through the economic literature for centuries.[33]

The "Regulation and Investment"[34] study by NBER shows that extensive market regulation negatively impacts economic development and technological innovation. Researchers found that regulatory measures, particularly excessive bureaucracy, hinder innovation. The findings indicate that regulatory reforms, especially those liberalizing market entry, stimulate investment, while strict product market regulation limits it.[35,36]

Most EU countries face similar regulatory challenges. According to the report "PEP2040: Progress or Disappointment?"[37] by a think tank, Ember Poland, Poland needs to streamline its permitting and grid connection processes to unlock the full potential of wind and solar energy. This includes more flexible and transparent grid connection procedures and better long-term planning for grid expansion.

Research covering 70 economies over 40 years suggests early deregulation yields more benefits than late deregulation.[38] Therefore, initiating reforms immediately would be welcomed.

We can point to examples outside the EU, which prove that market liberalization works. One of the most notable examples is the Electric Reliability Council of Texas, Inc. (ERCOT).[39]

First and foremost, it is worth taking a look at Texas. The primary difference between the energy market in Texas and EU is that the Texas power grid is managed, not by a government entity or monopoly, but by an Independent System Operator (ISO), the Electric Reliability Council of Texas Inc (ERCOT). ERCOT, a non-profit corporation controlled by its members. Those members "include consumers, electric cooperatives, generators, power marketers, retail electric providers, investor-owned electric utilities (transmission and distribution providers), and municipally owned electric utilities."[40] ERCOT owns no power lines or utilities. Instead it provides a marketplace for both wholesale and retail competition, matching buyer and sellers or electricity, dispatching power, balancing the grid, and perform financial settlements. For households in much of the state, the electricity market is also deregulated, meaning consumers have a choice among a range suppliers offering electricity from different mix of sources, with different services, rather than the lack of choices offered by most monopolies.

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33 In his magnum opus, *An Inquiry into the Nature and Origin of the Wealth of Nations*, Adam Smith criticized various government interventions in the market that harm market competition and trade. Joseph Schumpeter introduced the world to his creative destruction, which is essential to innovation and economic development. Barriers to market entry harm not only long-term economic growth but also consumers. Finally, George Stigler, for example, points to the regulatory capture by regulated businesses, which use regulation to disadvantage their competitors.

34 Alesina, Alberto, *Regulations and investments*, NBER Working Paper No. 9560 https://www.nber.org/digest/sep03/how-deregulation-spurs-growth (accessed 28.05.2024).

35 The study analyzed strategic sectors traditionally protected by the state, such as airlines, road transport, railways, and energy companies, across 21 OECD countries from 1975 to 1998.

36 Continental countries like France, Germany, and Italy experienced slowed investment and economic growth due to overregulation in the late 1990s, a period of significant technological innovation and environmental improvements. These countries had lower GDP per capita levels compared to those that implemented extensive reforms early in the 21st century, such as the United States and the United Kingdom. From the mid-1990s, the US economy grew at an average annual rate of 4.3 percent, while Germany, France, and Italy grew at 2 percent.

37 Czyżak, Paweł, *PEP2040: postęp czy rozczarowanie?* 6 February 2023 https://ember climate.org/pl/raporty/badania/pep2040-postep-czy-rozczarowanie/ (accessed 28.05.2024).

38 Stankov, Petar, *Deregulation, Economic Growth and Growth Acceleration. Journal of Economic Development, 2018*, jed.cau.ac.kr/archives/43-4/43-4-2.pdf (accessed 28.05.2024).

39 https://www.ercot.com/

40 https://en.wikipedia.org/wiki/Electric_Reliability_Council_of_Texas#cite_note-13

ERCOT is an example of a well-functioning deregulated energy market.[41] Liberal Texas produces more electricity than any other state - more than double that any of its neighbor, and 40 percent more than California. ERCOT provides 90 percent of the state's electrical needs. The corporation has provided low-cost energy with few interruptions since the beginning of the 21st century.

Energy suppliers operate based on free competition: competitors offer options, and residents decide who supplies the energy that powers their homes or businesses. Thanks to "retail choice," energy prices are competitive. ERCOT provides financial settlements for the competitive energy market and "administers retail switching for 7 million premises in competitive choice areas." Companies competing for customers offer attractive energy prices, which in Texas are cheaper per kilowatt-hour than the national average.[42]

Texas is also a leader in renewable energy. According to Ernst & Young's Renewable Energy Country Attractiveness Index, the US ranked as the top country for renewable energy investment at the end of 2021, with Texas at the forefront. Wind energy, the fastest-growing source on the Texas grid, provided 23 percent of the system's capacity in 2021, making it the second-largest energy source. In 2023, solar capacity in Texas increased significantly, with installations up 35 percent from the previous year, reducing natural gas consumption.

Other Examples of Market Liberalization

- **Australia:** The deregulated market allows distributors to sell to consumers across regions, forming the National Electricity Market (NEM).[43] This market purchases electricity from generators and supplies it to consumers, something that state-managed regulated markets could not achieve.

- **Canada:** In provinces like Alberta, customers can choose their electricity and natural gas suppliers. About 40 percent of energy consumers in Alberta use commercial electricity supply. The Alberta Electric System Operator (AESO) ensures the safe operation of the interconnected electric system and oversees a competitive electricity market.[44]

We also find several examples of countries undergoing partial liberalization and creating opportunities for private companies to participate in the energy market.

- **The UK:** The energy market was liberalized in the 1990s. Today, it boasts a diverse energy market with numerous private companies competing in the retail market under special supervision by Ofgem.[45] Since privatization in 1990, major electricity suppliers increased from 16 to 35 by 2021.[46] This competition has led to lower consumer prices and a signifi-

41 ERCOT dispatches energy through an electrical grid that connects more than 70,500 miles of transmission lines and more than 610 generating units across Texas. In this way, the organization delivers energy to more than 25 million customers in Texas. Industrial customers such as petrochemical plants and oil refineries use much of the energy despite Texas' massive demand for electricity.

42 Although the consumer can only choose from ERCOT-affiliated companies and suppliers, the number of energy suppliers competing for customers in Texas is still higher than in other states. According to the Public Service Commission of Texas, there are more than 130 different retail electricity suppliers in Texas. According to the U.S. Energy Information Administration (EIA), Texas's average commercial electricity rate is 8.85 cents per kilowatt hour, less than the national average of 12.39 cents per kWh. The average residential electricity rate in Texas is 14.58 cents per kWh, which is also less than the national average of 15.73 cents per kWh.

43 Australian Government, Department of Climate Change, Energy, the Environment and Water: *National Electricity Market,* https://www.dcceew.gov.au/energy/markets/national-electricity-market (accessed 28.05.2024).

44 Alberta's electricity grid encompasses 26,000 kilometers of transmission lines and connects 235 generating units and 200 energy sales companies to the market. AESO: *Guide to understanding Alberta's electricity market*, https://www.aeso.ca/aeso/understanding-electricity-in-alberta/continuing-education/guide-to-understanding-albertas-electricity-market, (accessed 28.05.2024).

45 Ofgem: the energy regulator for Great Britain https://www.ofgem.gov.uk/ (accessed 28.05.2024).

46 Competition in UK electricity markets, https://assets.publishing.service.gov.uk/media/633438478fa8f506931f6d19/Competition_in_UK_Electricity_Markets.pdf (accessed 28.05.2024).

cant increase in renewable energy usage. By 2023, renewables accounted for 43 percent of the UK's energy mix, with low-carbon sources making up 56 percent.[47]

- **Japan:** The Fukushima disaster in 2011 prompted Japan to liberalize its energy market, ensuring a stable supply through diverse sources. The Organization for the Interregional Coordination of Transmission Operators (OCCTO)[48] and the Japan Electricity Exchange (JEPX) were established to foster fair competition and transparency. In 2023, the Energy Act[49] enabled competitive bidding for marine transmission licenses, saving consumers significant costs - £800 million since its introduction.

Implications for the CEE Region

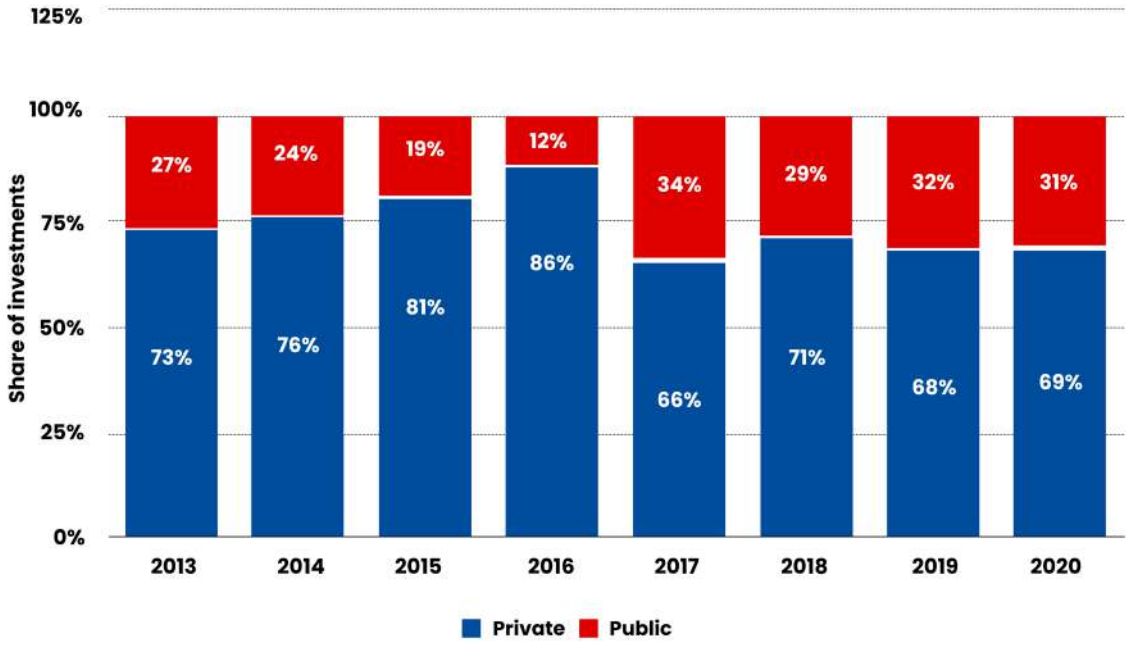
Despite an unfavorable regulatory and tax framework, private companies are already heavily investing in the CEE region's energy sector. The post-pandemic era offers opportunities for increased and accelerated investment. The global trend shows that low-carbon energy sources are predominantly driven by private investments, demonstrating the effectiveness of free market environments in advancing green transformation. The chart below presents the distribution of public and private investments in renewable energy worldwide from 2013 to 2020:

47 Analysis: *UK electricity from fossil fuels drops to lowest level since 1957,* https://www.carbonbrief.org/analysis-uk-electricity-from-fossil-fuels-drops-to-lowest-level-since-1957/ (accessed 28.05.2024).

48 Organization for Cross-regional Coordination of Transmission Operators, Japan, https://www.occto.or.jp/en/ (accessed 28.05.2024).

49 *Energy Act 2023: Electricity and gas market reform,* march 2024, https://www.nortonrosefulbright.com/en-jp/knowledge/publications/5351cd95/energy-act-2023-electricity-and-gas-market-reform (accessed 28.05.2024).

Chart 7. Distribution of public and private investments in renewable energy worldwide from 2013 to 2020



Source: https://www.statista.com/statistics/1386121/distribution-global-public-private-renewable-energy--investments

The European Investment Bank (EIB) published in 2023 the results of a survey on the investment levels in CEE companies — "Business Model Update: Are CEE Companies Investing Enough?".[50] The findings show that investment activity is recovering after the crises caused by the coronavirus pandemic and the Russian aggression to Ukraine.[51]

Key Findings from the EIB Survey:

- **Business Development Investment:** 77 percent of CEE companies invest in business development.
- **Innovation:** The share of companies investing in product and service innovation in CEE (27 percent) is higher than the EU average (24 percent).
- **Investment Barriers:** The primary barriers to investment are the uncertain macroeconomic situation (87 percent) and rising energy costs (87 percent).
- **Zero-Carbon Measures:** Companies in the region are particularly concerned about the costs associated with adopting zero-carbon measures, which often require modernizing production methods.[52]

Transition to Greener Business Models

- **Greenhouse Gas Emissions:** Nearly 90 percent of regional businesses aim to reduce greenhouse gas emissions.
- **Key Initiatives:** The primary initiatives include waste reduction and processing (67 percent) and investments in energy efficiency (55 percent), which have proven highly profitable.
- **Sustainable Transportation:** Investments in sustainable transportation are less common in CEE (43 percent) compared to the EU average.

Financing for CEE Companies

- **Sources of Financing:** In 2022, own funds accounted for 70 percent of financing among CEE companies, followed by external sources (25 percent), and group financing (4 percent).
- **External Finance:** Romania has the highest percentage of businesses using external finance (32 percent), while Czechia has the lowest (18 percent).
- **Bank Loans:** Three-quarters (75%) of companies using external financing in 2023 obtained bank loans, with 21 percent securing loans on preferential terms. Preferential loans are most common in Hungary (39 percent), Czechia (36 percent), and Romania (36 percent), and least common in Poland (7 percent).

Opportunities for venture capital and Private Equity

- The economies of CEE are on a path of rapid growth, offering attractive opportunities for private equity (PE) and venture capital (VC) investors. The PE and VC industry in this region has matured significantly over the past two decades, despite global financial crises and other challenges. Today, with a well-developed ecosystem, including experienced general partners (GPs) and management talent, the industry is poised for accelerated growth. Key advantages include a well-educated and relatively low-cost labor force, trends like intra-regional consolidation, and global manufacturers seeking locations close to Western European markets.[53]

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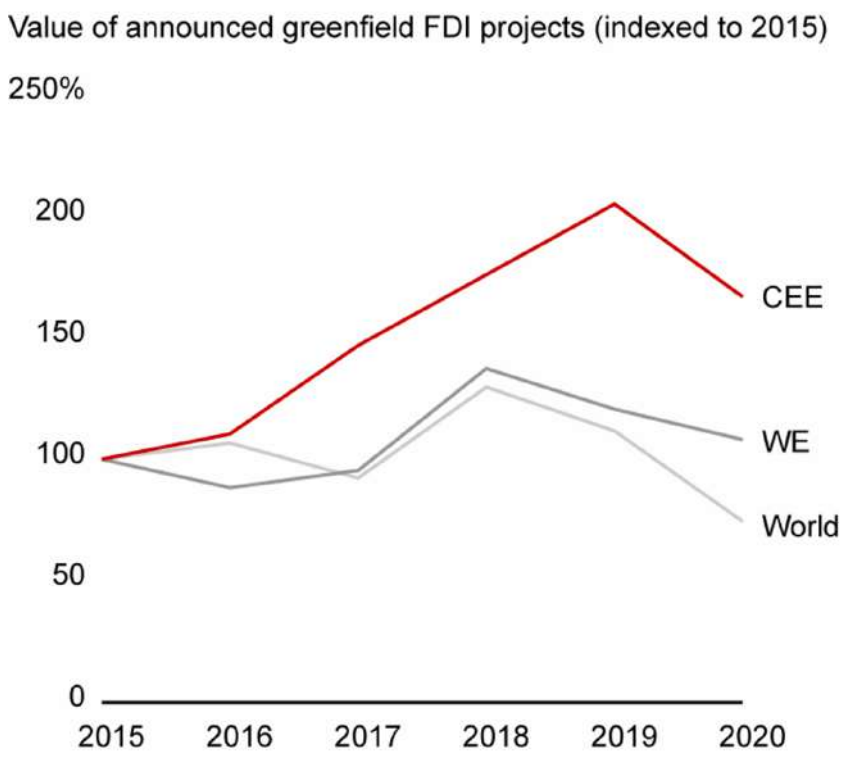
50 How Central and Eastern European companies are investing — findings from the EIB Group Investment Survey, 30 August 2023, https://www.eib.org/en/press/all/2023-301-jak-inwestuja-przedsiebiorstwa-z-europy-srodkowo-wschodniej-wnioski-z-ankiety-grupy-ebi (accessed 28.05.2024).

51 Companies are trying to break away from the old capital-intensive growth model and are looking for new opportunities in this regard, especially those related to the use of modern technologies and innovation. The level of investment in enterprises in the CEE region (77 percent) is close to the average in the EU (80 percent) and the United States (81 percent).

52 Due to the heavy reliance on fossil fuels and energy-intensive production techniques, 36 percent of CEE businesses view stricter climate standards and regulations as a threat, compared to 18 percent who see them as an opportunity. This contrasts with the EU average, where perceptions of threat and opportunity are balanced (32 percent each).

53 Poświata, J. Szreder, P., Kozub, P., Bobrowska, M.,Kolesnik, E., Swieboda, T. and Ćwikiewicz, M., November 15, 2022: *Private investments in Central and Eastern Europe are ready to ride the rising tide of growth, fuelled by strongly performing economies and broad talent pools*. https://www.bain.com/insights/private-equity-and-venture-capital-in-central-and-eastern-europe/ (accessed 28.05.2024).

Chart 8. Value of greenfield foreign direct investment (FDI) projects in CEE grew faster than global value



Note: Europe is defined as EU plus UK, Norway and Switzerland

Source: United Nations Conference on Trade and Development

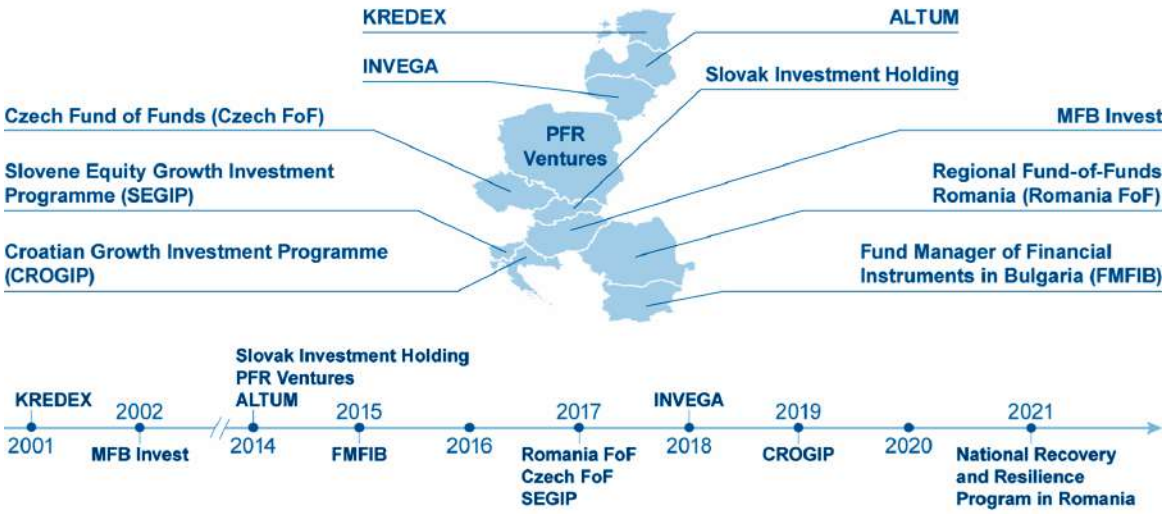
Table 2. Poland top three in Europe by value of announced greenfield FDI projects

Value of announced greenfield FDI projects, 2020		
Rank	**Country**	**Value (EUR B)**
1	United Kingdom	30,5
2	Germany	21,1
3	Poland	20,5
4	France	12,5
5	Spain	11,2
6	Ireland	8,5
7	Italy	5,8
8	Netherlands	5,4
9	Belgium	4,0
10	Portugal	3,5
11	Romania	3,3
12	Hungary	3,1
13	Switzerland	2,5
14	Slovakia	1,9
15	Czechia	1,8

Source: United Nations Conference on Trade and Development

Companies in the region are on average smaller than their counterparts in Western Europe, indicating higher fragmentation within sectors and greater potential for consolidation. However, local limited partnerships are emerging in the CEE region, with their activity intensifying in the last five years.

Chart 9. Limited partnerships' environment in the CEE region



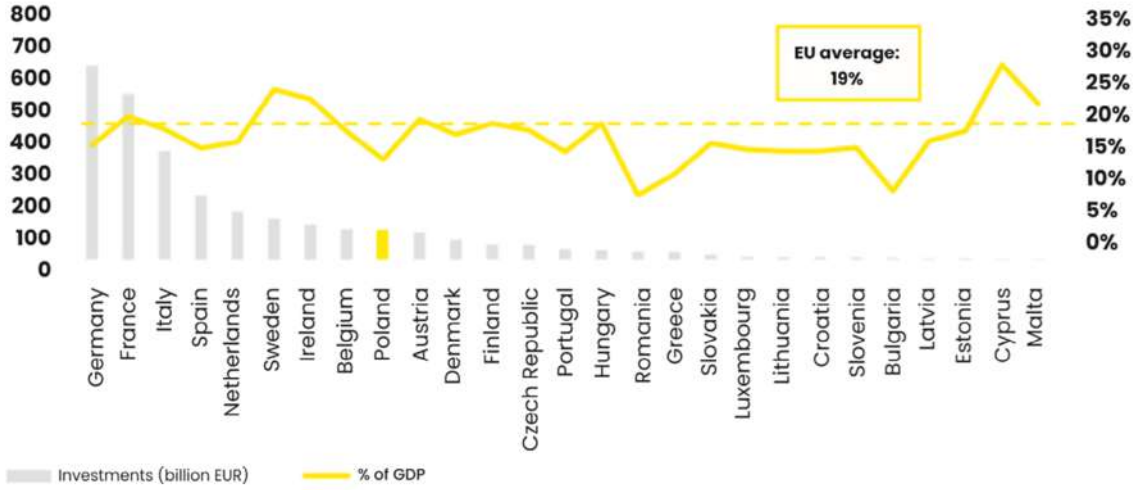
Sources: Kredex; Invega, Altum, MFB Invest; Your Europe; PFR; literature search

The Need for Greater Economic Freedom

Despite positive trends, Europe is still far from meeting its climate targets. The green transformation will falter if companies do not invest in essential upgrades and innovations. Typically, each new factory, piece of machinery, or product developed is more climate-friendly than its predecessor.

The chart below indicates that the highest investment-to-GDP ratios are found in Poland, Czechia, and Hungary. In six out of seven countries (no data for Ukraine), the share of investment in GDP ranges from 10 percent to 20 percent. Except for Hungary, this indicator remains below the EU average in all studied countries. Additionally, the high share of public investment signals potential inefficiencies and suboptimal allocation of public funds.

Chart 10. Investment as a percentage of GDP in the EU-27 (€ bilion, 2022)



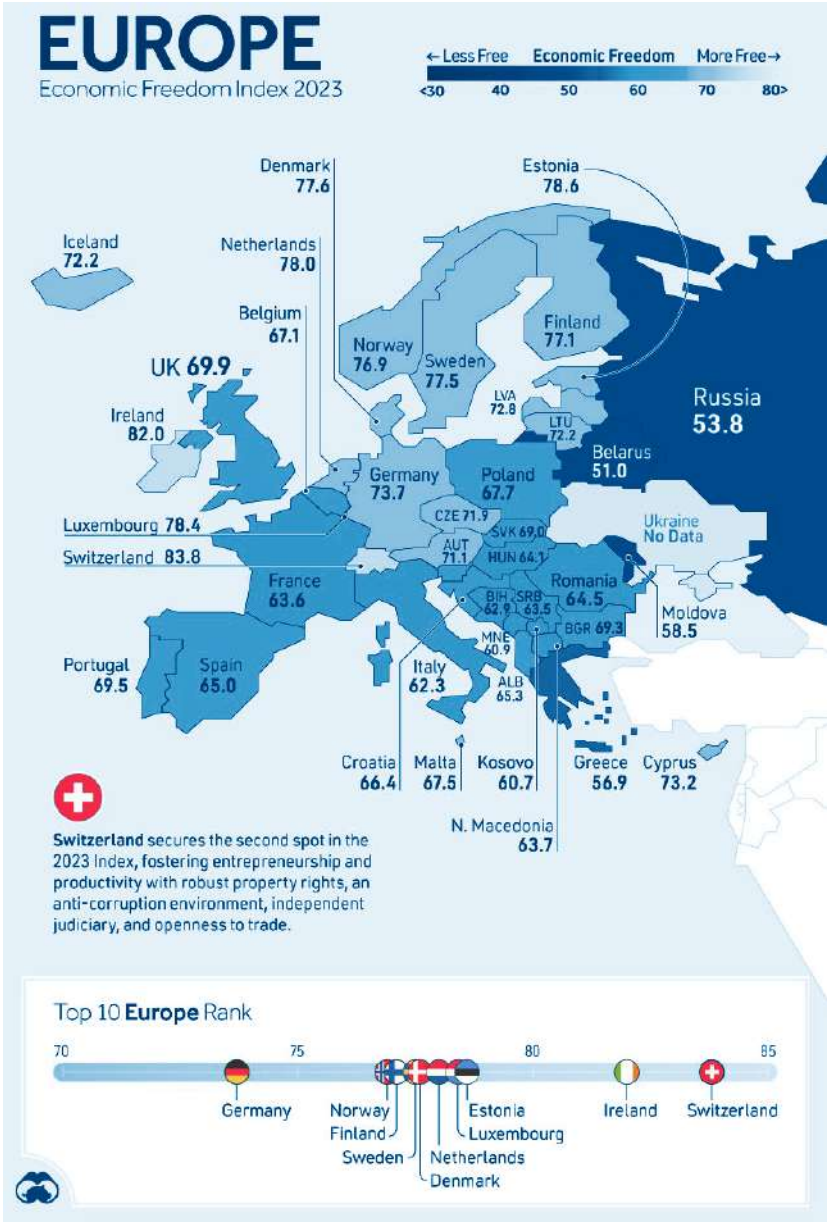
Sources: Eurostat, Oxford Economics, Central Statistical Office

To boost investment, it is crucial to mobilize both domestic and foreign capital. Investment willingness hinges on various factors assessed during due diligence processes, including legal, political, financial, environmental, and social risks. Generally, companies need economic freedom and a stable political environment with low regime uncertainty to thrive. In countries with low economic freedom, government coercion and restrictions limit the choices of individuals and businesses, ultimately hindering prosperity.

Let's see how CEE countries rank on the Heritage Foundation's Index of Economic Freedom.[54]

[54] The index, which shows the level of economic freedom, looks at factors such as the rule of law (property rights, judicial effectiveness, government integrity) and the size of government (tax burden, fiscal health, government spending). Regulatory efficiency (labor freedom, monetary freedom, business freedom) or open markets (financial freedom, trade freedom, investment freedom). Results are expressed on a scale of 1 to 100.

Map 1. Index of Economic Freedom, Heritage Foundation 2023



Source: Heritage.com

As shown on the map above, CEE countries are generally rated as moderately free. Unfortunately, the energy sector tends to be more regulated than others. Freedom levels have declined in all countries except Romania compared to 2022. Czechia ranks 24th, a relatively good position, while the rest fare worse, with Hungary having the lowest score and no data available for Ukraine.

Review of Investment Barriers

Government interventions and procedures often disrupt and distort the market, reducing the profitability of many energy sector companies and discouraging investors. Frequent regulatory changes, often implemented without public consultation, increase legal risk and regime uncertainty. Numerous economic studies highlight the negative impact of such regulations on economic growth. One study[55], likens regulations to a "corporate shadow tax," calculating the additional revenue firms could generate by investing in new machinery instead of paying this shadow tax.[56]

The pace of new renewable and other energy projects is slowing due to higher capital costs caused by various policies in CEE countries. Financial institutions are becoming increasingly hesitant and cautious. To secure a loan, investors must provide an ever-growing list of documents, contracts, and certificates. Politicians often promote agendas with flair but overlook the substantial progress that could be achieved by removing obstacles from economic actors' paths.

Summary of Main Investment Barriers

1. **Bureaucracy:** Excessive administrative procedures and red tape.
2. **Government Control:** Overregulation and state intervention in the market.
3. **Regime Uncertainty:** Frequent and unpredictable changes in regulations.
4. **Revenue Constraints:** Financial limitations and high operating costs.
5. **Limited Access to the Grid:** Challenges in connecting to the energy grid.
6. **Limited Access to Land:** Difficulties in acquiring land for energy projects.
7. **Taxes:** High taxation rates impacting profitability.

In our analysis, we counted as many as 40 investment barriers of various kinds. The barriers identified are the specific legislation of the CEE countries: laws and regulations, as well as prohibitions and forms of taxation that prevent energy development. The most common barrier is the lack of legal consistency and stability, which increases investment risk. This issue is prevalent in Bulgaria, Poland, Romania, Hungary, Slovakia, and Ukraine, where, despite investor-friendly legislation, the risk is heightened by the war. The lack of regulatory transparency and unpredictable policies discourage private entrepreneurs from investing in energy markets. Hungary, Bulgaria, and Romania have significant state control over their energy markets, followed by Poland, which also has a large share of state capital in the energy market. Limited access to the energy grid and land is an additional barrier to investment in renewable energy sources (RES), particularly in Bulgaria, Romania, and Hungary.

Part II of this report is recommended for those interested in detailed information on barriers in specific countries and their extended characteristics. Below, we outline the seven most frequently encountered barriers in CEE countries. Each barrier is described for each country. In the case of Ukraine, the ongoing war influences the presence of barriers.

We argue that we can effectively address all seven main investment barriers through libera-

[55] Pellegrino Bruno, Zheng Geoffery, Journal of Financial Economics, 2024: *Quantifying the impact of red tape on investment: A survey data approach*, https://www.sciencedirect.com/science/article/abs/pii/S0304405X23002039?dgcid=author#se0100 (accessed 28.05.2024).

[56] This study examines seven European countries—France, Italy, Spain, Germany, Hungary, Austria, and the United Kingdom—and finds that red tape significantly impacts the economy, with these nations experiencing an average annual GDP loss of $154 billion.

lization and privatization of the energy market, which will foster competition and innovation, encourage investment, and streamline processes.

Bureaucracy

Extensive bureaucracy significantly impedes the development and transition towards more sustainable energy solutions in the energy sectors of CEE Below, we explore examples of bureaucratic obstacles in various CEE countries, followed by how privatization and liberalization can address these challenges.

- **Bulgaria: I**n Bulgaria, only certified companies that the network operator selects can build infrastructure, with construction periods extending up to five years. This restrictive process slows development and limits competition and innovation in the energy sector.

- **Czechia:** The construction of wind farms in Czechia exemplifies bureaucratic delays. The average timeline to complete projects is at least seven years. This is one of the longest durations in the region, highlighting a cumbersome process that hinders timely advancements in renewable energy.

- **Hungary:** Hungary's public administration significantly delays energy investments. The decision-making process for energy projects is protracted, affecting housing projects and creating excessive burdens for installation companies and applicants. Although a recent amendment to the energy law aims to reduce these administrative burdens, visible changes have yet to be seen.

- **Poland:** Poland's bureaucratic procedures for renewable energy projects are convoluted and lengthy, lacking effective legislative measures for fast-tracking investments. This situation is compounded by officials' arbitrariness, notably in the challenges faced during the investment in small nuclear reactors (SMRs).[57]

- **Romania:** In Romania, the lengthy and complex process of obtaining construction and operation permits can be particularly daunting for private sector companies, especially smaller ones or foreign investors. The Romanian Energy Regulator (ANRE) imposes a substantial regulatory burden, making the process time-consuming and resource-intensive.

- **Slovakia:** Bureaucracy in Slovakia is primarily due to the outdated Environmental Impact Assessment (EIA) Act, which often extends the approval process for over a year. The government has committed to increasing the staffing of the responsible body by 115 employees by the end of 2026 as part of the Green Transformation milestones in the Recovery and Resilience Plan.

- **Ukraine:** Conversely, Ukraine has made notable progress in reducing bureaucracy, especially following the Russian invasion in 2022. The country has implemented digitized procedures, reduced inspections, and offered tax exemptions for significant investment projects, supporting economic activity and improving clean technologies.

Conclusion

The examples above highlight how bureaucracy hampers energy sector development in the CEE region. By reducing state control and opening markets to private investment, these reforms can facilitate faster project approvals, more efficient regulatory frameworks, and increased investment in sustainable energy solutions.

[57] To build an SMR in Poland, a whole series of complicated requirements must be met, which extends the preparatory phase of the investment to several years. However, in practice, as it turns out, the investment can be stopped on the basis of a secret opinion of the intelligence services, which has no binding legal force, but can be used as an excuse. This is what happened in Poland after the last elections. In addition, the previous government - in order to safeguard against the eventuality that a private investor builds an SMR in a neighboring country and then transmits energy to the country of origin - prohibited private players from building interconnectors.

State control

In many CEE countries, the state heavily controls the energy market, with state-owned enterprises dominating the sector. However, the level of administrative control varies across countries.

- **Bulgaria:** Bulgaria's renewable energy sector (RES) is largely dominated by the private sector. Despite rapid growth in RES capacity, frequent regulatory changes and infrastructure issues pose significant risks for investors. The installed capacity of RES has doubled in 18 months, and Bulgaria expects to nearly triple its capacity by 2025 compared to 2020.

- **Czechia:** The Czech energy market is relatively liberalized, with fewer entry barriers than other CEE countries. Building regulations vary by region; obtaining energy-related licenses requires specific qualifications and experience. The Energy Regulatory Office issues licenses under strict conditions, ensuring professional qualifications and a clean criminal record.

- **Hungary:** The Ministry of Energy supervises the energy sector, with MAVIR, the transmission system operator, managing the transmission network and the Hungarian Electricity Exchange (HUPX). The Hungarian Energy and Public Services Regulatory Authority (MEKH) defines licensing conditions, supervises compliance, and sets energy system charges.

- **Poland:** The electricity generation sector has a diverse ownership structure, including state-owned, private, and foreign companies. State-owned entities like Polska Grupa Energetyczna (PGE), Tauron Polska Energia, Enea, and Energa dominate the market, producing about 70 percent of the country's energy. The government's support for coal production remains a significant issue.

- **Romania:** The Romanian Energy Regulatory Authority (ANRE) oversees the entire energy sector. It ensures the proper functioning of the electricity market, protects consumer interests, and promotes competition. ANRE issues licenses to energy companies, sets rates for transmission and distribution services, and monitors market behavior. The Romanian government is also the largest shareholder in key energy companies, such as Transelectrica, Hidroelectrica, and Nuclearelectrica.

- **Slovakia:** Installing low-carbon energy sources, like photovoltaic and wind installations, must comply with the national energy policy. Consent is required from the distribution network, the transmission system operator, and the Grid Industry Regulatory Authority for significant projects, all of which are state-controlled.

- **Ukraine:** Restrictions on certain energy activities, often due to environmental or security concerns, are generally temporary and heightened during martial law. These restrictions primarily affect activities requiring special licenses or permits.

Conclusion

By decreasing state control and allowing more private investment, markets can become more competitive, transparent, and efficient. This can lead to improved infrastructure, innovation, and, ultimately, a more resilient energy sector. Romania's and Poland's reliance on state-owned enterprises could be alleviated by encouraging private and foreign investments and enhancing market dynamics. Slovakia and Hungary could improve their regulatory frameworks to ease low-carbon technologies investments for private companies. Ukraine's temporary restrictions highlight the need for flexible policies that adapt to changing circumstances.

Regime uncertainty

Regime uncertainty significantly discourages investments across CEE due to unstable energy laws, which increase investment risk and affect private companies' decisions, profitability, and operating costs.

- **Bulgaria:** Frequent amendments to the Bulgarian energy law create a volatile environment. Since the beginning of 2020, the Energy Law has been amended 14 times, with five changes just this year. The Bulgarian parliament recently rejected a law on offshore renewable energy, which would have clarified legal and technical definitions.[58]

- **Czechia:** The regulatory risk is relatively low. A transparent licensing system and regional autonomy protect market competition from central government influence, creating a stable environment for private investment.

- **Hungary:** Since 2016, Hungary has been in a near-constant state of crisis or emergency, allowing government decrees to bypass parliamentary legislation. This leads to frequent, rapid changes without sufficient public consultation, leaving businesses little time to adapt. In the energy sector, stakeholders often learn about new laws only from the Hungarian Gazette, sometimes just before they come into effect.

- **Poland:** Regulations since 2016 have reduced the profitability of renewable energy investments, creating a perception of insufficient government support. Investors face uncertainty as their plans can be abruptly halted by government agencies, exemplified by the sudden stoppage of the SMR project without clear explanation.

- **Romania:** The Romanian Energy Regulatory Authority (ANRE) requires companies to undergo a detailed accreditation process, including pre-accreditation upon project approval and final accreditation upon completion. This lengthy and documentation-heavy process, coupled with frequent changes to the support mechanism (such as green certificates), creates financial uncertainty and discourages investment.

- **Slovakia:** Although Slovakia privatized a significant portion of its energy sector nearly 20 years ago, strong state influence persists. The government regulates the market heavily, sometimes forcing agreements that favor political over market interests. Slovenské Electric was compelled to supply electricity below market prices for at least two years, reflecting political dominance over market operations. Political debates rather than independent decisions often determine household electricity and gas prices.

- **Ukraine:** Ukrainian politicians are under extraordinary pressure to win the war, which means a well-functioning energy sector is critical. Ukraine is committed to liberalizing its energy market following the EU Association Agreement. Implementing the third energy package has established a legal framework for liberalized gas and electricity markets. However, the conflict with Russia poses high investment risks, particularly for foreign capital. Unfortunately, a strong oligarchy and 'cronyism' means that many investments fail to materialize and may mean that politicians lose the war and end up in a Russian gulag. Cronyism also means that Ukraine may not receive Western aid.

Conclusion

Liberalization and privatization can mitigate regime uncertainty by creating a more predictable and stable regulatory environment. To reiterate, Czechia's low regulatory risk demonstrates how transparent rules and regional autonomy can attract private investment. Similarly, liberalization in Ukraine, despite war-related challenges, shows promise by adopting EU-aligned legal frameworks. If other CEE countries adopt similar measures—reducing frequent regulatory changes and increasing transparency—they can create more favorable conditions for private capital and overall stabilize the energy markets.

[58] Additionally, the regulator's tendency to underestimate market prices and inflate guaranteed premiums during price spikes adds to the uncertainty, making it difficult for renewable energy producers to forecast average annual market prices and premiums reliably.

Revenue Constraints

In many CEE countries, state-imposed price caps and additional taxes significantly squeeze energy companies' revenues. This section discusses several countries' challenges and how privatization and liberalization can mitigate these issues.

- **Bulgaria:** In Bulgaria, the Council of Ministers sets a price cap for energy producers not covered by the Feed-in Premium scheme, with recent reductions in the cap impacting revenues. The cap for renewable energy producers was lowered from EUR 179/MWh to EUR 153/MWh in 2023. Removing such caps could promote competitive pricing and encouraging investment in the energy sector.

- **Czechia:** Czechia has a relatively tax-friendly environment but imposes charges on consumers, with regulated components accounting for a significant portion of energy prices. While this ensures grid maintenance and upgrades, it favors large established companies. More liberal regulations would allow smaller players to enter the market and drive innovation and efficiency.

- **Hungary:** Hungary's 'utility cost reduction' program caps electricity prices for consumers, with significant state intervention to cover losses during energy price surges. The introduction of higher tariffs for consumption above average exacerbates the issue. Privatization can alleviate these constraints by reducing state intervention and enabling market-based pricing, which can boost efficiency and attract private investment.

- **Poland:** In Poland, the energy market is heavily regulated. The regulator approves electricity tariffs submitted by distribution companies and last-resort sellers (from the PGE, Tauron, Enea, and Energa groups) each year. This regulatory framework, where energy trading companies must pay up to 97 percent of the difference between purchase and resale prices, acts as an indirect tax. Less rigid controls can allow for a more market-driven pricing mechanism to boost the sector's revenue and investment.

- **Romania:** Romania imposes penalties of up to 10 percent of annual sales revenues on electricity and gas companies for non-compliance with regulatory obligations. Such stringent measures can deter investments. Liberalization and privatization could simplify regulations, lower penalties, and create a more appealing environment for private capital, ultimately benefiting consumers with better services and competitive pricing.

- **Slovakia:** Slovakia imposes a concept of 'excess revenues,' taxing net income above set thresholds for various energy sources at a rate of 90 percent. In 2023, the government expected to collect around EUR 30 million from this taxation. By privatizing and liberalizing the market, Slovakia could attract private capital, reduce heavy taxation, and create a more favorable environment for investment in renewable and traditional energy sources.

- **Ukraine:** During martial law, Ukraine imposed restrictions on capital flows out of the country, affecting private individuals and commercial entities. By lifting these restrictions, Ukraine can provide more stability and predictability for investors, which is crucial for attracting private capital in the energy sector.

Conclusion

The above experiences demonstrate how state-imposed price caps and additional taxes limit the revenue potential of energy companies, deterring private investment. For instance, in Bulgaria and Hungary, price caps reduce profitability, discouraging new market entrants and innovation, while high taxation in Slovakia hinders investment in infrastructure. As evidenced by Germany's energy sector, privatization and liberalization promote competitive pricing, reduce regulatory burdens, and attract private capital, leading to lower consumer prices and improved service quality. Specific reforms, such

as removing price caps in Bulgaria and Hungary, streamlining regulations in Poland and Romania, reducing excessive taxation in Slovakia, lifting capital flow restrictions in Ukraine, and fostering competition in Czechia, can create a dynamic and efficient energy market. These changes would attract private investors, strengthen energy security, and drive innovation, aligning with the EU's Green Deal objectives. By learning from each country's specific challenges and successes, CEE can build a favorable environment for private investment, benefiting the energy sector and its consumers.

Access to the power gird

Access to the power grid is a critical issue for private investment in the energy sector in the CEE region. Many countries face challenges related to outdated infrastructure and complex regulations, making it difficult for companies to connect to the existing power grid. Below are examples from various CEE countries highlighting these issues and potential solutions.

- **Bulgaria:** Bulgaria's Renewable Energy Sources Act of October 2023 introduces ambiguity regarding the timing of grid connections, creating unpredictability for investors. Numerous administrative procedures and procurement laws further complicate the investment process, increasing costs and delays. Bulgaria needs to provide more transparent regulatory frameworks and improve investor confidence by ensuring timely and predictable grid connections. It can achieve it through liberalization.

- **Czechia:** Czechia's energy infrastructure, including cables, power lines, and substations, cannot support the booming photovoltaic (PV) market. Reinforcing the grid involves multiple administrative steps, delaying the integration of new renewable energy sources. Liberalizing the market could reduce bureaucratic barriers, expedite grid enhancements, and attract investments needed to upgrade infrastructure and support the growing PV sector.

- **Hungary:** Hungary's grid, though stable, has limited storage capacity, posing risks to grid stability during sudden changes in power demand. An incident in January 2024 saw balancing power demand exceed 1,000 MW within an hour. Privatization can encourage investments in storage solutions and grid modernization to improve stability and accommodate renewable energy sources more effectively.

- **Poland:** In Poland, the outdated tree structure of the power grid hinders the dynamic development of renewable energy due to limited connection capacities and grid security concerns. A significant issue is the high rejection rate of grid connection applications, which currently stands at 90 percent. Modernization and redevelopment are essential to accommodate new generation sources, such as offshore wind and nuclear power, which are planned for the northern part of the country. At the same time, industrial production is concentrated in the south. Privatization could attract private capital for grid modernization and improve infrastructure efficiency.

- **Romania:** Romania's Law 123/2012 requires companies to obtain various licenses and permits from the Romanian Energy Regulatory Authority (ANRE), making the process complex and costly. This can discourage smaller players and new entrants. Simplifying the regulatory landscape, reducing entry barriers, and attracting diverse investments through liberal regulations would make grid connections more accessible and affordable.

- **Slovakia:** Slovakia has made significant progress in modernizing its grid and accelerating the pace of connection permits. Legislative changes and investments in "smart" grids connecting Slovakia with Czechia and Hungary have been implemented. However, the primary transmission network operator, SEPS, holds a monopoly position, which could

be addressed through market liberalization to increase competition and further investment in infrastructure.

- **Ukraine:** Ukraine's efforts to simplify grid connections and involve local communities have been hampered by the ongoing conflict, which diverts resources needed for infrastructure rebuilding. Despite the electronic services introduced in 2021, access to the grid remains a challenge due to damaged infrastructure. Privatization could bring in much-needed capital for infrastructure repair and development, enhancing grid access and stability in the long term.

Conclusion

The examples demonstrate that access to the power grid is a significant issue for private investment in the CEE region. These measures can lead to the modernization of energy infrastructure, improved grid stability and integration of renewable energy sources, ultimately benefiting investors and consumers in the region.

Limited access to land

Limited access to land often hinders energy investments in the CEE region. Through privatization and liberalization, it is possible to open up land for development.

- **Bulgaria:** Bulgaria restricts renewable energy development in areas under state protection and limits it to urban and commercial areas. Agricultural land, especially high-quality land, is often off-limits for energy projects. Some regions with high renewable energy potential fall under the Natura 2000 network, further restricting development. Liberalization could involve reevaluating land use policies to balance agricultural needs with renewable energy development.
- **Hungary:** Hungary's energy investments are constrained by extensive legislation protecting cultural heritage, environmental interests, and arable land. The lack of spatial planning for the energy sector exacerbates these issues. Recent changes reduced the minimum distance for wind turbines to 700 meters and introduced 'simplified areas' for accelerated licensing. However, the new regulations are criticized for favoring specific stakeholders and not promoting fair competition. The definition of the thresholds delineating the simplified areas is confusing. According to Energiaklub's[59] position, the new law favors specific stakeholders, and the designation of simplified areas may unduly restrict real competition in the market.
- **Poland:** In Poland, the investment process is notably complex and lengthy, with onshore wind projects taking an average of six years and the first offshore wind farm taking 13 years to materialize. The Wind Power Investment Act of 2016, with its restrictive 10H rule, significantly limited access to land for wind turbines. However, the amendment in March 2023 reduced the minimum distance to 700 meters, improving land access for investors. Experts suggest further reducing the distance to 500 meters to boost investment opportunities.
- **Romania:** In Romania, the complexity of obtaining construction permits, regulated by Law 50/1991, poses a significant barrier. Multiple approval stages involving various authorities and extensive documentation requirements can delay project implementation.[60] These hurdles can be mitigated by simplifying the permitting process and easing land use restrictions.

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59 *Energiaklub's opinion on the new Hungarian wind energy regulations*, January 8,2024, https://energiaklub.hu/en/news/energiaklubs-opinion-on-the-new-hungarian-wind-energy-regulations-5189, (accessed 18.05.2024).

60 Additionally, Law 17/2014's restrictions on agricultural land use for non-agricultural purposes complicate land acquisition for renewable energy projects.

- **Slovakia:** In Slovakia, despite efforts to accelerate administrative decisions, the approval process remains uncertain and prolonged due to additional stakeholder requirements. The rigorous environmental impact assessments and multiple administrative permits increase project costs and delay implementation. A more liberalized energy market could facilitate these processes, reduce approval times, and lower capital costs.

- **Ukraine:** In Ukraine, access to land for renewable energy projects has been simplified by recent legislation. The Land Code of Ukraine allows leasing land without changing its use, but Russia's aggression has introduced new risks and pollution, complicating land access. Under martial law, the public cadastral map is closed, affecting transparency. Continued liberalization efforts, including security measures and transparent land leasing processes, are essential for investor confidence.

Conclusion

Liberalization and privatization can significantly alleviate the land access hurdles in the CEE region by:

1. **Simplifying and deregulating the permitting process:** improved and efficient permitting processes reduce the time and complexity of obtaining approvals for energy projects. This encourages more investments by making the initial stages of project development less cumbersome.
2. **Reducing restrictive land use regulations:** Easing regulations that limit land use, mainly agricultural and protected areas, can open up more opportunities for renewable energy development. This approach must balance the need for conservation with expanding energy infrastructure.
3. **Enhancing transparency and reducing bureaucratic delays:** Transparent processes and reduced bureaucratic hurdles can increase investor confidence. Precise, predictable regulations and streamlined administrative procedures can make the investment landscape more attractive and less risky.
4. **Ensuring fair and equitable access to land for energy projects:** Fair regulations that promote competition and do not disproportionately favor specific stakeholders ensure a level playing field. Equitable access to land is crucial for a competitive market environment.

By addressing these issues, CEE countries can attract more private investment in the energy sector, promoting economic growth and sustainability. Liberalization and privatization are crucial to unlocking the region's potential for renewable energy development, ensuring that regulatory frameworks are conducive to innovation and expansion. This, in turn, will help CEE countries meet their energy needs more efficiently and contribute to global efforts in combating climate change.

High and complicated taxes

High and complicated taxes significantly hinder the green transformation of the energy industry. Liberalization and privatization can help alleviate these hurdles by simplifying tax systems and creating more predictable investment environments.

- **Bulgaria:** The energy sector in Bulgaria faces a complex tax regime that includes high VAT rates and multiple levies, deterring private investment. Simplifying these taxes and reducing the overall tax burden can attract more private capital.

- **Czechia:** Czechia stands out with a competitive tax system, ranked 5th in the International Tax Competitiveness Index 2023.[61] However, issues like limited access to land and grid connectivity still pose challenges. Further liberalization could improve access and boost investment opportunities.

[61] *Romania introduces massive tax changes*, https://www.schoenherr.eu/content/romania-introduces-massive-tax-changes (accessed 28.05.2024).

- **Hungary:** Hungary's Robin Hood tax, which can push the total tax burden to around 50 percent, heavily impacts energy producers and grid operators. Privatization and tax reforms could mitigate these excessive tax rates, making the market more attractive for private investors.

- **Poland:** Poland has one of the highest VAT rates on electricity in the OECD at 23 percent, compared to Germany's 19 percent. Reducing VAT rates on electricity and renewable energy sources through liberal reforms could attract more private capital into the energy sector.

- **Romania:** In Romania, new taxes introduced in 2023 significantly increase the tax burden on micro-enterprises and large companies. Simplifying the tax regime and reducing these additional taxes could make the market more appealing to investors. At the end of 2023, the Romanian government introduced new taxes[62], arguing for a growing budget deficit.[63]

- **Slovakia:** Slovakia imposes high surcharges on renewable energy and special levies on businesses in regulated sectors, resulting in an effective tax rate of 24.4 percent for many electricity producers. Liberalizing the tax system and reducing these surcharges could enhance investment in renewable energy.

- **Ukraine:** Ukraine faces instability in tax legislation, with segmentation by mode of taxation creating potential loopholes and ambiguities. Liberalizing the tax laws to create a more stable and transparent tax environment could significantly boost investor confidence.

Conclusion

Liberalization and tax cuts have proven effective in increasing economic growth and investment in Western countries, offering a compelling model for the CEE energy market. For instance, the United States experienced significant economic expansion following the Tax Cuts and Jobs Act of 2017, which reduced corporate tax rates and spurred investment and job creation. Similarly, the United Kingdom's gradual reduction of corporate tax rates from 28 percent in 2010 to 19 percent in 2019 attracted foreign investment and bolstered economic resilience.

Strategic tax cuts can create a more favorable investment climate. Similar liberalization measures in the CEE energy market could attract private capital, stimulate green investments, and drive the sector's transformation.

As summarized in the Table below, Czechia and Romania are the freest countries among the analyzed ones. At the same time, Hungary and Bulgarian energy markets face obstacles in most identified types. It is worth additional research on why this is so. Somehow, under the same EU policies umbrella, a much different set of national policies can co-exist.

62 International Tax Competitiveness Index 2023 https://taxfoundation.org/research/all/global/2023-international-tax-competitiveness-index/ (accessed 28.05.2024).

63 Under the new tax arrangements, micro-enterprises will pay a tax of 1 percent on turnover with revenues of up to €60,000 per year and 3 percent for revenues above this amount. Companies with more than €50 million will pay an additional tax of 1 percent on turnover. Oil and gas companies with a turnover of more than €50 million will pay an additional tax of 0.5 percent on turnover.

Table 3. Barriers in the energy sector by type

Country	Investment Barriers						
	Bureaucracy	State Control	Regime Uncertainty	Revenue Constraints	Limited Access to the Grid	Limited Acess To Land	High and complicated taxes:
Poland	+	+	+	-	+	-	+
Slovakia	+	+	+	+	-	-	+
Hungary	+	+	+	+	+	+	+
Romania	+	+	+	-	-	-	-
Bulgaria	+	-	+	+	-	+	-
Ukraine	+	+	+	+	+	+	-
Czechia	+	+	-	-	+	-	-

Source. Own study

Impact of EU Policies on States Energy Markets

The lack of a clear vision for how the EU energy market should function is a significant barrier to private investment. Companies are essentially gambling on which energy sectors will receive future subsidies or tax breaks, rather than pursuing profit-driven market exploration. While this is currently the rational choice for businesses, it does not necessarily align with achieving genuine, sustainable, and impactful climate goals in the industry.

This issue arises for several reasons. One key factor is that relatively free competition in the electricity market is a relatively new concept, and its development is ongoing. As recently as 1990, European electricity markets were dominated by monopolies operating under the principle of vertical integration, where one or more state-owned companies often managed generation, transmission, distribution, and sales. During this period, electricity prices were state-regulated, and smaller private companies had no market access. When these companies finally did gain access, they faced climate policies and targets that prevented them from developing solely based on market mechanisms.

The EU Dualistic Approach to Electricity Markets

Liberalization of the EU energy market began in the mid-1990s but proved to be incomplete. The EU's energy policy is a two-way street, promoting free competition while disrupting it. The result is bound to be suboptimal. The EU cannot decide whether to entrust the reduction of CO_2 emissions to the market or central control. Hence, ideas that try to marry one with the other are implemented.

In 1996, the EU began gradually introducing competition to liberalize the energy market. The opening of the market economy, which took place earlier and later in other sectors, was based on Art. 114 and 194 of the TFEU. The aim was to create a single integrated European internal market for electricity in all EU Member States to reduce overall network costs and exploit synergies in terms of security of supply. A crucial step in this process is the consistent "unbundling" of all national European electricity markets, defined as the separation of market activities about generation, transmission, distribution, and end customers in the member states. However, the 1996 directives only required accounting separation, which did not pave the way for real competition.

The second directive introduced in 2003 (Directive 2003/54/EC and Directive 2003/55/EC) also required the legal separation of energy supply companies. A company could only carry out one of the following activities: generation or transmission, distribution or retail supply. By 2007, European electricity consumers should also be free to choose their electricity supplier. Unfortunately, the old energy companies still retained significant market power.

With the EU's third energy package in September 2009, ownership unbundling became the next step. The "Winter Package" of 2016/2017 was the last step. The aim is to create a fully integrated, decarbonized electricity market with maximum security of supply thanks to solidarity and cooperation between EU member states.[64]

Later on, the Energy Union strategy was created to provide Europe and its citizens with "affordable, reliable, and sustainable" energy. It was presented by the European Commission in 2015 in response to a request from EU heads of state. The Energy Union is meant to be the answer to the big energy challenges facing the EU:

- Climate change;
- Energy dependence: as the world's largest energy importer, the EU wants to reduce its dependence on external markets;
- Aging infrastructure: The EU must fully integrate energy markets, modernize energy infrastructure, and ensure coordination of national energy prices.

In a perfect market economy, electricity generation and supply are entirely competitive activities that do not influence each other. This setup leads to lower prices in both wholesale and retail markets, giving household consumers the freedom to choose their electricity supplier and opt for green electricity if desired. However, real-world markets are imperfect, particularly in the energy sector, which requires significant capital and infrastructure investments. Consequently, commercial activities, especially at the transmission level, are dominated by a few large companies. Regulatory bodies such as the Energy Regulatory Office (URE) in Poland and the Agency for the Cooperation of European Energy Regulators (ACER) at the EU level monitor market developments and assess competition levels.

Reports from the seven countries analyzed indicate that a free market for household electricity, heat, and gas has not existed for several years. Prices are regulated and fixed, rendering supplier changes meaningless for end consumers.[65]

Another policy program that claims to be market-based but significantly distorts the market is the Emissions Trading System (ETS). A comparison with a purely free-market proposal, the Climate & Freedom Accord, will provide further insights into these policy approaches.

ETS

The European Emissions Trading Scheme (EU-ETS), launched in 2005, has undergone multiple updates since its inception. This market-based mechanism incentivizes Member States to adopt more sustainable energy sources and decarbonize the European economy. It encom-

64 The following legal instruments cover the Third Energy Package: Directive 2009/72/EC and Directive 2009/73/EC, Regulation (EC) No 713/2009, No 714/2009, No 715/2009.

65 Additionally, recent EU-imposed regulatory frameworks responding to geopolitical events have disrupted free market principles. The Temporary Emergency State Aid Framework, adopted on March 23, 2022, allowed member states to support their economies in the context of Russia's war against Ukraine by utilizing state aid rules. This framework was amended on July 20, 2022, and again on October 28, 2022, to align with the REPowerEU plan and to address high energy prices and improve cross-border gas exchanges. On March 9, 2023, the Commission adopted a new Temporary Framework for State Aid in crises and transitions, supporting sectors crucial to a net-zero economy in line with the Green Deal Industrial Plan. *Commission consults Member States on a proposal for a partial adjustment of the phase-out schedule of the State aid Temporary Crisis and Transition Framework in view of the upcoming winter heating period,* https://ec.europa.eu/ommission/presscorner/detail/en/ip_23_5525 (accessed 28.05.2024).

passes all energy and industrial installations with a thermal capacity exceeding 20 MW that emits CO_2, N2O, and perfluorocarbons (PFCs). In Slovakia, the scheme covers around 45 percent of total emissions.[66]

The ETS has undergone several phases, with some quite substantial adjustments. To increase the price of allowances, the European Commission has introduced a 'market reserve,' which reduces the volume of allowances available and thus increases the price. Each year, the volume of allowances that can be placed on the market is reduced. There have been several revisions to this policy following the adoption of the European Climate Change Act. The annual reduction in the volume of permits will accelerate from 2.2 percent to 4.3 percent each year from 2024-2027 and 4.4 percent from 2028-2030 so that in 2030 the emissions of companies covered by the scheme will be reduced by 62 percent compared to 2005 (initially 43 percent). However, maritime transport has also been included in the EU ETS, which will receive an allocation of 78 million permits in 2024, and in 2026, 100 percent of emissions from intra-European shipping should already be covered by the scheme.[67] In contrast to the status quo, Member States must use all sales revenues to finance climate programs.

Other changes concern the increase of the so--called Market Stabilization Reserve, which maintains an appropriate price (market stability) by withdrawing unused permits from the market. Now, 24 percent of the market volume per year (previously 12 percent) will be withdrawn to this reserve. Allowances accumulated in this way above the 400 million threshold will be automatically canceled. The European Commission will retain a portion of the total volume of allowances, and the proceeds of their auctioning will finance the Innovation and Modernization Fund and the gradual reduction of free allowances of selected sectors of the EU ETS, along with the roll-out of the CBAM. A portion of allowances issued under the separate aviation permit scheme will also be moved to the market reserve. A decision should be taken in 2026 on whether waste incineration will also be included in the EU ETS and on the desirability of lowering the 20 MW thermal capacity threshold to increase the range of economics covered by mandatory permit documentation.

A significant change to be introduced is the EU ETS2 in 2027, which is expected to cover emissions from transport, housing, and possibly other sectors (e.g. smaller industrial plants). The EU legislation foresees the possibility of the launch of ETS2 in 2028, should high energy prices persist, since over the last few years, the price dynamics for EUA (EU Allowance) has increased significantly. The price of emission allowances (EUAs) traded under the EU Emissions Trading Scheme (ETS) increased from below EUR 30 per metric ton of carbon in 2020 to above EUR 90 in early 2022, then dropped recently below EUR 60, which persists today. Functioning more and more like a financial market (with the participation of investment funds and not only entities that are forced to be present in this market), the ETS market is unfortunately susceptible to price bubbles. The Warsaw Enterprise Institute describes this in

66 Each Member State allocates free allowances to industrial (non-energy) companies based on national rules, aiming to prevent these companies from relocating to countries with higher emissions. Slovakia's National Allocation Plan, set for five-year periods, currently includes 94 plants with an annual volume of 12.8 million tons of CO_2. Companies must account for each ton of CO_2 emitted by including one allowance in their annual accounts. If their free allowances are Insufficient, they must purchase additional ones on the market. Failure to surrender an allowance incurs a severe penalty exceeding EUR 100 per ton of CO_2 equivalent. Allowances enter the market through auctions, with Member States selling their allocated allowances throughout the year. In 2023, the Slovak government had 14 million tons of CO_2 allowances available, with expected auction revenues of €340 million. Thirty percent of these revenues will go to the Modernization Fund to subsidize decarbonization projects.

67 DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL (EU) 2023/959 of 10 May 2023, amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 on the establishment and operation of a market stabilization reserve of the Union greenhouse gas emission allowance trading scheme, https://eur-lex.europa.eu/legal-content/SK/TXT/HTML/?uri=CELEX:32023L0959 (accessed 28.05.2024).

the report "The Poorest Will Pay", compiled by economist Marek Lachowicz.[68]

The narrative around the ETS has shifted in recent years, with growing recognition of the risk of price bubbles in EUA allowances. In the spring of 2021, few people raised concerns about this possibility, and the energy mainstream largely ignored those who did. However, more experts acknowledge that price bubbles are a real concern today. Despite a lengthy debate in the European Parliament about excluding financial entities from the EU-ETS, no decisive action has been taken.

Considering such problems, one should ask whether the ETS effectively reduces emissions. Yet, it depends on who you ask. One group of Norwegian researchers found that "the EU ETS, which initially regulated roughly 50 percent of EU carbon emissions from mainly energy production and large industrial polluters, saved more than 1 billion tons of CO_2 between 2008 and 2016. This results in reductions of 3.8 percent of total EU-wide emissions compared to a world without the EU ETS".[69] In the post-2016 period, ETS prices have been higher than before, which may affect emissions in other ways, but there are no reliable studies on this yet.

Other observers take a more critical view. First, there is some evidence that the ETS and other carbon pricing schemes actually slow the pace of decarbonization. One study points out that EU emissions declined steeply until the ETS rollout in 2005, then suddenly began to level out, flattening out completely and even rising a bit from 2008-2016. In other words, almost all of the emissions reduction claimed for the ETS occurred from 2005 to 2007 and were most likely caused not by the ETS but by pre-existing policies and market trends. Indeed, it seems the ETS slowed, then halted, the pace of decarbonization.

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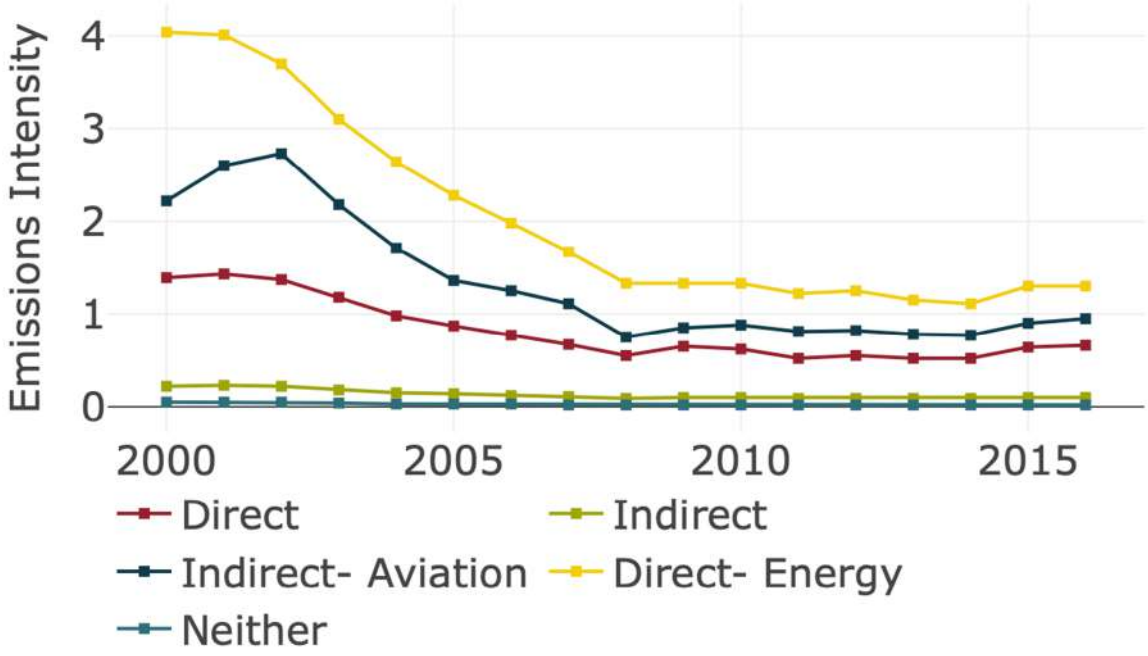
68 Lachowicz, M., *The Poorest Will Pay,* Warsaw Enterprise Institute, https://wei.org.pl/en/2023/news/admin/report-the-poorest-will-pay/ (accessed 28.05.2024).

69 *The EU Emissions Trading System reduced CO_2 emissions despite low prices,* https://www.pnas.org/doi/full/10.1073/pnas.1918128117 (accessed 28.05.2024).

Chart 11. The volume of emissions per unit of GDP



Source: The success story of emissions trading, https://www.bmwk-energiewende.de/EWD/Redaktion/EN/Newsletter/2020/07/Meldung/direkt-answers-infographic.html

A study by prof. Jesús Huerta de Soto and others compared decarbonization in the UK, Denmark, and Germany. The UK, which used a more free-market framework, reduced emissions faster and at a lower cost to consumers than Denmark and Germany, which relied on heavy carbon and environmental taxes. Although these carbon pricing schemes differ from the ETS, the unintended impact on prices and available capital is likely similar.

It is often claimed[70] that since 2005, this scheme has seen a 30 percent reduction in total EU emissions by 2020, exceeding the 21 percent target. That could be considered as some progress, were it not for the fact that this figure does not include an increase in non-EU emissions due to leakage.[71] Studies on other ETS systems in the UK[72] and China[73,74] indicate that leakage is a persistent problem with these frameworks precisely because the cost of the ETS makes firms less competitive versus foreign firms that do not face those costs. Hence, the EU ETS may seem to reduce EU emissions but could drive leakage, increasing global emissions as investments go offshore.

Other observers point out that Europe, especially Germany[75], is increasingly experiencing an alarming rate of deindustrialization and stagnant growth due to increased costs[76,77] – which the ETS and Green Deal exacerbate. Further, as emission permit prices rise, this will likely make the leakage, uncompetitiveness, and deindustrialization worse. Meanwhile, the ETS transfers more and more money from private businesses into the state coffers. This distorts capital allocation from market-directed to politically directed investment – which usually has a much lower rate of return.[78]

Studies suggest that the economic costs imposed by the ETS on society are significant and likely greater than those of a carbon tax.[79] However, even a carbon tax might not produce net economic benefits within our lifetimes. A study by prominent carbon tax advocates indicates that net economic benefits from a modest carbon tax (aligned with a 4°C warming scenario) would only benefit our great-grandchildren. At the same time, we, our children, and our grandchildren would face increased costs.[80] A more aggressive carbon tax calibrated to be Paris compliant (1.5°C warming) would cost far more

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70 *The success story of emissions trading,* https://www.bmwk-energiewende.de/EWD/Redaktion/EN/Newsletter/2020/07/Meldung/direkt-answers-infographic.html (accessed 28.05.2024).

71 Emissions leakage can be understood as the relocation of emitting companies outside the EU, or the tendency for new business projects with a large carbon footprint to be established outside the EU because it would be too costly from a regulatory perspective to establish them in the EU.

72 Jim McConalogue, May 2023: *A short route to deindustrialisation?: An introduction to the UK Emissions Trading Scheme (UK ETS) and its challenges,* https://www.civitas.org.uk/publications/a-short-route-to-deindustrialisation/ (accessed 28.05.2024).

73 *Evaluation of effectiveness of China's carbon emissions trading scheme in carbon mitigation* https://www.sciencedirect.com/science/article/abs/pii/S0140988320302127 (accessed 28.05.2024).

74 *Does the emissions trading system in developing countries accelerate carbon leakage through OFDI? Evidence from China* https://www.sciencedirect.com/science/article/abs/pii/S0140988321002966 (accessed 28.05.2024).

75 *The deindustrialization of Germany: If Europe's economic motor stalls, the Continent's already polarized political landscape will shudder,* https://www.politico.eu/article/rust-belt-on-the-rhine-the-deindustrialization-of-germany/ (20.05.2024).

76 *The Deindustrialization Of Europe In Five Charts Industrial electricity use in the EU is collapsing. US policymakers "Have no excuse for not looking at Europe and learning".* https://robertbryce.substack.com/p/the-deindustrialization-of-europe (accessed 28.05.2024).

77 *High Electricity Prices Have Europe Facing Deindustrialization; Don't Let It Happen Here,* https://www.heritage.org/energy/commentary/high-electricity-prices-have-europe-facing-deindustrialization-dont-let-it-happen (accessed 28.05.2024).

78 The European Environment Agency reports that total auction revenues generated by the ETS amounted to €38.8 billion in 2022, of which €29.7 billion went directly to EU member states. The remainder went to the Innovation Fund and the Modernization Fund, as well as to EFTA countries and Northern Ireland.

79 Diego Känzig Maximilian Konradt , 12 Aug 2023: *The economic effects of carbon pricing,* https://cepr.org/voxeu/columns/economic-effects-carbon-pricing (accessed 28.05.2024).

80 Murphy, Robert, 06.09.2019: *New Study Finds a Modest Carbon Tax Would Hurt All Humanity for Two Generations,* https://mises.org/mises-wire/new-study-finds-modest-carbon-tax-would-hurt-all-humanity-two-generations (accessed 28.05.2024).

than the social cost of carbon.[81] In other words, if no action is taken, the most affordable Paris-compliant carbon pricing solution costs more than the damage from climate change, and an ETS would be even costlier. This questions the cost-effectiveness of the ETS.

If we use carbon pricing, then a very high carbon price is required to drive comprehensive technological substitution, because existing barriers to substitution remain impervious to price changes. Market barriers and technological limitations prevent innovators from entering markets, and alternative zero-emission technologies have not yet achieved price-performance parity. Consequently, people are reluctant to adopt inferior, more expensive technologies.

More effective policies would directly remove market barriers and promote technology-neutral innovation, something the ETS fails to do. Instead, the ETS penalizes emissions without guiding how emitters should respond, while discouraging innovation by reducing the capital and raising overall costs of the firms we most need to innovate low carbon solutions.

Uncompetitiveness, economic stagnation, industrial relocation, and emissions leakage are predictable outcomes of using negative incentives like the ETS, which impose economic costs to penalize certain activities. Even conventional subsidies, which ETS revenues might fund, are not purely positive incentives. They can also block and punish disfavored innovators, often misallocating capital to failing business models and harming innovation and prosperity. Negative incentives raise costs, impoverish everyone, and lead to conflict or exit. Just as universities no longer beat students because they would enroll elsewhere or riot if unable to leave, negative incentives are likely to cause similar side effects if used in climate policy.

Due to these issues with costly negative incentives, the Climate & Freedom Accord (CFA) advocates phasing out the ETS, carbon taxes, and conventional subsidies in favor of a purely positive incentive approach. This approach focuses on removing barriers and burdens that block beneficial innovation. The CFA considers the ETS, carbon taxes, and wealth transfer subsidies to be neither free-market polices, nor effective climate policies, as they all impose economic burdens with counterproductive consequences.

EU leaders appear to contradict themselves regarding the effectiveness of the ETS. While the European Commission touts the ETS as a success, they also push for the Carbon Border Adjustment Mechanism (CBAM). This is because the ETS and Green Deal policies make European firms uncompetitive compared to those in nations without such interventions, leading to deindustrialization and offshoring of emissions. The push for CBAM indicates a tacit admission that the ETS and Green Deal policies are economically and environmentally failing. Europe's response seems to impose costly carbon duties on others, effectively spreading the negative impact.

CBAM

The Carbon Border Adjustment Mechanism (CBAM) is a tariff that introduces a new kind of protectionism: climate protectionism. It was devised to impose costs on the greenhouse gas emissions of products imported into the EU.[82]

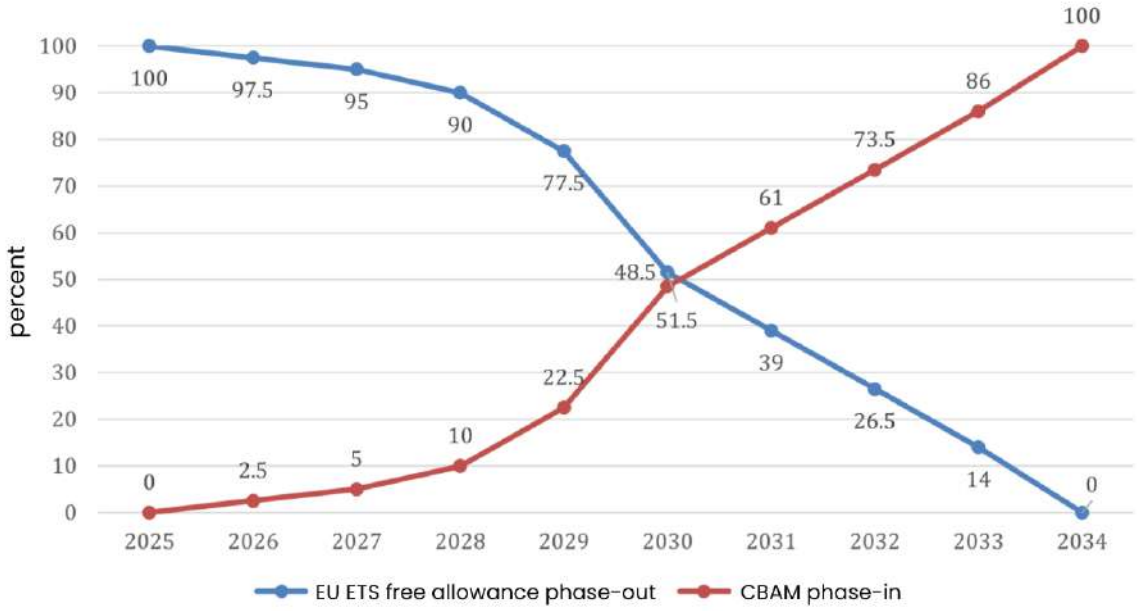
The dynamics of this decline is illustrated in the following chart[83]:

81 Murphy, Robert P. (2009) "Rolling the DICE: William Nordhaus's Dubious Case for a Carbon Tax" The Independent Review, v. 14, n. 2, Fall. Nordhaus, William D. (2007) *The Stern Review on the Economics of Climate Change.*

82 Importers will need to buy allowances equal to the emissions generated during the production of these goods in their home countries, with prices set according to the EU Emissions Trading System for products like iron, steel, aluminum, cement, electricity, and hydrogen. Additionally, allowances must be purchased for indirect emissions from electricity used in cement and fertilizer production. A World Trade Organization (WTO) condition for implementing CBAM is that the volume of free allowances granted to EU producers of these products must be proportionately reduced following the introduction of CBAM.

83 https://icapcarbonaction.com/en/news/eu-adopts-landmark-ets-reforms-and-new-policies-meet-2030-target

Chart 12. EU ETS free allowances phase-out and CBAM phase-in



Source: EU adopts landmark ETS reforms and new policies to meet 2030 target, https://icapcarbonaction.com/en/news/eu-adopts-landmark-ets-reforms-and-new-policies-meet-2030-target

CBAM will undergo a transition period until the end of 2025, after which it will enter its maturity phase. Starting January 1, 2028, and every two years thereafter, the European Commission will report on CBAM's functioning, including its impact on carbon leakage, the sectors covered, the internal market, the economy, inflation and prices, and developing countries.[84]

A fundamental WTO principle prohibits countries from providing benefits or privileges to selected trading partners, ensuring that no trade policy discriminates against particular producers or countries. Thus, CBAM cannot be explicitly protectionist, favoring EU producers. However, in practice, CBAM can only be rhetorically framed as non-protectionist. It is widely understood that its true purpose is to shield EU firms from international competition.

The expected difficulty arising from CBAM is that the new tax will increase the price of input products for various processes. This is a historically proven result of any duty imposed on imports.[85] CBAM will certainly not lead to lower energy prices. The combination of high per capita energy

84 The report will also cover issues related to evasion, the management system, and the application of penalties in the countries of origin. This approach treats the European economy as a living experiment for evaluating CBAM's effects. Full implementation of CBAM is expected by 2034.

85 As Henrique Schneider remarks in his article: *The CBAM is at its core a protectionist measure. It is unrealistic for the EU to expect an increase in industrial competitiveness while simultaneously curbing competition. Import duties increase prices and cause what economists refer to as "welfare loss." In the CBAM's case, a portion of this welfare loss is intentional. The EU aims to curtail the production of commodities like aluminum or cement. This reduction is achieved through the ETS and CBAM, which lower production levels by increasing costs. These higher prices ripple through the economy until they reach the consumer, who pays more for less – and when competition is scarce, quality decreases as well... By distorting economic incentives, the mechanism will lead to rent-seeking – when companies divert money from the production process to gain political influence... Importers into the EU are facing more bureaucracy and higher prices for CBAM certificates. Meanwhile, several industrial sectors in the bloc have stepped up their lobbying: they want even higher taxes on imports and a portion of the money collected from these taxes to be given back to them.* Schneider, Henrique, January 10,2024, CBAM will expedite carbon leakage https://www.gisreportsonline.com/r/cbam-eu, (accessed 28.05.2024).

demand and the relative poverty of older age groups can pressure governments to artificially decrease energy prices or increase energy production. According to Eurostat data from 2022, energy poverty levels were significantly high in the CEE region compared to the EU average of 9.3 percent. Specifically, 22.5 percent of people in Bulgaria and 15.2 percent in Romania could not adequately heat their homes.

In most CEE countries, the ability to keep household energy prices low plays a central role in gaining political power. It is possible to manipulate them because electricity and natural gas prices for households are administratively regulated in all countries represented in this report. This is undoubtedly one of the barriers to extensive RES adoption and does not incentivize market participants to reduce demand through energy efficiency improvements.

The CBAM, like the ETS, is a costly negative incentive. A recent study estimates it would cost African nations $25 billion annually.[86] Negative incentives lead to conflict or rupture. That is precisely what we are seeing now. Since enacting the CBAM, the EU has failed to close priority trade deals with Australia and the Latin American "Mercosur" trade bloc. Moreover, the CBAM is alienating essential allies and sparking trade disputes. India and South Africa have threatened to challenge the CBAM at the WTO.[87] Last February, 74 countries, including 55 African nations, signed a WTO Ministerial Declaration opposing "unilateral trade-related environmental measures" – in other words, the CBAM.[88]

In summary, the CBAM functions as a form of climate protectionism designed to protect EU industries by imposing costs on the greenhouse gas emissions of imported goods. Despite its non-protectionist framing, CBAM effectively shields EU firms from international competition, leading to higher prices and economic inefficiencies. This approach, however, is counterproductive as it creates conflicts, disrupts trade negotiations, and faces significant opposition from numerous countries, undermining the goal of global cooperative climate action. If the CBAM is intended to improve international cooperation on climate action, it is failing in that objective.

86 X.com/Pieter Cleppe https://twitter.com/pietercleppe/status/1679872287862845440 (accessed 28.05.2024).
87 https://twitter.com/pietercleppe/status/1679872287862845440
88 World Trade Organization: MINISTERIAL DECLARATION ON THE CONTRIBUTION OF THE MULTILATERAL TRADING SYSTEM TO TACKLE ENVIRONMENTAL CHALLENGES, https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/MIN24/28.pdf&Open=True (accessed 28.05.2024).

3. Just Let Them Do It! Practical policy proposals

- ***Countries still have considerable autonomy to design their own economic policies, and they should utilize this freedom without relying solely on the EU's directives. The proposals in this chapter are framed within the Climate & Freedom Accord (CFA), which emphasizes that innovation is vital for addressing climate change. Achieving net zero and prosperity necessitates technological advancements, best driven by policies promoting freedom and free markets.***
- ***Our recommendations include implementing instruments such as CoVictory Bonds and Clean Tax-Cuts while eliminating interventionist policies that disrupt and slow down the process of bottom-up market decarbonization. At the Member State level, it concerns too much state ownership, over-regulation, monopolization, or price control. At the EU level, it is mainly about the high costs, economic drag and uncompetitiveness caused by the ETS and the CBAM.***
- ***The EU should aim to become a functional platform to share the best practices. Instead of a source of more regulations, the EU should become a place to exchange difficulties and embrace best practices for successful grid administration, planning, regulation, and stakeholder engagement.***

This chapter examines how the EU and member states can improve freedom, competition, and investment in the energy sector, maximizing economic, environmental, and climate benefits.

Our suggestions are inspired by the CFA, a collaborative and evolving proposal for an international free market agreement on climate and sustainable development.[89] It proposes a radically original approach to climate, based exclusively on policies that expand freedom and remove the barriers, burdens, and costs which governments impose on citizens, innovators, and economies.[90] In other words, it is precisely the opposite approach from most conventional climate policies, which impose barriers, burdens, and costs on citizens, innovators, and economies. Costs that contribute to unintended consequences include uncompetitiveness, deindustrialization, and offshoring emissions. The CFA offers a clear alternative designed to avoid the costs and cost-driven failings of conventional climate policies.

This study also considers how some of the new CFA proposals might apply to the realities of the CEE region.

The Climate & Freedom Accord

The Climate & Freedom Accord originated from a series of policy innovation workshops convened

89 The Climate & Freedom Accord, https://cleantaxcuts.org/wp-content/uploads/climatefreedomaccord-straw-230202.pdf (accessed 28.05.2024).

90 All CFA proposals must stick to this fundamental free market design constraint. It follows that proposals must avoid picking winners and burdening losers, and maintain tech neutrality. This rules out conventional wealth transfer subsidies. These block disfavored innovation and distort capital allocation, which leads to economic loss, as well as dangerous subsidy bubbles, by creating economically draining sectors based on subsidy-dependent business models. CFA tax proposal, some quite innovative, include only broad-based supply-side tax rate cuts, which accelerate all successful innovators by allowing them to keep more of their profit, and avoids all subsidy-related drawbacks. Moreover, supply-side tax rate cuts will not lead to subsidy bubbles, because the underlying businesses must be profitable, without subsidies, to benefit from the tax rate cuts. As we discuss below, low investment taxes also have well understood environmental benefits that we cannot currently claim for low consumption taxes, although that could change subject to the emergence of new research. Tax or tariff increases, which impose fiscal barriers, burdens and costs on the economy, do not meet the Accord's free market design constraint, which rules out market-based policies which impose such burdens and costs.

since 2016 by members of what is now known as the Climate & Freedom International Coalition.[91] This fellowship of think tanks, scholars, journalists, and policymakers share a common interest in pioneering a new free-market approach to climate, a crucial solution set missing from climate and free-market policy thinking.

The Accord is founded on two logical premises. First, achieving net zero emissions and economic prosperity requires technological advancements, making innovation essential to addressing climate change. Second, freedom has historically been the primary driver of innovation since the Enlightenment, indicating that free markets are crucial for accelerating the innovation needed to solve climate change.

Studies by coalition members support these premises, demonstrating that free market policies not only are not climate neutral but accelerate decarbonization.[92] Indeed, recent paper comparing competitive versus monopoly US power markets finds that competitive power markets decarbonize 66 percent faster than uncompetitive power markets.[93] This is because competitive markets reduce costs, facilitate easier market access for new innovators, and allow consumers to demand cleaner, cheaper, and more reliable electricity. In contrast, monopolies lack economic incentives to innovate or respond to consumer needs.

Another study considers how a Reagan era supply-side tax policy ("accelerated capital expensing") drove the energy efficiency revolution before climate change was even a public concern.[94] Adopted in 1981, rapid expensing of new property, plant, and equipment (PP&E) reduced the cost of such new investment. That stimulated investment, job growth, and helped reduce inflation by expanding supply. It succeeded. But unexpectedly, it also drove the energy efficiency revolution by making energy-efficient investments cheaper and more profitable. Lowering the cost of new PP&E accelerates the adoption of newer, cleaner, and more efficient technologies, phasing out older, dirtier ones more rapidly. Consequently, U.S. emissions declined per capita and per unit of GDP during this period.

These studies highlight the free market drivers of innovation and decarbonization, providing insights for better policy design. It follows that policies promoting inclusive market access and reducing new investment costs help drive decarbonizing innovation. Conversely, policies creating market barriers and raising investment costs hinder it.

The Basic Deal: Agree to Free Markets, Unlock Large Capital Flows

Building on these lessons, the Climate & Freedom Accord proposes a straightforward deal. Accord nations agree to:

- Phase out all climate and energy policies that constrict markets and raise costs;
- Phase in classic free market policies (free trade, inclusive competition, classic human and property rights, low investment tax rates);
- As an incentive to join the Accord, Accord nations jointly unlock access to vast international capital flows for foreign direct investment via CoVictory Funds, a new kind of easy-to-use, internationally reciprocal

91 Some of the think tanks authoring this study have participated in Climate & Freedom workshops. Such expert groups can design original, outside-the-box solutions more rapidly than single experts working alone. Studies such as this one further analyze these ideas, preliminary to scholarly peer review.

92 Free Economies are Clean Economies, https://www.c3solutions.org/policy-paper/free-economies-are-clean-economies/ (accessed 28.05.2024).

93 Winegarden, Wayne, *AFFORDABLE AND RELIABLE. Creating competitive electricity markets to deliver consumers affordable, reliable, and low-emission electricity*, https://www.pacificresearch.org/wp-content/uploads/2021/09/ERR_EnergyCompetition_F.pdf (accessed 28.05.2024).

94 Muresianu, Alex, *How Expensing for Capital Investment Can Accelerate the Transition to a Cleaner Economy*, https://files.taxfoundation.org/20210112151505/How-Expensing-for-Capital-Investment-Can-Accelerate-the-Transition-to-a-Cleaner-Economy.pdf, (accessed 28.05.2024).

tax-free private debt for PP&E and conservation investments. These reduce investment costs, increase capital flows across borders, and act as a diplomatic incentive for expanding free markets, as well as an economic incentive for accelerated decarbonizing innovation;

- The Accord also drives decarbonization by replacing problematic wealth transfer subsidies and environmental taxes with Clean Tax Cuts (CTCs)—technology-neutral, supply-side tax rate reductions, which increase the rate of return on income from decarbonizing innovation. Like carbon pricing, CTCs take the GHG externality into account, but do so by reducing the cost of decarbonization and innovation, rather than raising the cost of emissions, which leads to economic drag. Tied to clear metrics, CTCs leave technology choices to the innovators.

Nations would phase out expensive, distortionary climate policies that hinder markets and innovation. Instead, they would adopt a positive, free-market approach to decarbonization by expanding market access and reducing costs for innovators. Liberalization—freeing people to unleash innovation—would end distortionary subsidies, bans, mandates, crony monopolies, state-owned enterprises, carbon taxes, tariffs, and compulsory offset schemes.

These measures raise costs, cause uncompetitiveness, off-shoring, leakage, deindustrialization, and restrict essential investment. They would be replaced with policies that foster a free-market framework and international private capital flows.

International Tax-Free CoVictory Bonds, Loans and Savings Funds

Accord nations would access substantial tax-advantaged international capital flows for investment and development through a novel tech-neutral, internationally reciprocal leveraged supply-side tax cut. This mechanism is designed to accelerate innovation, growth, decarbonization, and the expansion of free markets. Any private debt used to finance property, plant, and equipment (PP&E) or conservation investments would be tax-exempt in all Accord nations, eliminating the tax on interest. This could reduce the cost of debt by approximately 30 percent.[95]

In every Accord nation, developers, entrepreneurs, banks, hedge funds, mutual funds, and financiers could raise tax-exempt debt—called CoVictory bonds, loans, and savings accounts. These funds would then be pooled into CoVictory Funds and reinvested in any Accord nation for private PP&E or conservation projects. CoVictory Funds would increase private capital flows between free nations, financing conservation and cleaner development projects, providing a strong incentive to adopt a free market framework.

These tax-exempt CoVictory Funds would offer the same tech-neutral, decarbonizing benefits as rapid capital expensing. They lower the cost of capital for PP&E, accelerating the transition to the newest, cleanest technologies without favoring specific technologies. CoVictory Funds make clean technologies more affordable and increase the return on equity, attracting investment not only to the tax-exempt debt but also to the taxable equity.

CoVictory Funds also drive international capital flows through inclusive, easy-to-use investment opportunities for everyone, from billionaires to ordinary individuals with a bank account. Unlike strategies that pick winners and losers, often resulting in many losers, CoVictory Funds provide a democratic and inclusive international incentive to expand free markets. They could replace mechanisms like the Carbon Border Adjustment Mechanism (CBAM) with and engine for global growth and innovative decarbonization. They

95 *A Free Market Clean Sweep for the Climate Policy Mess by BrusselsReport.eu,* https://www.brusselsreport.eu/2023/10/09/a-free-market-clean-sweep-for-the-climate-policy-mess, (accessed 10.06.2024)

can strengthen energy security ties among free nations, and help rebuild war-torn infrastructure in places like Ukraine, Israel, or Gaza.

Clean Tax Cuts: the pure positive alternative to subsidies or carbon pricing

Clean Tax Cuts (CTCs) present an innovative approach to drive decarbonization and economic growth in the five sectors responsible for approximately 80 percent of greenhouse gas (GHG) emissions: energy, electric power generation, transportation, real estate, and industry.

How Clean Tax Cuts Work

Each of these sectors meets two essential conditions for effective CTC implementation: they have profitable taxpayers and clear, reportable metrics of GHG emissions. A straightforward "performance bonus" tax rate cut tied to emissions reduction can significantly grow the profitability of top decarbonizing innovators, providing them with free capital for further innovation.

CTCs do not replace basic supply-side tax policy but merely add a slight bonus rate reduction, say five percentage points, for firms that achieve the most significant emissions reductions.[96]

Sector-Wide Application

This clean tax cut concept can be applied across the transportation sector and to energy-efficient home appliances and industrial equipment manufacturers. Lower emissions in the electric power sector result in lower tax rates on business and investor income. The same principle can reduce fugitive emissions in oil and gas production and motivate energy-efficient construction and renovation in real estate.

Advantages Over Conventional Methods

Traditional methods like the ETS, carbon taxes, and wealth transfer subsidies aim to reduce GHG emissions but impose costs that stifle prosperity and innovation. Carbon pricing can lead to uncompetitiveness and economic leakage. CTCs avoid these issues by offering a positive incentive that attracts businesses, unlike punitive measures that drive them away. Conventional subsidies often pick winners and losers, transferring funds to unviable business models and creating economic drag and subsidy bubbles. Tech-neutral CTCs allow profitable decarbonizing innovators to retain more profits without increasing costs for others, thus avoiding economic drag and subsidy bubbles.

Integration with the Accord

CTCs align with the overall Accord framework for decarbonization. Imagine the Accord as a ship: free-market streamlining shapes the hull to minimize drag and maximize lift. Capital accelerators like full expensing and tax-exempt CoVictory Funds drive investment in property, plant, equipment, R&D, and broad-based innovation. Clean tax cuts provide the rudder, steering investment toward the most profitable decarbonization innovations.

National Implementation

The Accord allows each nation to implement equity CTCs according to their unique challenges[97] but strongly incentivizes their use in the five outlined sectors. No Accord nation will impose carbon tariffs or global minimum tax penalties on firms from other Accord nations utilizing CTCs, recognizing the framework as a powerful, positive alternative to conventional carbon pricing or subsidies.

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96 For example, in the automobile industry, sustainability can be summarized in one number: the average vehicle fleet emissions. So, the lower the emissions, the lower the business and investor income tax rate. This provides a simple method of aligning corporate behavior with a goal of emissions reduction. From the board room to the shop room floor, every investor and employee owns stock in the company, which gets more valuable as emissions and the tax rate is reduced. The innovators, not the politicians, pick the technology they use.

97 Some CEE nations have business tax rates as low as 10 percent. CTCs would still have a useful impact in that case, because five percentage points is five percentage points, whether the business tax rate is 10 percent or 40 percent.

Proposed Variations on Clean Tax Cuts

- **Game Changer Tax Cuts:** Reward firms that achieve breakthrough innovations eliminating a large share of GHG emissions with 15 years of tax exemption on profits (e.g., zero-emission fuels).
- **First Five Tax Cuts:** Offer five years of tax exemption to the first five new types of zero-emission power plants (e.g., advanced nuclear and geothermal, or fusion).
- **Demonopolization Tax Cuts:** Eliminate gains taxes for investors, breaking up monopolies and government-owned companies into private, competitive entities.
- **Other provisions:** expand and harmonize charitable giving between Accord nations to expand private sector solutions; expand the use of highly successful US-style private conservation incentives; and provide frameworks for responsive private development and conservation of land and natural resources.

Simple Ideas That Work

Embracing the power of the free market is essential for achieving economic prosperity and environmental sustainability simultaneously. Rather than imposing top-down CO_2 reductions, we should encourage innovation within the market to address issues like global warming and pollution while boosting prosperity. For instance, by removing barriers to renewable energy deployment, CEE countries could significantly reduce electricity prices and enhance European competitiveness while bolstering energy security.

However, we recognize the challenges of implementing revolutionary changes in climate policy within the EU's political framework. Despite this, the current direction of EU climate policy is suboptimal. **That's why we propose a strategy for change.**

Our strategy tackles energy policy and economic development challenges in the CEE region by addressing market distortions, bureaucratic hurdles, monopolistic structures, and restrictive tax regimes. Inspired by the CFA document, our reforms aim to liberalize the energy sector, increase investment, and promote sustainable development. This includes eliminating distortionary climate policies, fostering competition, privatizing state-owned assets for conservation, breaking monopolies, and reforming tax policies to spur innovation and investment.

These reforms are quick fixes, medium-term adjustments, and long-term transformations. Immediate actions include legislative changes to reduce bureaucracy and stimulate investment. However, overcoming significant obstacles, such as inefficient capital allocation and monopolistic structures, will require sustained efforts.

Crucially, national initiatives should be complemented by EU-level policy adjustments. While coordination between national and EU policies may pose challenges, CEE countries can lead by example and demonstrate the effectiveness of market-driven solutions.

Our proposed economic ecosystem and decarbonization pathways prioritize technology neutrality, eschewing favoritism in policy decisions. We can unlock the market's full potential by forming an environment where the best solutions naturally thrive.

Furthermore, there is ample opportunity to reduce competitive barriers in CEE countries, even without altering climate policies. The OECD's ranking of energy market regulations underscores the room for improvement, highlighting the potential for greater economic freedom and efficiency in the region. It ranges from 0.67 to 1.98.

Table 4. Sectoral Product Market Regulation Indicators, OECD 2018

Country	Indicators
Czechia	0,67
Hungary	1,45
Slovakia	1,98
Poland	1,98
Bulgaria	1,62
Romania	1,87
OECD Average	1,48
average of top 5 best performing OECD countries	0,44

Source: Indicators of Product Market Regulation, https://www.oecd.org/economy/reform/indicators-of-product-market-regulation, (accessed 28.05.2024).

Quick Fix Solutions

Urgent action is required to unlock energy markets and promote competition and free trade. The initial steps toward this liberation can be swift and straightforward. The bureaucratic labyrinth within the energy sectors of Central and Eastern European (CEE) countries vividly demonstrates the detrimental impact of convoluted climate policies. Administrative complexities, like protracted building permit procedures and myriad formalities, impede energy sector investments and constrain the expansion of renewable energy sources. Bulgaria, Czechia, Hungary, Slovakia, and Poland are poignant examples of bureaucratic entanglements leading to delays and complications in the investment process.

Here are some proposed Quick-Fix solutions tailored to specific countries:

Bulgaria

1) Amend the Renewable Energy Sources Act:
Establish a clear framework for acquiring permits to build energy infrastructure
Objective: Improve the investment process. The current ambiguity within the act fails to safeguard investors' legal interests, stalling infrastructure projects due to lengthy administrative procedures, such as the protracted building permit process. Without clear regulations on connecting new renewable energy sources, investors lack legal protection, prolonging investments and altering initial contracts with operators, resulting in increased costs and lost profits. Simplifying construction procedures and expediting permit acquisition are imperative for investment advancement.

2) Simplify Regulation No. 6 of February 24, 2014, regarding connecting electricity producers and consumers to transmission or distribution networks
Objective: Facilitate network access for power generators and consumers. Network operators face numerous administrative hurdles, leading to an uncertain investment environment characterized by fluctuating variables like procedure duration, connection points, and costs. The process needs revision to accommodate increased investment interest in renewable energy, necessitating rapid grid connections.

3) Abolish the price cap for electricity producers
Objective: Encourage new investments. Despite the cessation of EU-level price cap implementation in June 2023, the government retains this measure, creating an unfavorable environment in a competitive energy market. While this move might only reduce excess profits for renewable energy producers with Fixed Feed-in Premiums (FiP), it could severely impact new investors without FiP, given the market's price volatility. Eliminating the price cap would stimulate new project development and bolster renewable energy integration.

4) Eliminate the price cap for electricity consumers

Objective: Expand the long-term power segment. The existing price cap for non-household consumers obstructs the development of a long-term power segment, eliminating the need for hedging instruments and long-term contracts. Based on the Day Ahead Market, this measure further incentivizes traders and consumers to focus solely on this segment, hindering market diversification and stability.

Czechia

1) Simplify the System of Issuing Public Licenses: Governed by Act 458/2000 Coll., i.e., the Act on the conditions for conducting business activity and performing state administration in the energy sectors.

Objective: Facilitate entry for small energy suppliers. Currently, applicants for general energy activities require higher technical education or complete secondary education, 6 years of experience in electricity or heat production up to 1 MW and independent energy installations, vocational education, and 3 years of experience or retraining certification for small energy sources suffice. However, these stringent requirements fail to incentivize innovation and service improvement among companies while effectively blocking the smallest suppliers from market entry.

2) Expedite Permit Issuance for Energy Infrastructure Construction

Objective: Encourage new investments. Construction challenges, especially in wind farms, have led to an estimated 7-year timeline for completion, resulting in no new wind farms in Czechia over the past three years (CSVE 2023). Varying regional regulations exacerbate the problem, where approval from one city may conflict with rules set by the region itself. Standardizing national laws and setting maximum permit acquisition times are vital to accelerating investment.

3) Revoke Government Decree 298/2022

Objective: Enhance consumer choice. The decree limiting consumer options states that those without continuously installed smart electricity/gas meters cannot negotiate energy prices with suppliers. Revoking this decree would expand consumer freedom and foster competition among energy suppliers.

4) Simplify the Law on New Transmission Network Construction

Objective: Encourage new investments. The construction of new transmission networks faces delays due to regulatory ambiguity and municipal approval processes. Strengthening networks in response to insufficient capacity involves lengthy procedures, including municipal approval, design documentation, and construction requirements, hindering flexibility and responsiveness, especially amid the country's significant photovoltaic development. Addressing legislative gaps, such as defining community energy in the new energy law, is essential for progress.

Romania

1) Eliminate High Fines for Energy Sector Entrepreneurs: Described in Act No. 123/2012 - Law on electricity and natural gas

Objective: Remove penalties discouraging entrepreneurial participation in the market. High fines imposed under this law significantly dent energy companies' revenues, dissuading their involvement in the energy market. Regulators are authorized to levy fines of up to 10 percent of annual sales revenue on energy and gas companies (producers, suppliers, and network operators) for non-compliance with obligations to protect end consumers' interests.

2) Amend Law No. 123/2012 - Electricity and Natural Gas Law

Objective: Reduce technical and operational requirements for small companies. Current standards impose rigorous technical and operational criteria, necessitating substantial investments in infrastructure, technology, and expertise. Compliance with these standards is a significant barrier, particularly for companies lacking the requisite capital or technical capabilities.

3) Streamline the Permit Acquisition Process for Energy Infrastructure Construction

Objective: Encourage new investments. Securing building permits under Law 50/1991 involves a protracted and intricate process. Companies navigate multiple approval stages involving various local and national authorities, necessitating the submission of exhaustive documentation, including environmental impact assessments, urban planning consents, and safety evaluations. Delays in permit acquisition often lead to significant project setbacks, hampering investment prospects.

Hungary

1) Establish a Spatial Development Plan for Energy Infrastructure Installation

Objective: Facilitate access to energy networks for power generators and consumers. The absence of spatial planning for Hungary's energy sector poses significant challenges, particularly for large, non-domestic solar power plants. Currently, investors are acquiring land without strategic planning, resulting in the construction of large-scale photovoltaic parks on high-quality arable land or through expropriation, adversely impacting agricultural activities. It is imperative to conduct comprehensive studies on the country's spatial development and enact legislation specifying suitable locations for energy infrastructure.

2) Repeal the Robin Hood Tax

Objective: Encourage new investments. Originally intended to finance the district heating system using surplus revenues from energy companies, the Robin Hood tax led to the departure of several foreign energy traders from Hungary. Despite its abolition, the tax rate skyrocketed to 41 percent by Government Decree No. 496/2022, effectively resulting in a total deduction of approximately 50 percent, including corporate tax. This tax burden contributed to the collapse of numerous small and medium-sized energy companies in Hungary, hindering renewable energy development and innovation. Immediate abolition of the tax is necessary to provide financial protection to entrepreneurs driving innovation in the sector.

3) Elimination of the Right of First Refusal for State-Owned Solar Companies

Objective: Promote free market competition. The introduction of a state right of first refusal for non-household solar energy companies in December 2023, as outlined in Government Resolution No. 1576/2023, has deterred foreign investors. Currently, Hungary's policy grants state-owned solar companies the exclusive privilege of acquiring photovoltaic farms before private investors, effectively creating a monopoly on these resources. Due to the uncertainty and costs associated with navigating government intervention, this distorts the market dynamics and dissuades foreign investors from entering the sector.

As a result, Hungary misses out on diverse pools of capital and expertise that could fuel innovation and drive investment in solar energy projects. By eliminating this barrier, Hungary can level the playing field, attracting a broader range of investors and developing a climate where projects are evaluated based solely on their merits rather than subject to government interference. This increased competition leads to lower prices and a more comprehensive range of options for consumers and drives industry growth and sustainability. Thus, by championing this policy change, Hungary can position itself as a leader in solar energy innovation while reaping the economic benefits of a thriving and competitive market.

Slovakia

1) Boost New Energy Investments: Enhance Access to Land for Energy Projects

Objective: Stimulate increased investment in energy. Slovakia has seen a dearth of new installations in recent years, partly due to the arduous approval process for land access, which mandates a rigorous Environmental Impact Assessment (EIA). Uncertainty in approval and additional stakeholder requirements prolong the permitting process by several years, inflating project investment costs. Simplifying procedures would unlock Slovakia's vast investment potential. De-

spite being less densely populated than France and Germany, with only 118 people per square kilometer, Slovakia faces no shortage of land for renewable resource development. Though the sunniest areas coincide with high agricultural land use, this should not hinder, for instance, wind energy development. Mainly when the state, through the State Land Fund, owns substantial agricultural and hunting land holdings, totaling 142,000 ha and 137,000 ha, respectively, ripe for development.

2) Eliminate Excessively High FiP Surcharges: Lower Electricity Prices for Homes and Businesses
Objective: Address the high surcharges (FiP) on electricity prices from solar power plants. A decade ago, 0.5 GWe of solar sources were installed, costing the state EUR 200 million annually for power production. This resulted in a staggering EUR 957 per ton of CO_2 emissions saved. These subsidies inflated consumer electricity prices, impacting households and businesses alike. While surcharges decreased significantly during the energy crisis, the subsequent dilemma emerged as producers opted out of the surcharge regime for better earnings on the spot market.

3) Simplify the Investment Process: Revise or Repeal Act no. 24/2006 on Environmental Impact Assessment
Objective: Simplify the investment process by addressing environmental bureaucracy, primarily stemming from outdated legislation. The Environmental Impact Assessment (EIA) Act imposes stringent requirements on impact studies without distinguishing between small and large projects. The most significant cost of this legislation lies in the extensive time wasted awaiting the Ministry of Environment (or specific authorities) review of EIA analyses and the continuous stakeholder appeals permitted by the law, leading to substantial delays and investment costs.

Ukraine (for after the war)

1) End War-Time Trade and Investment Restrictions:
Objective: Restore economic openness and encourage foreign investment. Eliminating all restrictions imposed during the war will signal Ukraine's commitment to revitalizing its economy and attracting international investors.

2) Introduce Regulatory Stability:
Objective: Provide a predictable and favorable business environment. Establishing stable regulatory frameworks will instill confidence among investors and businesses, nurture long-term economic growth and development.

3) Enhance transparency and access to public information:
Objective: Promote accountability and trust in governance. Increasing transparency in decision-making processes and providing easier access to public information will empower citizens, strengthen government accountability, and reduce corruption.

4) Remove Public Service Obligations (PSOs) burdening companies:
Objective: Improve financial stability and technical conditions of energy facilities. Liquidating PSOs will relieve companies of onerous obligations, enabling them to allocate resources more efficiently towards infrastructure maintenance and upgrades, ultimately enhancing energy sector performance. Liquidation of the Resolutions[98] under which the maximum price level for natural gas and electricity is maintained. These resolutions should be temporary measures to protect end consumers from price volatility and resource shortages during the war.

[98] Resolution of the Cabinet of Ministers of Ukraine No. 222 on the approval of the Regulation on imposing special obligations on natural gas market entities in order to ensure the public interest in the process of functioning of the natural gas market, dated March 6, 2022; Resolution of the Cabinet of Ministers of Ukraine No. 483 on the approval of the Regulation on imposing special obligations on electricity market participants in order to ensure the public interest in the process of functioning of the electricity market, dated June 5, 2019.

5) Abolish resolutions maintaining maximum price levels for natural gas and electricity:

Objective: Phasing out these price controls signals a shift towards market-driven pricing mechanisms. While initially necessary during wartime to shield consumers from volatility, they now hinder market dynamics and competitiveness. Embracing market-based pricing strengthens efficiency and ensures a fair allocation of resources.

6) Eliminate price caps hindering investment and import access:

Objective: Removing price caps facilitates investment decisions by creating a more transparent and competitive market environment. It also encourages energy imports, enhancing market integration and diversification. By aligning with international standards, Ukraine positions itself for greater efficiency and competitiveness in the global energy landscape.

Poland:

1) Establish Clear Guidelines for Energy Sector Investments:

Objective: Create a transparent legal environment that strengthens investor confidence. Currently, the investment process is convoluted and subject to arbitrary decisions by officials and politicians, leading to delays such as suspending the SMR small reactor project. Transparent and predictable guidelines are essential to attract investment.

2) Enhance transparency and stability in legislation:

Objective: Reduce transformation costs for the economy and provide certainty for investments. Engage in consultations with the industry to improve the quality and stability of regulations. Enhancing the quality of laws and regulatory impact assessments is crucial for post-governmental changes, ensuring alignment with market dynamics and verifiable data.

3) Streamline Administrative Processes:

Objective: Accelerate the energy transition. Simplify administrative and court proceedings to shorten investment timelines. The current regulatory burden prolongs investment processes, with onshore wind projects taking an average of 6 years and offshore projects like the Baltic Power wind farm requiring up to 13 years. Deregulation is essential to expedite the transition.

4) Expand Grid Connection Capacities:

Objective: Avoid blocking connection possibilities due to theoretical investments. Currently, connection capacity issuance is monopolized by network operators, hindering the integration of new generating units. There is a need to reassess connection conditions to prevent capacity blockages and allow for the integration of new energy sources.

5) Promote Long-term Strategic Planning:

Objective: Encourage business involvement in the energy transition. Update national energy plans to ensure ambitious renewable energy goals. Simplify licensing processes to engage Polish entrepreneurs actively in the country's renewable energy strategy.

6) Repeal Distance Regulations for Wind Power Plants:

Objective: Allow for flexible siting based on local conditions. Onshore wind energy in Poland has been evolving over two decades, with wind farm capacity exceeding 100 MW in 2005 and nearing 10,000 MW presently. However, the introduction of the distance law in 2016, enforcing the 10H rule, halted onshore wind power development for an additional seven years.

Despite nearly two years of discussions wherein energy companies were assured a minimum distance of 500 meters from buildings for new wind projects, Parliament disregarded this consensus and increased the distance to 700 meters. The exact distance between 10H (ten times the turbine height) and 700 meters from development will be determined based on the state authority's results of the Strategic Environmental Assessment (SEA). This law imposes top-down regulations, obstructing renewable energy source (RES) investments for over 7 years. Repealing

the law would enable wind turbine placement to align with each municipality's specific characteristics and conditions, promoting fair and effective wind energy development.

Tools for the change

While immediate solutions are being implemented, initiating longer-term reforms is crucial: de-monopolization and denationalization of the energy sector, tax reform implementation, and land privatization. These reforms aim to lay a solid economic foundation, fostering a business-friendly environment within a predictable and transparent regulatory framework.

Denationalization

Competitive energy markets decarbonize faster than monopolistic ones. However, large state-owned entities dominate the market in many countries, limiting competition and stifling innovation. To address this, energy markets must be depoliticized, denationalized, and demonopolized.

The necessity for denationalization, or privatization, arises from the inefficiencies associated with state control. Concentrating resources and decision-making power in a single state-owned entity can hinder the adoption of new technologies and the growth of the renewable energy market. State control often leads to bureaucracy, delayed decision-making, and a lack of incentives for private companies to invest in innovative technologies and renewable energy sources. In the CEE region, state controls regulate concessionaire activities, set energy system tariffs, and oversee the electricity market. State-owned power plants often receive government support for coal production, which can delay the energy transition and environmental mitigation efforts.

In Poland, robust state control over the energy market is evident, with many power plants owned by state companies like the Polish Energy Group (PGE), Tauron Polska Energia, Enea, and Energa (Orlen Group). These companies predominantly use conventional energy sources such as coal and natural gas, exemplified by the Bełchatów Power Station, Europe's largest coal-fired power plant. Similarly, Hungary's energy sector is partially state-controlled, with the dominant transmission system operator, MAVIR, being state-owned.

Denationalizing the energy sector can yield numerous benefits, including increased competition, enhanced innovation, and reduced environmental impact. Private companies in a competitive market are driven to improve operational efficiency and reduce costs to attract customers with better prices or services. In contrast, state-owned enterprises often lack this competitive pressure, leading to monopolistic practices. Market competition encouraging innovation as companies strive to differentiate themselves with new products, services, or business models. Thus, denationalization can accelerate the adoption of modern technologies in the energy sector, particularly those related to renewable energy and energy efficiency.

Moreover, maintaining state-owned energy companies often requires significant state budget allocations, which can strain public finances and limit investment in other critical areas such as education or healthcare. While some state-owned companies may decarbonize rapidly, their operations align more with political agendas than market demands. This often results in short-sighted economic decisions and vulnerability to political instability.

Private companies, competing for customers, are more likely to improve the quality of their services and customer support compared to state-owned enterprises, which may neglect these aspects due to a lack of competition. Thus, liberalizing the energy sector by encouraging private ownership and competition can drive efficiency, innovation, and sustainable development, benefiting the economy and the environment.

Tax reforms

CEE countries should review and reform their tax systems. Legislators creating reforms should remember to use simple tax laws to interpret and enforce. Excessive and complicated taxes effectively impede the green transformation of the industry. This is a problem, especially in Poland, whose tax system is one of the worst in the OECD.[99] Achieving Europe's decarbonization goals necessitates multi-billion investments, predominantly from the private sector. The design of the tax system can either significantly hinder or facilitate these investments.

According to our country reports the need for tax reforms is giant. In Hungary, since 2020, system usage fees and connection fees have risen sharply, adversely affecting the costs for energy companies and producers of Renewable Energy Sources (RES). This increase was justified by the need for network balance, maintenance, and development, yet it resulted in diminished profitability for operations in the Hungarian renewable energy market.[100] Introducing uniform tax rates and tax cuts in the energy sector in Hungary could alleviate the burden on businesses, contributing to a more competitive market. Similarly, enabling total depreciation of fixed assets and research and development efforts could incentivize investments in new, cleaner technologies like solar, wind, and hydro energy, aligning with decarbonization goals.

Reducing the tax burden and establishing more stable and competitive conditions for energy enterprises in Poland could hasten the energy

99 International Tax Competitiveness Index 2023 https://taxfoundation.org/research/all/global/2023-international-tax-competitiveness-index/ (accessed 28.05.2024).

100 Additionally, the so-called Robin Hood tax, which has been tightened in recent years, adversely impacts energy companies, traders, and network operators. An increase in the tax rate to 41 percent implies that tax deductions amount to roughly 50 percent significantly straining company budgets and complicating investments.

sector's transformation toward sustainability and ecology. Polish tax law includes an accelerated depreciation mechanism that allows for increased depreciation rates for electricity-related assets, crucial for investments in renewable energy. It should be expanded to include all investments in the energy sector. Still, the lack of clarity in tax law interpretation may create uncertainty for investors. Introducing more precise regulations and higher depreciation rates could encourage more significant investments in renewable energy sources. Moreover, VAT rates on electricity in Poland remain high compared to other EU countries. Aligning VAT rates on electricity from renewable sources with those of other OECD countries could promote using these energy sources.

Let's note that the EU countries with the highest standard VAT rates are Hungary (27 percent), Croatia, Denmark, and Sweden (all at 25 percent). Luxembourg levies the lowest standard VAT rate at 17 percent, followed by Malta (18 percent), Cyprus, Germany, and Romania (all at 19 percent). **The EU's average standard VAT rate is 21.6 percent, more than six percentage points higher than the minimum standard VAT rate required by EU regulation.**[101]

Slovakia, with a corporate income tax rate of 21 percent, has the highest rate in the CEE region, significantly higher than Hungary's 9 percent or Bulgaria's 10 percent. This high rate prolongs the payback period for investments. A reduction would be beneficial, but Slovakia's record public sector deficit in the EU in 2023 minimizes the chances of such a reduction.[102]

From a purely economic point of view, simplifying and lowering taxation is more effective than subsidies. Tax reliefs promote economic growth, encourage investment in science and research, and attract foreign capital. In this case, the loss of revenue to the state budget would be compensated by a reduction in subsidies, which, although they can help a particular sector if properly designed, are more likely to distort the market in the longer term, in some cases making operators dependent on subsidies and leading to unintended consequences such as reduced incentives to innovate.

Improving existing taxes is one thing. It will also be necessary to introduce new solutions. CEE countries face challenges and opportunities for development in the energy sector that are partly determined by tax policy. Developing appropriate tax recommendations is essential in driving sustainability and energy efficiency. The transition to cleaner and more sustainable energy sources requires investments in infrastructure and the adaptation of tax regimes to encourage more significant capital investment and innovation.

Here's how tax reforms and financial instruments can pave the way for a more efficient, innovative, and sustainable energy sector:

I. Accelerating Innovation and Investment:
Fully depreciating fixed assets and investing in research and development (R&D) are crucial. By reducing expenses and fostering innovation, we can expedite the adoption of cleaner technologies. With EU R&D expenditures stagnating, CEE countries must ramp up efforts to stay competitive globally.

In 2022, EU research and development expenditures relative to GDP stood at 2.24 percent, lower than the previous year, when it recorded 2.27 percent. On average, CEE countries contributed less than 2 percent of GDP to developing new

101 VAT Rates in Europe, 2024, 2024 VAT Rates in Europe | EU VAT Rates, 2024 (taxfoundation.org), (accessed 28.05.2024).

102 The tax burden is further increased by the tax imposed on entities from regulated sectors, effectively resulting in a 24 percent tax rate. The record rise in energy prices, and consequently the revenues of selected producers, was further burdened by the excess profits tax, based on European legislation adopted. Ideally, the EU would repeal this "justification" for the new tax due to the decrease in prices of energy raw materials and suppliers' revenues.

technologies. In Poland, it was only 1.46 percent of GDP, and in Hungary, 1.39 percent of GDP.[103]

II. Exempting bonds, loans, and savings funds from taxation can attract international investment for energy infrastructure development, leading to a quicker transition to efficient and low-emission technologies. This is particularly vital for CEE countries, where outdated energy infrastructure remains a significant challenge. By providing tax exemptions, these nations can finance the construction of modern energy systems and strengthen their overall energy security and sustainability.

III. Implementing supply-side tax cuts and eliminating ineffective subsidies. Supply-side tax cuts can have a profound impact by enabling small companies to enter the energy market, thereby increasing competition and driving innovation. Removing subsidies for profitable enterprises, particularly in state-dominated energy sectors like Poland's coal industry, ensures that resources are allocated more efficiently. This approach encourages market entry and competition, resulting in a more dynamic and innovative energy sector.

IV. Tax cuts to promote innovation and deployment of low-carbon products. Tax incentives for innovative, low-carbon products can drive significant advancements in reducing greenhouse gas emissions. The proposed "Game Changer" tax cuts offer 15 years of tax relief for pioneering companies achieving breakthroughs in zero-emission technologies. Developing cost--effective zero-emission fuels and machinery could eliminate 75 percent of global emissions, making these tax incentives critical for achieving substantial environmental benefits.[104]

V. Tax cuts for demonopolization. Monopolies stifle innovation and efficiency in the energy sector. Introducing tax cuts to incentivize the breakup of monopolies can open the market to new entrants, fostering competition and innovation. Monopoly investors could be exempted from taxation for a limited period if they sell their assets under competitive terms. This approach makes it financially attractive for investors to relinquish monopolies and mitigates political opposition, facilitating a smoother transition to a competitive market environment.

VI. Harmonized Access to International Charitable Assistance (HAICU): Adopting a charitable tax deduction model similar to the US system can enlarge access to international donations for energy infrastructure projects in CEE countries. This model, which does not burden the state budget, can be particularly beneficial for post-war reconstruction efforts, such as those in Ukraine.[105]

VII. VAT reduction: Reducing Value-Added Tax (VAT) to align with the OECD average can alleviate the financial burden on consumers and businesses, promote higher energy consumption, and support sustainable energy sources.[106]

Most of the above proposals are universal and could be implemented in all studied countries. However, in the context of specific countries, the specifics of tax recommendations may differ.

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103 R&D expenditure https://ec.europa.eu/eurostat/statistics-explained/index.php?title=R%26D_expenditure#Eurostat%20#StatisticsExplained (accessed 28.05.2024).

104 The Climate Freedom Accord: *A Straw Proposal for an International Free Market Climate Agreement* climatefreedomaccord-straw-230202.pdf (cleancapitalistleadershipcouncil.org), (accessed 10.06.2024)

105 International partners have already allocated nearly 170 billion euros for Ukraine's recovery. Implementing clear rules for charitable support can significantly bolster energy infrastructure expansion in economically strained regions. The Climate Freedom Accord: A Straw Proposal for an International Free Market Climate Agreement climatefreedomaccord-straw-230202.pdf, (cleancapitalistleadershipcouncil.org) (accessed 10.06.2024)

106 For example, lowering the high VAT rate in countries like Poland could encourage more efficient energy use. Additionally, as seen in France and Germany, implementing a zero VAT rate for renewable energy technologies can stimulate investment in renewable sources, accelerating the transition to sustainable energy and reducing greenhouse gas emissions.

Selling 50 percent of Government Land, Especially Forests and Deforested Lands:

Accessible land with suitable natural conditions is crucial to facilitating the expansion of energy infrastructure, especially renewable energy investments. CEE countries should consider selling 50 percent of government land to private entrepreneurs, particularly forests and deforested areas. This sale should include provisions for public access rights, resource rights, easements, the rule of law, and US-style tax deductions to encourage private conservation, reforestation, and sustainable resource use.

Limited access to land is a significant barrier to energy investments in the CEE region, including Bulgaria, Hungary, and Ukraine. Regulatory and practical issues, such as restrictions on land categories, conservation areas, cultural heritage protection, and land ownership disputes, further complicate this problem.[107]

Reforming land access regulations by introducing uniform, transparent, and flexible policies that balance private sector needs with environmental protection can stimulate renewable energy investments and strengthen regional energy security.

VIII. CoVictory Funds

While abolishing investment barriers is essential, ensuring capital flows to the most needed areas is equally crucial. CoVictory Funds, proposed in the Climate and Freedom Accord (CFA), can facilitate such investments. These funds are based on the premise that new equipment is cleaner and more efficient, making them vital for decarbonization. CoVictory Funds would exempt private debt from tax, finance expenditures on fixed assets and environmental protection, and lower the cost of new investments. But what's next? Are we sure a stream of capital will flow where it's most needed?

CoVictory Funds proposed in the CFA should facilitate investment

In each country covered by the CFA, developers, entrepreneurs, banks, hedge funds, and financiers could access tax-free loans and credits to finance new property, plant, and equipment (PP&E) investments. This would accelerate the adoption of newer, more efficient, and low-carbon technologies. By lowering capital costs, CoVictory Funds attract new investments, debt, and equity, making them highly profitable.[108]

The Climate & Freedom Accord offers various initiatives, including CoVictory Bonds, Loans, and Savings Funds, which provide internationally reciprocal private tax-exempt debt to finance PP&E deployment in the EU. In CEE countries like Bulgaria, Poland, and Czechia, outdated infrastructure requires modernization, and new transmission networks and wind and hydroelectric power plants are needed. Meanwhile, Bulgaria has ideal conditions for hydropower development, and Poland needs new wind power plants to move away from coal mining. CoVictory financial instruments would enable these upgrades and new constructions.

The Climate & Freedom Accord includes Clean Tax Cuts (CTCs) for Transport, Energy, Power, Industry, and Real Estate. These supply-side tax cuts, which are technology-neutral, target sectors responsible for 80 percent of all GHG emissions. Implementing these cuts will not conflict with EU or national laws, avoiding legal obstacles. CTCs provide better economic impacts than conventional subsidies, which phase out under the Accord, putting more money into private investors' pockets.

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107 For instance, developing renewable energy sources on lower-class agricultural lands in Bulgaria is prohibited, hindering investments in photovoltaic or windmills. Hungary's cultural heritage and environmental protection regulations can prevent certain energy investments. In Ukraine, while the Land Code is relatively liberal, legal changes and challenges due to Russian aggression complicate land access further.

108 For instance, a typical energy project using 50 percent equity and 50 percent CoVictory Funds could generate 350 percent more tax revenue from equity returns than the tax expense on the debt.

Currently, EU countries like Poland and Germany often subsidize coal mining. Replacing these subsidies with tax cuts will encourage private companies to offer renewable energy sources, stimulating a competitive market. As more private companies enter the energy market, competition will increase, leading to better consumer services and furthering the transition to renewable energy sources.

Free Market Clean Sweep

The proposed reforms, including reducing red tape, denationalization, lowering taxes, and land sales, directly conflict with existing policies like energy price controls and subsidies for energy production companies or consumers. Abandoning these market-distorting programs is essential to successfully implementing free-market solutions.

Embracing Frederic Bastiat's Principle

One should start from the assumption, proposed by Frederic Bastiat in the 19th century, that what can be seen is less important than what cannot be seen. For example, if country X ceases subsidies for a particular renewable energy technology, there may be an immediate visible decline in clean energy production from that source. However, by implementing broader reforms that facilitate industry-wide investment and modernization (such as CoVictory funds), the long-term results will include more significant CO_2 savings and improved energy efficiency. These benefits may not be immediately visible but will manifest as new, energy-efficient infrastructure comes online.

Long-Term Climate Benefits

From a political standpoint, the immediate visibility of subsidies may seem attractive, but from a climate perspective, the long-term effects of free-market reforms are far more beneficial. Over time, the favorable climate impact of market-driven innovation and efficiency gains will outweigh the short-term adverse effects of eliminating subsidies.

Eliminating subsidies is a significant challenge because they create a dependency among beneficiaries who resist their removal. Subsidies defined here as direct transfers from the state budget to specific institutions or companies differ from tax rate cuts, which do not involve direct state expenditure. While subsidies may appear beneficial from a state revenue perspective, they distort by building reliance on government support rather than encouraging market-driven efficiency.

From an economic standpoint, tax rate cuts are more effective than subsidies. Tax reductions promote economic growth by reducing the tax distortions that cause economic drag. CTCs directly promote investment in innovation increasing the rate of return, which attracts domestic and foreign capital. In contrast, public subsidies distort the market by making companies reliant on government funding, undermining long-term market efficiency and innovation.

Energy subsidies, particularly for fossil fuels, artificially maintain low energy prices (at taxpayer expense) encouraging higher consumption and investment in outdated technologies. This discourages energy saving and the transition to sustainable sources, as traditional energy becomes more competitive than renewable energy sources (RES) due to artificial pricing.

Data from CEE countries reveal that state subsidies, including those for RES, have entrenched existing production and consumption models, hindering innovation and efficiency.[109]

[109] From 2015 to 2021, fossil fuel subsidies in the EU averaged around EUR 56 billion annually, with a sharp increase in 2022 due to the energy crisis triggered by the Russian invasion of Ukraine. Over 230 temporary subsidies were implemented across the EU to protect households and industries, totalling EUR 120 billion. These subsidies burden EU budgets and stifle innovation in RES development and market competition. Fossil fuel subsidies, https://www.eea.europa.eu/en/analysis/indicators/fossil-fuel-subsidies (accessed 2024).

Examples from CEE Countries:

- **Bulgaria:** The state subsidizes renewable energy storage systems as part of its National Reconstruction and Resilience Plan.
- **Hungary:** From January 2024, subsidies covering up to 66 percent of investment costs for HMKE installations with a 4-5 kW inverter and 7.5-10 kWh storage will be available, capped at HUF 5,000,000.
- **Poland:** The state heavily subsidizes coal production, with 2022 subsidies amounting to almost USD 1,500 per capita annually, more than in the UK or France. Regarding GDP, Poland's fossil fuel subsidies are higher than those of Western European countries, at 8 percent of GDP.[110]
- **Slovakia:** By 2030, the heating sector will receive EUR 1 billion in state aid, with additional support from the Modernization Fund and the Recovery and Resilience Plan, totaling over EUR 2 billion for green investments.

Therefore, we recommend eliminating all subsidies, regardless of industry or technology, to ensure technology neutrality. We recommend replacing the subsidies with Clean Tax Cuts and CoVictory Funds, which will make the shift politically easier, while directly driving decarbonizing innovation with positive, liberalizing incentives.

At the same time, it seems reasonable that while removing subsidies, policymakers should ensure that the banking and financial sectors function correctly and can provide liquidity and capital to the renewable energy sector. Implementing CFA instruments and strengthening the rule of law, political stability, and contract enforcement would ensure the proper functioning of the financial system.

What Steps Should be Taken at EU Level?

The EU should reconsider its current climate policies, such as the Emissions Trading System (ETS), Carbon Border Adjustment Mechanism (CBAM), and Environmental, Social, and Governance (ESG) criteria. While these regulations aim to mitigate climate change, they impose substantial burdens on companies, affecting their resources and increasing operational costs. This, in turn, diminishes the global competitiveness of European businesses. To address these concerns, the EU should explore more flexible and cost-effective approaches that achieve environmental goals without disproportionately impacting economic performance.

The financial demands of the energy transition are significantly higher than the funds currently allocated by the EU. This discrepancy is particularly challenging for CEE countries, which struggle to meet the ambitious targets set by the EU's Net-Zero Industry Act and the Critical Raw Materials Act. The EU should reassess its funding strategies, ensuring that the financial support provided is commensurate with the estimated costs of the transition. This adjustment is crucial to enable CEE countries to keep pace with EU objectives and avoid the risk of failing to implement the green plan despite substantial efforts and investments.

The transition to an all-electric economy in Europe appears irreversible, with systematic electrification of various economic sectors underway. This shift, especially in heating, marks a significant change in energy use. Over the next two decades, adapting new electrification technologies will shape the EU's economic position globally. Therefore, the EU should facilitate this transition by promoting innovations in electrification and supporting infrastructure development that accommodates this shift. Embracing these changes will position Europe at the forefront of the global economy.

The energy transition in the CEE region must acknowledge the historical reliance on coal energy

[110] Review of state subsidies on the path to efficient, dynamic, and green economy in Poland, Hungary, Bulgaria and Slovakia from the Country papers made by Civitas Institute (HU), Institute of Economic and Social Studies (SK), Institute For Market Economics (BG) and Wind Industry HUB (PL) in cooperation with Kochański &Partners (PL).

and the unique economic conditions of these countries. Imposing uncompromising political decisions without considering these factors can hinder progress. Instead, the EU should promote flexibility and economically optimal solutions tailored to the specific needs of the CEE region. This approach will facilitate a smoother transition and ensure that all areas benefit equitably from the energy transition.

We recommend:

- **Phase-out of the ETS mechanism.** The ETS market has become unstable and highly unpredictable. While it contributes to reducing CO_2 emissions, its impact is overstated due to carbon leakage. This is not enough to achieve the desired goals. Further, it contributes to uncompetitiveness, deindustrialization, and offshoring emissions because it uses negative incentives that impose costs on the EU economy. In the short term, we recommend that any tightening of emission targets by the European Commission be discussed with member states well in advance rather than adopted in haste and in conjunction with large money transfers. This creates a temptation for politicians to approve even unachievable targets. **In the long term**, we recommend reevaluating the ETS as such and considering replacing it with the mechanisms described in this paper, such as Clean Tax Cuts and Co-Victory Funds. The EU should incentivize its members to support policies that positively incentivize economic actors by creating more freedom to act, not by erecting barriers to "steer" them in a government-determined direction.
- **Climate targets should focus on reducing emissions**, where the development of renewables is only one of the many ways to achieve this goal. More comprehensive discussions around targets for the share of RES should be opened, and the proposed solutions should be flexible, as enforcing them requires economically suboptimal decisions from some countries (like Slovakia). Indeed, emission targets should be based on final consumption (including imports), not production. It should be noted that a genuine revolution seems to be already underway in CEE's countries, led by citizens and businesses, and visible under the form of an unprecedented deployment of decentralized solar PV and heat pumps or SMR's investment plans. The function of the climate target should also be reconsidered. It should be treated as assessing what is feasible at a given time and cost rather than as a rigid target that must be met no matter what. Paradoxically, such a complex approach may result in actors delivering only what bureaucrats want them to give rather than realizing their full potential, thus limiting the outcome.
- **The European Commission should not relax state aid rules any further. The regulatory capture should be prevented.** Recent relaxations aimed at competing with the US's Inflation Reduction Act (IRA) demonstrate a misunderstanding of market economies, viewing them as zero-sum games rather than win-win environments. State aid channelled to specific industries and companies benefits some at the expense of others, distorting competition. The EC should protect the market from discretionary and disruptive political decisions. Achieving shared European goals requires market-driven solutions rather than flooding the market with taxpayer money.
- **The EU should push countries to introduce policies that enable the expansion of interconnectors and mutual energy trade.** Building a network of energy interconnections across the continent allows everyone to produce and sell energy regardless of geographic location. The EU should improve coordination between national grid operators to advance demand-side flexibility and integrate it into national strategies. Dedicated terms should be offered to small and local players, such as energy communities, active consumers, and SMEs, who might struggle with competitive grid access procedures to further decentralization. The same applies to flexible services like storage and demand-side response.

- **Stopping CBAM implementation.** The climate benefits of the Carbon Border Adjustment Mechanism (CBAM) will be minimal, while the costs of doing business and the burden on European consumers will be high. CBAM is a protectionist tool that can politically fragment global relations and escalate conflicts. The EU should seek alternative methods to address carbon leakage that do not impose significant economic costs and political tensions.
- **The EU should become a functional platform to share the best practices.** Instead of a source of more regulation, the EU should become a place to exchange information about challenges and solutions and embrace best practices for successful grid administration, planning, regulation, and stakeholder engagement.

Freedom Pact

In an ideal scenario, member states would simultaneously implement reform efforts alongside the EU, advancing change at both levels. This would involve introducing pro-investment policies and dismantling statist policies. However, politically, this may be challenging, as there is likely to be resistance from the EU to initiatives that undermine existing climate policies.

The EU comprises highly wealthy and poorer countries, primarily in the CEE region. Wealthier countries face less pressure to change their climate policies, while poorer countries experience greater pressure due to the higher difficulty and cost of green transformation. Politicians in these countries may be tempted to question the entire climate agenda, especially as the costs of fighting climate change become more apparent to ordinary citizens through an extended ETS impacting their homes.

We propose a proactive solution: the countries of the CEE region should lead by example, implementing market-oriented reforms first. They should do this jointly by concluding the "Pact for Freedom," an agreement that coordinates goals and tools. The aim would be to create a coherent, interconnected energy ecosystem based on EU guidelines for reducing CO_2 emissions, employing non-restrictive regulations and tax solutions outlined in the Climate and Freedom Accord. This initiative would establish a common free energy market for at least 110 million people.

Legal Feasibility and Strategic Advantages

Our expert analysis indicates that no provision in EU law prevents such an initiative. While countries in the region still need to comply with mechanisms like the ETS and CBAM, they are not obligated to:

- Maintain complicated bureaucratic-administrative procedures.
- Subsidize industries (beyond transferring funds under EU policies).
- Impose additional regulatory barriers to investment (beyond EU law).
- Operate their own enterprises in the energy sector.
- Set tariffs and retail price controls.
- Impose additional taxes on energy producers (such as windfall taxes).

Sovereign Opportunities for Reform

EU member states can still:

- Ensure transparency and stability in the legal framework.
- Improve the regulatory and operational environment.
- Shape their tax systems independently (except for VAT and customs collection).

The Path Forward

By implementing the Freedom Pact, CEE countries can demonstrate the benefits of market-oriented reforms and create a more flexible and competitive energy market. This initiative would serve as a model for EU policymakers, showcasing the potential for economic growth and environmental sustainability through less restrictive and more efficient regulatory frameworks.

The Pact for Freedom should be founded on the proposals in The Climate & Freedom Accord. As highlighted in country reports (Part 2). In contrast, some CEE countries have solutions

aligning with these proposals. Still, they often remain incomplete or inconsistently applied across companies seeking to invest in property, plant, and equipment (PP&E) or research and development (R&D). Complicated instruments like tax credits, reliefs, write-offs, or exemptions can disadvantage companies unable to afford specialized legal and tax expertise. Our goal is to create an environment where bureaucratic complexities do not impede investments in innovation and modernization.

To develop the Pact's content, a series of workshops should be organized for regulators and legislators from each country. These workshops will provide opportunities to explore alternative ways to reduce CO_2 emissions, compare legal and tax systems, and determine actionable steps.

Key Provisions of the Pact for Freedom

For the Pact to be effective, it should include the following key provisions:

Optimal tax levels: Set and harmonize existing taxes (mainly CIT and VAT) at the lowest feasible levels, ensuring they are as similar as possible across signatory countries.

Eliminating market-distorting subsidies: Commit to phasing out subsidies that distort the market, creating a level playing field for all companies.

Reduction of bureaucratic and regulatory barriers: Oblige countries to revise and streamline bureaucratic and regulatory procedures, reducing barriers to investment.

Allocation of EU Funds: Ensure EU funds are allocated primarily to infrastructure investments that expand the market and enhance energy interdependence among signatories.

Rollout and integration of enabling technologies: Accelerate the deployment of smart meters, facilitating grid monitoring and consumer empowerment.

Addressing energy poverty: Link energy transition initiatives to addressing energy poverty, moving beyond temporary fixes to design long-term structural solutions that empower energy-poor households to become active consumers and benefit from sustainable energy systems.

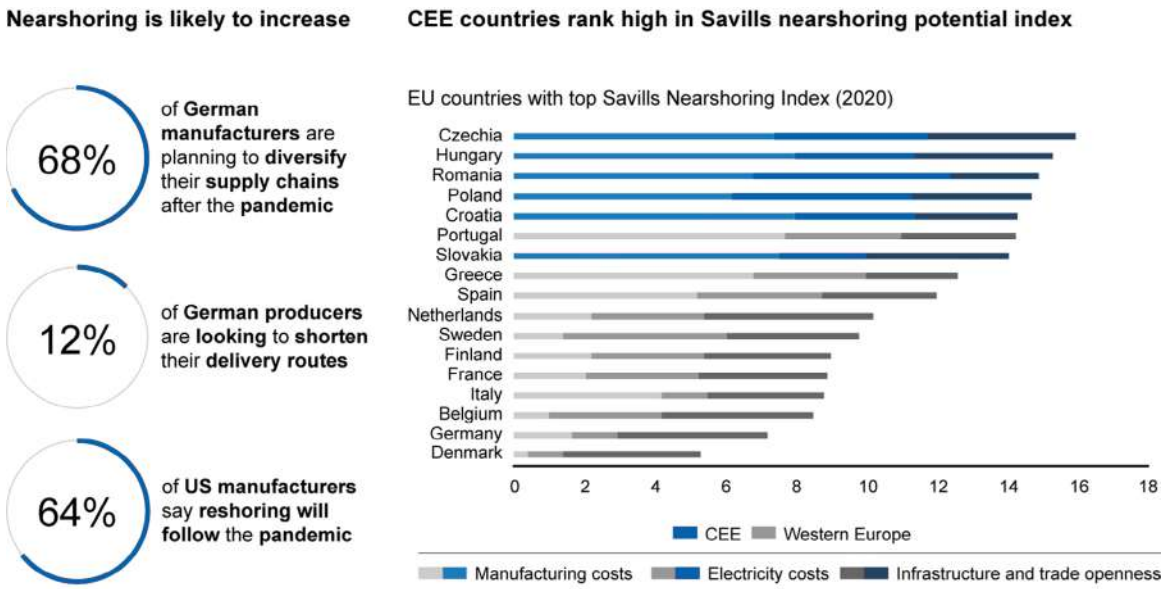
Mutually recognized tax and financial mechanisms: Introduce harmonized tax and economic incentives, such as accelerated depreciation and CoVictory Bonds, to strengthen investments in the broad energy sector.

Evaluation and Monitoring: Implement a robust system for evaluating and monitoring the effects of the Pact's objectives, ensuring accountability and continuous improvement.

The Pact for Freedom would create a uniform Special Economic Zone (SEZ) across CEE countries, attracting more investments and capital. This initiative aligns with the Three Seas Initiative, which aims for a closer economic cooperation among 13 CEE countries. CEE is already emerging as a "nearshoring" hub for business services and manufacturing as industries rethink their global supply chains after COVID-19. Notably, CEE countries took six of the top seven spots in the 2020 Nearshoring Index from Savills[111], highlighting the region's economic growth and investment potential.

[111] Poświata, J. Szreder, P., Kozub, P., Bobrowska, M.,Kolesnik, E., Swieboda, T. and Ćwikiewicz, M., November 15, 2022, *Private Equity and Venture Capital in Central and Eastern Europe Private investments in Central and Eastern Europe are ready to ride the rising tide of growth, fuelled by strongly performing economies and broad talent pools*, https://www.bain.com/insights/private-equity-and-venture-capital-in-central-and-eastern-europe, (accessed 2024).

Chart 13. EU ETS free allowances phase-out and CBAM phase-in



Source: Penn World Table; Savills; Thomas survey (2020); literature search

The successful acceleration of decarbonization in CEE countries, driven by free market principles, has the potential to inspire other regions and countries. The original Climate & Freedom Accord (CFA), developed by experts from global think tanks, is limitless in its applicability. Creating an international framework that guarantees economic freedom is essential for achieving faster economic development and secure environmental protection worldwide.

4. CLOSING REMARKS: Let's measure it!

The greatest danger to civilization is not climate change but the uniformity of thought stifling innovation and progress. Climate policy today has become an echo chamber, rejecting alternative ideas and clinging to outdated solutions. It's time for a change.

Our work aims to shatter these ineffective paradigms that dominate green politics. We take climate change seriously, so we believe its solution lies not in the hands of bureaucrats but in the hands of the world's most creative citizens and entrepreneurs. Free market mechanisms have consistently delivered groundbreaking technologies, saving us from seemingly insurmountable challenges time and again.

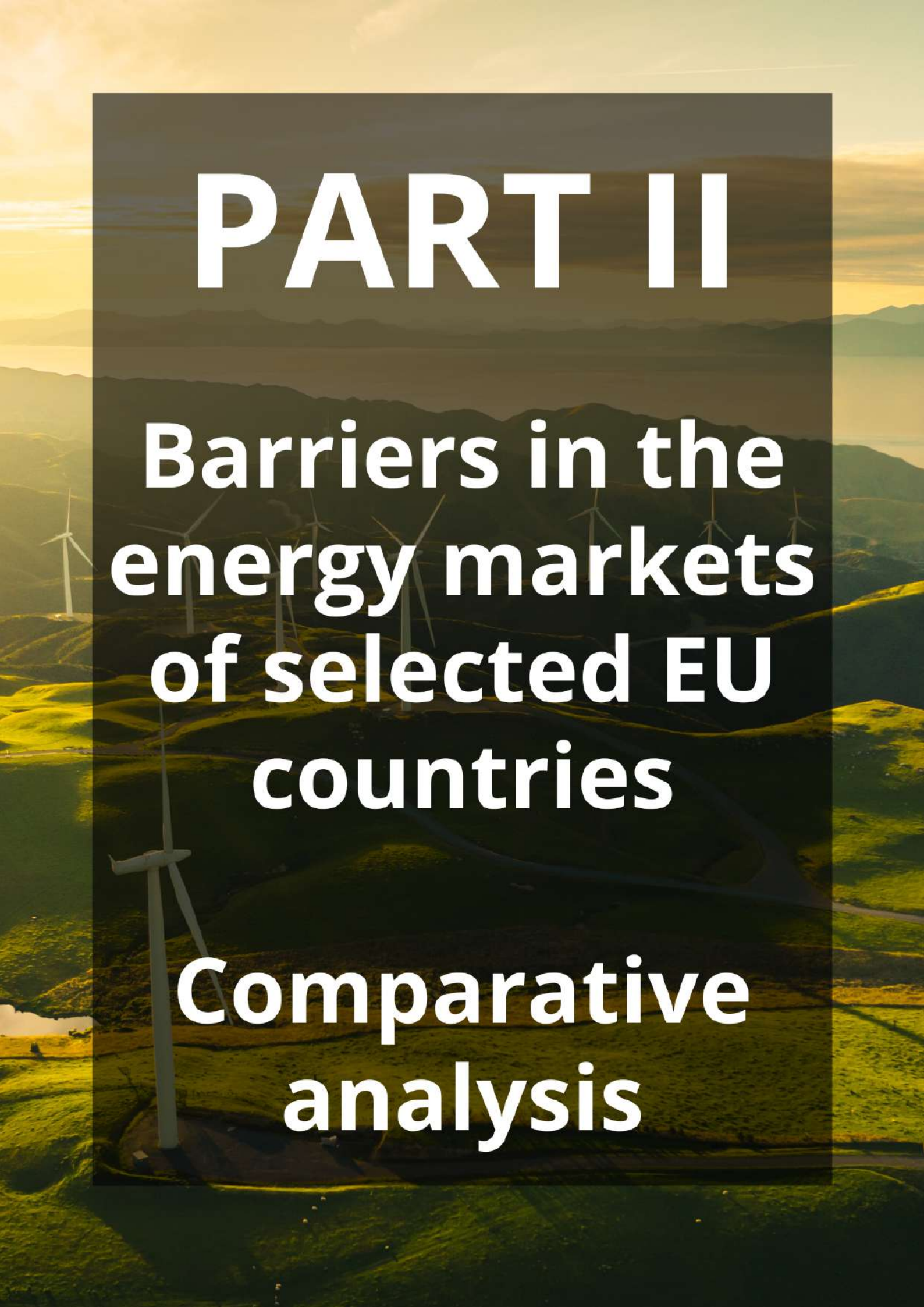
Some claim this time is different and that global harmonized action is imperative. We agree, but with a twist. Harmonized action should not mean uniformity but collaboration driven by innovation and free market principles. Let's build a global framework that encourages peaceful, creative industrial cooperation. Let's direct our collective efforts toward genuine development and modernization, not just the reproduction of old methods.

The climate crisis is real, and scientists have detailed how much we need to slow the temperature rise to protect humanity and nature. But the solutions won't come from rigid plans or centralized control. Instead, they should come from a dynamic market where the best ideas can flourish. Economists, not just climatologists, must be crucial in designing these solutions.

Governments do have an essential role in setting standards and protecting public welfare. We've left behind the days of child labor and cigarette ads, understanding the need for regulation. Similarly, we recognize the need to limit industrial CO_2 emissions. But our tools to achieve this must be adequate, market-driven, and bring net benefits. The free market often does not have a good press, but history shows it's the most powerful engine for progress. Despite the success of bestsellers by authors like Johan Norberg, skepticism remains about the market's ability to tackle climate change. This is why we call on researchers worldwide to model and measure the impacts of the policies we propose. Econometric analyses tailored to specific countries can provide evidence to convince even the staunchest critics.

We have the resources, the expertise, and the urgency. Let's measure the impacts, implement the solutions, and take decisive action. Let's show that with creativity, collaboration, and economic freedom, we can meet and exceed our climate goals. The future depends on it.

Let's measure it and act! The clock is ticking.



PART II

Barriers in the energy markets of selected EU countries

Comparative analysis

Country-specific Reports on the Barriers in the Energy Sector

The Warsaw Enterprise Institute, as the lead author of the report, engaged seven local partners (think tanks and a law firm) from Poland, Ukraine, Czechia, Slovakia, Romania, Bulgaria, and Hungary to obtain data-driven, country-specific expertise on the investment barriers in the energy sector.

The country-specific reports assess the market distortions and strategic weaknesses created by various government interventions and regulations, including mandates, subsidies, tax barriers to investment, government ownership that crowds out private competition, and systems such as the ETS or tariffs. The documents focus on energy producers, technology providers, energy distributors and sellers, and related industries. It also includes policy proposals that address identified barriers and promote the development and deployment of innovative energy solutions and technologies by private companies and investors. The reports use the ideas expressed in the Climate & Freedom Accord and assess their potential application in the CEE region. The document offers a simple approach to using technology-neutral supply-side tax cuts to accelerate the transition to low-carbon energy, promoting competitiveness and economic benefits.

All analyses and figures presented in the report are based on the authors' work and publicly available sources listed in the document's final pages.

The list of questions addressed by Partners in their studies:

I A general energy market characteristics of the studied countries

a. The current energy mix and projections therein (description and a chart, diagram)
b. Description of local-specific energy transition, goals/numbers, directions of main investments, financing
c. Continuation chart with energy price levels at a national level (in the years 2020-2023)
d. Ownership structure among entities producing, distributing, and trading electric energy (general description of the market + available numbers)
e. Organization of the power grid and it's level of preparedness for distributed energy generation
f. fThe level of competition and the type of state involvement (price controls, subsidies),
g. The number of existing energy clusters, energy communities, and their condition/effectiveness
h. The number of private RES installations/investments in comparison to total RES production in the country
i. Enumeration of dominant challenges for public policies aimed at making the sector more competitive

II General description of the most critical barriers for investments/activity connected with energy transition processes. Potential areas:

a. Access to the power grid
b. Access to land
c. Access to information/technology/value chain
d. Inclusion of a given investment in the spatial development plan
e. Access to funding, bank guarantees, ratings, subsidies, and mandates (for example, on preferable conditions or not)

f. Access to the public bidding process
g. Limitations of revenues (put in place via dedicated acts – temporary/long term)
h. Limitations in free access to a specific type of activity (for example, secured for public entities only)
i. Limited access to specific resources
j. Overwhelming costs/taxes
k. Extended bureaucracy
l. Corruption/lack of transparency/influence of strong group of interest
m. Lack of stable law, high regulation risk,
n. Lack of proper definitions in the law (for example, PPA's, CfD's, cable pooling, direct line, sector coupling, hybrid installations, etc.)
o. Other

III My country vs. the EU

a. Do European regulations, decrees, and directives make bringing disruption and innovation to a country's energy markets easier or harder?
b. Is there anything the EU is doing or planning to do that could spoil or help efforts to revitalize the energy sector with private initiatives?

IV How to finance energy investment?

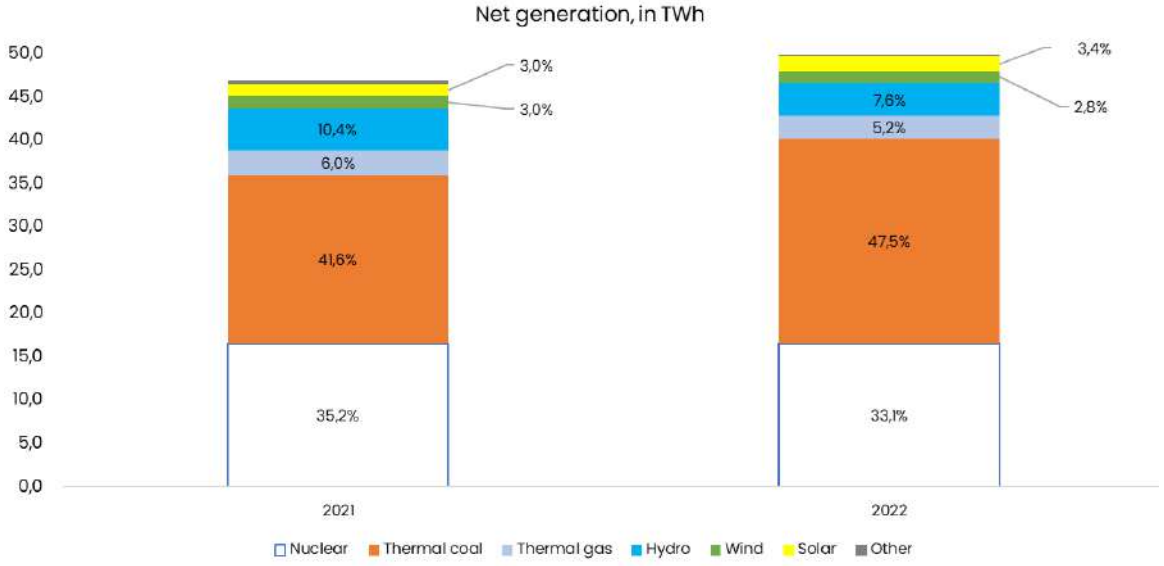
1. General Energy Market Characteristics of the Studied Countries

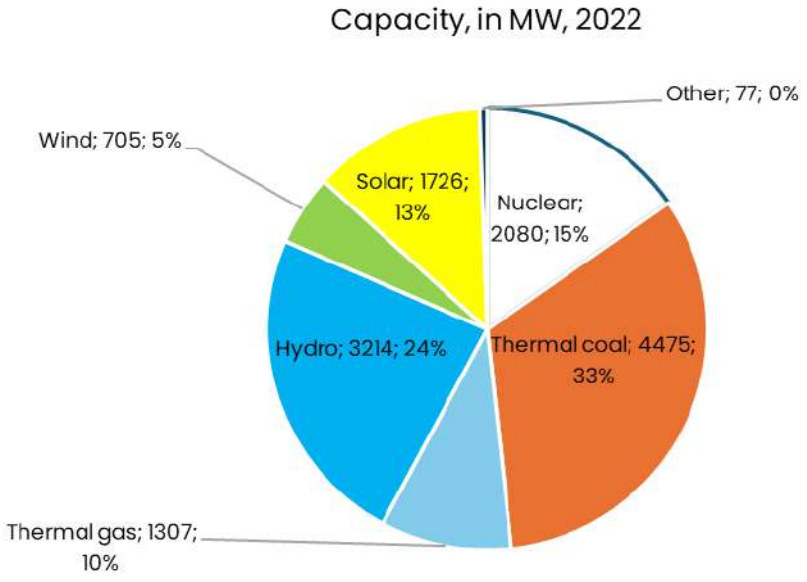
Bulgaria

Current energy mix and projections

The energy mix is dominated by nuclear power generation and coal (almost entirely lignite) thermal generation. As of end-2022, the installed nuclear capacity is almost 2.1 GW (15.3%), while coal reaches almost 4.5 GW (32.9%). Thermal natural gas capacity (1.3 GW or 9.6%) combines power and heat generation. Almost ¼ of the installed capacity is hydraulic, with a sizable part (860 MW) of it being hydro pump storage, which unfortunately is severely damaged and deactivated at present.

Chart 1. Power generation and capacity





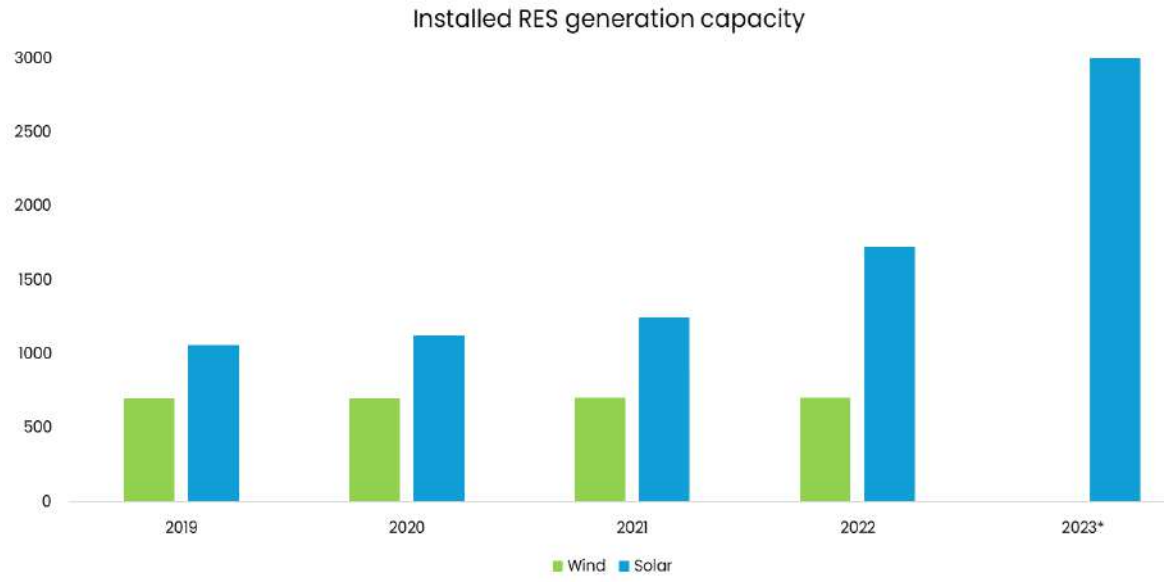
Source: ENTSO-E, 2021, 2022

As the energy crisis in Europe raised prices significantly in 2021 and especially in 2022, while at the same time the economy recovered from the Covid-19 recession, Bulgaria increased its total electricity generation (by 15% in 2021 and 8% in 2022). Most of the expansion was due to external demand, as Bulgaria is already well integrated into the regional power market. Peak prices and solid growth in consumption in neighboring countries, as well as in Europe in general, led to a 40% increase in exports, which reached ¼ of total generation.

The growth was largely based on coal, which increased its share of net power generation from 41.6% to 47.5%, while nuclear slightly shrank from 35.2% to 33.1%. The share of wind and solar in the 2022 total generation was 6.2%, with wind generation remaining over the last years unchanged as no new capacity was added. Solar generation, however, increased by 38.5% to reach 3.4% in the mix. From a longer-term perspective, since 2012, the generation from wind has increased by 30%, while solar energy has increased 8 times.

While there are no new installations of wind generation capacity in recent years, the capacity of solar plants has grown significantly in 2022 and especially during 2023. Starting from around 1 GW in 2019, by the end of 2023 solar capacity reached 3.7 GW.

Chart 2. Installed capacity of wind and solar



Source: Electricity System Operator

Energy transition: goals, numbers, directions of main investments, financing

There are several strategic documents related to energy transition with little coherence between them. The latest, developed as part of the National Recovery and Resilience Plan reforms package, is the Roadmap to Climate Neutrality by 2050, which the parliament approved in the first week of October 2023. The Roadmap (Table 1) envisions an exit from coal generation by 2035, a steep increase in new photovoltaic capacity, new wind, mainly offshore, 1000 MW of new nuclear capacity in 2035, and another 1000 MW in 2040. Although the mix after 2035 does not include coal-fired generation it provides that 1000 MW of coal TPP will remain a strategic (cold) reserve.

As the Roadmap does not deal with the heating and industrial sectors (which are the subject of other sector policies), there is no information relating to the generation of electricity from Combined High-Efficiency Heat and Power Generation (CHEHPG) from district heating plants and from factory plants, which use natural gas as a fuel. However, the overall generation of electricity from natural gas was around 7% of net electricity generation in the country in 2021–2022.

Table 1. Change in the electricity mix of Bulgaria 2026–2050, GW

	2026	2030	2035	2040	2045
Coal	2,9	1,6	0	0	0
Nuclear	2	2	3	4	4
Hydro	2,8	3,2	4	4,8	4,8
Wind	0,7	2	4	6	8
Solar	3,5	5,5	8,1	10,6	11,2
Storage	1,2	1,6	1,7	1,6	2,1

Source: Roadmap to Climate Neutrality by 2050

The Roadmap points to the following primary sources of financing: the National Recovery and Resilience Plan, Just Transition Fund, Modernization Fund, Cohesion Fund, European Regional Development Fund, REPowerEU, and the Social Climate Fund. In our experience, these financial mechanisms are usually focused on subsidies for RES and CHEHPG subsidies and funding programs for the insulation of residential buildings. Other countries, e.g., Greece and Romania, are using the Cohesion Fund and the European Regional Development Fund for infrastructure investments in their electricity transmission and distribution grids. Still, Bulgaria has yet to use them in this way. According to Eurelectric's Power Barometer 2023, for every 1€ invested in generating capacity, countries should invest another 0.67€ in distribution grids. Due to the chronic underinvestment in the Bulgarian grids, this ratio is around 1:1.

Energy price levels at a national level

As network interconnectivity deepened throughout the last decade, domestic prices became more and more dependent on the conditions of the regional energy market. In 2019 and 2020 (also affected by the COVID-19 recession), the average prices on the energy exchange were EUR 47 and 39 per MWh, respectively. Although natural gas plays an insignificant role in power generation, a steep increase in gas prices in Europe and its impact on electricity prices in most EU countries was almost directly transmitted to the domestic market, starting in mid-2021. The average price for 2021 grew to EUR 109 per MWh and then to EUR 253 per MWh in 2022, until dropping back to around EUR 104 per MWh for the entire 2023. It should be noted, however, that the government introduced a compensatory mechanism for domestic non-household consumers (i.e., businesses) in October 2021, and it had been in place until the end of 2023, effectively capping the price (see below). Also, End Suppliers for households do not purchase the power from the energy exchange at market prices but at a fixed price (below market levels since 2021, e.g., it has been EUR 59 MWh since 1 July 2023) from the public supplier.

Chart 3. Average wholesale electricity prices by month

Source: Independent Bulgarian Energy Exchange

Ownership structure among entities producing, distributing, and trading electric energy

Around 45% of the installed capacity is concentrated in State-owned Enterprises, which are owned by the Bulgarian Energy Holding (BEH):

- NPP Kozloduy – 2080 MW;
- Natsionalna Elektricheska Kompania (HEK), Run-of-the-river and Reservoir Hydro Power – 1837 MW;
- Natsionalna Elektricheska Kompania (HEK), Hydro Pumped Storage – 864 MW;
- TPP Maritsa East 2 – 1620 MW;
- Sofia District Heating, Fossil Gas – 280 MW.

The rest of the installed capacity is privately owned:

- Fossil Hard Coal – 356 MW;
- Fossil Lignite Coal – 2499 MW;
- Hydro, Run-of-the-river and Reservoir Hydro Power – 513 MW;
- Fossil Gas – 1051 MW;
- Solar – 2173 MW;
- Wind onshore – 705 MW;
- Biomass – 74 MW.

BEH also owns the Transmission System Operator (Electricity System Operator), while the distribution grid is privately owned. The companies—Electrohold, Bulgaria; EVN, Austria; Energo-Pro; Czech Republic—operate under an exclusive geographic license.

The wholesale electricity market is divided into two parts – a liberalized market, covering around 2/3 of annual net electricity consumption, and a regulated market, covering around 1/3 of net yearly electricity consumption and reserved for households only.

- Trading on the liberalized market takes place exclusively on the Independent Bulgarian Energy Exchange. However, RES projects in exploitation after 2018, as well as storage facilities in exploitation after January 2023 can conclude deals on an OTC Market. According to the annual report of the Energy and Water Regulatory Commission, there were 65 active market traders, which is a considerable increase compared to 40 in 2021. Currently, according to national law, there is an exclusive license for the operator of the electricity exchange. However, the parliament plans to vote on allowing multiple licenses soon.

- The regulated market is reserved for households that are supplied by an End Supplier (Краен снабдител), which operates under an exclusive geographic license corresponding to the permit for the Distribution System Operators. In short, Electrohold, EVN, and Energo-Pro each own a DSO and an End Supplier. Households can switch their End Supplier for a free market supplier but cannot switch to another.
- The regulated market works as follows: The Regulator determines production quotas for SOEs, which are sold to the NEK at regulated prices; NEK sells the corresponding quantities to each End Supplier at regulated prices; the End Suppliers sell the electricity to households at regulated prices. Prices are set for 12 months, starting on 1 July and ending on June 30. Prices can be changed during the 12 months, but it is a rare occurrence and did not happen even during the high market prices of 2021-2022.

Organization of the power grid and its level of preparedness for distributed energy generation

New RES investments flatlined between 2012 and 2020 and picked up as soon as 2021 due to the high electricity prices and the war in Ukraine. As a result, between 2020 and mid-2023, installed RES capacity has increased from 1784 MW to 2878, almost entirely due to an increase in solar. ESO projections show that by the end of 2023, installed solar capacity could increase by another 700 MW. The NRRP includes investment projects to increase ESO's capacity to connect new RES installations by 6500 MW in 2024 compared to 2020 levels and an increase of 1200 MW of additional net interconnection capacity with Romania and Greece compared to 2020.

Although the transmission capacity is a priority, that is not the case with the distribution capacity and the **DSOs have stated that they have almost reached its limit**. Another issue is that even if the DSO can connect new RES installations to its grid, due to a disproportionate increase in generators compared to consumers, and an insufficient transformer capacity to the TSO grid, it leads to curtailments. It should also be pointed out that around 75% of solar and 50% of wind generation is connected to the distribution grid, and Eurelectric projections show that by 2030 75% of all new generating capacity in the EU will also be connected to the distribution grid.

Despite the increase in new RES installed capacity, there are also investment intentions for another 40 000 MW. Experts from the TSO and DSOs believe that a large part of it is speculative; however, investment intentions also "reserve" the available capacity, and new investments have to be postponed. As a result, parliament has voted in a **"guarantee" of BNG 50 000 (€ 25 565) to be paid upfront by new investors;** smaller investors can waive the guarantee.

Level of competition, and the type of state involvement

The Ordinance on the Electricity Trading Rules includes two indices for evaluating the competitive environment of the market by determining market concentration: the Herfindahl-Hirschman Index and an index determining the total market share of the three largest market participants CR3.

Based on the data provided by TSO, it was established that for the period the total market share of the three main market participants was over 82% based on produced energy. According to the thresholds in PTEE, at CR3 concentration index values within 70-100%, the market is defined as highly concentrated with limited competition. With the existing structure of the market with the dominant participation of BEH's subsidiaries, the concentration index has high values - HHI is over 4700, defining the market as highly concentrated with limited competition in the market for the production of primary electricity.

The last regulatory assessment of the market concentration was published in 2019 and relates to 2018; there hasn't been a new assessment since. The market concentration, however, should have declined given the market coupling with Romania and Greece, and the narrowing price

differential with these markets. Another factor supporting this assumption is that traditionally, Bulgaria is a net exporter of electricity; however, in May 2023, the country was a net importer, suggesting that the market power of the state-owned BEH is declining.

RES installations connected until 2014 were subsidies via a Feed-in Tariff, which was changed to a Feed-in Premium in 2018 for generators with an installed capacity of no less than 0.5 MW. NEK has two Power Purchase Agreements (PPA) with TPP AES-3C Maritza East 1 and TPP ContourGlobal Maritsa East 3, which expire in 2026 and 2024, respectively.

The government introduced price caps for consumers on the liberalized market as soon as autumn 2021, and has reduced the cap to BGN 250/MWh (€ 127.82) for 2022 and to BGN 200/MWh (€ 102.26) for 2023. Following the Council Regulation *(EU) 2022/1854 of 6 October 2022 on an emergency intervention to address high energy prices* the government introduced price caps for producers and traders, trading on the liberalized market. Although the application of the Regulation ended in June, the government has extended the effect and lowered the level of the price caps for producers until the end of 2023.

Number of existing energy clusters, energy communities and their condition/effectiveness

Currently, there are no energy communities/clusters as there had not been a legal stipulation defining such communities. Parliament is voting on amendments to the Energy Law which should both define and support creating such communities.

Private RES installations/investments in comparison to total RES production in the country

In 2022, there were around 3100 privately owned legal entities producing renewable energy from solar, wind, hydro, and biomass. The total privately owned installed RES capacity is around 65% in 2022, and distributed as follows:

- Hydro, Run-of-the-river and Reservoir Hydro Power – 513 MW;
- Solar – 2173 MW;
- Wind onshore – 705 MW;
- Biomass – 74 MW.

Dominant challenges for public policies aimed at making the sector more competitive

Some of the inhibitors to the faster development of RES projects include, but are not limited to:

- administratively heavy procedure for grid connection examination and permitting;
- opaque procedures for allocating grid capacity;
- inconsistent methodology for assessing connection costs;
- the latter prompts project developers to submit requests for multiple grid connection points simultaneously and explore alternative options (see letter 'e' above);
- difficulties and lack of coherence between issuing building permits in different municipalities, often due to incomplete or vague legal frameworks and guidelines;
- lack of priority zones ("go to areas") for the development of RES projects;
- administratively heavy procedure for increasing grid capacity for new RES projects, lack of financial resources for DSO operators, and outdated regulatory practices.

Czech Republic

The energy sector is an integral part of the industrialized economy and is a key player in both domestic production and international energy trade. The following chapter will outline the sector's realities in the Czech Republic.

Table 2. Energy mix of the Czech Republic / Installed capacity (2022, MW)

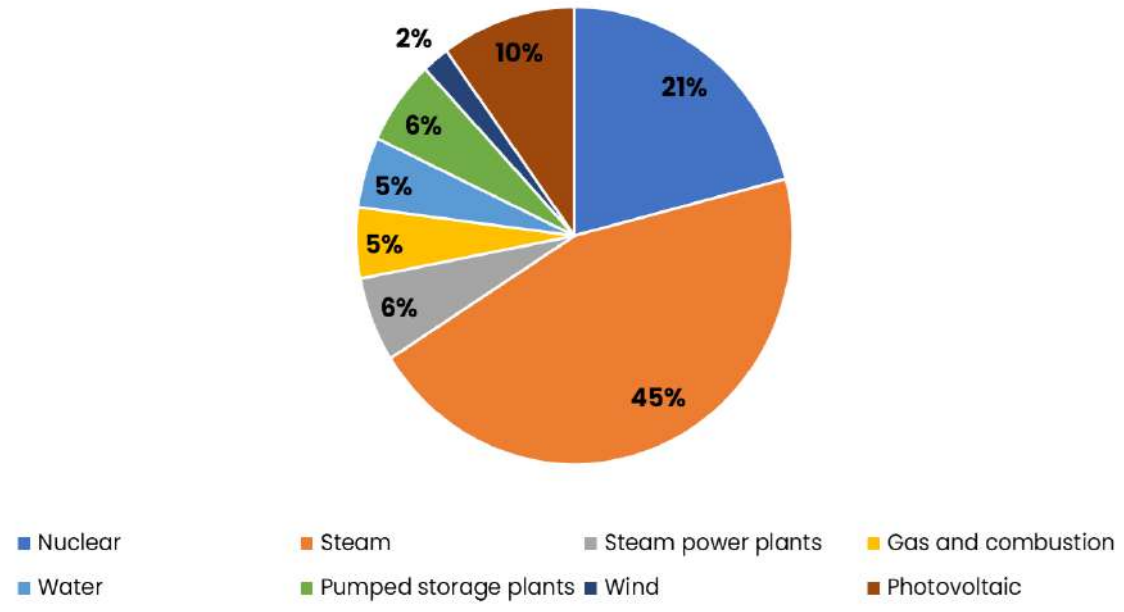
	2018	2019	2020	2021	2022
Total Czech Republic	22 302,60	22 014,30	21 378,50	20 877,60	20 806,20
Nuclear	4 290,00	4 290,00	4 290,00	4 290,00	4 290,00
Coal	11 075,40	10 729,90	10 058,80	1 363,50	1 363,50
Coal Power Plant	1 363,50	1 363,50	1 363,50	1 363,50	1 363,50
Gas and Combustion	910,9	937,7	961,7	983,2	1012,20
Water	1 112,50	1 113,20	1 113,90	1 114,60	1 113,60
Pumped storage	1 171,50	1 171,50	1 171,50	1 171,50	1 171,50
Wind	316,7	339,4	339,4	339,4	339,1
Photovoltaic	2 062,00	2 069,10	2	1,6	2,1

Source: The ERO, 2022, own processing; https://www.eru.cz/rocni-zprava-o-provozu-elektrizacni-soustavy--cr-pro-rok-2022

The Czech energy market is based on two nuclear power plants, several coal and steam power plants and a larger number of power plants using renewable energy sources, which, however, do not reach the output of the first mentioned types. The shift towards renewables in the Czech Republic, as in other post-communist countries, has been gradual and the main development of RES has taken place mainly in this and the last decade. In addition to conventional power plants, in recent years there has been a rapid development of small-scale, mainly photovoltaic, power plants. In the first half of this year, the Ministry of Industry and Trade registered a total of 130,331 such plants with a capacity of 2,969 MW.[1]

[1] https://tiny.pl/dnzmr.

Chart 4. Energy mix of the Czech Republic / Installed capacity shares by source (2022, %)

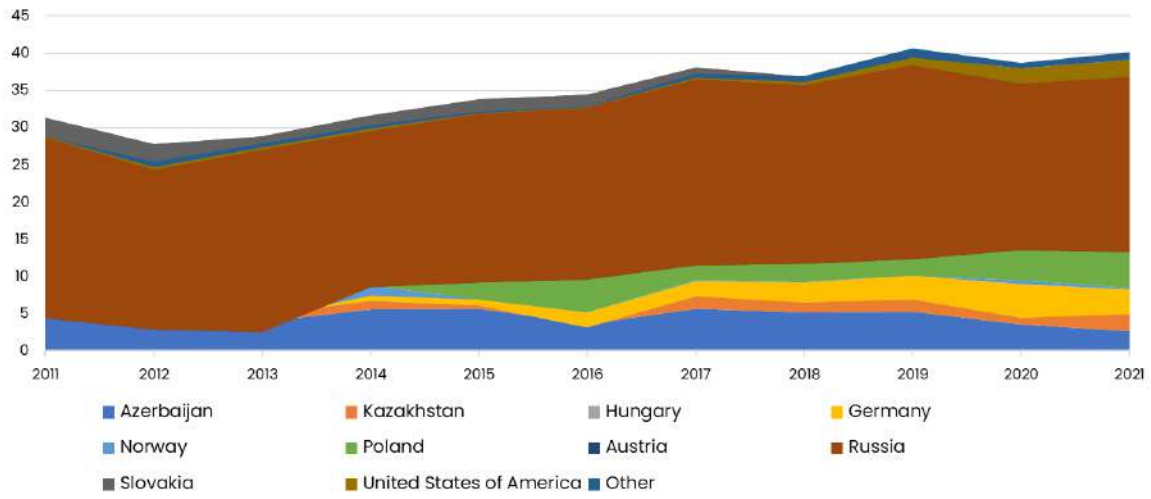


Source: The ERO, 2022, own processing; https://www.eru.cz/rocni-zprava-o-provozu-elektrizacni-soustavy--cr-pro-rok-2022

The Czech Republic has traditionally been a net exporter of electricity due to its large coal resources and two nuclear plants.[2] The regulatory framework governing the energy sector is evolving to be in line with national and EU-wide energy transition objectives. Currently, two main trends can be observed in the Czech market. The first is **the increased pressure for energy self-sufficiency**, which is closely linked to the Russian invasion of Ukraine in 2022. Prior to this event, the Czech Republic was 40.1% dependent on foreign "energy" imports.[3],[4] About a quarter (25.4% in 2021) of total imports came from Russia.

[2] https://www.iea.org/reports/czech-republic-2021
[3] Coal, oil, natural gas and more.
[4] Figures for 2021. https://www.mpo.cz/assets/cz/energetika/statistika/energeticke-bilance/2023/3/Dovozni_zavislost_2011-2021.pdf

Chart 5. Energy import dependence of the Czech Republic by country (2011–2021, %)



Source: MIT, 2023, own elaboration; https://www.mpo.cz/assets/cz/energetika/statistika/energeticke-bilance/2023/3/Dovozni_zavislost_2011-2021.pdf

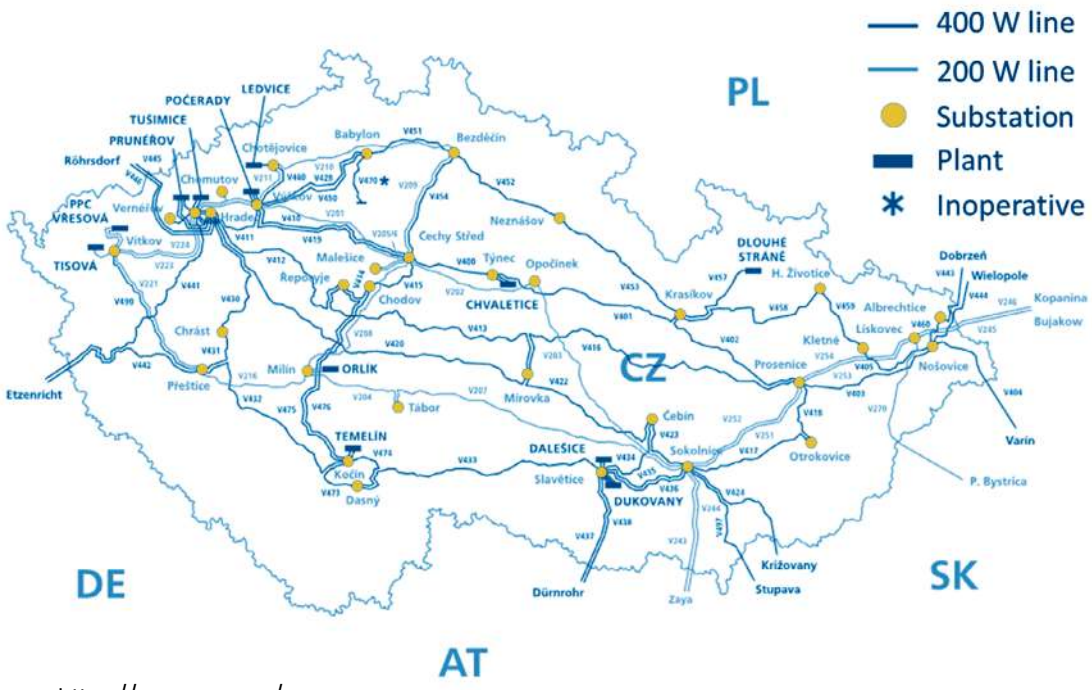
The second theme of the Czech energy sector is the effort to decarbonize it. Both topics are closely related. The majority of the Czech public, as well as most of its recent governments, is highly in favor of using nuclear energy.[5] Nuclear energy is firstly perceived as a clean energy source and secondly, thanks to the existing infrastructure - the Dukovany and Temelín power plants, it is much easier to expand the current capacity in the Czech Republic than to build it on greenfield sites.

The current government strategy envisages the expansion of both plants. Dukovany should receive new units by 2036 and the tender for the completion has already been announced. Temelín should have added new units in the 1940s. The Ministry of Industry and Trade expects the expansion of the two plants to increase electricity production to 48–56% of the total. At present, the share is around 35%.[6] In 2022, for example, the two power plants delivered up to 31,020,000 MWh to the grid. CEZ then states that the two power plants will prevent more than 22.5 million tons of CO_2 from being emitted into the atmosphere each year.[7]

The Czech power grid can be described relatively easily. One part of it is the transmission system, which connects large energy sources (e.g., power plants), transmits large power over long distances, and at the other end, large consumers (e.g., distribution companies) are connected to it. The second part of the energy network is the distribution system. This is where individual distribution companies manage their part of the grid and then distribute the energy to end users. In the Czech Republic, there is a number of small independent suppliers and three main energy suppliers, which are the semi-state company CEZ, and the private companies E.ON and PRE.[8]

5 https://www.protext.cz/english/press-release.php?id=19194
6 https://www.mpo.cz/cz/rozcestnik/pro-media/tiskove-zpravy/budoucnost-ceske-energetiky-bezpecnost--dekarbonizace-nebo-energeticka-ucinnost--273623/
7 https://www.cez.cz/cs/pro-media/tiskove-zpravy/ceske-jadro-dodalo-nejvic-elektriny-v-historii-170146
8 https://www.svetenergie.cz/cz/energetika-zblizka/distribuce-elektriny/distribuce-elektricke-energie-podrobne/distribucni-soustava/vyklad

Chart 6. Czech transmission system



Source: https://www.ceps.cz/cs

Similarly to other European countries, the Czech government has moved to price caps at a time of the highest energy price increases. For households and small businesses, the cap on electricity prices covered 100% of their consumption, while for larger companies it covered 80% of their highest consumption in the last 5 years. The cap on gas prices was set in practically the same way. The price cap was in place from the beginning of 2023, and was abandoned again the same year, following the fall in energy prices.

Hungary

Electricity is extremely important not only for Hungary but for the whole world. In the last ten years, electricity generation in Hungary has fallen by a quarter, mainly due to regulatory changes, but we see an improvement thanks to photovoltaic (PV) systems. The Hungarian Energy and Public Utility Regulatory Office (MEKH) and the Hungarian Electricity Transmission System Operator (MAVIR) publish the production and consumption statistics.

Hungary's electricity consumption is about **45.4 TWh.** There is no significant change compared to the recent years. It is also worth looking separately at the total consumption of the residential and competitive markets in Hungary, as there is a significant difference between them:

- Universal service (retail market): This sector accounts for around **26%** of total energy consumption in Hungary. In numerical terms, this means that **11.7 KWh** of the total consumption of 45.4 TWh is consumed in this sector. It is important to note that users entitled to the universal service can either buy within the universal service at regulated prices or enter into a competitive market contract; however, the exit of Telekom has minimized the proportion of the population buying from the free market. Magyar Telekom has been providing energy retail services in Hungary since 2010, quickly becoming a significant player with 150,000 customers (electricity and gas, residential and business) by 2013. However, the so-called "utility cost reduction" initiative, which started in several phases from 2013, ruined its business model (as well as that of every other player in the electricity, gas, water, and district heating markets). This cost reduction mandated the governmental decrease of previous residential prices: *Under utility cost reduction, one must understand the decrease of end-user prices of public services based on legislation* (Act LIV of 2013). In mid-March, the parliament enacted a law prohibiting energy service providers from including transaction fees, a special income tax, or taxes on utility lines in their prices. In 2015, Telekom withdrew from the residential market, guiding its business customers into a joint venture with MET company. Due to the persistence of utility cost reduction and the explosion of energy prices, by 2022, the sole universal electricity and gas provider became the state-owned MVM (which incurs the loss due to cost reduction). The number of distribution licensees organized on a territorial basis is low (MVM ÉMÁSZ, MVM DÉMÁSZ, E.ON North-Transdanubia, E.ON South-Transdanubia, OPUS, ELMŰ).
- Competitive, wholesale, and corporate market: The competitive market accounts for the largest share of electricity consumption, accounting for around **59%** of total consumption, or **26.9 TWh** out of 45.4 TWh.
- Network losses and power plant consumption: Although Hungary's power plants mainly generate electricity, they also require a lot of energy. Losses during electricity transmission are part of the total consumption, so about 15%, 6.8 TWh, of the total consumption is attributable to power plants and grid losses.

Legislation

In order to establish an efficiently functioning, competitive electricity market, to enforce the principles of energy efficiency and energy saving in the interests of sustainable development, to ensure the secure, uninterrupted, high-quality and transparent supply of electricity to users, to integrate the Hungarian electricity market into the unified electricity markets of the European

Community, to comply with the legislation of the European Communities and to establish objective, transparent and equal treatment-compliant regulation to ensure the realization of all these, Parliament adopted **Act LXXXVI of 2007 on electricity.** The purpose of this Act is

- to promote the competitiveness of the economy through the development of an efficiently functioning competitive electricity market,
- to promote the principles of energy efficiency and energy saving in the interests of sustainable development,
- ensuring access to electricity networks in an objective, transparent and non-discriminatory manner,
- to secure, uninterrupted, and transparent supply of electricity of appropriate quality and cost structure for users,
- effective protection of the interests of users,
- the integration of the Hungarian electricity market into the converging electricity markets of the European Union, in particular concerning the establishment and development of trans-European networks and the promotion of the interoperability of the electricity system,
- promoting the creation of new generation capacity and new network infrastructure and the emergence of new entrants in the electricity market,
- promoting electricity production from renewable energy sources, waste, and co-generation.

The scope of this Act covers the generation, transmission, distribution, trade, consumption, and transmission of electricity; the management of the electricity system; the construction, operation, commissioning, maintenance, and termination of the electricity plant; the interconnection and user equipment, as well as the **production line, private line, and direct line;** and on the activities subject to authorization under this Act and activities which may be carried out without authorization. The relevant legislations are the Government Decree 273/2007 (X. 19.) on the implementation of specific provisions of Act LXXXVI of 2007 on Electricity and Government Decree 299/2017 (X. 17.) on mandatory feed-in and premium support for electricity produced from renewable energy sources.

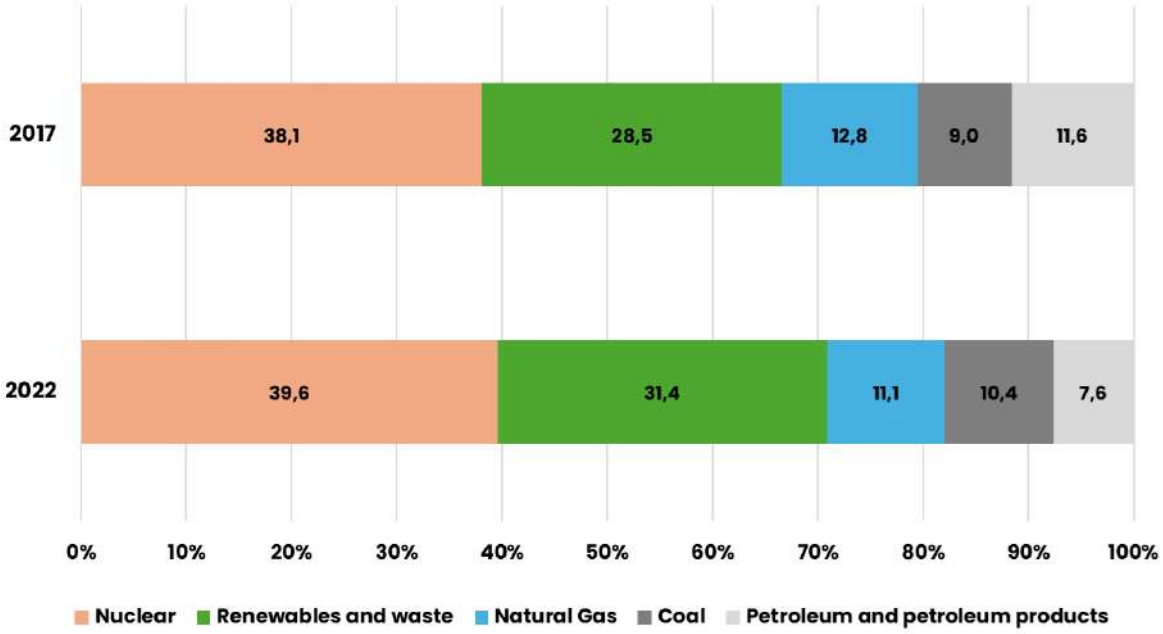
The National Assembly considers that the peaceful application of nuclear energy in many fields of industry, agriculture, health and scientific research contributes to the improvement of living conditions for humanity; considering, however, that its misuse may be detrimental to human and animal health and the natural environment; in order to ensure that the risks posed by the use of nuclear energy are no greater than the socially accepted risks of other activities and to ensure that safety requirements are met by domestic regulation which is also in line with international standards; on the protection of the general public and the environment against the harmful effects of ionizing radiation and on the regulation of the use of nuclear energy, the licensing procedure relating to that, the basic tasks and obligations of the authorities and the users of nuclear energy in this field adopted the **Act CXVI of 1996 on Nuclear Energy**. The scope of the Act covers the peaceful uses of nuclear energy, the rights and obligations associated with them, and the protection of human beings and the living and non-living environment against the harmful effects of ionizing radiation of natural and artificial origin.

The National Atomic Energy Authority (Országos Atomenergia Hivatal, OAH) is an autonomous regulatory body responsible for the safety and radiation protection of nuclear installations, radioactive waste storage facilities, and containers used for the transport of nuclear and other radioactive materials and their protection. The OAH has general building authority and construction supervision powers for structures located in the safety zones of nuclear installations and radioactive waste storage facilities. The OAH supervises the entire construction process for new nuclear installations, from site investigation methodology to commissioning and operation. The OAH is neither for nor against the use of nuclear energy.

Market participants

The primary power plants in Hungary are the following: Paks Nuclear Power Plant, Mátra Power Plant, Mátra Thermal Power Plant, Komló Thermal Power Plant, Tatabánya Thermal Power Plant, Pécs Thermal Power Plant, Tisza I. Hydropower Plant, Csepel Gas Turbine Power Plant, Dunamenti Thermal Power Plant, Kispest Power Plant, Kelenföld FIAT Gas Turbine, Győr I. Thermal Power Plant. Most of Hungary's electricity is generated at the Paks Nuclear Power Plant. The rest is mainly provided by coal and gas-fired power plants and the emerging renewable generation (which has doubled since 2008 from 4.19% to 8.48%). Total generation is thus broken down by category: 49% - nuclear, 27% - gas, 12% - coal, 11% - renewable, including 5% - biomass, 3% - solar, 2% - wind and 1% - waste recovery.

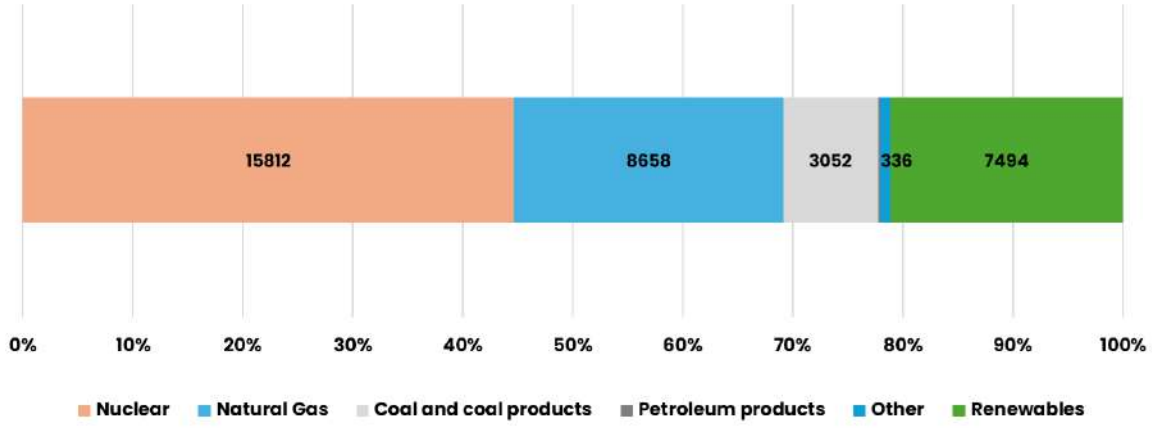
Chart 7. Total energy produced according to its source (%)



Source: KSH (2022): Hungary – Energy Management; https://www.ksh.hu/apps/shop.kiadvany?p_kiadvany_id=1079525&p_temakor_kod=KSH&p_lang=HU

The amount of energy from domestic production has been steadily decreasing since 2017. In 2022, the amount of energy produced from base-load energy carriers will be 0.9% less than in the previous year, at 437 PJ. Nuclear energy accounted for four tenths of our energy production, with electricity and heat generated in nuclear power plants falling by a further 1.1% in energy value terms, after a decline of 0.5% in the previous year. Of the fossil fuels that account for around three tenths of production, oil production fell by 1.4% in heat equivalent terms, coal production rose by 2.1% (after a low in 2021) and natural gas production was essentially unchanged compared to the previous year. Energy from renewables and waste decreased by 1.4%, their share of production falling to 31%.

Chart 8. Electricity generation data, 2022 [million kWh]



Source: KSH (2022): Hungary – Energy Management, https://www.ksh.hu/apps/shop.kiadvany?p_kiadvany_id=1079525&p_temakor_kod=KSH&p_lang=HU

Hungary's electricity generation increased between 2015 and 2021, with the exception of a decline in 2018, and the 36 billion kWh of electricity generated in 2021 was the highest since 2010. In 2022, production was below the 2021 level for all but five months and for the year as a whole, falling by 2.0% overall to 35 billion kWh. 45% of Hungarian electricity production was provided by the Paks nuclear power plant, with a further 24% coming from natural gas and 8.6% from coal. Both nuclear generation and coal-fired electricity decreased by around 1-2%. The decrease in Hungarian electricity generation is mainly due to the reduction in the use of natural gas, which in all months except February and March was below the level of a year earlier. The October-December period was the main contributor to the annual decline of around 8%, with production falling by around a fifth in those months. Our country's renewable electricity generation has been steadily increasing since 2013, reaching a record 7.5 billion kWh in 2022, accounting for a fifth of our electricity production. The primary source of green electricity generation has been solar power. The amount of electricity generated by solar panels has grown most dynamically, from just 850 thousand kWh in 2010 to over 1 billion kWh for the first time in 2019 and 4.6 billion kWh in 2022. The use of other renewable energy sources has declined, with the exception of biomass and wind, by more than 10% in 2022.

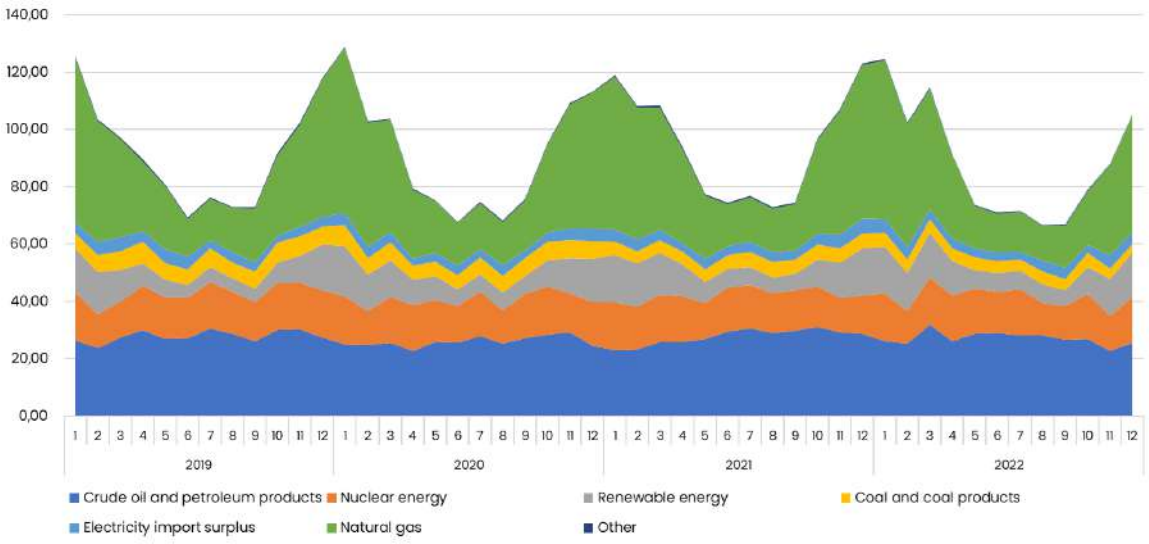
Nuclear power generation still represents a much larger share than the following energy generation categories. It is interesting to note that the Paks NPP has a utilization rate of around 90%, while the utilization rates of the other Hungarian power plants vary widely, depending on current market prices and regulatory conditions. Hungary can buy electricity more cheaply from neighboring countries, due to lower prices there. Electricity production in Hungary is lower than consumption (about two-thirds of total production compared to total consumption), so the country needs imports. Electricity prices are not the same everywhere, so it makes sense to import from where it is cheaper, and export to where it is more expensive. Hungarian stock exchange prices (HUPX, HUDEX) have been around 10-13 EUR/MWh higher than electricity prices in Germany over the past year. Electricity supply in Hungary and the CEE region has changed significantly in the recent period. While Hungary used to import electricity from Ukraine, Romania and Serbia, all three countries have now changed from exporters to importers, so as a consequence Hungary exports electricity to these countries. The situation is different in Slovakia and Austria, where electricity prices are lower than in Hungary, but unfortunately, due to tight border capacity, nut much electricity can be imported from these countries.

Domestic electricity production cannot meet domestic demand, so imports have become increasingly important in the electricity balance. Net imports remained below 10 billion kWh throughout the period 1991-2012, and have since fluctuated between 12 and 14 billion kWh. In 2022, our electricity imports exceeded exports by 12 billion kWh, less than the 13 billion kWh of 2021, due to a larger increase in electricity imports than electricity exports.

The opening up to electricity trading also means that MET Group, previously a gas-only trader, has become an integrated trading house, covering the entire gas and electricity value chain in the South-Eastern European and Central-Eastern European region. The MET Group is an integrated European energy company headquartered in Switzerland, with activities in natural gas and power, focused on multi-commodity wholesale, trading, and sales, as well as energy infrastructure and industrial assets. The Group is represented in 15 countries, with 900+ permanent staff in Austria, Bulgaria, Croatia, France, Germany, Hungary, Italy, Romania, Serbia, Singapore, Slovakia, Spain, Switzerland, Turkey and Ukraine. MET Hungary Ltd. is one of the flagship operating companies of MET Group, responsible for large industrial sales on the Hungarian end-customer and wholesale market[9].

[9] https://hu.met.com/en/about-us/about-our-company

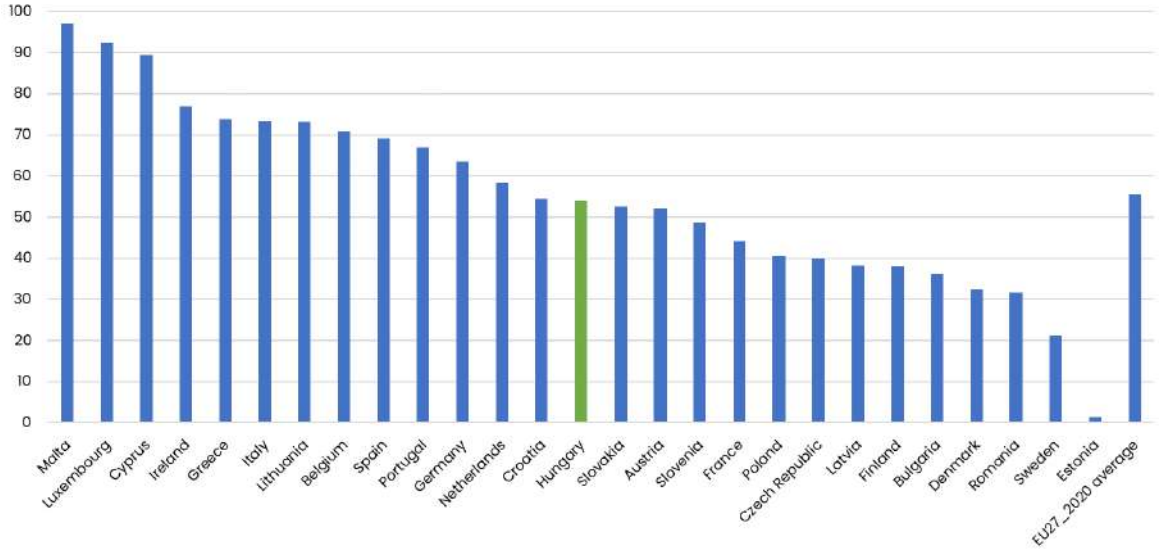
Chart 9. Primary energy consumption of the national economy by energy carrier per month [Petajoule]



Source: KSH (2022): Hungary – Energy Management, https://www.ksh.hu/apps/shop.kiadvany?p_kiadvany_id=1079525&p_temakor_kod=KSH&p_lang=HU

Primary energy use in both October and November fell by almost a fifth in November, the largest decline in five years. As a result, the overall decrease compared to 2021 was 1,056 PJ of energy, 6.8% less than in 2021, resulting in the lowest consumption since the middle of the 2010 decade. This, in addition to a milder-than-usual autumn and December, is the result of the regulatory price controls on natural gas and electricity prices.

Chart 10. Energy import dependence of EU countries, 2021 [%]



Source: KSH (2022): Hungary – Energy Management; https://www.ksh.hu/apps/shop.kiadvany?p_kiadvany_id=1079525&p_temakor_kod=KSH&p_lang=HU

In 2022, Hungary's energy imports (891 PJ) were 8.8% higher than a year earlier, while exports (212 PJ) were 2.5% higher. Among fossil fuels, which account for nine-tenths of imports, imports of coal and coal products and petroleum and petroleum products fell by 30% and 3.1%, respectively, while imports of natural gas increased by 31%. Exports of coal and coal products and of petroleum and petroleum products were down on a year earlier, while exports of natural gas increased significantly. Hungary's energy import dependency ranged between 50% and 70% in the 2010s, with the lowest rate between 2011 and 2013 (50% in all three years) and the highest (70%) in 2019. The year-to-year fluctuations in energy import dependency are also linked to changes in storage capacities and the timing of stockpiling, among other factors. The timing of stockpiling and consumption is also influenced by fluctuations in world energy prices, procurement opportunities and weather conditions. Among the Visegrad countries, Slovakia's energy import dependency was similar to Hungary's, while the Czech Republic and Poland had significantly lower dependency.

The most important characteristics and problems of the Hungarian energy system briefly include:

- The energy consumption of the Hungarian industry has been dynamically increasing (again) since 2009.
- Hungary's energy imports are significant. Oil and natural gas imports annually amount to 80-90%. Uncertainties exist (Russian aggression against Ukraine, increasing Ukrainian transit fees, transit fees from Croatia, Croatian port capacities, etc.). 26-32% of electricity consumption also comes from imports.
- There are uncertainties surrounding the expansion of the Paks nuclear power plant. The fate of the project is uncertain. It is

questioned whether the Russian Rosatom will be able to implement the project at all in the war-sanction environment.

- In recent months, the government has announced a dozen investments related to battery manufacturing. If all of these are realized, the country's electricity consumption could increase by 30-40% within ten years.
- The government has clearly opted for solar energy among the RES, making a political decision, which deteriorates the stability of the network. No wind turbine has been built since 2011. Geothermal energy and the utilization of industrial waste heat have not been emphasized.
- The building stock is outdated, and the energy efficiency incentives and grants that were characteristic a decade ago have fallen behind.
- The harmful effects of "utility cost reduction" on infrastructure and consumer awareness. The current system of utility cost reduction does not encourage energy savings, and investments in networks have been neglected in all areas, from the electrical network to the drinking water network. (However, it undoubtedly protected Hungarian residential consumers from the 2022 energy price explosion, with "utility cost reduced" gas and electricity prices in Hungary being the lowest in the EU.)
- General political risk (extraordinary legal order, legislations without consultation, political group of interest considerations, missing European Union funds due to various retentions, preference for Hungarian ownership).
- Decarbonization would require more complex planning involving more actors and a comprehensive development policy (instead of often "point-like" interventions).

Poland

The energy market in Poland and the security during the transformation period

The production of electricity in Poland is becoming increasingly diversified, but it is still mainly based on conventional sources such as hard and lignite coal and natural gas. Renewable energy sources (RES), such as wind, solar and biomass, have been intensively increasing their share of energy generation, in recent years. Poland is simultaneously an important producer of hard coal, which, however, is a minority share in the volume of this raw material used for energy production (import dominates) and at the same time entails a huge challenge in the area of decarbonization of the economy and social change in regions with mining traditions.

The transfer of electricity from producers to consumers is carried out through the transmission network, which is managed by the National Transmission System Operator (NTSO). This grid includes transmission lines of various voltages and power transfer stations. Electricity is distributed to end users by local Distribution System Operators (DSOs). Distributors manage the distribution grids in their area and deliver energy to homes, enterprises and institutions.

The sale of electricity in Poland is a market segment in which various suppliers (public and private) offer electricity to end users. Energy trading is mostly done through the Towarowa Giełda Energii (POLPX), which offers a variety of products in the SPOT and derivatives markets.

The energy market in Poland is heavily regulated by laws and institutions, including the Energy Regulatory Office (ERO) and the Energy Regulatory Commission (ERC)[10]. Regulations include pricing, security of supply, energy efficiency, and greenhouse gas emissions.

Energy security is an important aspect of the Polish energy market. Poland wants to diversify energy supply sources, build new (international) interconnections, and modernize infrastructure.

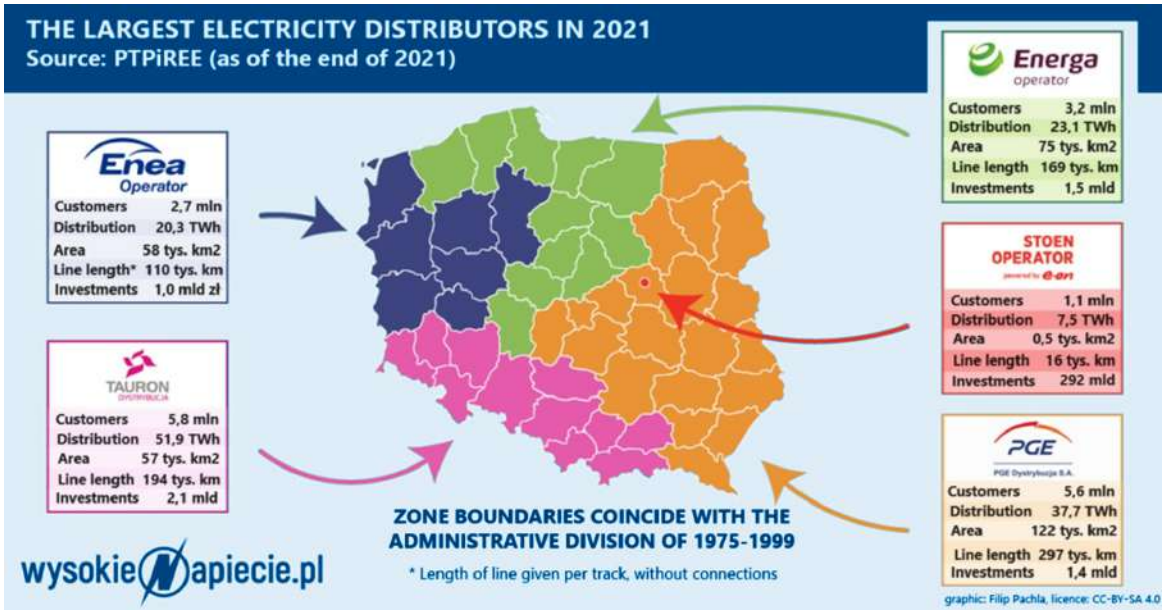
Market participants

The ownership structure of electricity production assets in Poland is diverse and includes both state-owned and private companies, including foreign ones. Poland still has numerous state-owned power plants, which are owned by the

[10] https://www.erc.gov.ph/

State Treasury. Many of these power plants rely on conventional energy sources such as coal and natural gas. Examples include the Bełchatow Power Plant (the largest coal-fired power plant in Europe at 5 GW) and the Kozienice Power Plant. Among the energy companies that operate power plants in Poland, the following state-owned companies dominate: Polska Grupa Energetyczna (PGE), Tauron Polska Energia, Enea, and Energa (Orlen Group), which account for about 70% of the energy produced in the country. These entities, as part of integrated energy groups, also control the energy distribution market:

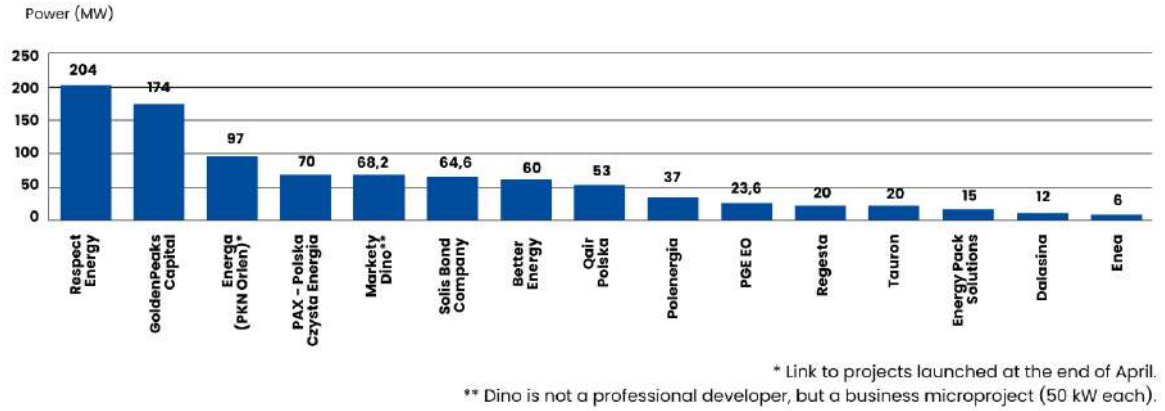
Map 1. The Largest Electricity Distributors in 2021



Source: https://wysokienapiecie.pl

In Poland, there are also private investors, including foreign ones, who own power plants or shares in power plants. The largest private entities holding conventional assets are ZE Pak, Polenergia and Fortum. Within wind turbines, photovoltaic or other renewable energy sources, competition is far greater. When we take a broader look at the ownership structure when it comes to photovoltaic installations in Poland, we notice that private entities seem to dominate here:

Chart 11. Power Distribution of Photovoltaic Farms in Poland



Source: Instytut Energetyki Odnawialnej. Spółka

Looking at wind farms, here the largest investor is state-owned PGE, whose wind projects have a capacity of 772.4 MW. The second place with installations above 700 MW is held by foreign investor EDP Renewables. The third place, with a capacity of 472 MW, belongs to Polenergia, a Polish private company. And fourth place, with a capacity of 450 MW, goes to RWE Renewables, a company owned by Germany's RWE. Another state-owned company, Tauron, has 416.8 MW, and Energa has 243.9 MW.

In some regions of Poland, there are energy cooperatives that bring together local owners and manage small power plants or RES farms. Energy cooperatives were introduced into Polish law by the Law on Renewable Energy Sources of February 20, 2015. They can be established only in rural and urban-rural municipalities. On 1 October, an amendment to the Law on Renewable Energy Sources[11] came into force, which introduced certain facilitations for the establishment of energy cooperatives. Above all, the amendment repeals the provision that limits the number of cooperative members to 1,000. The removal of the limitation of the number of members to 1,000 may lead to the promotion of the establishment of energy cooperatives in rural areas. However, the Polish legislator still has not made it possible for an energy cooperative to sell the energy it generates to external parties, thus limiting the entity's ability to make financial gains from its activities in the energy sector. The legislator has introduced the requirement that the total installed electrical capacity of all renewable energy source installations should not exceed 10 MW, and that their electricity generation efficiency should enable them to cover no less than 70% of the energy cooperative's own needs and those of its members during the year. In October 2023, there were 20 energy cooperatives operating in Poland. Although cooperatives benefit from statutory support, successive legislative amendments regulating their activities in Poland have not been sufficient to unleash their full potential.

The number of licensed electricity traders fluctuates over time, but competition in this area is nonetheless substantial. While state-owned companies remain the dominant sellers on the Polish market, independent energy sellers include numerous Polish and foreign entities, including large foreign corporations such as Fortum, Axpo, Engie, Enefit, etc. The chart 2 below illustrates the number of electricity seller changes by month from March 2022 to March 2023 in households (orange - G tariffs) and businesses (blue - A, B, C tariffs):

[11] Polish Law on Renewable Energy Sources https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20230001762

Chart 12. Number of electricity sellers changes by month from March 2022 to March 2023

Source: URE

The ownership structure of electricity production assets, as well as the activity of companies within energy trading in Poland, is a result of the processes of liberalization of the energy market and various investments in the energy sector, which, however, have sometimes been restricted in various ways over the years by state regulators wishing to maintain control over the domestic energy market.

Disadvantages and challenges of the Polish energy market

Among the disadvantages and challenges of the Polish energy market that may affect its efficiency and development are:

1. **Dependence on coal:** One of the main disadvantages of the Polish energy market is excessive dependence on coal as the main source of energy (63% share in energy production in the country in 2023). This energy source is not only harmful to the environment due to greenhouse gas emissions, but is also vulnerable to fluctuations in the price of the raw material on international markets. At the same time, it is also difficult to replace it in a short time. In Polish conditions, it seems realistic to reduce coal-based power generation to 50% in 2030. In 2030, the following energy mix can be realistically expected in the Polish system:
   - 30 TWh is the possible output of land-based wind farms in 2030, assuming their rapid development supported by the Energy Act Reform,
   - 30 TWh is the expected production of gas units in 2030,
   - 25 TWh will be produced by photovoltaics in large-scale sources and in the prosumer system,
   - 20 TWh in 2030 should be produced by offshore wind farms,
   - 10 TWh is expected to be the maximum production from biomass and biogas,
   - The remaining needed volume must be supplied by coal, which will remain a significant source of electricity in Poland until 2040 at the earliest.
2. **Low energy efficiency:** Poland still has many areas where energy efficiency is relatively low. This means that more energy is used than necessary to achieve the same goals, with negative cost and environmental impacts.
3. **Obsolescence of infrastructure:** Some of Poland's energy infrastructure is outdated and in need of modernization. This can lead to problems with electricity availability and make it difficult to integrate with new technologies such as renewable energy sources. A number of coal-fired units are planned to be successively shut down in the coming years, risking a decline in power availability in the power system.
4. **Grid infrastructure and connection wedge:** The biggest challenge in the area of the electricity grid is its modernization and redevelopment into distributed power generation. Historically, the structure of the network was based on a tree structure: from large sources of generation toward consumers. Presently, this is a significant obstacle to the dynamic growth of RES in the system, due to the lack of available connection capacity and risks related to grid security and stability. The number of rejections has been steadily increasing and now exceeds ninety percent of rejections to connect RES sources to the total applications submitted. In addition, Polish industrial production is located in the south of the country - meanwhile, currently planned significant new generation sources (offshore wind and nuclear) will be located in the north of Poland.
5. **Centralization tendencies vs. competition:** Despite the existence of competition in the market for energy generation and sales, state-owned companies remain the dominant force in the energy market, which are able to exploit their position in many areas of the market, as well as sometimes receive preferential treatment from policy makers.
6. **Greenhouse gas emissions:** Poland's heavy reliance on hard coal results in some of the highest greenhouse gas emissions in Europe.

This poses a major challenge in the context of global efforts to address climate change

7. **Lack of diversification of energy sources:** In order to increase energy independence and reduce the risks associated with fluctuating raw material prices, Poland needs to diversify its energy sources. Of the tens of millions of tons of coal that Poland needs annually, only a small portion is produced by domestic mines. The remaining volume is imported.
8. **Europe's largest coal-based district heating system:** Poland's district heating market is the largest in the European Union. This is primarily the result of climatic conditions, as well as high urban density and high urbanization ratio. Poland is also the European leader in the amount of heat sold to end users. Modernizing Poland's heating sector is probably one of the biggest challenges the country faces. The most popular direction for modernization is gas-fired cogeneration, although less carbon-intensive technologies are slowly entering the market.
9. **Barriers to renewable energy sources:** Despite the efforts made by investors and politicians to develop renewable energy sources, there are still significant regulatory, administrative and financial barriers hindering the expansion of these technologies in Poland.
10. **Scale of investment needed:** Modernization and development of energy infrastructure requires significant financial expenditures, which can be a challenge for the state budget and private investors.
11. **Regulatory instability:** The pace and frequency of changes to energy laws and sectoral legislation (e.g., regarding renewable energy sources) are excessive. Investors identify regulatory risk as a very important aspect that negatively affects the predictability of their business.

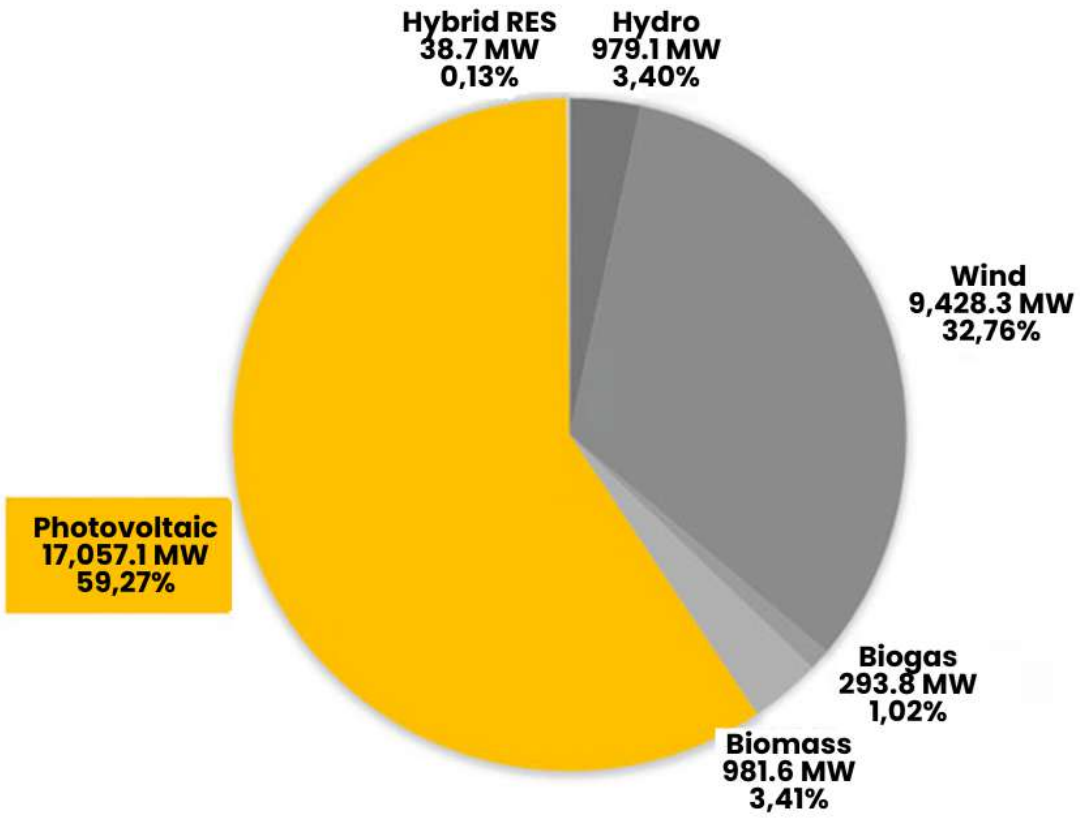
The above-mentioned defects in the energy market in Poland require attention and action from public institutions, energy market participants, and society so that a more sustainable and efficient energy system can be established. Implementing sustainable energy sources, increasing energy efficiency and modernizing infrastructure are key steps toward solving these problems. The transformation of Poland's energy system must be divided into several stages, with the most critical stage being the first, which falls between 2024 and 2030 and focuses on the decarbonization of the economy. Assuming the timely implementation of planned investments in new generation sources in the second half of the 2030s, Poland can have a modern, complementary and efficient energy system that meets the environmental conditions required by the European Commission.

However, to make this possible, Poland should intensify its efforts to ensure a smooth transformation of the domestic energy sector. At the same time, the paramount goal is to provide customers with security of supply and stability, as well as price competitiveness. Both legislative activity and investment projects in the energy and heating sectors can be considered essential actions.

Key figures

The installed capacity of the Polish electricity system is over 60 GW, of which 28 GW in RES. At the end of 2023, the installed capacity of photovoltaics in Poland reached 17,057.1 MW, including commercial PV power plants - 1,142.8 MW and independent PV power plants – 15,914.3MW. The dynamics of the increase in PV installations illustrates the huge potential of private investments in Poland. The share of other renewable sources is presented in the graph 1 below (data from December 2023):

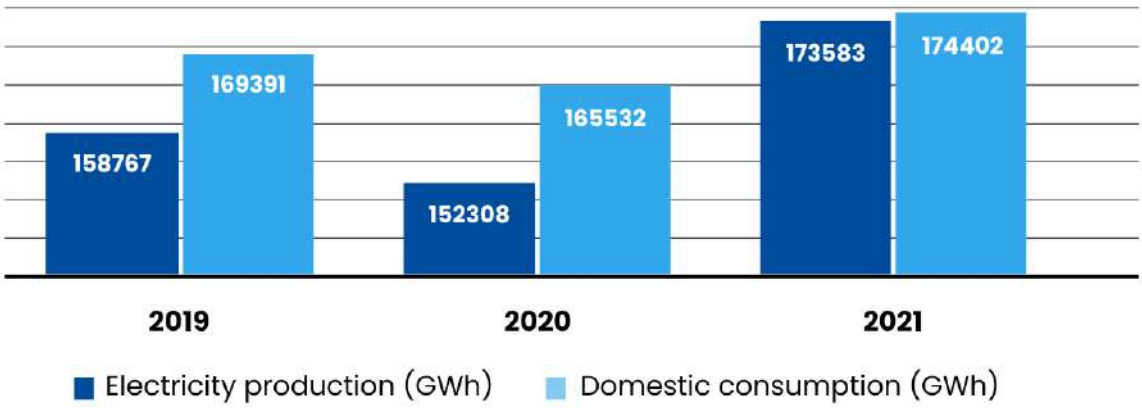
Chart 13. The share of other renewable sources



Source: Max Energy, https://max-energy.pl/12-gw-mocy-zainstalowanej-w-fotowoltaice-przekroczone

In 2023, energy production in Poland amounted to 163.63 TWh, of which 27% came from renewable sources. Electricity demand in 2023 reached 167.52 TWh. For industrial purposes, Poland consumes about 43%, additionally 29% for business purposes, while the share of households is 19% and for energy goals 9%.

Chart 14. Energy production and consumption in 2019–2021 in Poland

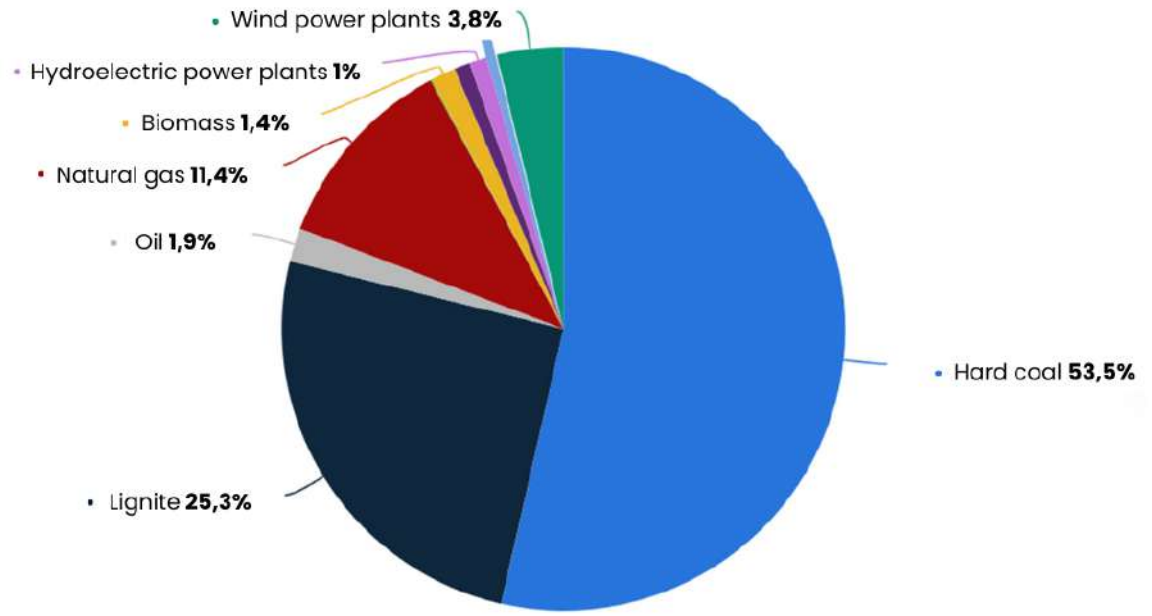


Source: Statista, Poland structure of energy sources

Poland has the largest share in total exports with developed countries – 86.3% (including the EU 74.1%). This means that the Polish economy urgently needs large amounts of sustainable energy to produce export goods with the maximum reduction of carbon footprint.

Poland's gas consumption in 2023 amounted to about 15.8 cm. About 46% of gas is consumed for industrial use in Poland, 10% for trade and services, 34% for households, and 10% for thermal power plants.

Chart 15. Structure of electricity sources in Poland in 2023



Source: Own study, Kochański&Partners

As a country, Poland is now entering an investment cycle in the power industry, as part of which new installations will replace coal-fired units that are being phased out. Poland will have to deal with growing demand resulting from the electrification of heating, transportation and industry, as well as ensure that demand and supply are balanced (e.g., during climatic droughts or cold winters). According to estimates by the Polish Electricity Association (PKEE), outlays for the transformation of the energy sector by 2030 could amount to as much as €135 billion, including protective measures for the mining sector linked to the electricity and heating sectors. According to PKEE, in the perspective of 2030, the financial resources of Polish energy groups and other investors, as well as the funds available through EU instruments, may be insufficient to cover the total capital expenditures for the energy transition in both the generation and distribution segments. It is necessary to seek further sources to support investment financing.

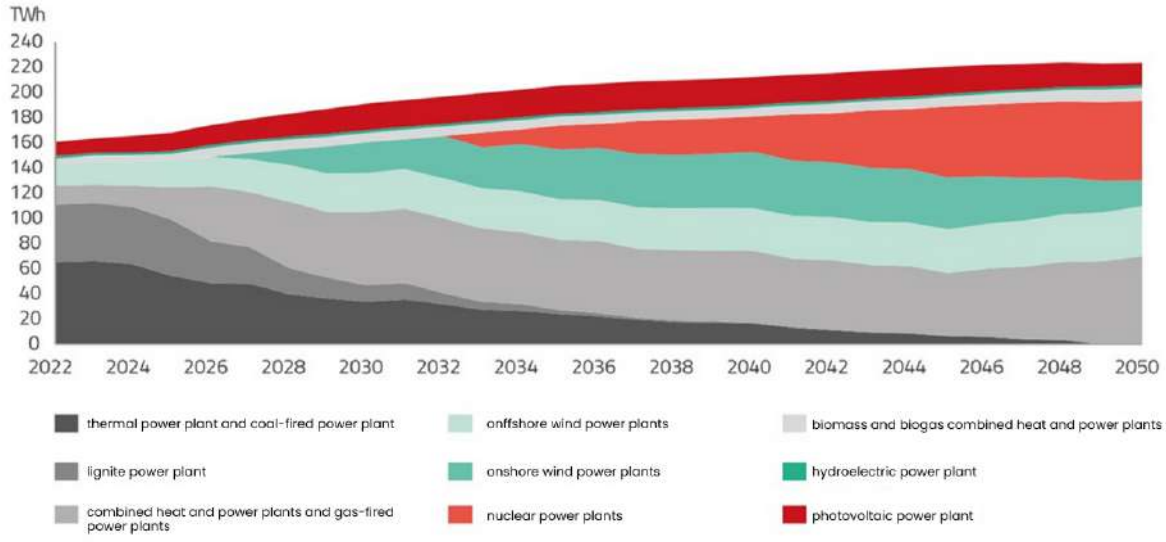
At the same time, the Energy Regulatory Office, on the basis of data collected from 69 power generators (units over 50MW) that were obliged to submit plans for investment in new generation capacity to the regulator for 2022-2036, forecasts a decrease in the availability of capacity in the system.

Chart 16. Generators' investment plans for 2022-2036: balance of generation capacity using KWDe

Source: URE based on survey data

So far, investment plans in the power industry have been based on the initial assumptions of the National Energy Policy adopted in 2018, which envisioned the following transformation of the power production mix over time:

Chart 17. Electricity production forecast for Poland's baseline demand until 2050



Source: EY compilation based on assumptions for PEP2040 update

In the face of the energy crisis and Russia's use of gas fuel as a tool of blackmail, it was necessary to update the PEP2040 (National Energy Policy for 2040) document. For the time being, however, the work on the document is ongoing (interrupted by the change of the government due to elections in Poland in Autumn 2023). At the same time, new government, is working on an update of National Energy and Climate Plan – an initial draft was sent to European Commission in mid-March 2024.

Analyses done by a number of research centers show that Poland's potential for the growth of new generation sources is much greater than former government documents predicted:

Table 3. Energy mix of the Czech Republic / Installed capacity (2022, MW)

Source	Target	Share of RES in eletricity production in 2030 (%)	Share of RES in eletricity production in 2040 (%)	Installed capacity of RES in 2030 (GW)	Installed capacity of RES in 2040 (GW)
Instrat (2021)	GHG55%	71%	83%	57	100
Ember (2022)	2050 net zero	66%	78%	52	103
Agora (2021) GHG55% Policy Measures	GHG55%	65%	–	54	–
Forum Energii (2022)	Cost of fuel imports	54%	–	57	–
PSE (2022)	Network development	50%	–	47	–
CAKE (2022) - NEU	2050 net zero	47%	68%	40	88
Bank Światowy (2022)	2050 net zero	45%	67%	45	–
Komisja Europejska (2021) - MIX	GHG55%	44%	–	45	–
Obecna PEP2040 (2021)	GHG40%	32%	39%	22	29
Założenia do aktualizacji PEP2040 (2022)	?	32–50%	50%	34–52	50–60

Source: scenario analysis published by the Energy Forum, Instrat, European Commission, Agora Energiewende, Center of Climate and Energy Analysis, Polskie Sieci Elektroenergetyczne (PSE), World Bank, Ember.

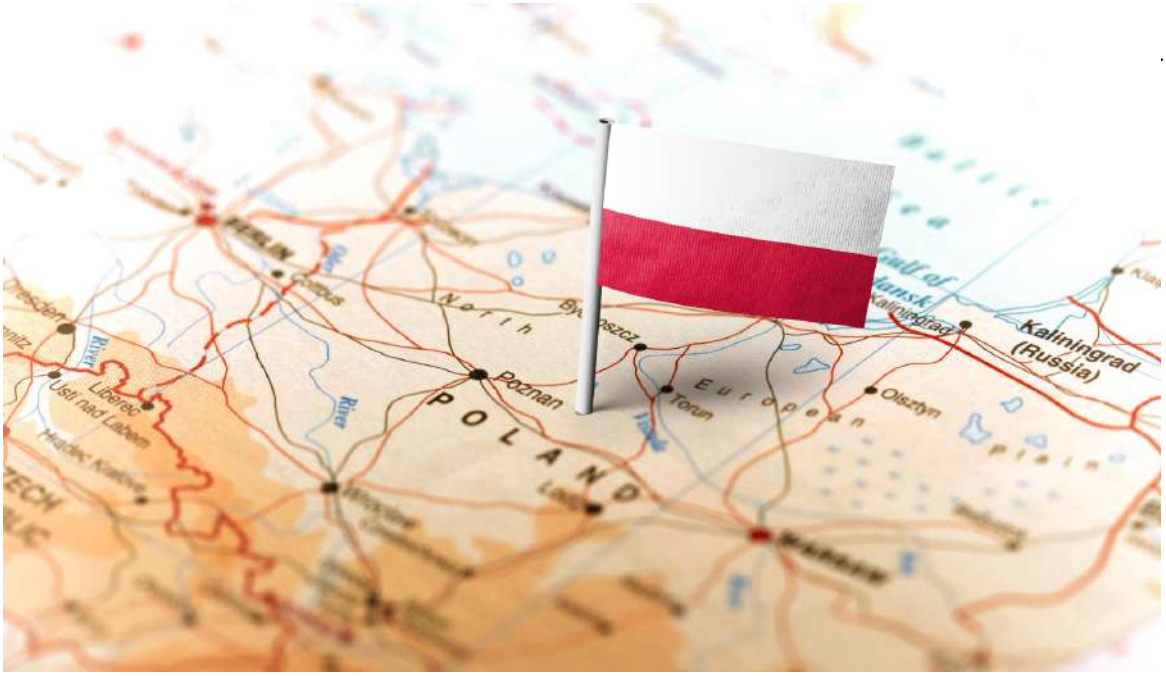
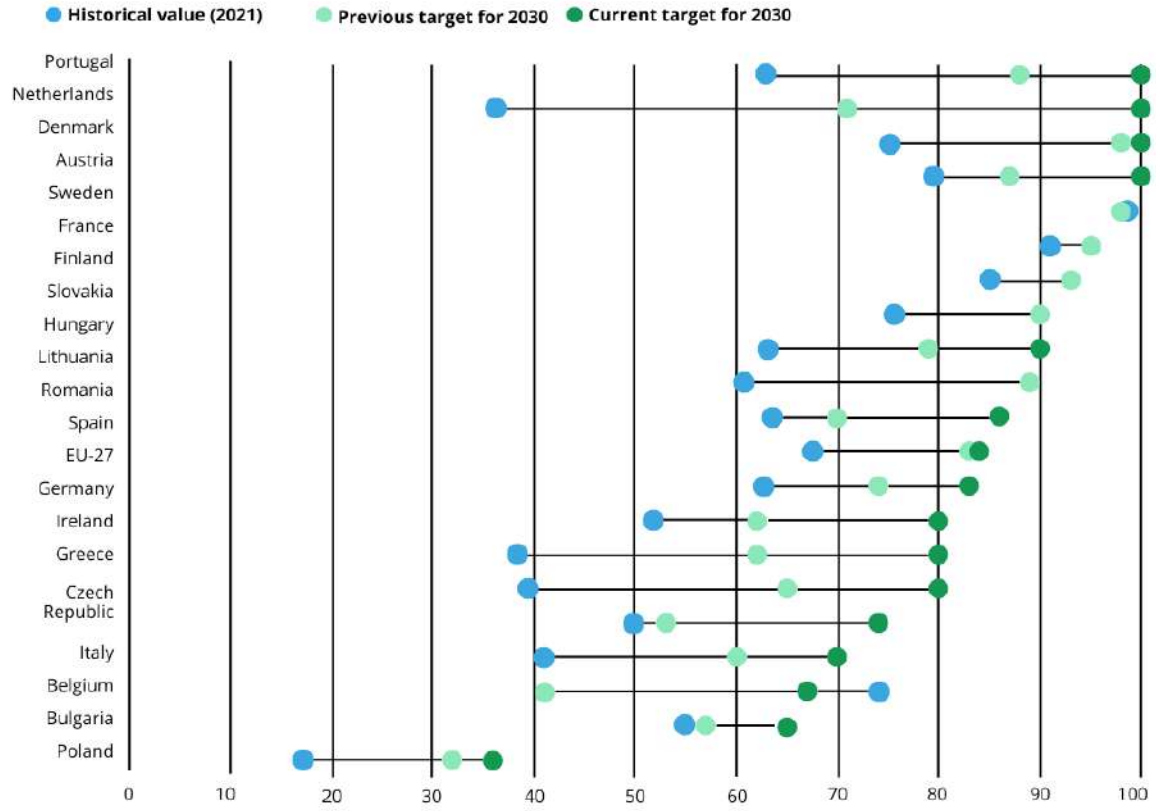


Chart 18. Current and planned (in 2030) share of low-carbon sources in electricity generation (%)



Source: Ember national climate policy database

Previous target = 2019 National Energy and Climate Plans (NERPs); Current target = latest official policy statements from governments. Coutries shown account for > 97% of EU electricity consumption. Updated 18/10/2022.

Poland is aware of the need for a gigantic energy investment campaign, which has already begun. Gas investments are currently underway in 7 sites in the country. They are scheduled to be finalized till 2027 and are expected to deliver about 6.9 GW. Investment in pumped storage power plants is expected to double the existing installed capacity, reaching 4.4 GW around 2030. Biomass, biogas, biomethane, and hydrogen sources are also expected to show steady growth, but this is a multi-year prospect before a significant capacity volume is generated.

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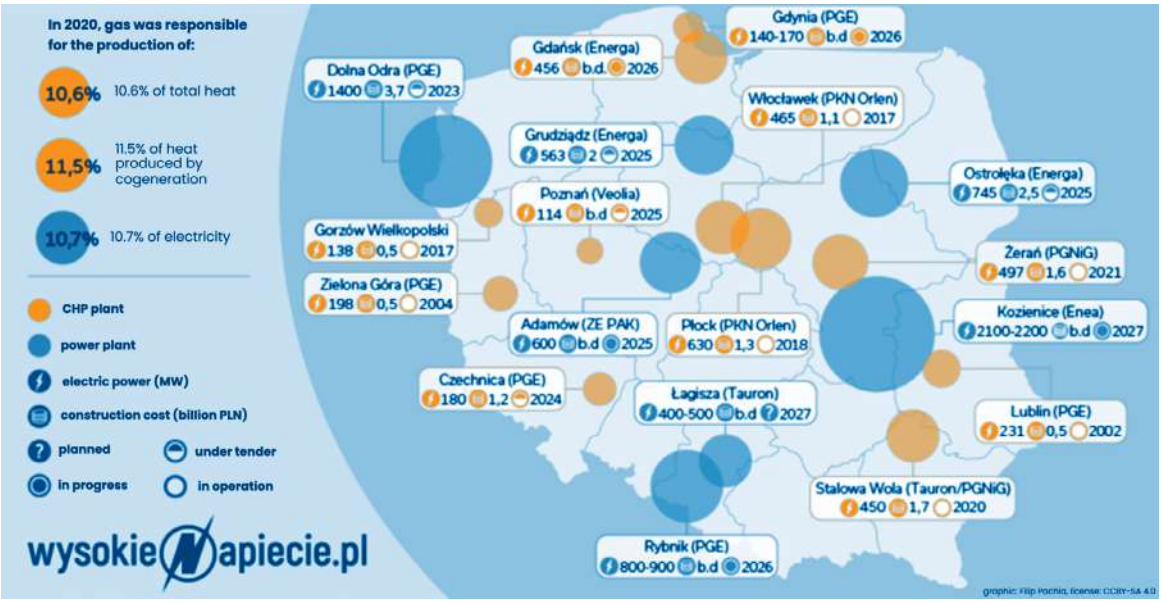
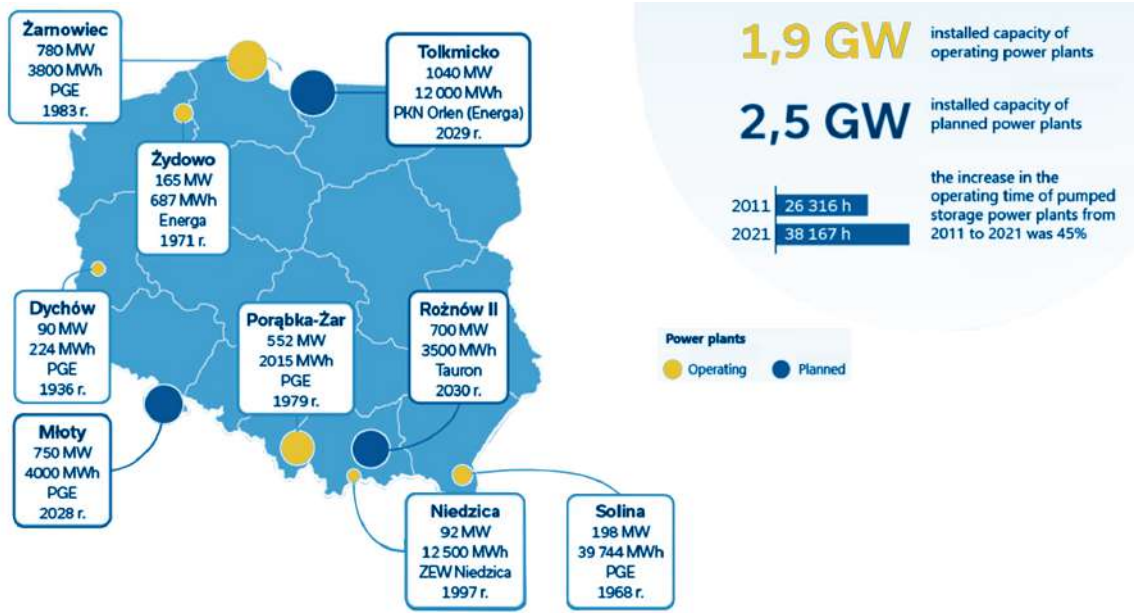
Map 2. Largest gas-fired power plants and CHPs in Poland (data as of December 2022)



Source: wysokienapiecie.pl

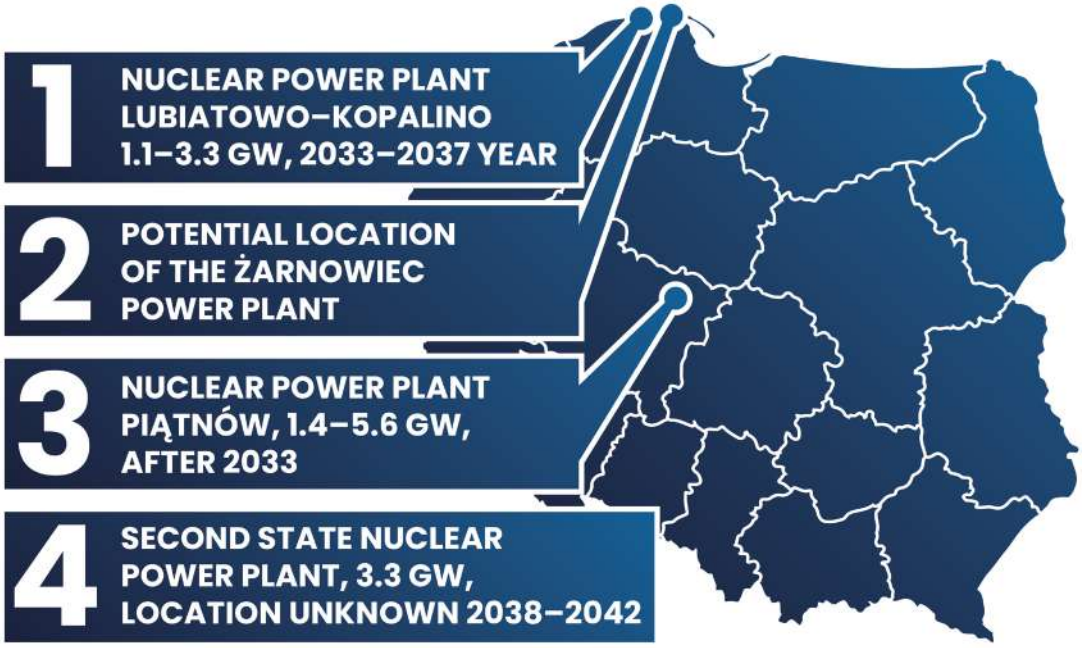
Map 3. Pumped storage power plants in Poland (data as of February 2023)



Source: wysokienapiecie.pl

The bare minimum scenario for Polish nuclear policy requires 2.2 GW of reactors in operation in 2035 and 4.4 GW in 2040 – however the final time frame in nuclear projects is actually difficult to predict. If, on the other hand, the maximum plan in the area of nuclear power was implemented, i.e. two plants of the state nuclear program (PEJ) and two units of 1,400 MW each in Pątnów (ZE PAK/PGE) - this would give almost 12,000 MW of nuclear power in the mid-2040s. The initial power from full-scale power plants, according to investors' declarations, is to start flowing in 2033, from SMRs in 2029 – but these are very ambitious assumptions. Especially that the new government decided to interrupt Polish nuclear projects with audits aimed at finding potential irregularities.

Map 4. Plans to build nuclear power plants in Poland (excluding SMR/MMR units)



Source: Own study, Kochański&Partners

By 2038, ORLEN Synthos Green Energy, a special purpose vehicle of PKN ORLEN and Synthos, plans to erect 76 small nuclear reactors (SMRs - Small Modular Reactors) at 26 locations in Poland. The first tranche of locations have already been selected:

Map 5. Potential locations for SMRs in Poland

Source: orlen.pl

Other investors in Poland are also planning their own nuclear generation capacity (e.g. KGHM, Industria, Respect Energy). Interest in this technology has been growing in recent months, and several foreign SMR suppliers are already active on the Polish market.

In turn, offshore wind projects with a total capacity of about 5.9 GW are currently under development in Polish maritime areas in the so-called Phase I of development. It is planned to develop in sum 18 GW till 2040. Meanwhile, the identified (by PWEA, among others) offshore wind potential of the Baltic Sea is around 33 GW. Crucial for smooth offshore wind projects development will be strengthening local supply chain base, which requires an update of Polish Industrial Policy.

The onshore wind power industry is currently focusing on projects that were granted construction permits at least six years ago. These are investments that, for various reasons - often financial - have not yet been completed. However, since the development of new projects has been severely limited until 2023, due to the so-called "10H law" (distance bill), it led to a collapse of investment in this area. The unfortunate law was partially liberalized in Autumn 2023 and the new government plans to fully unlock the onshore wind potential by further law liberalization in Spring 2024. It is expected that the number of new wind power capacities being developed will, for the time being, decrease from year to year. And the real effects of the liberalization of "10H law" will be seen in 4-5 years from now, when new wind projects begin to be developed after the permitting period.

Price volatility of recent years

Before 2018, price volatility in Poland within the electric power industry was marginal. Differences in contract valuations a year ahead, over the course of the year, did not exceed 20-30 PLN/MWh. The situation changed starting in 2018, when, after a significant increase in energy prices (from about 200PLN/MWh to about 300PLN/MWh), the government decided for the first time to apply electricity subsidies for end users. And while there was a downward trend in the following 2 years, there was an almost uninterrupted upward trend from the end of 2020 until August 2022. From the fall of 2022 to the present, the market is clearly correcting currently approaching the 430 PLN/MWh price. The last 3 years have been marked by very high price volatility.

Notably, before the energy crisis, electricity prices in Poland were significantly higher than those in western and northern Europe. This was mainly due to the dominance of coal in the generation mix and its cost, the price of CO_2 emission certificates, along with the not-so-highest efficiency of utility power units. Since spring 2022, price relations between Poland and Germany, France and the Nordic countries have not been so clear-cut. For a few months of 2022 Poland even became an energy exporter. However, the situation has already returned to the one we witnessed before the crisis. Thus, in the near future, it is to be expected that the balance of interchange will show much higher volumes on the side of energy imports to Poland rather than vice versa. Unfortunately the number and capacity of interconnectors in Poland do not let freely manage the balancing among European common market.

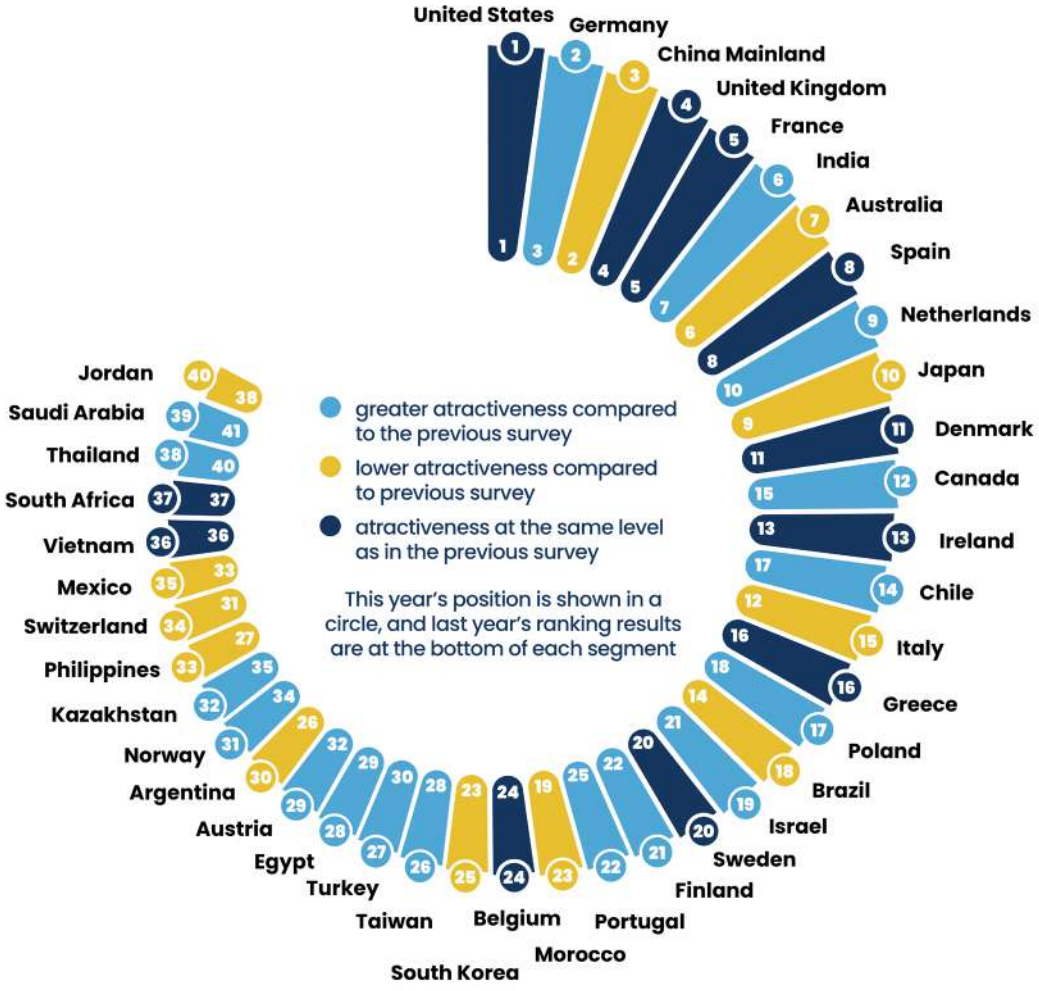
RES growth dynamics

Photovoltaics remains the fastest growing renewable energy source in Poland, with a total of 91,220 new installations in the first half of 2023. PV constitutes the vast majority of all RES sources installed in the country. The next places in terms of investments from the first half of 2023 were occupied by cogeneration units (25), wind energy (23) or biogas (15). Biomass sources recorded 5 installations, hydro sources 3 installations and hybrid sources only 2 installations in the first half of this year. The last 2 years have also seen a noticeable installation boost in the area of heat pumps. In 2022, about 200,000 of them were installed, an increase of up to 10 times over 5 years. In the past two years, according to the Polska Izba Magazynowania Energii (PIME), 12,000 energy storage units have been installed. In 2022, 40 percent more storage units were installed than in 2021. Undoubtedly, the energy storage market

has huge growth potential in the coming years. Especially since investments in energy storage are currently being promoted as part of the government's My Electricity (Mój Prąd) program, under which a grant of up to PLN 16,000 (a maximum of 50% of eligible costs) can be obtained. At the same time, over the past 6 years, energy storage prices have been dropping year after year, and while investors continue to emphasize that the cost of these installations is a significant barrier, it seems that without an increase in the number of storage facilities, dynamic growth of RES in the system will not be possible.

According to EY, Poland is the 17th country in the world in terms of attractiveness of RES investments. The graph below shows the results of the ranking, conducted for the 61st time. Over the past 20 years:

Chart 19. Attractiveness of RES investments



Source: EY RECAI 2023

Romania

Romania's hydroelectric and nuclear power capabilities are significant components of its energy infrastructure. Together, they cover about one-fifth of total energy consumption.

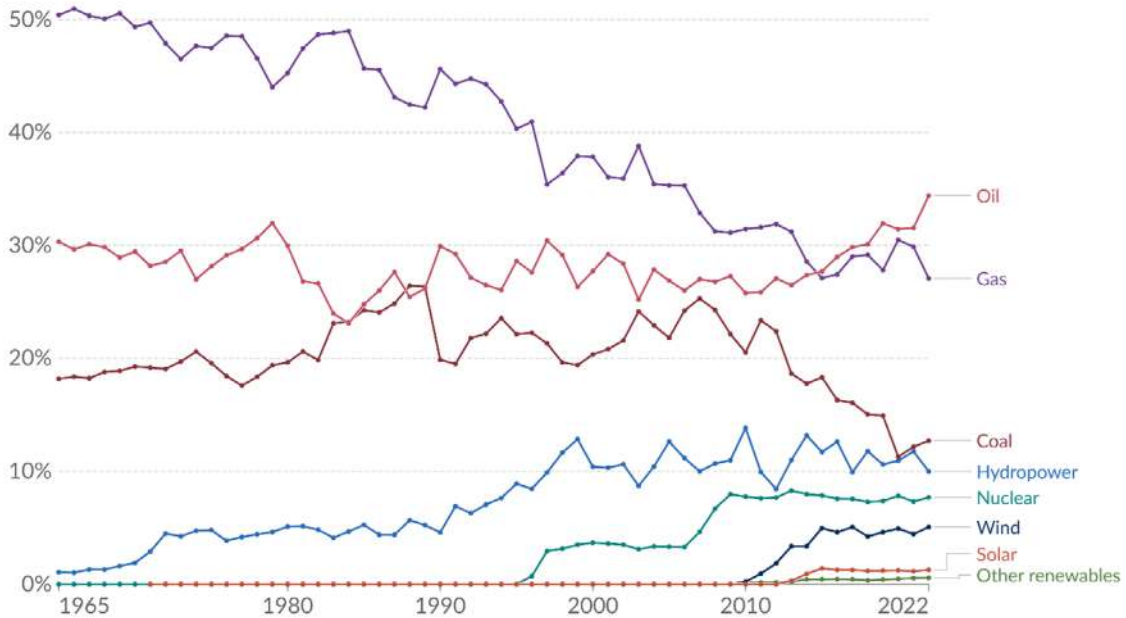
The biggest and fourth hydroelectric plants are on the Danube River, and many others use most of the hydroenergetic potential of the internal rivers. This fact, combined with environmental concerns, limits the potential further development of hydroelectric capacities. However, one large-scale project, a half-century old, is periodically resuscitated by the authorities: a 1GW pumped-storage hydroelectric plant in the center of Transylvania (Tarnița-Lăpușești)[12].

The Cernavodă Nuclear Power Plant (two CANDU-type reactors, operational since 1996 and 2007) is a critical element in Romania's energy landscape, providing about one-fifth of its electricity. The nuclear energy contribution is under its potential, even though it always had strong political and public support ever since the end-sixties. Regime change, financial constraints, politicians' strategic incoherencies, and, more recently, interest rates spike-up are the main explanations for the delays in launching other nuclear projects like reactors 3 and 4 (at Cernavodă) or the Small Modular Reactors plant (at Doicești).

Despite its push towards renewable sources, Romania still relies heavily on fossil fuels like coal and natural gas. Coal, however, is facing a decline due to environmental concerns and the aging nature of the coal-powered plants. The country is also endowed with natural gas reserves, and there is an active initiative to boost production through exploration and development projects (off-shore, on-shore). These efforts are part of a broader strategy to diversify energy sources and reduce dependency on imports from unfriendly countries.

[12] Economica.net. (2023). Burduja, despre Tarniţa-Lăpuşteşti: Două mari companii din lume şi-au manifestat interesul faţă de acest proiect. Retrieved November 24, 2023 from https://www.economica.net/burduja-despre-tarnita-lapustesti-doua-mari-companii-din-lume-si-au-manifestat-interesul-fata-de-acest-proiect_708253.html

Chart 20. Share of energy consumption by source, Romania



To convert from primary direct Energy consumption, a thermal efficiency factor has been applied to renewables and nuclear power (i.e. the 'substitution method'). This assumes that they are as inefficient as fossil fuels

Source: Data source: Energy Institute Statistical Review of World Energy (2023); OurWorldInData.org/energy | CC BY

In line with EU energy policy, Romania's renewable energy sector is experiencing significant growth, particularly in wind and solar power. The country has tapped into its substantial potential for renewable energy, attracting investments to develop these resources. This growth is driven by environmental concerns and the economic benefits of renewable energy. The development of wind and solar power is not only helping Romania reduce its greenhouse gas emissions but also positioning it as a potential leader in renewable energy within the region.

Romania's energy sector also stands out for its level of energy independence. Thanks to its diverse energy sources and ongoing efforts to increase production, particularly in natural gas and renewable energy, the country has the potential to become a net exporter of energy. This position of strength is crucial in the context of the broader European energy market and enhances Romania's role as a key player in the regional energy landscape.

However, the energy sector in Romania faces several challenges. These include the need to modernize its energy infrastructure, manage the transition from coal-based energy, and integrate renewable energy sources more effectively into the national grid. These challenges represent significant hurdles but also offer opportunities for growth and development. The modernization of infrastructure, for instance, could lead to increased efficiency and reduced environmental impact, while the shift away from coal opens the door to more sustainable energy practices.

In accordance with Romania's Integrated National Energy and Climate Plan[13] Romania is focusing on reducing carbon emissions and enhancing the share of renewable energy in its energy mix. The country has committed to achieving net zero emissions by 2050, with priority actions to reduce carbon emissions, build resilience, and support inclusive economic growth. [14] This includes plans to add around 7 GW of new renewable capacity by 2030, with a significant portion expected to be solar projects.[15]

Romania has codified plans to phase out coal by 2032, with the possibility of keeping some coal-fired plants in reserve until then. This is part of a broader strategy to transition away from coal towards cleaner energy sources, supported by European Union funds.[16] Romania views natural gas as a significant part of the transition, with major projects like Neptun Deep expected to cover 30 times the annual demand and supply 4.3 million households. This project represents the first deepwater offshore gas development in Romania, with investments up to EUR 4 billion. Additionally, Romania is exploring LNG projects, including a memorandum of understanding with Azerbaijan's Socar for an LNG project in the Black Sea, aiming to transform Romania into a major European LNG supplier and transport hub.[17]

The nuclear sector is a critical component of Romania's energy strategy, with plans for the construction and commissioning of new units at Cernavoda NPP and the exploration of Small Modular Reactor (SMR) technology to achieve decarbonization goals. How much of these plans will come to fruition has been a matter of great debate for some time now.

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13 European Commission. (2023). Integrated National Energy and Climate Plan of Romania. 2021-2023 Update. First Draft Version. Available at: https://commission.europa.eu/publications/romania-draft-updated-necp-2021-2030_en

14 World Bank Group. (2023). Romania Country Climate and Development Report. CCDR Series. Washington, DC: World Bank. Available at: http://hdl.handle.net/10986/40500

15 EY Romania. (2021). Renewables can accelerate the decarbonisation of the Romanian energy sector, but public initiatives must be synchronised with business intentions. Available at: www.ey.com/en_ro/news/2021/04/ey-romania-report--renewables-can-accelerate-the-decarbonisation

16 Buchsbaum, M. (2022). Romania's continuing power moves: coal exit codified as EU funds new energy projects. Available at: https://energytransition.org/2022/08/romanias-continuing-power-moves-coal-exit-codified-as-eu-funds-new-energy-projects/

17 International Trade Administration. (2024). Romania - Country Commercial Guide. Available at: Shttps://www.trade.gov/country-commercial-guides/romania-energy

At the beginning of 2023 there were 54 retailers in the Romanian electrical energy market.[18] The top five electricity distributors are Electrica Furnizare, Enel Energie and Enel Energie Muntenia, E.On Energie Romania, Hidroelectrica, and CEZ Vanzare.[19] Ownership of electrical energy companies in Romania varies from fully private to a mix of state and private ownership.

The Romanian Government, through the Ministry of Energy, holds a substantial stake in Electrica SA, the parent company of Electrica Furnizare, making it the most important shareholder with 49.785%. The rest of the shares are held by various institutional and retail investors, including international investment funds and private investors.[20]

18 ANRE. (2023). Lista furnizorilor de energie electrică activi pe piața cu amănuntul de energie electrică la data de 31 decembrie 2022 Available at: https://arhiva.anre.ro/ro/info-consumatori/operatori-economici/energie-electrica1391006213/furnizare-catre-consumatori1391006442

19 Statista. (2023). Leading companies in the energy industry in Romania 2022, by revenue and net profit. Available at: https://www.statista.com/statistics/1147370/romania-top-companies-in-the-energy-industry-by-turnover

20 Electrica (2023). Raport annual 2022. Available at: https://www.electrica.ro/wp-content/uploads/2023/05/ELSA_RO_RaportAnual2022_210x297mm_web_spread.pdf

Table 4. Voting shares = 339,553,004, representing total shares (346,443,597) minus own shares held by Electrica (6,890,593), which have their voting rights suspended

Shareholder	Number of Shares	Participation Held (% of Share Capital)	Percentage of Voting Shares (%)
Romania through the Ministry of Energy, Bucharest, Romania	169,046,299	48.7948%	49.7850%
European Bank for Reconstruction and Development	17,355,272	5.0096%	5.1112%
Electrica SA	6,890,593	1.9890%	–
BNY MELLON DRS, New York, USA	2,164,816	0.6249%	0.6375%
Other legal entities	131,170,892	131,170,892	38.6357%
Natural persons	19,815,725	5.7198%	5.8358%
TOTAL	346,443,597	100.0000%	100.0000%

Source: Central Depository, Electrica

As of October 25, 2023, the majority stake in Enel's companies in Romania has been acquired by the Public Power Corporation (PPC) Group, a leader in the energy sector in Southeast Europe, listed on the Athens Stock Exchange. This acquisition includes Enel's supply and distribution network, serving 3.1 million customers, and a renewable energy production division with a capacity of nearly 600 MW in Romania.[21]

Hidroelectrica's ownership structure underwent some changes in 2023 as the company was listed on the Bucharest Stock Exchange, attracting over 1BN EUR in private investment. The Romanian Government kept its 80% stake in the company, while Fondul Proprietatea, a joint-stock company established to compensate Romanians whose properties were confiscated by the former communist government, which held a minority stake, sold its shares.[22],[23]

Transelectrica is the national transmission system operator (TSO) responsible for electricity transmission, system and market operation, grid security and stability, and balancing the electricity market in Romania. It operates under the regulation of the Romanian Energy Regulatory Authority (ANRE) and is tasked with ensuring the efficient, secure, and reliable operation of the national power system. Transelectrica is also responsible for the maintenance and development of the high-voltage transmission network.

Several regional distribution system operators handle electricity distribution to consumers. These are typically subsidiaries of larger energy companies and include Electrica Group subsidiaries, E.ON Energie Romania, Enel Distributie Banat, Dobrogea, Muntenia, CEZ Distributie, and other smaller regional distributors.

To illustrate the level of preparedness of the national power grid for distributed energy generation we need to give a single example. After subsidizing the development of on-grid solar power, the Romanian Government seemed to be changing its mind.[24] Apparently, successful, highly productive prosumers are creating new challenges for the country's aging electrical grid. Therefore, their productivity should be limited, and if they are too productive, they should be fined.[25]

The Romanian Energy Regulatory Authority (ANRE) oversees the entire energy sector, with the stated goals of: ensuring the proper functioning of the electricity market, protecting consumers' interests, and promoting competition. ANRE is responsible for issuing licenses to energy companies, setting tariffs for transmission and distribution services, and monitoring market conduct.

The OPCOM (Romanian Electricity and Gas Market Operator) administers the wholesale electricity market, facilitating electricity trading between producers and suppliers or large consumers. It operates various market segments, including the day-ahead market (DAM), intraday market (IDM), and balancing market, with the stated objectives of ensuring transparency and competitiveness in electricity trading.

21 ENEL (2023). Companiile Enel în România au devenit parte a grupului PPC Available at: https://www.enel.ro/enel-energie/ro/cine-suntem/a201611-enel-in-romania.html

22 Hidroelectrica (2023). Structura actionariatului la data de 11 iulie 2023. Available at: https://www.hidroelectrica.ro/article/18

23 Pacuraru, G. (2024). Hidroelectrica este victima ticăloșilor naționali și nu a conspirațiilor americane! Contributors.ro. Available at: https://www.contributors.ro/hidroelectrica-este-victima-ticalosilor-nationali-si-nu-a-conspiratiilor-americane

24 Cernat, F. (2023). Fenomenul fotovoltaicelor a scăpat de sub control. ANRE propune limitarea capacității pe care o poate instala un prosumator. Hotnews. Retrieved November 6, 2023 from https://economie.hotnews.ro/stiri-energie-26550071-fenomenul-fotovoltaicelor-scapat-sub-control-anre-propune-limitarea-capacitatii-care-poate-instala-prosumator.htm

25 Wall Street. (2023). Burduja: Prosumatorii corecți pot suferi din cauza unor prosumatori incorecți, care ar trebui sancționați. Wall Street – Romania Verde. Retrieved November 12, 2023 from https://www.wall-street.ro/articol/Social/302992/burduja-prosumatorii-corecti-pot-suferi-din-cauza-unor-prosumatori-incorecti-care-ar-trebui-sanctionati.html#gref

Several of the important players on the Romanian electrical energy market have the Romanian Government as their largest shareholder. These include Transelectrica, Hidroelectirca and Nuclearelectrica.

In 2023 the Romanian Government extended the price cap on electricity and natural gas for specific consumer categories, including vulnerable household consumers, SMEs, food industry companies, and public institutions. The European Commission recommended the elimination of price caping and a narrow focus on vulnerable consumers. This possibility, discussed in June 2023[26] was explicitly ruled out by the government in September.

The government has essentially agreed to compensate energy suppliers for the losses they incur due to the price cap and has then decided to tax those same suppliers in order to get back the money they are paying in compensation. At best, this means that government agencies are wasting money calculating the correct amount of compensation and taxes before arriving at a situation that is very similar to what would have happened in the market without the government intervening in the first place.

Romania has begun to develop energy clusters and energy communities, reflecting the broader European trend towards more localized, sustainable, and community-based energy production and consumption models.

While there is no definitive list of Romanian energy clusters, examples of energy clusters include the Romanian Energy Center (CRE), the Romanian Sustainable Energy Cluster (ROSENC), the Green Energy Cluster, the MEDGreen Cluster, and the Transylvania Energy Cluster (TREC).

The concept of energy communities, especially renewable energy communities, is relatively new in Romania. Although it is gaining traction in public discourse, as part of the broader European Union efforts to promote sustainable energy production and consumption at the local level, there are no notable examples of energy communities we can mention.

Investments in renewable energy have intensified in recent years, but there is still a long way to go to meet the commitment from the National Integrated Plan in the Field of Energy and Climate Change 2021-2030 (PNIESC).[27]

According to the latest ANRE data, Romania has a production capacity of 3 GW of wind energy and 1.5 GW of solar energy. According to the current version of PNIESC, adopted in October 2021, Romania aims for the share of energy from renewable sources to reach 30.7% in the final gross energy consumption by 2030 through the commissioning of new wind, photovoltaic, and hydroelectric power plants and by increasing the number of prosumers.

The version of the Long-Term Strategy for Reducing Greenhouse Gas Emissions (LTS) notified by Romania to the European Commission in April 2023 increases the share of energy from renewable sources in the final gross energy consumption by 2030 to 36.3%.

Overall, though PNIESC 2021-2030, Romania has proposed installing 6.9 GW of additional production capacities from renewable sources during the period 2021-2030.

The financing of investments in renewable energy sources (RES) primarily comes from the private sector, with substantial contributions through

[26] Ghițulescu, R. (2023). Anunț important pentru toți românii! Cum se va renunța la plafonarea prețurilor la energie. Infofinanciar.ro. Retrieved November 12, 2023, from https://www.infofinanciar.ro/anunt-important-pentru-toti-romanii-cum-se-va-renunta-la-plafonarea-preturilor-la-energie.html

[27] Mitrita, A; Petre, S. (2023). Analiză PwC: Producția de energie verde trebuie să crească de opt ori, iar investițiile anuale în distribuție să se tripleze pentru a atinge, la nivel global, neutralitatea climatică până în 2050. Available at: https://blog.pwc.ro/2023/08/16/analiza-pwc-productia-de-energie-verde-trebuie-sa-creasca-de-opt-ori-iar-investitiile-anuale-in-distributie-sa-se-tripleze-pentru-a-atinge-la-nivel-global-neutralitatea-climatica-pana-in-2050/

government support mechanisms and EU funds aimed at fostering the development of renewable energies. Funding mechanisms employed include EU Cohesion Funds, the National Recovery and Resilience Plan (PNRR), as well as direct government support.

Among the dominant challenges for public policies in Romania aimed at making the sector more competitive we can indicate:

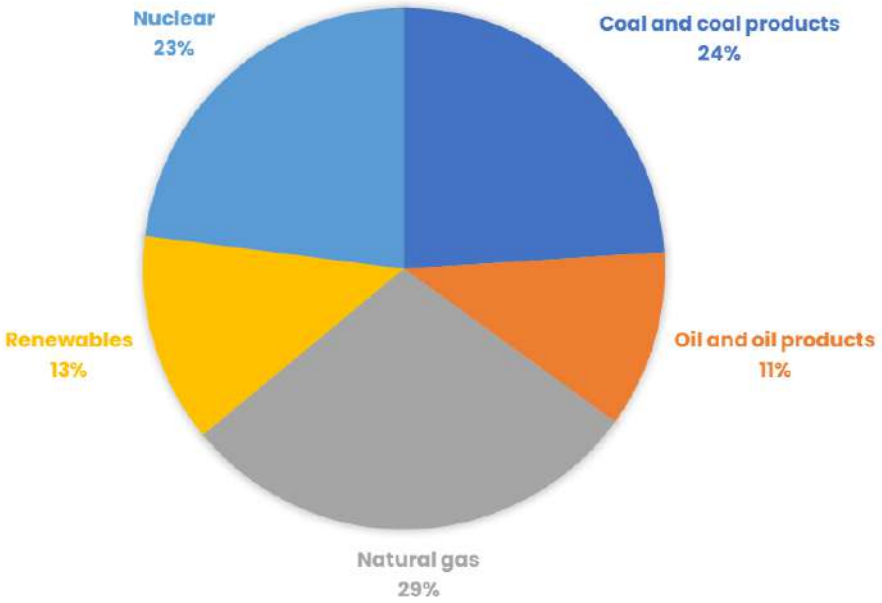
- Developing policies that simultaneously achieve energy security, promote the use of sustainable and renewable energy sources, and keep energy affordable for consumers and businesses.
- Efficiently integrating a growing share of variable renewable energy sources (e.g., wind and solar) into the national grid without compromising grid stability.
- Mobilizing sufficient investments in energy infrastructure, renewable energy projects, and innovative energy technologies.
- Encouraging the development and adoption of new energy technologies, including energy storage, advanced nuclear technologies, and carbon capture and storage (CCS).
- Increasing energy efficiency across all sectors (industrial, residential, transport) to reduce energy consumption and emissions.
- Managing the transition away from fossil fuels in a way that is socially fair and does not leave communities behind.
- Aligning energy policies with climate goals, including significant reductions in greenhouse gas emissions in line with the Paris Agreement and EU targets.

Slovakia

The current energy mix and projections therein

The energy mix in Slovakia is defined by heat production, electricity production, and industrial consumption. The single most important source of energy is natural gas, which is used for both electricity and heat production. Renewable sources are mainly used for electricity production, partly also for heat production. The high share of nuclear in electricity generation means that it accounts for almost a quarter of the total mix. Consumption of petroleum products is mainly linked to transport and industrial production.

Chart 21. Energy mix of Slovakia 2021



Source: European commission, https://energy.ec.europa.eu/system/files/2022-10/SK_2022_Energy_Snapshot.pdf

The Slovak Republic is extremely dependent (90%) on imports of primary energy sources. All nuclear fuel is imported (so far from Russia), 100% of oil has been imported, and there is very limited natural gas production in Slovakia, but over 98% is imported as well. So far there is a lignite coal production, but this will be terminated in 2023-2024. Hard coal has to be fully imported as well. The main resources are, therefore, water (river dams) and wood (biomass).

The electricity generation mix is highly dependent on nuclear energy. Slovakia had the second-highest share of nuclear power generation in the EU after France. Fossil fuel generation combines coal-burning and natural gas-burning power plants. Combined renewables and hydropower generation accounts for almost quarter of generated electricity. Solar and Wind play relatively insignificant role, accounting for less than 8%. Carbon Intensity of electricity mix is well below EU average at 124 gCO_2eq/kWh.[28] Share of renewables on energy consumption in EU metrics was 17,4%.

[28] Source: app.electricitymap.com

Table 5. Electricity generation mix

Electricity generation in GWh	2021	2022	Index (%) 2022/2021	Share on production 2021 (%)	Share on production 2022 (%)
Nuclear energy	15 730	15 920	101,2	52,3	59,1
Fossil fuels	7 274	4 769	65,6	24,2	17,7
Hydropower	4 604	3 992	86,7	15,3	14,8
Renewables	2 380	2 125	89,3	7,9	7,9
Other	105	110	104,9	0,3	0,4
Generation	**30 093**	**26 916**	**89,4**		
Saldo (Import +)	774	1412	182,5		
Consumption	**30 867**	**28 328**	**91,8**		

Source: SEPS, gross energy production; There are several methodes how the government reports the share of renewable resources. Sometimes it also includes combined cogeneration of heat and power. In this terms, the ratio was 23% on total production and 22% on total consumption. Source: https://www.urso.gov.sk/podiel-vyroby-elektrickej-energie-z-obnovitelnych-zdrojov-energie

In 2022, we saw a significant drop in electricity production, caused mainly by a drop in generation from fossil fuels. The largest natural gas power plant had technical issues, eliminating its production throughout the year. Lower river levels decreased hydropower generation.

Almost 10% drop in consumption of electricity related to sharp increase of prices on power markets which led to closure of large aluminum smelter and decreased production in metallurgy industry.

Despite lower consumption, Slovakia had to import increased amount of electricity, covering 5% of consumption.

Future energy mix

Three major changes will take place in electricity generation in the coming years. Firstly, the third unit of the 470 MWe Mochovce Nuclear Power Plant was connected to the grid in 2023. This will increase the output from nuclear by around 25%. An identical fourth unit is under construction and should be connected three years later. At the same time, the last lignite-fired plant in Nováky was shut down at the end of 2023 and the last black coal power plant in Vojany was closed in March 2024. After these changes, the share of nuclear will increase to 70% (ceteris paribus). Higher nuclear production will change the trade position of the country. Already in 2023, Slovakia turned into a net exporter from a net importer.

The dominance of nuclear-produced electricity poses certain limits to the future development of the electricity mix. First of all, nuclear energy provides a baseload, which is very difficult to use as compensation for fluctuations in consumer demand. Ensuring grid stability and sufficient volume of energy at peak times will require the existence of resources capable of supplying electricity on demand, regardless of the weather. Hydropower and gas fired power plants serve well to this purpose, but the total hydro-energetic potential is almost fully utilized. This composition creates a natural limit for any large development of renewables, which is opposite to flexible on-demand production. Unless the price of electricity storage becomes truly competitive in matters of size, wind and solar will not play a major role. This is recognized by the Slovak Government, which proposed a mild increase of 6% in the target share of renewables of 23% on energy consumption in 2030 in its Integrated National Energy and Climate plan (2023 version).

As a matter of fact, any projection of the future energy mix is dependent not only on projected new sources but also on projected demand. In general, predictions (over 10 years) success rate is rather low. In 2008 document Strategy of energy security of Slovakia,[29] **the reference scenario for year 2020 expected gross consumption was 37 TWh, almost a quarter higher than actual consumption.** The ability to predict energy efficiency and growth of industrial production is just terribly low, especially in the EU, where emission goals may change several times in one year.

Slovakia, as a relatively small economy, is quite difficult to predict, as individual firms can significantly influence the total outcome. The Slovalco aluminum smelter consumed a full one-tenth of the electricity in Slovakia in 2020. The fertilizer producer Duslo consumed 10% of natural gas. The iron producer US Steel emitted 20% of the emissions of the whole industry. Potential producers of batteries for electric cars will increase electricity consumption by 5-10%. It is, therefore, obvious that the future has to be foreseen in alternative scenarios. Therefore, we attach the Slovak transmission system operator's assumption of what the source structure of electricity generation should look like in 2032. In the scenarios, the latter considers both different generation contributions and different consumption scenarios (Table 10):

[29] https://rokovania.gov.sk/RVL/Material/4819/1

Table 6. Electricity mix scenarios by Slovak TSO SEPSin 2032

Electricity generation in GWh	2021	Baseline scenario	New large customers scenario	Without 4th block o NPP	Expected scenario without Slovalco	Lack of Natural gas scenario	Scenario by ENTSO-E
Total gross generation (TWh)	**30,6**	**42**	**42,3**	**38,5**	**41,8**	**42**	**35,1**
of which Nuclear	17,2	24	24,2	20,3	24	24	22,9
od which fossil	5,8	4,8	5	5,2	4,7	4,7	1,8
of which RES+Hydro	7,7	12,9	12,9	12,9	12,9	13	10,2
Total gross consumption (TWh)	**30,9**	**38**	**44,8**	**44,5**	**35,6**	**38,1**	**36,2**
Share of carbonfree production	80,5%	97,0%	82,6%	74,5%	103,6%	97,1%	91,2%
of which RES+Hydro	24,8%	33,9%	28,7%	28,9%	36,2%	34,0%	28,0%
of which Nulear	55,6%	63,2%	53,9%	45,6%	67,4%	63,1%	63,1%
Fossil powerplants	18,7%	12,7%	11,2%	11,6%	13,2%	12,4%	5,1%
Total	99,1%	109,7%	93,8%	86,1%	116,8%	109,5%	96,3%

Source: SEPS, https://www.sepsas.sk/verejna-konzultacia/verejna-konzultacia-k-dokumentu-desatrocny--plan-rozvoja-prenosovej-sustavy-na-roky-2024-az-2033/

The variance in consumption is over 15%, and the variance in generation is 20%. Insecurity about future consumption complicates investments in the grid.

Another factor that can influence consumption is the potential existence of large battery factories, which can be located in Slovakia, as currently, four large automakers (another one, Volvo, is coming) make Slovakia the biggest per capita producer of cars in the world. The adoption of EV mobility, resp. production of EV batteries is closely related to the development of renewable resources. It seems that for some battery producers, it is crucial that nuclear energy electricity does not meet the condition of renewability. This could have an impact on future government thinking about the share of renewables. There is the largest variability in predictions or potential of renewables in Slovakia:

Table 7. Different projections of RES in Slovakia in 2030

	Actual	Ministry of environment SR	Ember Ambitious Scenario
In MWe	**2021**	**2030**	**2030**
FVE	680	1200	1700
Wind	3	215	2300
Biomass	1900	200	
Small Hydro	96	1755	
Geoterm	0	4	
Biogas	130	200	

Source: ME SR; https://www.minzp.sk/files/iep/iep_analyza_fit_for_55_.pdf; https://ember-climate.org/app/uploads/2023/05/In-it-together_-the-road-to-a-cleaner-cheaper-CEE-power-system-1.pdf; EMBER

The largest relative increase is expected in wind power. No new turbine has been erected in Slovakia in the last 19 years, so the potential is huge, especially thanks to a large area of agricultural land. However, we can see that the difference between the Minister's and Ember's estimates is significantly different. The increase in solar installations is roughly 100%. The authors of the small hydro-power projection point out that the stated hydro-potential is not feasible due to nature protection requirements. From the relative size of renewable sources (if we do not take hydro into account) compared to nuclear and fossil sources, it is clear that there will be no energy revolution in Slovakia by 2030.

Heat generation scenarios

Production and consumption of heat will play a crucial role in decreasing emissions in the next 10 years. 73% of all energy consumption of households is represented by heat. Insulation of buildings was a prevalent approach in the last decade, and the electric heat pumps sector is steadily growing in production (mostly exported) and rather slowly in adoption. The government foresees a decline in the use of coal in the heating sector, which will be replaced primarily by the combustion of natural gas, biogas, biomass, or waste. Natural gas covers almost half of the heat production. Geothermal energy is an often-mentioned untapped potential, but its large-scale use is still only on the planning tables. The following table describes the expected energy mix in the production of heat in 2025:

Table 8. Primary fuels in heating

Primary fuels and sources in central heating systems (all in GWh)	2010	2021	2025
Natural gas	12 551	9 497	10 479
Coal	5 519	3 095	2 973
Wood and related	1 293	3 446	3 515
Nuclear	1 526	1 111	1 133
Other*	3 112	3 589	3 567
Total	**24 002**	**21 162**	**21 666**

*oil and oil products, waste incarnation, metallurgical gases, heat from chemical production

Source: INECP 2023

Energy transition, goals/numbers, directions of main investments, financing

The energy transition is primarily defined by the Fitfor55 targets for 2030. The Slovak Republic has signed up to the shared targets and defined its targets in the Integrated National Energy and Climate Plan document,[30] which are shown in the last column of the table below.

[30] Last version adopted by government from August 2023.

Table 9. Summary of goals in energy transition

	2019	2021	2030
Renewable energy – heat and cold (%)	19,7	19,5	28,3%
Renewable energy – electricity generation (%)	22,1	22,4	30%
Renewable energy – transport (%)	8,3	8,8	14,7%
Total share of renewable energy sources (%)	16,9	17,4	23%

Source: INECP

A comparison of 2021 statistics with 2030 indicates that achievement of any of these targets will be highly challenging.

Increasing the share of renewable energy in heat and cold production will be complicated mainly due to the high share of natural gas in heating, which provides more than 50 percent of the heat.[31] The current less than twenty percent share of renewable energy is mainly the result of burning wood and biomass. This share is unlikely to increase much, so there will be a need for the use of solar energy for water heating or heat production, doubling the penetration of heat pumps and multiplication the pace of insulation of both private and public buildings. Using more geothermal energy for central heating is still only under development, and it's difficult to rely on. Biogas (biomethane) production is another option; there is already 1 production facility connected to the natural gas distribution grid, and another 33 are being planned.

Of course, all these measures will be quite expensive, especially the installation of heat pumps. An alternative in terms of financial costs appears to be a combination of building insulation and the use of condensing gas boilers, which results in significant and immediate savings in natural gas consumption. Nevertheless, such a step, resulting in a 15-20 investment period, would represent a limit for further savings after 2030.

Increasing the share of renewable sources in electricity production in Slovakia will be complicated by the fact that, at the same time, the volume of electricity production from nuclear power plants will grow, which, in fact, means that the production from renewable sources will have to grow faster. As we have mentioned above the high share of nuclear electricity complicates the use of unstable intermittent renewable sources. The country's water potential is already relatively depleted; therefore, the main sources of growth will be wind and solar energy. Each of these sources should add 1,5 TWh of electricity to the grid. Another 2 TWh will be required from biogas/biomethane and solid biomass to meet the stated goal.

The most difficult target to achieve will be the transportation target. The current value of around nine percent is relatively stable. It results from a combination of the addition of bio-based components to fuels and the existing electrification of rail transport and part of public urban transport. It is expected to increase the share of fuel biocomponents by about 60% (45% for bio-diesel). Currently, an equivalent of 12,3 ktoe of renewable sources of electricity is used in transportation. This amount should almost double to 22 ktoe. Although this will be partially achieved thanks to the new RES installations, huge investment will be required in the electrification of road transport. Due to the current absence of relatively cheap Battery electric cars (BEV), it would be too expensive to subsidize this transition. The second-hand market with BEVs in the EU is not sufficiently developed to provide a useful alternative. Roughly the same value of 10 ktoe should be provided by biomethane.

We can evaluate the financing of the energy transition from several perspectives: first, who will be the final beneficiary of the existing resources; second, who will finance the transformation. From the first perspective, we are talking about industry, public administration, and households. From the second perspective, we are talking about public and private resources. From the perspective of the government, it is easiest to finance the transformation in industry because it allows a relatively high level of electrification to be achieved in a small number of projects; for example, steel production at US steel has already received the support of 600 million euros for the electrification of two blast furnaces. The owners of the factory estimate that the minimum investment required is 1,3 billion euro. Another tens of millions of euros have been provided to paper, cement or glass production factories. Although the government institutions made projections

[31] Slovakia has the second most dense network of natural gas in Europe.

of future costs of the energy transition, these are dated to 2018 and do not reflect additional costs related to increased greening targets of the Fitfor55 package.

The transition in heat production is taking place at all three levels; subsidies are provided for industrial heat production, for heat production in central heat supply and mainly for projects for the insulation of family houses or the replacement of boilers. There are several sources of financing. Except of EU funds and Next Generation Funds, there are cumulated resources from sale of emission allowances (ETS), modernization fund, or Just Transition Fund. Projecting the volume of resources needed in transition in heat production segment is rather difficult, firstly because we do not know the resulting technologies used and secondly because we do not know when in time the investments will take place.

Hydrogen

Hydrogen is important component in industrial production and it also can be used as a tool for energy transition. Government adopted its National hydrogen strategy in 2021 and Action plan (60 mln euro) in 2023. Expected consumption of 200 kt of H_2 in 2030 should be secured by green H_2 (currently gray). Slovakian own production should not be sufficient; imports will be needed. Nevertheless, it is mostly SPP Distribution A.S., the company distributing natural gas, who works on this strategies. The following map 1 indicates, what are the potential investments into gas distribution networks for larger use of H2, should it be mixed with natural gas and so decrease the total CO_2 emissions, especially in heating sector and transport. A pilot project has been already performed in small villages where NG is used for heating. The public transport company of Bratislava is already using 4 buses powered by H_2,[32] and hydrogen is expected to play a role in meeting the emission goals in transport sector. The largest project for green H_2 generation is planned by company Duslo Šaľa, which plan to produce annually 2 162 tons of H_2.[33] The project worth of 120 mln euro will consist of combination of own 50 MWe wind and solar power plants; construction of these facilities will be supported by 58 mln euro from Modernization fund. This investment should substitute around 2% of consumed natural gas in largest fertilizer company in Slovakia. The company Nafta A.S., operating huge natural gas underground storages already tests potential of storing H_2 underground.

[32] https://www.mojelektromobil.sk/prve-slovenske-mesto-nakupi-vodikove-autobusy-chce-inspirovat-aj-dalsie-mesta/
[33] https://www.energie-portal.sk/Dokument/duslo-plyn-vodik-110406.aspx

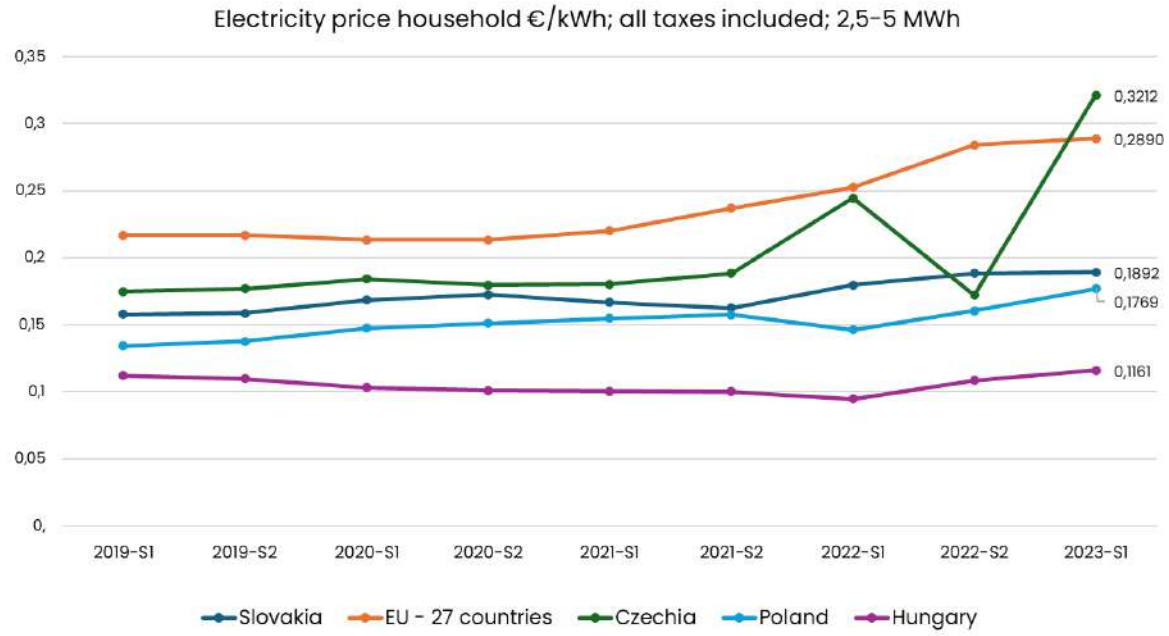
Map 22. Energy mix of Slovakia 2021

Source: SPP Distribúcia A.S., IINECP

Energy prices

Slovakia is a part of the European electricity market. Market prices that arise on the stock exchange are understandably fully applicable to the Slovak market. Nevertheless price regulation for households has a long tradition in Slovakia. It is therefore not surprising that the price of electricity for households rose due to energy crisis minimally. The government achieved this by concluding a memorandum with the dominant producer Slovenské elektrárne A.S., stating the fixed price for power delivery for two years at 61 euro/MWh. Final price of electricity, including all taxes and levies was 35% lower than EU average in the first half of 2023. In comparison, the prices was almost twice as high in neighboring Czech republic, were the price was regulated at maximum level of power delivery 199€/MWh.

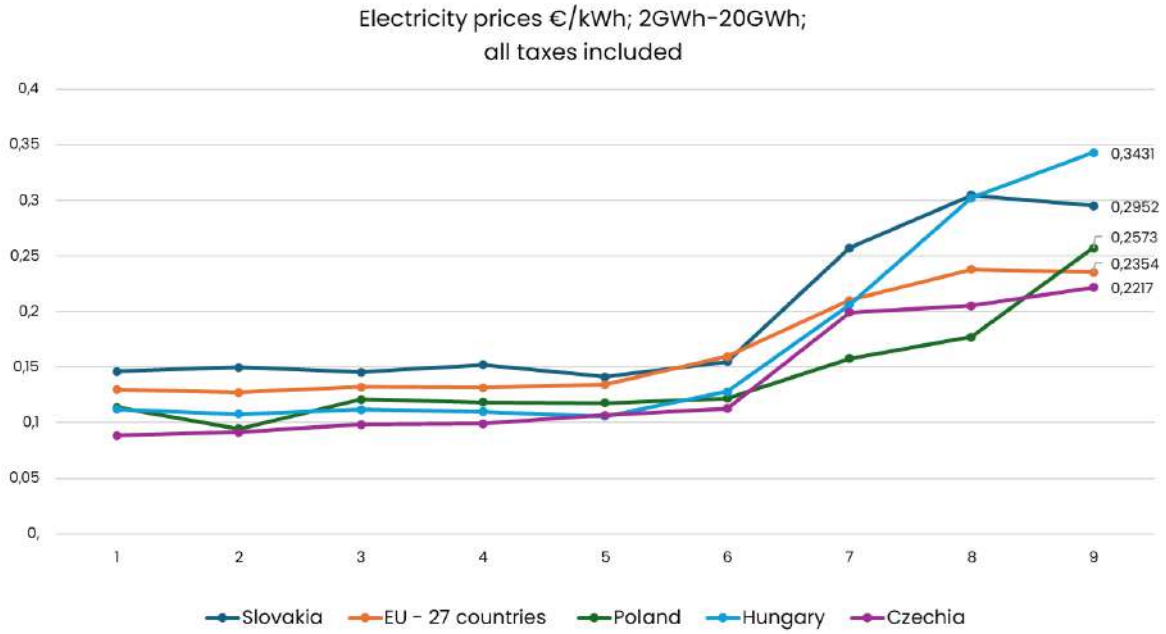
Graph 23. Electricity household prices



Source: Eurostat

On the other hand the business sector had to bear the full price increase up to the ceiling set by the European Union of 199 euros per megawatt-hour. From comparing both charts, there is a clear pattern indicating, that strong price regulation in households led to higher prices than EU average in business sector. Governments in V4 countries are passing the burden of high prices on productive companies, and so, via their products price level spike, increasing the inflation rate in the country.

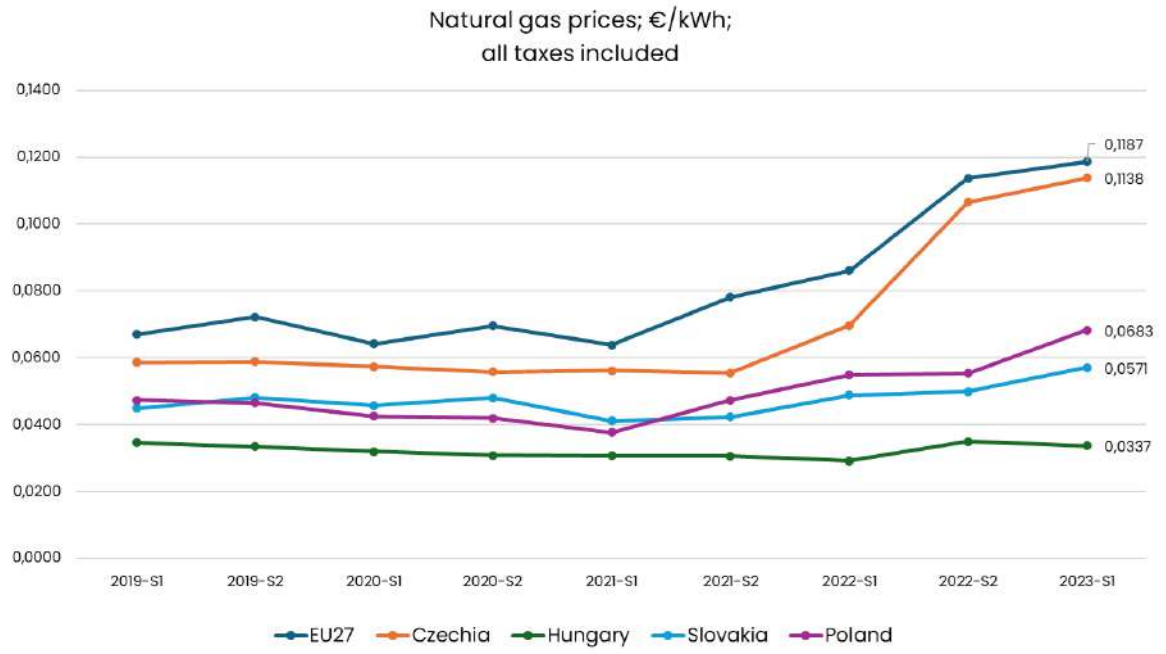
Graph 24. Electricity non – household prices



Source: Eurostat

We can observe the same pattern in natural gas prices. Slovak politicians decided to fix the price of electricity for households at pre crises levels. Although, despite of the price CAP, it has effectively risen slightly for end-consumers, it did not reflect the real market price of natural gas, and was at half compared to EU average, or price in Czechia.

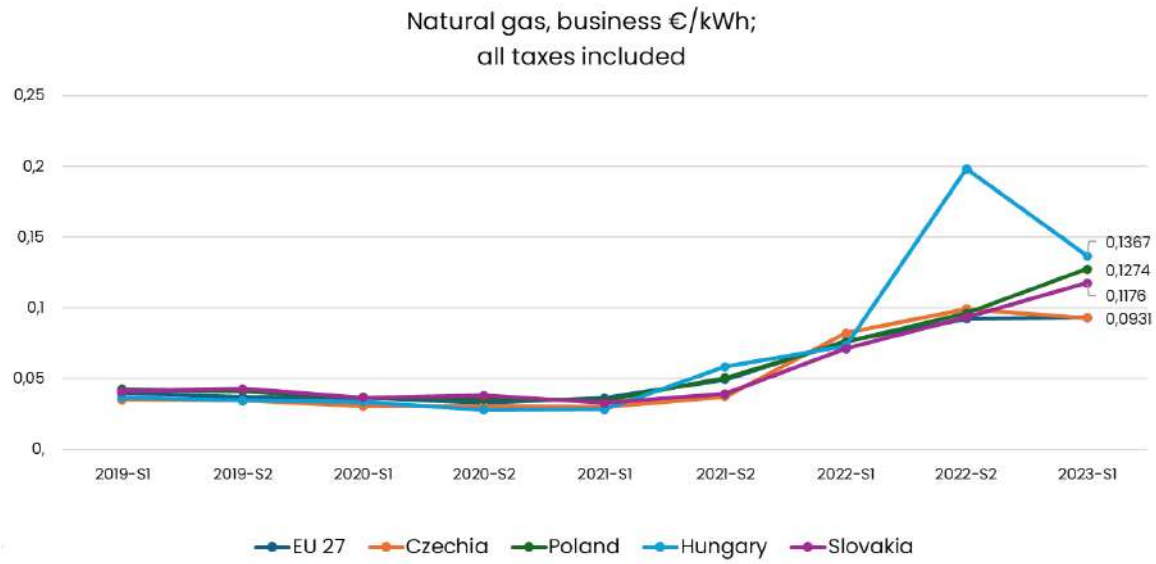
Graph 25. Household prices Natural gas



Source: Eurostat

Again we can observe the fact that the price of gas in countries where households pay very low prices is significantly higher for industrial users.

Graph 26. Natural gas non – household prices



Source: Eurostat

Due to the fact, that natural gas is used for over 50% in central heating systems, the household price of heat was regulated in similar way.

Market environment

Electricity

Electricity generation has been largely transferred to the private sector through privatization. The largest producer, Slovenské elektrárne, produces two-thirds of the electricity generated in Slovakia The government retains a one-third stake in the company and partial influence on the company's decision-making. The remaining part of electricity generation is divided between state-owned and managed hydroelectric power plants, state-owned thermal power plants that produce both heat and electricity in cogeneration units and the private sector, which owns mainly steam-gas power plants or smaller biomass power plants. Part of the production also takes place in large privately owned industrial firms. The production of electricity from large solar installations is in private hands The total installed capacity of solar currently amounts to over 680 MWe. Wind generation is rather insignificant with installed 3MWe.

Natural gas

98% of natural gas is imported. Former Czechoslovakia as a part of Soviet bloc was supplied by natural gas via the pipeline Druzba. Before the Russian aggression against Ukraine Slovakia has been crucial transit country, more than 10 times than Slovak consumption (5 bcm) has been transported to rest of Europe. Currently, about two thirds of the gas is still Russian. The rest is purchased either on European markets (mostly Norwegian), or supplied in LNG form and transported to Slovakia from Croatian port. State owned company Slovenský plynárenský priemysel (SPP) is the biggest supplier of natural gas in Slovakia, controlling more than two thirds of the market. The majority owner (69%) of transit line is the private company (EPH), which also has 49% stake and managerial control of SPP distribution, the company responsible for regional distribution of natural gas.

Oil

There is no national production of oil. Before the Russian aggression against Ukraine, all of oil supplies were delivered via the pipeline Bratstvo. The only refinery Slovnaft was tuned to specific composition of Ural oil, which enables higher

production of diesel fuel. The refinery is control by Hungarian company MOL.

National electricity grid

The state-owned company Slovenská elektrizačná prenosová sústava, A. S. (SEPS) has been established in 2002 as a part of unbundling process in Slovak electricity market. Before unbundling, transmission network was part of Slovenské elektrárne A. S., which is today only an electricity producer. SEPS is responsible for the transmission of electricity at high voltage, ensures the import and export of electricity, stability and maintains the frequency in the network. It also operates company OKTE, which operates the short-term electricity market in Slovakia.

Table 10. Length of high voltage overhead transmission lines

Voltage kV	Km
400	2357
220	689
110	80
Sum	3125

Source: SEPS

The Slovak Republic is currently meeting the target of a 10% level of interconnection of the transmission systems of the Member States of the European Union planned to be met by 2020 according to the regulations adopted by the Council of the EU in 2002 and also the target of a 15% level of interconnection by 2030 set by the Council of the EU in 2014 as a ratio of net import transmission capacity to the total installed capacity of the Member State's electricity generation facilities. In 2022, Slovakia had to import 1,4 TWh of power, but the total amount of imported electricity was 17 TWh, and more than 15 TWh has been exported. That represents more than half of annual consumption. Slovak transmission grid so plays an important role in the transit of electricity-abundant Czechia (sometimes Germany) to electricity-deficient Balkan countries.

The level of interconnection is increasing with the construction of new cross-border interconnections, while it is decreasing with the construction of new generation capacities. The Slovak Republic's current interconnection is not expected to fall below 15% even in the case of extreme new RESdevelopment. The Slovak national grid is connected to all neighboring countries except for Austria. There is no investment plan for this connection.

Regional distribution

There are three regional distribution systems in Slovakia. All of them are operated by companies in which the state has a majority stake (51%), but management control is held by foreign owners. Due to an agreement between the German companies RWE and Eon, the East Slovakian distribution company has transferred to the West Slovakian Distribution company, which is controlled by Eon. The third, Central Slovakian distribution company is controlled by the Czech firm EPH.

One of the hot topics in the deployment of renewables is the process of connecting them to regional distribution grids. This situation is, to some extent, a legacy of bad decisions from the past. During the first major wave of large-scale solar generation and connection, a relatively high 534 MWe of new capacity was installed. This was due to the financially attractive public subsidy program for each kWh produced. The sharp increase in the supply of intermittent resources and the high cost of subsidies led to the introduction of a cap on the connection of new resources since 2013. Regional distribution system operators decided via their document Technical and operational rules not to connect

any RES with more than 10 kW generation capacity[34]. This decision, probably illegal, was "silently" tolerated by the regulator due to the fact, that government was not properly compensating RDSO for the costs of subsidizing RES generation. This limit was only relaxed in 2020 when the transmission grid manager allowed an additional 407 MWe of large renewable resources to be connected (connecting household installations up to 11 kWe is not limited). The released capacity was used up relatively quickly and construction of these plants is currently underway. Next year, capacity for another 170 MWe will be released. However, even this may not be enough; moreover, the whole process "suffers" from predatory strategies, where spare capacity is booked by investors who end up building nothing.

This issue relates only to solar farms, but companies that desire to cover their own electricity consumption from their own FVE generation are considered "local sources." The installed capacity of the local source shall not be greater than the maximum reserved capacity of the off-take point. This means that the installation must not produce more power than the off-take point is capable of consuming. In case local generation is higher, the owner was originally allowed to sell a maximum of 10% of his generation, but this exemption was canceled together with canceling the size limit of 500 KW for local sources. Therefore, with any sale of electricity to the grid, any owner of the local source needs to register as an official energy entrepreneur. Becoming an energy entrepreneur results in the loss of various administrative advantages. Local resource operators do not receive state subsidies for produced kWh, but they do not have to pay the special fee (fee for operating the grid) if they produce less than 1000 MWh annually. Local sources also have the right to free and preferential connection to the distribution system before other electricity generation facilities.

Electricity market

In the process of privatization and decoupling, control over most productive resources was transferred into private hands. This reduced the degree of state interference and allowed new resources to emerge. Even the construction of the third and fourth units of the Mochovce nuclear power plant is primarily financed by the owner from its own resources. The state supports this construction only indirectly through an agreement not to pay dividends from the company's profits.

Dozens of companies operate in the supplier market, and despite the collapse of some of them during the electricity price spike in 2022, supplies are still dominated by private companies.

However, the state intervenes quite significantly in pricing policy in two ways. It regulates the price to households (either by regulating profits) or by directly regulating the resulting price, as is currently the case. This creates pressure on prices for the business sector, which thus "has to pay" the lost profit of suppliers. Due to this regulation, Slovak households still cannot take advantage of dynamic factors that would allow efficient timing of their consumption. The second way in which the state influences electricity prices is through the determination of taxes and fees related to electricity consumption. Subsidies for the production of electricity from renewable sources are also reflected in the price of electricity.

Achieving environmental goals has thus not become an expenditure item of the state budget, for which the state obtains financing from auctions of carbon permits, but a tax that all consumers must pay. The biggest challenge for the future development of the electricity market will be to ensure the predictability and stability of these fees. This is directly related to the problem of maintaining grid stability (purchasing support services for grid stability) with the increasing volume of installation of new renewable sources. Slovakia continues to lag significantly behind in the strategy of streng-

[34] https://www.polacekpartners.sk/clanok/otazka-instalacie-lokalneho-zdroja-v-miestnej-distribucnej-sustave

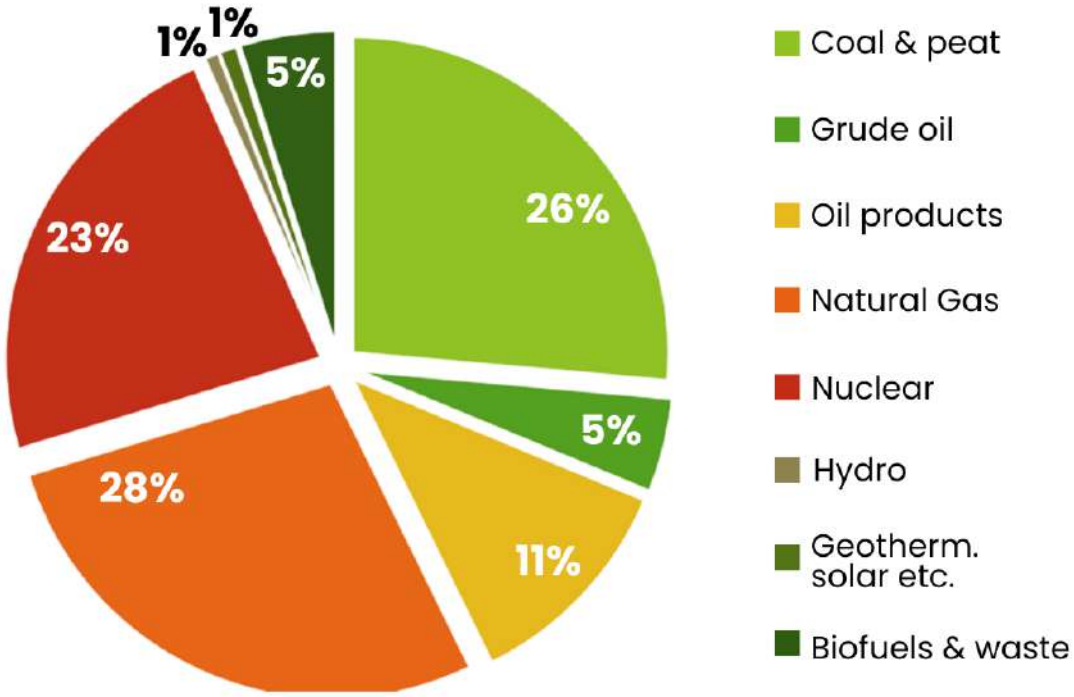
thening the position of the so-called prosumers. Today, only a minimum number of households can enjoy intelligent smart meters, which would enable the implementation of such tools as, for example, providing the storage capacity of electric car batteries (vehicle to grid). These challenges will need to be addressed as soon as possible, as the targets set for 2030 are only a weak decoction of what will need to be achieved in the period 2030-2050.

Ukraine

The full-scale armed aggression of the Russian Federation against Ukraine in 2022 caused a change in the structure of the energy mix. The official institution responsible for publishing data on the energy balance of Ukraine is the State Statistics Service. The latest official published data is for 2020[35] (as martial law allows companies not to send their reports to the State Statistics Service):

[35] https://www.ukrstat.gov.ua/

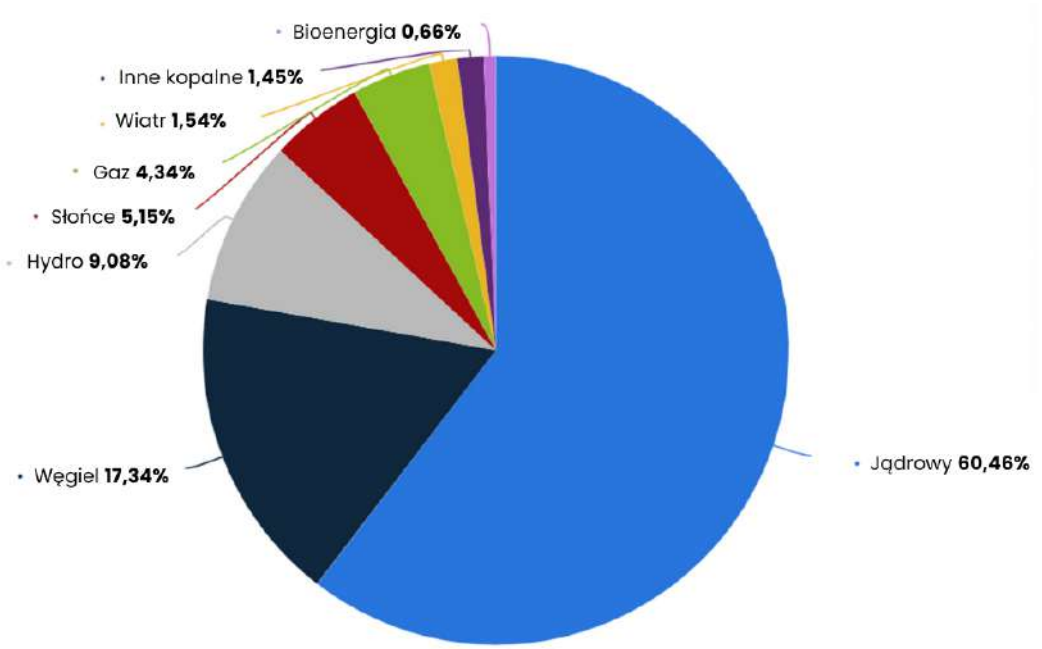
Graph 27. Natural gas non – household prices



Source: authors based on data from the State Statistics Service; https://www.ukrstat.gov.ua

The structure of electricity production has undergone significant changes. The share of nuclear energy generation in the energy balance increased, as did the share of the combined heat and power plants in energy generation. On the other hand, the share of renewable sources fell.

Graph 28. Distribution of electricity generation in Ukraine in 2022



Source: https://www.statista.com/statistics/1237676/ukraine-distribution-of-electricity-production-by-source/

Due to the reduction of industrial consumption of electricity in the country by more than two times with the beginning of a full-scale invasion, occupation of the ZNPP, systematic damage to energy infrastructure, Energoatom reduced the volume of electricity production and sales by a quarter.[36]

As of 2020, the share of RES in the official energy balance was 7% (this includes wind, solar generation, biofuels, hydroelectric power plants). According to some forecast data, in 2021 there was a positive trend of an increase in RES generation by +8%, and an increase in HPP generation by +23% from the volumes of 2020, but there are no official figures.[37]

On April 21, 2023, the Cabinet of Ministers of Ukraine approved the Energy Strategy until 2050. Due to Martial Law "Energy Strategy until 2050" is currently marked "For official use only" and is sent to ministries and state-owned companies only in paper form for perusal.

As a contracting party of the Energy Community, Ukraine developed a National Energy and Climate Plan (NECP), which should specify the target indicators of the energy transition until 2030 and contain a forecast for 2050. The NECP Draft[38] was published by the Ministry of Economy of Ukraine in February 2024 and entered the public consultation phase. After the Energy Community Secretariat assesses the draft NECP and provides its recommendations, the plan is expected to be adopted by June 2024.

The development and approval of NECP are conditions for the distribution of financial assistance from the EU under the future Ukraine Facility.[39]

36 https://www.ukrinform.ua/rubric-economy/3746389-energoatom-na-cvert-skorotiv-obsagi-virobnictva-ta-realizacii-elektroenergii.html
37 https://zakon.rada.gov.ua/laws/show/373-2023-%D1%80#Text
38 https://me.gov.ua/Documents/Detail?lang=en-GB&id=d3c7185c-8669-4ce9-8da0-29a47b4b95a2&title=NationalEnergyAndClimatePlanOfUkraine2025-2030
39 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2018.328.01.0001.01.ENG

Electricity prices for households

Ukraine used to regulate electricity prices for households to keep electricity affordable by imposing special obligations. On May 30, 2023, the Ukrainian Government approved amendments to the Procedure on the imposition of special obligations (PSO Act) on electricity market participants. As a result, **regulated electricity prices for households in Ukraine were increased to 2,64 UAH/kWh** (app. 0,066 EUR/kWh) (including network charges, fees, levies, and VAT). It is important to note that even with this adjustment, the fixed end-user price, which encompasses network costs and levies, remains below the average day-ahead electricity market price of 68 to 81 EUR/MWh in 2023 in Ukraine. The Ukrainian Government's decision to bring household prices closer to market levels is expected to rectify distorted market signals and reduce subsidies, primarily at the expense of generating plants responsible for maintaining the security of supply in Ukraine.[40]

[40] https://www.energy-community.org/news/Energy-Community-News/2023/06/01c.html

Table 11. Base market price (based on the data of Ukrainian Energy Exchange, UAH/MWh)

	2021	2022	2023
January	1 183,80	2 520,1	3 247,6
February	1 416,6	2 635,7	3 256,1
March	1 423,0	2 366,2	2 773,9
April	1 267,5	1 733,7	2 702,3
May	1 368,1	1 788,8	2 702,7
June	1 086,0	1 898,4	2 849,2
July	1 175,3	1 952,7	3 051,2
August	1 309,4	2 136,3	3 522,7
September	1 743,8	2 592,7	3 871,6
October	2 076,3	2 934,5	3 683,9
November	2 324,3	3 312,9	
December	2 969,6	3 268,8	

Source: https://www.ueex.com.ua/exchange-quotations/electric-power/indexes

Ukraine's electricity sector comprises separate generation, wholesale market, transmission system operation, distribution, and supply entities. The wholesale electricity market (WEM), created in 1996, was operated by the state-owned company Energorynok as a sole wholesale trader under a single-buyer model from 2000 to mid-2019; it also acted as a settlement center for all payments until July 2019. To meet its Association Agreement commitment to implement the EU Third Energy Package, Ukraine successfully switched from a single-buyer model to a more competitive power market structure consisting of bilateral contracts, day-ahead, intraday, balancing, and ancillary services markets in July 2019. UkrEnergo, Ukraine's state-owned national electricity company, operates the United Energy System of Ukraine (UES), including transmission networks and interconnections with neighboring countries.

The electricity sector has undergone several stages of reform: it was mostly unbundled and partially privatized in the 1990s, while state-owned assets were consolidated in 2004. Most thermal generation plants have been partially or fully privatized, with the private company DTEK controlling the bulk of the market. In 1995, regional distribution and retail companies (oblenergos) were created, one for each administrative region. As a part of electricity market reforms and to ensure retail market competition, Ukraine enforced the unbundling of oblenergos into distribution system operators (DSOs) and electricity supply companies. Since 1995, there have been several rounds of privatization, so most DSOs and electricity supply companies are now privately owned by domestic or foreign investors. Energoatom is the state-owned operator of nuclear power plants and Ukrhydroenergo is the state-owned operators of hydropower stations.

Most of the thermal power plants, large hydroelectric power plants, nuclear power units, and central heat and power plants that are currently operational were built between 1950 and 1990.

Until recently, decentralized generation[41] made a relatively insignificant contribution to consumers' power supplies. It is developing along the paths of distributed RES facilities, distributed cogeneration, and distributed temporary emergency solutions.

Small-scale distributed generation began to develop rapidly in Ukraine in the mid-2010s, driven by the government's incentive system, which was based on green tariffs. Solar photovoltaic (PV) power plants have come to dominate this sector. Under the current legislation, any power plant in Ukraine connected to distribution networks (110 kV and below) that has an installed capacity of or below 20 MW is considered a distributed generation resource. Most of the renewable energy power plants in Ukraine fall into this category. This includes mostly ground and roof/façade solar PV plants, small hydropower plants, and bioenergy power facilities. Large renewable energy power plants, such as wind farms and a few ground-based solar PV plants with capacities in the tens or even hundreds of megawatts, are classified as non-distributed generation resources.

The security of energy infrastructure is now the primary motivating factor for the development of distributed power generation in Ukraine. Since the Russian aggression began, enterprises and citizens, confronted with the instability of the electricity supply from the Unified Energy System, have purchased diesel and gasoline generators in droves, **in most cases with a unit capacity of up to 7.5 kW. Hundreds of thousands of these are now in private hands, representing a total capacity exceeding 1 GW**. However, generators of this type only provide temporary relief: their high fuel cost, air pollution, noise, and limited lifespan makes them incapable of serving as a long-term solution.

To implement the provisions of Item 12 Part One Article 58 and Item 8 Part One, and Item I Part Two Article 57 of the Law of Ukraine "On Electri-

[41] https://libmod.de/wp-content/uploads/LibMod_PB_EmpoweringUkraine.pdf

city Market," NEURC (the Regulator) approved changes to the Electricity Retail Market Rules having **guaranteed the right of all retail electricity prosumers (both household and non-household) to sell the surplus energy generated by their own generating plant to the power supplier at a contractual price**. The Regulator's decision primarily focuses on developing distributed generation for business entities with a generating plant capacity of up to 5 MW in the retail electricity market. Resolution removes one of several obstacles to the development of distributed generation and usage of available district heating (DH) infrastructure in Ukrainian cities. We need further governmental decisions to address the unused potential of existing DH systems in cities to benefit customers.

The ministry of energy works now on the **concept of the state target program to support distributed generation from renewable energy sources (RES)**. In the first stage (2022-2025), it is planned to install 200,000 RES facilities together with storage facilities for consumers, and in the second stage (by 2030), up to one million such facilities.[42]

Although state-owned companies dominate the supply of natural gas (Naftogaz of Ukraine) and electricity (Energoatom, Ukrhydroenergo, PJSC Centernergo) to consumers in Ukraine, private companies also dominate the distribution of electricity.

The electricity market has been designed to subsidize household and public sector energy consumption. Until July 2019, the electricity market was organized using a single-buyer model. Hydro, nuclear, co-generation, and renewables generators were paid fixed prices set by the National Energy and Utilities Regulation Commission, while thermal plants competed for the remaining demand in an energy-only market. In April 2017, the parliament adopted the new Electricity Market Law to meet the EU Third Energy Package requirements and join ENTSO-E. The law stipulated that bilateral contracts replace the single-buyer model of market operations. Accordingly, the electricity market was divided into a bilateral contracts market, a day-ahead market, an intra-day market, a balancing market, and an ancillary services market. The new market model was launched in July 2019, as scheduled under the law. Energorynok was restructured into three companies: a guaranteed buyer (a state-owned trader that buys electricity from producers under feed-in tariffs and sells this electricity on the organized day-ahead and intraday markets), a market operator (responsible for organizing trading on the day-ahead and intra-day markets) and Energorynok (responsible for dealing with outstanding debts). The TSO, Ukrenergo, was assigned the roles of commercial metering administrator and settlements administrator.

In Ukraine, a guaranteed purchase of all electricity output at green (feed-in) tariffs will apply until the end of 2029 for projects that obtained respective licenses from NEURC. However, it is possible to switch to purchases on the wholesale electricity market, and many large RES facilities use this opportunity.

In Ukraine, over 50,000 households installed solar PV plants in 2017 to 2022, resulting in a total installed capacity of more than 1.4 GW (compared to some 8.3 GW of non-household systems).

Russians destroyed 90% of solar non-household systems and 30% of wind capacities as they were located in the south and east of Ukraine. Hence, they are under occupation or were destroyed in the combat actions.

Enumeration of dominant challenges for public policies in Ukraine aimed at making the sector more competitive:

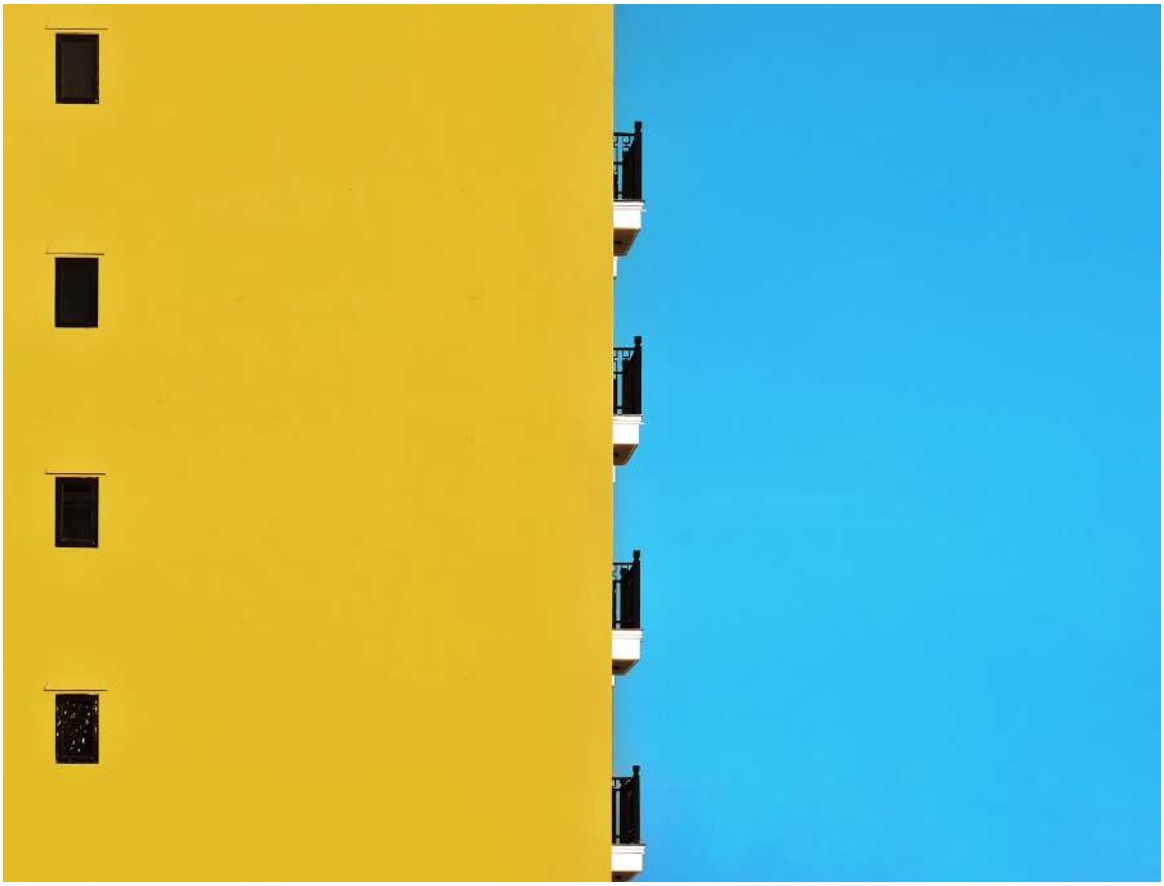
- The primary barrier to effective policy design, evaluation,, and implementation is limited and mismatched data on energy use and economic activity in different sectors and

[42] https://ubn.news/ukraine-has-developed-a-concept-to-support-distributed-green-generation

subsectors. Accurate and comprehensive data analysis can provide critical information for decision-making, including for future scenarios, baselines, and indicators necessary for tracking progress and monitoring, evaluating, and correcting energy efficiency initiatives.

- Russia's military aggression against Ukraine resulted in a decrease in electricity consumption and, consequently, a decrease in the amount of electricity transmitted. This has caused further delays in introducing green auctions because the electricity transmission tariff compensates for the difference between the market price at which green electricity is sold and the approved rates of green tariffs for renewable generation resources. At the time of writing, Ukraine is implementing a comprehensive reform of its system to incentivize renewable energy production. The reform applies to all categories of producers of green electricity, and the Ministry of Energy, along with electricity sector stakeholders, is drafting corresponding legislation.

Financial difficulties in the renewable energy sector in Ukraine have hindered the implementation of market instruments intended to stimulate further the development of renewable energy power plants, i.e., auctions for the distribution of support quotas. These auctions were supposed to determine the level of fixed payments to renewable energy power producers for 20 years (under the draft law, this period would be reduced to 12 years). This mechanism was aimed at introducing competition among participants. Participating in an auction is supposed to be mandatory for investors planning to build solar PV with an installed capacity of or above 1 MW or wind turbines with an installed capacity of or above 5 MW. In contrast, those investing in other power plants would have the right to participate if they chose. However, financial challenges in the sector have caused the holding of these auctions, which had been slated to start on 1 July 2019. The situation was further aggravated by the Russian war in Ukraine.



II Country-specific energy law focus and investment barriersin the Energy Sector

Bulgaria

Barriers to new green investments in Bulgaria are almost entirely physical: grid connections rather than administrative, financial, or other. However, the lack of a clear energy policy, especially about coal-fired power plants, has left some investors conservative. On the one hand, the installed capacity is over 3000 MW, and some of it is currently receiving some form of state aid, making new green investments less competitive. On the other hand, coal-fired power plants and coal mining occupy considerable technological, financial, and human capital, which can be used more efficiently and effectively in the green transition. Rather than look for solutions, however, several governments are looking for stop-loss measures, which can only prolong the inevitable decline of coal generation. In January and the beginning of February 2024, Bulgaria became a net electricity importer due to the power mix's lower carbon footprint in neighboring countries such as Romania, Greece, and even Turkey. Should natural gas prices remain stable around 20-30 euro/MWh, we expect this situation to remain unchanged, meaning that at the same time, we will have an enormous installed capacity of coal-fired power plants, which are not working, but not enough new investment in green technologies, leading to electricity imports.

Bulgaria is much more Green Deal-friendly than it was a decade ago. However, there are still some opponents, mainly in the face of coal, natural gas, and nuclear companies/investors. A few political parties support such investors and are opposing the transition. The three parties in the ruling coalition favor new green investments and have made several steps to support them by reducing red tape, introducing ambitious reform and investment plans, etc. Business organizations remain on the fence, as they predominantly care about the low market prices. Meanwhile, labor unions are vocally against green investments as they will reduce the workforce in the mining and energy sectors. The NGO sector is disproportionately in favor and would usually criticize governments for not being ambitious enough. Some regional organizations and local communities usually take a not-in-my-back-yard stance regardless of the project.

As we have pointed out, the investment process is quite liberal, and politicians favor improving it. Unfortunately, we don't see a clear energy sector vision for the next 10-20-30 years. This is usually clouded by a desire for greener investments and keeping all the coal-fired power plants and their employees. The process should start here – developing an energy strategy and a roadmap for implementing it, which can be revised every couple of years. Currently, the government is working on one, and we expect to see a preliminary draft in the next months.

The next step is identifying priority zones for new grid connections and developing the post-haste infrastructure so that new investors can predict future projects more accurately. Some of them will fall in or near residential areas, and governments and companies should work with the local communities—guaranteeing a lack of negative externalities, benefits for the local economy, potential scale-up, etc. This is especially true for wind and biomass generation and less so for PV generation.

The legislative process should follow a clear path – strategic vision, environmental impact assessment, economic feasibility and effects, safeguards against negative externalities, sufficient public discussion, and working with local communities (when applicable). In reality, however, most legislative amendments are not

communicated properly, often contradict strategic documents or policies, are enacted quickly and have weak argumentation. Improving the legislative process and ensuring transparency and predictability would have a much greater impact on the investment environment than abolishing a procedure or reducing its time from 30 to 15 days, for example.

As mentioned, the government is developing an Energy Strategy and an updated National Integrated Energy and Climate Plan, which should be published in the next few months. These should include new investor guidelines and policies aimed at reducing red tape.

In the beginning of December 2023, a group of members of parliament submitted a new law for offshore wind. Bulgaria is the last country with sea access to introduce such legislation, and it should support new investment projects. The law provides a contract for a difference support scheme for new offshore wind investors with a strike price to be determined through a tender procedure but no greater than € 81.81/MWh.

The power grid has become the new red tape for RES development not only in Bulgaria but for the EU in general. After the end of the previous RES boom of 2011-2012, new installations almost flatlined for an entire decade, leading to a divergence in investment priorities for grid operators and the regulator. As a result, new connection capacities grew moderately and have been all but exhausted during the current RES boom. Now, grid investments will need to catch up with RES investors with intentions to connect over 40 000 MW to the grid, given a total grand capacity of 14 058 MW in 2023.

While there has been a considerable decrease in red tape for new RES projects in the past years, including as a result of changes to EU law and reforms included in the National Recovery and Resilience Plan, the administrative burden on grid development has not followed suit. While RES projects are seeing administrative procedures abolished and deadlines cut, infrastructure project development has remained almost unchanged with lengthy administrative procedures, e.g., acquiring a construction permit, arranging public tenders (grid operators are 100% regulated legal entities), appeals, etc.

Traditionally, in Bulgaria, grid development is financed through grid tariffs with little to no utilization of grant funding (EU, national budget, other). Due to the country's low living standards, grid tariffs are increasing only moderately, leading to underinvestment. Currently, the government is trying to employ some grant funding to both alleviate the financial burden and increase the development of new connection capacity. Unfortunately, the government's impulse seems weak, which could prolong this problem.

In Bulgaria, RES development is allowed in city and commercial land but is forbidden on agricultural land no higher than category 7. Agricultural lands in Bulgaria are categorized into 10 categories (so-called credit categories; 1 is highest) according to the productive capabilities of the soils, climatic conditions, relief and technological qualities of the land, its suitability for different types of plant production, and the imposed restrictions on the use of the land. The next step is to change the purpose of the land from agricultural to electricity generation.

Some areas of the country with high potential for solar or wind generation are included in the Nature 2000 network of nature protection areas in the European Union's territory.

Access to financing has not been a problem in Bulgaria until now, but it could become a mid--term barrier to new investment projects. Traditionally, the financing price in Bulgaria has been relatively higher than in other EU countries due to several elevated risks, including political, regulatory, legislative, etc. The cycle of increasing interest rates worldwide can only exacerbate this trend, which can weigh in on the decision whether to invest in Bulgaria or other countries, given the similar CAPEX of the projects. This is more relevant to foreign investors, which formed

the bulk of new investments during the previous RES boom. Till now, the share of local investors in Bulgaria was considerable. Nonetheless, the premium price of capital in the country could prove an inhibitor for new RES projects.

Bank lending is becoming more conservative, probably driven by falling energy prices and restrictive monetary policy. To secure a loan, investors are required to show a long-term power purchasing agreement (PPA) with a duration of at least three years. This is a requirement which could prove problematic for several reasons:

- Long-term power markets have lacked depth since the pandemic in 2020, and even more so since the increase in energy prices since mid-2021.
- Traditionally, PPAs concluded that the Bulgarian power exchange had a duration of no more than 12 months.
- Non-household consumers have enjoyed a price cap since October 2021, which has been lowered several times and is currently at just over 102 euro/MWh; there are discussions for a further reduction next year. The price cap destroys any incentives for price hedging, making long-term PPAs hard to conclude.
- Although traders have an incentive to conclude a PPA, they are subject to a trading margin cap—a maximum of 10% on the difference between their revenues and expenses related to the purchase and sale of electricity.

Bulgaria has not used a financial support mechanism for new RES projects connected to the grid after 2014. For projects before that date, the mechanism of choice was Feed-in Tariffs, which were later changed to Feed-in Premiums. As part of the National Recovery and Resilience Plan, there is an investment project to support the development of new RES projects coupled with a storage system. The financial support is related primarily to the storage system, and the investors should secure the financing for the RES installation by themselves, which is becoming harder, as explained above. Next year is the deadline for the updated National Integrate Climate and Energy Plans, which could show a change in government policy on this matter. However, there are no indications yet.

Producers have faced in Bulgaria a price caps determined by the Council of Ministers. For RES producers, which are not part of the Feed-in Premium scheme, the cap was 179 euro/MWh until August 2023 and was later reduced to 153 euro/MWh. Producers with a FiP of 0 euro/MWh have a cap of 10% of the difference between their actual revenue and the regulatory revenue cap, relevant to the price starting in July of the current year and ending in June the following year; producers with a FiP above 0 euro/MWh applies the regulatory revenue cap.

Connecting to the grid is long, has to run parallel to other administrative requirements, such as acquiring a construction permit, and isn't streamlined. Even before the project has a detailed layout plan, the investor sends an application for an opinion to the grid operator (if it is a DSO, it coordinates with the TSO). The grid operator proposes a preliminary contract that includes the connection location (which can be far away from the land the investor has or is planning to purchase), an estimation of costs, etc. The investor then needs to acquire a new construction permit for the grid infrastructure, which is a much higher category according to the Territory Planning Act. The construction of infrastructure can only be done by certified companies chosen by the grid operator. Due to the lengthy administrative procedure and the time it takes to build the infrastructure, the final contract between the investor and the grid operator may differ from the preliminary one, including a different point of connection, investment costs, etc.

There is a high degree of legislative risks – changes are very frequent, opaque, and unpredictable. The Energy Act alone was amended five times in 2023 and 14 times since the beginning of 2020. The latest amendment, which includes a full market liberalization for electricity household consumers, the introduction of definitions for energy poverty, vulnerable customers, aggregator services, and other was vetoed by the

president, and during the parliamentary deliberation, one MP said they agreed with most of the president's arguments. Nevertheless, they vote in the amendments now and change the law again at the beginning of next year. The Renewable Energy Sources Act has seen three amendments this year and eight since the beginning of 2020. However, the latest amendments sparked heated debates among experts and politicians, and the MPs had several months to mull them over. At the same time, a completely new law was submitted to Parliament in September 2022 - the Bulgarian Offshore Renewable Energy Act, due to the lack of legal and technical definitions relating to this type of energy source. Although initially, politicians favored it, it has yet to be voted on and come into force.

Different regulatory risks relate to both investors that are part of the FiP scheme and to market functioning. The regulator traditionally underestimates market prices and overestimates Feed-in Premiums during an upward price cycle. However, during the downward price cycle, like the one we have seen since the beginning of 2023, the regulator tends to overestimate market prices and underestimate premiums. For projects that have already been paid off, this results in lost profits; however, for projects that are still paying back loans, this could spell financial difficulties on top of increasing interest rate payments. This is the general case for wind and solar power generation, which doesn't have primary energy expenditures. However, those expenditures must also be calculated for biothermal power generation. On top of overestimating market prices this year, the regulator has **underestimated primary energy expenditures for those plants, leading to many shutdowns.** Similarly to the legislative process, the regulatory process regularly creates additional risks for investors, which are hard to predict and lack concrete arguments.

Currently, RES producers are excluded from the balancing market due to a lack of appropriate market instruments. On the one hand, this means that their revenues are strictly related to the market price and for producers with FiP – to the premiums determined by the regulator. Market prices have been extremely volatile in the past three years, and projections for the medium term show that the volatility between seasons and peak and off-peak prices should further increase. This is partly due to new RES installations but also to the increased share of the Day Ahead Market, the market integration in the EU, increased interconnection capacity, etc. On the other hand, in cases of risks to the security of supply, the TSO can remotely switch off RES producers, leading to lost revenues.

Volatile market prices lead to an unreliable projection for the average annual market prices and consequently – the premium for RES producers. The Energy Act stipulates that the regulator can update the FiP within the 12-month price period no sooner than 6 months after the price decision, given that there is a "significant deviation between the price projection and actual prices." However, this is also a projection for the remaining 6 months of the price period, and the regulator cannot rule on compensation to be paid to/by the RES producer in cases of under/overestimating the FiP. This peculiarity of the law has been pointed out several times both during the upward and the following downward price cycles, but there is no debate on amending the norm.

In the past months, talks have been about introducing a new product for downward balancing for RES producers. This will both alleviate, at least partially, the risk of the TSO remotely switching off producers, provide an alternative source of revenue, and stimulate RES producers to invest in high-end investors, which will allow for a more flexible generation profile. Furthermore, by gaining access to the balancing market, RES producers will have a further incentive to invest in storage systems to further optimize their revenues/costs.

In the most important barriers for private investors in the energy market in Bulgaria we can include:

1. Renewable Energy Sources Act, October 2023

It introduces ambiguity regarding deadlines for grid operators to connect new RES. Without a clear normative framework for new RES connections, investors can't rely on predictability or the legal system's protection of their rights. This can increase the length of the investment process, alter the terms in the preliminary contract with the operator, increase the investment costs, increase interest payments, lost profits, etc.

2. Ordinance No. 6 of 24.02.2014 on the connection of producers and customers of electricity to the transmission or distribution electricity networks, last amended in June 2023

This is a general, rather than a specific, problem related to grid connections and the burdensome administrative process of building infrastructure. Rather than revamp the whole administrative process of RES investments and their corresponding grid connections, we have seen only sporadic normative changes that, more often than not, create more problems. Operators are undercapitalized, and the grid development is behind RES investment intentions. The legislation does not define or designate priority grid zones, which can send the right investment signal to new investors. As a result, RES investors often have to pay for the construction of grid connections (lines, substations, etc.), and then transfer them to the grid operator free of charge.

Apart from being undercapitalized, grid operators have not seen any improvement in red tape. In contrast, both at the EU and national levels, we have seen a steady decrease in administrative procedures related to RES development. Grid operators still must adhere to numerous administrative procedures and special laws, for example, coordination with the Road Infrastructure Agency application of the so-called tacit consent for building permits under the Territorial Planning Act, taking into account the fact that network operators are required to apply public procurements, stipulated in the Public Procurement Act, when choosing suppliers and contractors, etc. To partially rectify this situation – the process is not entirely under the control of the grid operators, which are subject to permitting and coordination procedures from other national or local authorities - there are different deadlines in the ordinance which are more wishful than concrete, there aren't penalties, and operators have some wiggle room.

This creates an uncertain investment environment with constantly changing variables, including the length of the procedure, connection points, investment costs, etc. The whole process needs to be revamped and adapted to the new reality of higher RES investment intentions, accelerated grid development, and reduced red tape.

3. Renewable Energy Sources Act, August 2014

The initial financial support mechanism for RES generation in Bulgaria – currently Feed-in Premiums – was discontinued in 2014 after the country had reached its 2020 RES target. After that date, the regulator sets preferential prices and applies a Feed-in Premium mechanism only for RES generation up to 30 kW for facade and roof installations. The end suppliers buy the electricity (Bulgaria still has a regulated market for household consumers). The institute of a public supplier should be terminated as of July 2024,

and the end suppliers should follow, raising the question of such contracts' future.

Neither the National Integrated Climate and Energy Plan nor any other strategic document envisions reintroducing new support mechanisms, which in a restrictive monetary policy environment could burden new investors. This applies to an even greater extent for wind energy, both onshore and offshore, characterized by a longer development process, higher unpredictability of generation load, and, in general, a lower market penetration rate in the EU and Bulgaria. The National Recovery and Resilience Plans include an investment project and support for new RES installation coupled with storage systems. Still, investors have complained **about the tender procedures and financial requirements.**

4. State Budget Act, July 2023

The government has continued implementing a price cap on electricity producers. However, the effect of the Regulation introducing the measure on an EU level has ended in June 2023. The price cap level is set by a decision by the Council of Ministers and has already been reduced in September 2023. The State Budget Act for 2024 includes the same measure for next year, and the decision on the exact level of the cap was published in mid-March:

- Nuclear Power Plant = 76.69 €/MWh;
- Thermal Power Plants using:
  - Coal = 153.39 €/MWh + 1.32x Price of CO_2 calculated as €/MWh;
  - Coal + biomass = 153.39 €/MWh + 0.9x Price of CO2 calculated as €/MWh;
- Hydro Power Plants = 102.26 €/MWh;
- RES without Feed-in Premium = 153.39 €/MWh;

The problem with the measure is not the specific price cap level, but rather its existence in a competitive and integrated free power market. For RES producers with FiP, the measure would only limit any excess profits. However, their annual revenues are guaranteed by the support mechanisms. **For new RES investors without FiP, however, the measure could severely and negatively impact their financial standing as prices have been volatile in the past few years.** Furthermore, limiting the market price signal would dissuade new investors from developing new projects and increase RES penetration.

Overall, administrative barriers and favoritism for State-owned Entities in Bulgaria are not so much set in laws and ordinances as are the result of market design flaws. Since we cannot pinpoint a specific document, we propose a list of other soft or hard barriers:

1. Lack of a developed long-term power segment

Bulgaria does not have an OTC power market; all electricity must be traded on the power exchange. The only exceptions are the regulated market for households (which should continue until the end of 2025) and the new RES generation, connected after 2018. Over 85% of all electricity traded on the power exchange is concentrated on the Day Ahead Market, which leaves few opportunities for traders and RES producers to hedge their respective loads. This is further exacerbated by the introduction of a margin cap on power trading companies of 10%, which has led to limited involvement of foreign traders in Bulgaria. Until the beginning of discussions on the cap in October 2022, a large share of RES production used to be traded through long-term contracts; afterward, most producers were forced to deal with the Day Ahead Market.

2. Price cap for consumers

The development of a long-term power segment is further obstructed by the generous price cap for non-household consumers, which applies to all consumers for their entire consumption. This measure eliminates the need for hedging instruments and long-term contracts, traded on the power exchange and OTC contracts with RES producers, connected after 2018. Furthermore, the reference price for the measure is the Day Ahead Market, which creates further stimuli for traders and consumers to focus all trading on that segment. (It should've been a temporary measure for 2022. However, it has entered the State Budget Act for 2023 and 2024.)

3. Lack of alternative revenue sources

RES producers have two sources of revenue—market revenue and Feed-in Premiums (for installations connected to the grid before 2014). RES producers don't have access to the balancing market, although there have been discussions to introduce downward balancing products for RES. Currently, the power exchange is developing a new trading platform for green certificates, which could provide financial support for new investors.

4. Lack of reliable storage systems

The rapid deployment of RES generation in the past few years has highlighted several market and system shortcomings, which an increase in storage systems development can alleviate. Bulgaria has a large hydro-pumped storage system; however, it is currently out of commission due to improper use. This makes balancing the variable RES generation very challenging, leading to further financial problems for investors. A quicker deployment of new storage systems, e.g., batteries (faster construction) and other hydro-pumped storage systems (very slow construction), could help. Unfortunately, there is no government plan to stimulate such developments; there is a discussion on a draft Energy Strategy, which is not very ambitious regarding new batteries.

The RES sector in Bulgaria is dominated, almost entirely, by the private sector, and it is difficult to identify any soft or hard entry or operational barriers. In 18 months, installed RES capacity has doubled, and we expect it to almost triple in the next year compared to 2020 levels. The government's attitude towards the sector is very favorable (sometimes to such an extent that it leads to social backlash, as seen in 2013, 2015, and 2022). Due to increased investor interest and dwindling connection capacity, the government, with the help of the TSO, has introduced a temporary connection mechanism, which lets at least part of RES generation capacity be connected to the grid before the final development of the planned grid infrastructure. The same can be said about charging stations, which private sector investors dominate, and only in recent years has the government started to develop programs for state-owned charging infrastructure.

Most barriers are related to either a lag in transposing EU Directives, outdated legal and regulatory frameworks, or market inefficiencies, which can lockdown investors into a few business models. There are a lot of opportunities, however, to streamline administrative and development processes, further reduce red tape, improve the business and investment environment, provide for more transparent and predictable legislative changes, develop different financial support mechanisms, focus on investors and activities, which could benefit the most from them, etc.

Czech Republic

Barriers arising from Czech energy legislation

At this point, however, it should be noted that the Czech energy market is generally considered sufficiently liberalized and barriers to entry are not too high compared to other countries. We will therefore try to find at least some examples where competition could be strengthened and the market further liberalized, which should ultimately help consumers. In the course of the chapter, the Czech laws that cause problems in the energy market will be discussed, namely:

- Energy Act (458/2000)
- Building Act (183/2006)[43]
- Act on Conversions of Commercial Companies and Cooperatives (125/2008)[44]
- Government Decree 298/2022

License

The functioning of the Czech energy market is governed and regulated by Act 458/2000 Coll., i.e., the Act on Business Conditions and the Exercise of State Administration in Energy Sectors (Energy Act). The Act sets out all the requirements that

[43] From 1 January 2024 it will be replaced by the new Building Act 283/2021.
[44] In particular the forthcoming Section 311, see below.

must be met by a private or legal person planning to participate in the energy market. The first major barrier to entering the market is the need to obtain a license from the *Energy Regulatory Authority*, for which the conditions set out in the Act must be met. The applicant must have a university degree in a technical field or a full secondary education and 6 years of experience for general energy activities. For electricity or heat generation up to 1 MW and stand-alone electricity or heat distribution installations up to 1 MW, vocational education in the field and 3 years of experience or a certificate of retraining for the operation of small energy sources is sufficient. No professional qualification is required for renewable energy production up to 50 kW.

Applicants must be financially capable of operating the licensed activity for at least 5 years. Financial inability is evidenced by a history of bankruptcy or insolvency proceedings due to insufficient assets or outstanding debts for taxes, social security, employment contributions, general health insurance, and fines. The energy equipment must be certified as safe in accordance with legal and other occupational health and safety regulations and technical documentation. If the energy installation is a building, the applicant must also demonstrate the right to use or operate the building.

At the same time, the person applying for the license must not have any previous criminal record. Licenses are granted for varying lengths, with electricity and gas production licenses for up to 25 years, while electricity and gas trading licenses are granted for only 5 years. From the point of view of economic theory, licenses can be criticized because they restrict competition in the market. It cannot then provide sufficient incentives for companies to innovate and improve their services to customers. At the same time, it effectively prevents the smallest suppliers from entering the market.

Bureaucracy

Unlike the relatively benevolent licensing system, the energy sector, like many other areas of the Czech economy, is plagued by bureaucracy. First and foremost, then, is the length of the construction procedure, which has been a long-standing problem in the Czech Republic that no government has yet to solve effectively. In the energy sector, wind power plants serve as a good example of the problems with construction, where the average time needed to build them is estimated to be at least 7 years, which is one of the reasons why no new wind power plants have been built on the territory of the Czech Republic in the last three years (CSVE 2023).[45]

In different regions of the Czech Republic, different provisions regarding construction apply. Although, for example, a particular municipality may approve the construction of a power plant, the construction may still run into problems with the region itself because each region sets its spatial development principles, which is why, for example, the Ústí nad Labem region has precisely defined what kind of structures can be built on its territory. If there is a conflict between the investor/municipality and the region, the application may end up in court.

For example, in 2013, there was a dispute between the municipality of Petrovice and the Ústí nad Labem Region, which ended up in the Constitutional Court(Ekonews 2022).[46] After obtaining a zoning decision, the investor must still obtain a conventional building permit, which can again take several years, and last but not least, a license to trade in electricity from the Energy Regulatory Office. In addition, contracts must be concluded with distribution companies to connect the wind farm to the grid. Wind farms with a capacity of more than 500 kWe or more than 35 meters must undergo an EIA. In this process, the public and various authorities comment on the wind farm's environmental impact, consi-

45 https://www.csve.cz/clanky/statistika/281
46 https://www.ekonews.cz/proc-se-nestavi-vetrne-elektrarny-stavbu-komplikuji-slozite-schvalovaci-procesy-i-obavy-z-hluku/

dering the landscape, population density, and cultural or natural monuments.

Predictability of the market environment

Currently, the Czech state is the main shareholder of CEZ with a 70% stake. Last year (2023), a significant legislative action was the draft amendment to the Act on Conversions of Commercial Companies and Cooperatives. This amendment introduces Section 311, which proposes to lower the threshold for mandatory takeover of minority shareholders from the current 90% to 75%. Although this amendment, including Section 311, has not yet been approved, it raises concerns that the state may intend to get rid of minority shareholders to strengthen its control. This trend towards renationalization in the energy sector, a reversal of previous liberalization trends, is reflected in several European countries such as Germany, France, and Poland. Like these countries, the Czech state considers the energy sector strategically important and seeks to retain sole ownership for security reasons.

The argument that privatization could cause significant short-term price fluctuations is false. The British market is experiencing price volatility like the Czech market. Similarly, markets in other countries with active participation in the energy sector have been unable to avoid price volatility, especially in recent years. The aforementioned amendment to lower the threshold for excluding minority shareholders in CEZ is considered a targeted move by the state to facilitate the company's takeover. This dual role of the state as majority shareholder and regulator, if it leads to the exclusion of minority shareholders, can ensure short-term control over critical infrastructure. In the long term, however, it could damage the perception of the Czech legal system by domestic and foreign investors.

Theoretically, the state could break up CEZ, compensate minority shareholders, keep the part considered critical, and leave the rest to the private sector. However, the current legislative strategy seems to take over the entire company at a minimal cost. While this may lead to lower financial costs, losing trust could be much more costly. This perspective can also be used to look at the imposition of the so-called windfall profits tax, which the Czech government has started to apply in the energy sector. From the point of view of institutional economics, the greater the state intervention, the greater the potential for market distortions and distortions of confidence. Even though its effects may be felt over a longer time horizon, such intervention sets an uncertain precedent. It suggests that if an industry makes profits that the regulator considers excessive, it could face similar taxation in the future. This scenario could discourage market participants from further investment in sectors that could generate taxed profits in the long term. The projected tax revenues of CZK 85 billion (MF 2022) may initially benefit the state budget but also have significant potential to reduce future investment and confidence in Czech institutions.

Restricting consumer choice

Government Decree 298/2022 stipulates that consumers who do not have continuous metering of electricity or gas (smart electricity/gas meters) installed at their point of consumption cannot negotiate energy prices with energy suppliers *with a method of price determination directly dependent on changes in the price of electricity or gas on short-term organized markets...* The Czech government, therefore, directly prohibited the purchase of energy at spot prices with this regulation, and the regulation was in force even during periods when energy prices were low again. The government argues for prevention and consumer protection in the regulation, but such behavior has nothing to do with market principles. Of course, a consumer who buys on the spot market should know the risks involved in this type of trade.

When times are calm, and prices are low, they pay less for energy than consumers who have fixed prices for longer periods. However, this 'discount' is offset by the risk that, if prices rise, such consumers will have to pay much higher amounts. It, therefore, depends entirely on the consumer's attitude to risk. If risk-averse, they

are more likely to opt for a longer fixation at a higher price; if they are risk-seeking, they will prefer spot prices. For both types of consumer, this is a free choice that no one is forcing them to make, but both should be willing to bear the consequences of their decisions. The government is only preventing educated, risk-aware consumers from buying to protect others who might prefer to choose fixed prices anyway.

Insufficient network capacity

The Czech Republic is experiencing a solar boom, and many households are trying to switch to solar energy. Several subsidy titles, such as the so-called *New Green Savings Scheme*, are also helping this transition. However, a larger transition to renewable energy sources is hampered by the state's unpreparedness. This takes two forms. The first is the unpreparedness of existing electricity infrastructure, such as cables, power lines, or old substations. Where there is insufficient grid capacity in a given location, the company that manages the grid deals with the local municipality to reinforce it. However, each extension requires municipal approval, project documentation and other requirements of the construction procedure before it can be implemented, so grid reinforcement can again drag on for several years, leaving the grid unable to respond flexibly to the huge development of PV in the country. The second issue is legislative shortcomings, such as the lack of a clear law on community energy, which further hampers progress. However, community energy should be defined in the new energy law, which should come into force on 1 January 2024. However, what form it will take is still unclear at the moment.

Remaining minor barriers

Even if the entity can meet the state's and the ERO's requirements for granting a license to operate in the energy sector, it will subsequently encounter another more problematic obstacle closely related to the Czech market set-up. In particular, the electricity market is highly concentrated in the hands of the three largest suppliers, one of which is even 70% owned by the state. Such an oligopolistic structure has demonstrably several disadvantages, and in terms of barriers, it is a competitive advantage over new entrants. Thus, in addition to a license to operate in a given market, they have to compete with several huge companies and, consequently, the state, which in the long term harms consumers and competition and reduces the level of innovation in the sector.

The price Czech consumers pay for energy consists of two components (the customer gets it on one invoice). The unregulated component, which the consumer negotiates with the supplier, and then the regulated component, set annually by the ERO, is used to cover the costs of operating, maintaining, reinforcing, and upgrading the network. In 2024, this regulated component accounts for around 50% of the electricity and 20% of the gas prices. Although used to maintain and reinforce the network, this type of price regulation and price caps, for example, applied during 2023, further favor the largest companies already operating in the market.

Although the Czech state and European legislation require market participants to unbundle individual companies, there is concern that unbundling is insufficient and that vertical integration of firms may continue to occur, further increasing barriers to entry for new firms. (European Commission 2020)[47] Given their advantageous position, these entities may exercise market power in a discriminatory manner against other market participants. This situation creates barriers to entry and competition as these dominant players can influence market conditions in their favor, potentially to the detriment of smaller or new entrants. The effectiveness of market rules in preventing such market power is crucial.

In cases where market rules are insufficient or not sufficiently enforced, these dominant players may continue to maintain their advantageous position, thereby perpetuating inequality in the

[47] https://energy.ec.europa.eu/publications/european-barriers-retail-energy-markets_en

market. Given that the largest firm in the industry is 70% state-controlled, the question arises as to how much the rules can be set against it.

Main barriers of the Czech market

- Licensing and restricting the entry of entrepreneurs without professional training
- Slow construction procedures limiting investment in the sector
- Construction procedure for wind power plants, in which municipalities, regions, the public, and interest organizations can also have their say
- Government market intervention
- Unpredictability of the market environment
- State unpreparedness and insufficient power network capacity
- Restricting consumer choice by limiting the supply of suppliers
- Regulated component of the energy price
- Lack of unbundling and vertical mergers
- Active state participation in the market through CEZ

Hungary

Hungary has at least one 400 kV connection with all its neighbors (including a 750 kV with Ukraine), with the last one on the Hungarian-Slovenian border being commissioned in December 2022. Further connections with neighboring countries are planned. The Hungarian network is considered stable by European standards, but its storage capacity is small, and this stability is increasingly at risk. In January 2024, the balancing capacity requirement exceeded 1000MW within an hour (sudden clouding over and rapid clearing of the sky).

The framework regulations are set by the 2007 Act LXXXVI on Electricity and its implementing decrees (Government Decree 273/2007. (X. 19.)). The Operational Rules of the system operator MAVIR establish the conditions for connection to the power greed. These are typically amended several times a year. The regulations are even more frequently amended, often in significant respects: in January 2024, the 37th version[48] is in effect; a year ago, it was the 30th, but there have also been instances recently where certain points of the Operational Rules, the conditions for connection, were overridden by government decree[49] citing the extraordinary legal order due to the war risk situation. "Distribution Licensees" have exclusive operational rights in a given area, so a specific consumption site can only connect to the grid of the territorially competent Distribution Licensee. Adapting to such a rapidly and unexpectedly changing legal environment is challenging.

Regarding solar energy, the re-authorization or prohibition of connecting household-sized or larger solar power plants to the grid has been a continuous topic of debate since May 2022. In Hungary, the number of household-sized (hereafter "HMKE," i.e., systems smaller than 50 kW) power plants grew significantly faster than planned, reaching 251,637 units with a nominal installed capacity of 2281.1 MW by December 1, 2023. Previous estimates had projected to reach this level of 250,000 units by 2030. Their number has tripled compared to 2020, and the number of installations in 2023 was nearly as many as all those established up to 2020. By the end of 2023, there were 3,187 producers above 50kV, with an installed capacity of 3301.7 MW. Therefore, the total installed capacity was 5582.8 MW on December 1, 2023[50] (the estimate for 2030 was 6500 MW). To this, will be added:

- +3300MW (projects that acquired connection rights before the first publication procedure between 2024-2027)
- +1588MW (projects that acquired connection rights during the first publication procedure from 2028)
- +1000 MW (HMKE projects approved in 2022),
- thus, at least 11GW of solar power capacity is expected by 2028, plus the installed capacity

48 https://www.mavir.hu/web/mavir/uzemi-szabalyzat
49 https://net.jogtar.hu/jogszabaly?docid=a2200527.kor
50 https://mavir.hu/documents/10258/251334624/PV+STATISZTIKA_HU_20231201_ig_v1.pdf

of industrial units producing for their use (net-metering systems) is yet to be known.

The lengthy introduction was necessary because the rapid growth led to significant, sudden, and sometimes unpredictable changes in the last two years in the connection possibilities and circumstances (purchase price, accounting method, balance) for HMKE and power plants larger than 50kW. This massive amount of newly entering weather-dependent production capacity places a heavy burden on the network.

In May 2022, the system operator MAVIR reduced the limit for new applications for systems larger than 50kW to 0 MVA, prohibiting it (individual petitions remained possible under special conditions). The lack of connection opportunities led to further extensions of the deadlines for expiring permits and contracts, and an increase in the connection fee raised the cost of investments while deterring others from planned projects, with nearly two hundred non-residential investors withdrawing in 2023. This restriction was lifted only in September 2023, as one of the conditions for accessing RRF funds was that the government allow the re-submission of connection requests (with new conditions for 1588 MW capacity and 287 MW storage capacity). The second publication procedure opened in December 2023. **In the coming years, the opportunity to acquire connection rights will only be available on a limited basis.**

The distribution companies have long accepted and evaluated HMKE (household micro-cogeneration units) network connection requests. In many cases, the evaluation time increased, and there might have been a long wait for a network connection, possibly even waiting for network development. The connection restriction also reached HMKE; as of October 31, 2022, there was no possibility for newly established HMKEs to feed into the grid. The announcement's manner and suddenness made it a public discourse topic, stirring significant political controversy, given the number of households affected. The restriction on HMKE was lifted on January 1, 2024, with the release applying to nearly the entire set of connection points (93%), but not yet for the entire country. A significant achievement was launching a website to check the feeding possibility for household-sized power plants.

Most experts did not dispute the reasons behind the connection moratoriums. MAVIR and the operators of the distribution systems justifiably argued that accepting connection requests would increase the risk of power outages. Some highlighted that the government could have reacted faster, seeing the accelerating spread of solar panel systems after 2020, suggesting that more steps could have been taken to develop the power grid. Others pointed out that a general connection ban is not a good solution, as local networks might be suitable for feeding. **Most stakeholders were dissatisfied with the manner and suddenness of the announcement, as well as the lack of consultation. Investors, traders, and installers feared for their jobs, with several non-resilient solar trading companies ceasing operations or laying off salespeople. The unexpected announcements (and their occasional withdrawal) created an unpredictable environment, making return on investment difficult to calculate.**

Overall, it can be said that network connections are issued very late even in the case of positively evaluated connection requests. The development of the grid and substations has been neglected, and the process is costly. The feed-in party is very vulnerable to the network entitled due to connection and network capacity allocation; electrical grid-entitled parties to exercise their operational, regulatory rights and claims. A few years ago, in non-HMKE size, it was possible to connect to the network within a year after submitting the feasibility study. In the current auction system, it is more than a year. Therefore, investors prefer to buy projects that are "ready to build" or close to that stage.

Without claiming to be exhaustive, efforts are being made to improve the condition of the electrical grid through smaller and larger investments.

Examples include the Danube InGrid project by E.ON Hungária, which will last until 2025 in the Western Transdanubian region, and Elmű is carrying out grid development until 2028 in the Central Hungary region, among others. The fate of further grid development projects largely depends on access to RRF resources, so the realization of future investments has political conditions and risks. Distribution fees have significantly increased recently, but this is not sufficient funding for electrical grid modernization. The transmission system operator MAVIR is required to prepare an annual grid development plan for the electric power system for networks of 132 kV and above.[51] *However, there is a need for a comprehensive national electrical grid development strategy involving network operators, research institutes, manufacturers, system users, and decision-makers.*[52] The importance of improving the transparency, predictability, and accessibility of network connections cannot be overstated.

Since 2011, no wind turbine has been built in Hungary, with the last authorization wave occurring in 2006.

In Hungary, there are heritage protection rules, national and local building and settlement image protection regulations, environmental rules, rules protecting geological interests and arable lands, mining, transportation interests, and those relating to common property.

A general problem that can be articulated is that there is **no spatial planning for the energy sector in Hungary,** where the expertise of different scientific fields is synthesized. This is especially a problem for large-scale, non-household solar power plants. Investors acquire land where they can, leading to situations where large-scale solar parks exceeding 100 hectares may be built on very high-quality arable lands, or land can be expropriated from those who would prefer to continue cultivating it (instead of selling it) under the designation of priority government investments. It is problematic that nearly 90% of domestic non-household solar power plants are installed on "greenfield sites," mostly on arable land, even though the previous METÁR system awarded extra points for projects realized on brownfield sites. Favorable regulation of brownfield sites has never provided a competitive advantage to applicants. Additionally, land withdrawn from cultivation before the application could be counted as a brownfield site.[53]

The government is (rightly) trying to broaden the possible areas for establishing solar power plants. For example, the requirements for the afforestation of parking lots were modified in the 253/1997. (XII. 20.) Government Decree (OTÉK) in 2023 to support the solar energy utilization facilities on parking surfaces. As a commitment under the RRF, the **prohibition on balcony solar panels may be lifted sometime in 2024**. Furthermore, in the autumn of 2023, the Civil Code was expanded with a new element, introducing the "building right." According to the bill's justification, the legislator expects it will be easier to secure bank financing for solar power plant investments. The legislative intent is correct, but the favorable reaction of banks is not guaranteed, nor are the effects and practical application of the building right known. However, one consequence of its introduction is that even rooftops can be rented, which may contribute to the growth of installations. In solar power projects encouraged by legislators, it is not yet apparent how building rights could become truly well-functioning security. For example, it could be stipulated that the power plant permit transfers to the buyer in the case of the transfer of the building right. Furthermore, it could be specified that the transfer of the building rights and the permit requires the prior approval of the Hungarian Energy and Public Utility Regulatory Authority (MEKH). Thus, the building right

51 https://www.mekh.hu/download/3/cf/51000/HFT2023_A%20magyar%20VER%20h%C3%A1l%C3%B3zatfejleszt%C3%A9si%20terve_2023.pdf
52 https://rekk.hu/downloads/academic_publications/V4ETTP_Outlook%20for%20RES%20integration_2023.pdf
53 https://energiaklub.hu/files/event/Csak%20nappal%20-%20csak%20nappal%20final.pdf

and the permit would transfer simultaneously, maintaining the related regulatory control.[54],[55],[56]

Since 2011, no new wind turbines have been built in Hungary. A government decree issued on September 15, 2016, prescribes a set of conditions related to their establishment, defining a **protective distance of at least 12 kilometers from the area intended for construction**. This 12-kilometer protective distance makes establishing new wind turbines impossible, as Hungarian settlements are within this boundary. Political reasons may underlie this decision, as no civil movements disputed the already established (330 MW) power plants from a landscape, noise, or nature conservation perspective. Technology acceptance among those living near wind turbines is higher than average. **The government has legally and verbally favored solar energy over wind energy, biogas, or biomass.**

The European Commission tied the payment of 5.8 billion euros in RRF EU support available within the plan's framework to the abolition (among other things) of regulations hindering wind energy investments. **On December 15, 2023, a legislative proposal appeared unexpectedly, according to which the protective distance would be reduced to 700 meters (with deviations allowed near brownfield sites), which came into effect from 2024.** Wind turbines cannot be placed within the national ecological network zones, zones of excellent agricultural quality lands, areas designated for landscape protection, landscape protection zones, and World Heritage and World Heritage candidate areas. The municipal government can designate areas for installing wind turbines in the local building regulations, where the general building height limit does not have to be applied.

Government Decree 650/2023 (XII. 28.) distinguishes additional "simplified areas," which could mean accelerated licensing, as the processing time limit for the competent authority in environmental and construction permitting procedures is a maximum of fifty days. The definition of the thresholds defining the simplified areas is confusing. According to the position of Energiaklub, in practice, this could imply which stakeholders might be favored, suggesting that the designation of simplified areas could overly restrict real market competition. They also have reservations about whether the regulation prioritizes economic efficiency, return on investment, and energy considerations.[57] **Despite the simplifications, new wind turbines are unlikely to connect to the system before 2029, although there is a significant need for balancing capacity.**

Since the mid-last decade, the Hungarian government has pursued what is known as a high-pressure economic policy, with the Hungarian National Bank (MNB) and the state or partially state-owned banks being partners until the end of 2022. One element of this economic policy was the placement of favorable loans and maintaining a low-interest rate environment. One example among many is that, from 2021, MNB introduced a capital requirement discount for corporate or municipal project loans and investment loans placed by the banking sector that finance renewable energy investments. The turn of 2022-2023 marked a turning point, certainly in the national bank's approach. However, access to credit is currently not a problem, as Hungarian banks "favor" RES projects. Market players can easily obtain loans with a good sales and business plan. It is advantageous if the producer has a PPA contract for several years with low-risk, high-revenue companies or if a part of the sales is in the old KÁT system because it represents

54 https://www.retivarszegipartners.hu/suss-fel-watt-az-epitmenyi-jog-varhato-szerepe-a-naperomuvi-beruhazasokban/
55 https://www.economx.hu/magyar-gazdasag/ingatlan-epitmenyi-jog-foldhasznalat-hasznositas.774690.html
56 https://www.portfolio.hu/ingatlan/20230522/kinek-lesz-fontos-az-epitmenyjog-bevezetese-igy-latja-a-szakma-a-kormany-legujabb-donteset-616590
57 https://energiaklub.hu/hirek/velemenyunk-a-szeleromuvek-tarsadalmi-egyeztetesre-bocsatott-szabalyozasarol-5187

fixed revenue independent of volatility (but today, PPA contracts are more common because of the higher available price). When applying for a loan, the real estate legal status of renewable power plants or the duration of the term could pose a problem, as banks prefer terms shorter than 20 years.

The public typically aligned with grant waves, awaiting their announcement. These grants often came with state-subsidized loans. For example, starting in January 2024, it is possible to apply for the installation of HMKE with a 4-5 kW inverter and a 7.5-10 kWh capacity storage. The grant can cover up to 66% of the total investment cost but no more than 5,000,000 HUF. (This is the first residential grant where storage installation is mandatory.) The budget is sufficient for the installation of more than 15,000 HMKEs. Besides these grants with an intensity of 50-66%, a favorable, state-supplemented savings scheme, the home savings plan, could also be used to establish solar panels or for energy modernization.

A significant deficiency is the lack of a developed financing system for utilizing geothermal energy despite the country's significant geothermal energy potential.

In Hungary, there was no need for a direct state investment support program to promote the spread of RES. Until the end of 2016, Hungary's electricity production growth was primarily supported by the so-called mandatory off-take system (KÁT system), which provided operational support (a guaranteed off-take price higher than the market price). From 2017, this was replaced by the Renewable Energy Support Scheme (METÁR).

For the public, there is a price cap known as "utility cost reduction" since 2013. The discounted rate is valid up to an annual consumption of 2523 kWh (monthly 210 kWh), with the normal (A1, A2) tariff at 36.9 HUF (0.095 EUR) /kWh, and the B tariff (controlled, "night" electricity) at 23.1 HUF/kWh. The reduced electricity prices, like market prices, do not change. The price of 1m3 of gas is roughly 102 HUF (0.26 EUR). Until August 2022, these prices were valid (for small businesses or municipalities as well), after which an "above average consumption" value was introduced, which is 676 HUF/m3 and 70.1 HUF/kW. The billions of euros in losses incurred by residential consumption during the 2022 energy price explosion were covered by MVM and, thereby, by the Hungarian state.

In 2020, in response to the extraordinary situation caused by COVID, Act LVIII of 2020 was introduced, in which the government established an FDI notification obligation for several sectors, including the energy sector. Government Decree 561/2022 (XII. 23.) further solidified and tightened this situation. Then, in December 2023, the government – quite unexpectedly – introduced a **state pre-emption right for solar power companies (non-household size)**. Government Resolution 1576/2023 specifies the details: the state acquires the solar park intended for sale through its pre-emption right, and then the Minister of Energy, acting as the owner, transfers it to MVM. This pre-emption right automatically deterred foreign investors, as the company's due diligence intended for purchase could cost tens of millions, or even more than a hundred million HUF (100,000-400,000 euros). The foreign buyer could lose the due diligence cost if the state exercises its pre-emption right. Introducing the pre-emption right affected project development companies the worst, as their projects became practically limited in marketability. This measure reduced the price of projects. In the short term, this benefits Hungarian buyers because more sellers have more projects at better prices. Only foreign buyers with high-risk tolerance or can exploit certain legal "loopholes" can enter the Hungarian market. Interestingly, following the issuance of the decree, MVM announced the purchase of a 63MW project within a day (though not necessarily citing the decree).

Distribution costs and connection fees have increased 2-6 times since 2020, although there was a minor reduction in January 2024. This significant increase was justified by the need to balance, maintain, and develop the electrical

grid. The residential "utility cost reduction" electricity price consists almost entirely of system usage fees.

Producers must pay the costs of balancing energy in proportion to deviations from the planned schedule, which has also significantly increased in recent years. **A business that often cannot adhere to the planned schedule and lacks energy storage capacity is no longer viable in the Hungarian RES market.**

The so-called Robin Hood tax, applied to the Hungarian energy sector, was introduced in 2008 as a temporary measure, with the tax base being 8% of the pre-tax profit. Its original purpose was to finance the loss-making district heating system from excess revenue. It's important to note the impact of the last 15 years of levies on energy trading and their current effects on the Hungarian energy market. **In 2010, the government imposed extra taxes on several sectors relating to net revenue until 2013.** This led to the withdrawal of several foreign energy traders from Hungary. Although the extra tax was phased out, the rate of the Robin Hood tax was increased to 31% in 2013 and then unexpectedly raised to 41% by Government Decree 496/2022 (XII. 7.). This means that, together with corporate tax, the total deduction is approximately 50% (the tax base is not entirely comparable, and this approximate value holds if the company cannot utilize certain tax-reducing opportunities). **It's crucial to add that the tax affects energy producers, traders, and electrical grid operators.** The only exceptions were RES producers still in the old KÁT-METÁR support-offtake systems. However, they were also affected by the tax increase since, **unexpectedly, in June 2022, RES (except biomass) was also subjected to the tax, and from November 2022, balancing electricity as well.** Overall profits greatly increased in 2022-2023, but such deductions and future political risks hinder investments. The withdrawal of foreign energy traders has led to a decline in traditional, physical delivery energy trading, while the role of derivative trading exempt from the Robin Hood tax has increased (over 90%). When the government suddenly excluded small and medium-sized enterprises from the "utility cost reduction" in 2022, these companies had to enter into contracts with traders. These companies either received no offers from traders or were only offered electricity at the high current HUPX stock exchange price tied to the daily rate.

With such fees and taxes and without storage capacity, the return on investment for a newly built non-residential solar power plant investment is highly questionable.

The Hungarian energy sector is partially overseen and regulated by the Ministry of Energy. MAVIR, the Transmission System Operator, is responsible for the continuous operation and development of the transmission network and operates the Hungarian Electricity Exchange (HUPX). The Hungarian Energy and Public Utility Regulatory Authority (MEKH) specifies the conditions for licensable and related activities in permits and oversees compliance with relevant sectoral legislation. It also establishes electricity system usage fees and determines the justified costs of licensees.

While Hungarian legislators and regulators act in the interest of the energy system's stability, sustainability, and green transition, this does not mean that Hungary is free from the **detrimental effects of over-bureaucratization or under-regulation in certain cases**. The European Commission's expectations for the Hungarian RRF program also highlight this. Procedures related to right-of-way have become significantly faster in recent years, and cable laying is also straightforward. Overall, "bureaucracy" is slow, with available deadlines being maximally utilized. Still, legislative efforts have recently been made to accelerate this process, mainly under the pressure of the European Commission, for the drawdown of RRF resources. The county-level government offices are the general territorial administrative organs of the government. They generally exhibit a customer-friendly attitude in energy and land office matters, but **interpretations of a question may differ between two government offices**. Additionally, a non-Hun-

garian investor cannot conduct affairs without knowledge of the Hungarian language or without Hungarian assistants. MEKH is a well-functioning organization characterized by a customer-friendly and direct approach.

Reducing bureaucracy (overall) would be necessary for biogas power plants, but a regulatory definition of the feeding and trading frameworks for "green gases" is also needed.

An example of under-regulation could be the case of small-scale solar power plants under 0.5MW but not household-sized, especially if they are established on less fertile land, where almost no regulatory site inspections (e.g., soil protection) are conducted. In some cases, the connection of HMKE power plants to the bureaucracy has hindered residential projects, imposing excessive burdens on the companies implementing the installations and the applicants. According to an amendment published in December 2023, the administrative burdens on network licensees are reduced from this year, but its practical operation is yet to be seen.

The problems that can arise are well illustrated by the 2021 residential solar panel grant case. The supporting documents were delayed by about half a year, after which the installation could be carried out. Still, the accounting could not be uploaded to the grant website, so the contracting companies received only an advance even after two years. In the case of the most recent residential grant in January 2024, the client portal suffered a denial-of-service attack due to the high number of interested parties.

The expansion of the Paks nuclear power plant carries the most significant risk of corruption. Confidence is not enhanced by the fact that business and technical data contained in contracts concluded by the commissioned Russian and Hungarian organizations and their subcontractors, as well as data related to the preparation of the implementation agreement and the treaty that underpin decisions, cannot be made public as data of public interest for thirty years from their creation.

Since the mid-last decade, certain emerging economic interest groups close to the government (typically Hungarian and Turkish) have been aiming to establish non-household-size solar power plants. Several investigative reports were published on this between 2015 and 2022. These business circles were capital-strong, well-informed, and possibly easily obtained loans under more favorable conditions. At the same time, the then-prevailing off-take system, KÁT, provided a favorable return, enabling payback well within ten years. Briefly, one of the electrical grid service providers and the largest Hungarian thermal power plant came under the ownership of a well-known government-close entrepreneur. Still, these were repurchased by the state and transferred to MVM, and the circumstances of these transactions were extensively discussed in the Hungarian press. **It is conceivable that the lobbying power of certain groups is behind the fact that no new wind turbines could be built, while there is a need for them due to the diversification of renewables**. (They can be operated profitably, and the power plant is easily marketable.) Widening the decision-making process, making it more transparent, opening it up (to regulators, offices, municipalities, civil society), and decentralizing it could benefit. The corruption risks in Hungary are a continuous subject of debate both within the country and the European community.

Since 2010, the Fidesz-KDNP party alliance has won the elections, achieving a constitutional two-thirds majority in the legislature on each occasion. **A declared goal was for domestic capital to surpass international in the energy sector.** Following the 2008 crisis, the decrease in demand and energy prices led many multinational companies in the sector to offer their devalued properties for sale. The buyers were mostly the state, municipalities, or government-close private companies. Therefore, in several stages from 2010, power plants, universal service, and competitive market electricity and gas suppliers; utilities; district heating, water utility, waste management companies, gas storages, etc., were acquired. By the middle of the previous decade, the "Hungarian majority" was realized. However, the share

of foreign energy companies in investments remained significant. The Hungarian ownership mainly increased in areas where the state diverted profits or reduced residential burdens, e.g., the "utility cost reduction" concept was central to the government parties' 2013-14 election campaign. **This resulted in a lack of investments for years, especially in district heating and water utilities, where disruptions occurred** (today, 25-33% of drinking water leaks into nature). The state-owned MOL, with the state holding shares granting voting majority rights, must be mentioned. MOL is a leading player in the Hungarian and a significant player in the Central and Eastern European oil and energy market. From this year, the entire Hungarian waste management (MOHU) also belongs to the MOL group. Additionally, the government created the MVM group, which operates in electricity production, transmission, system control, and electricity trading.

Since 2016, Hungary has been in a near-constant crisis or emergency, with special legal orders. This means, in short and simplified terms, that **government decrees can bypass parliamentary legislation. Nearly hundreds of government decrees are issued yearly, citing the emergency situation.** While this allows for quick and often flexible legislation, it does not favor social consultation, clash of professional viewpoints, or the maturity of laws. Stakeholders often learn about changes to the laws surrounding their lives from the Hungarian Official Gazette, sometimes just before midnight for the next day. In the energy sector, the constructive intention of legislators is generally not questioned, but social consultations and the viewpoints of other professions and scientific fields often do not sufficiently appear. **2022 and 2023 were eventful in the energy sector due to debates over feed-in bans and the accounting methods for residential power plants. The proposition to abolish the annual net metering for HMKE power plants (even for already contracted customers) caused a storm that the government backed down due to political risks, as it would have affected the return on investment calculations of approximately 200,000 households.**

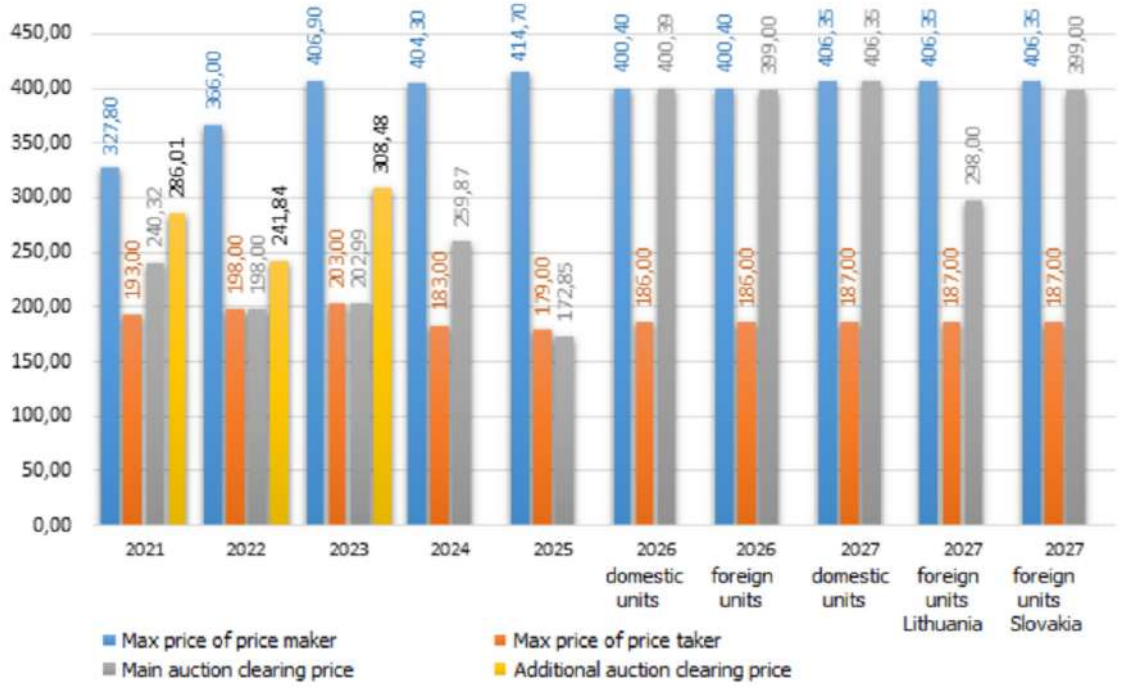
Due to the rapid legislative practice discussed above, definitional errors or imprecise formulations often occur. A benefit of rapid legislation is that these can be easily corrected. A current, unresolved example is the requirement for "nearly zero" energy building levels on new constructions, which mandates an average renewable energy share of 25%. Solar panels cannot yet be operational during the construction of a new property; they can only be connected to an existing electricity meter, which contradicts the "nearly zero" program. Another example is the definition of "simplified areas" in Government Decree 650/2023 (XII. 28.).

Poland

The Polish electricity sector is partly privatized. It has legally unbundled companies, most of which belong to vertically integrated entities. Vertically integrated state-owned entities have taken some important privatization steps since 2008[58], however, the process has not been fully finished. In 2011, legislative changes in Poland were started, which aimed at introducing significant changes to the Energy Law to implement the Third Energy Package (concerning common rules for the internal market in electricity), and these changes came into force by way of an amendment to the Energy Law on 11 September 2013. This amendment to the Energy Law provided for, amongst other things, the implementation of the Transmission System Operator (TSO) certification and unbundling regime, new regulations concerning micro installations, new regulations supporting the grid connection of renewable energy sources (RES), and regulations relating to the statistical (i.e. virtual) transfer of energy produced by RES between EU member states. Later, the new Renewable Energy Sources Act came into force, which changed the principles of the RES support system. The green certificates system was replaced for new installations with a new auction-based system.

[58] https://cms.law/en/int/expert-guides/cms-expert-guide-to-electricity/poland

Graph 29. Prices in auctions 2021-2027 [PLN/kW/year]



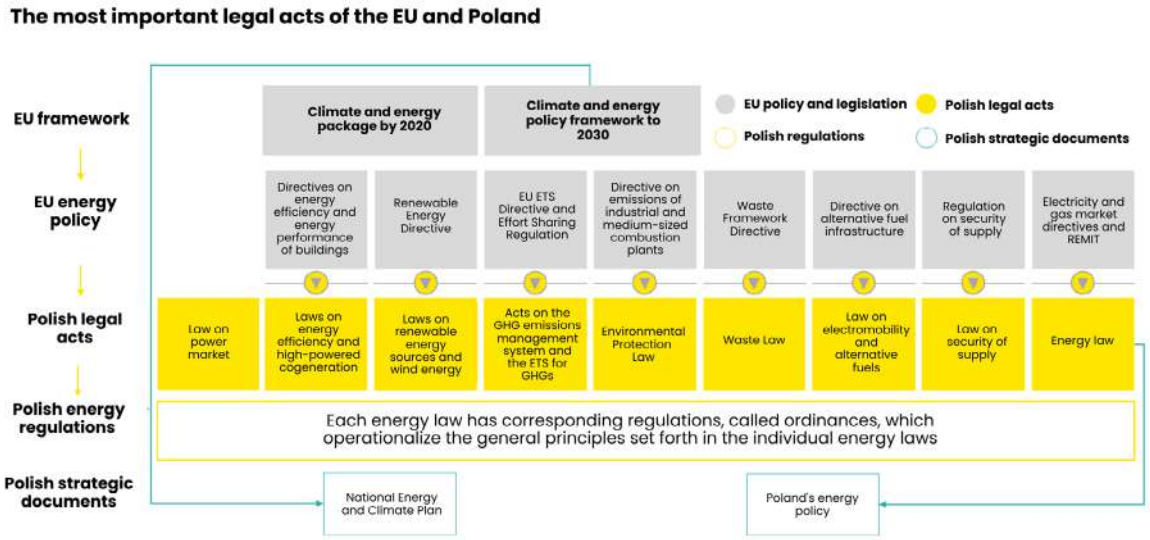
Source: https://cms.law/en/int/expert-guides/cms-expert-guide-to-electricity/poland

The Polish energy sector requires significant investment over the next ten years because existing and often less efficient generating stations must be decommissioned in line with EU regulations regarding CO_2 and other environmental restrictions. Poland also needs to modernize and develop the transmission and distribution networks, particularly in northern Poland, where many new renewable energy projects are located. The country has problems allowing grid connection due to a lack of capacity. The Polish TSO also needs further investments in new interconnections with neighboring countries in line with the goal of a single EU energy market. All of these challenges motivate politicians to introduce amendments to laws often.

Entities operating in the Polish regulatory reality often stress the complexity of the legal environment. The energy market is overregulated and legally embroiled. Frequent changes to the law, introduced by amendments grouped into packages of issues referring to various legal acts, often make it difficult to keep up with the currently applicable legal order. Although the structure of legal regulations in Poland relating to the energy market seems quite clear in the graph below, many provisions and definitions are inconsistent between the acts. Operating on the energy market in Poland requires specific competences or the support of a specialized law firm, many of which are on the market.

A licensing regime regulates the electricity sector. Generally, a license is required from the ERA President for generation (which includes an entitlement to sell the electricity), transmission, distribution, and trading. Before construction commences, the developer must obtain a land management decision (no title to the site necessary at this stage) and then a construction permit (securing title to the site, e.g., ownership or lease is required beforehand). A land management decision is only needed if no local development plan is adopted for that area. The relevant local authorities issue both decisions. The construction process usually also requires an environmental impact assessment. Finally, the facility must obtain an operating permit. This involves a number of approvals from the police, fire unit, sanitary inspector, etc.

Graph 30. Polish energy law system construction and complexity



Source: https://cms.law/en/int/expert-guides/cms-expert-guide-to-electricity/poland

Table 12. Institutions that play a crucial role in the process of Polish legal system creation

Key institutions	Main bodies	Responsibilities
European Union	• European Commission • European Parliament • Council of the European Union	• Development of European energy and climate policy • Development of binding European regulations • Approval of national policies
Government and Parliament of Poland	• Parliament and Senate • Council of Ministers • Ministry of State Assets • Ministry of Climate and Environment	• Development of national policies • Development of national regulations
Local authorities	• Provincial Office • District office	• Local taxes • Issuing construction and environmental permits
Regulatory and Energy Office	• President of the ERO	• Regulation of energy and fuel markets and promotion of competition in the energy sector • Granting and revoking licenses and approving and controlling tariffs • Monitoring the operation of gas and electricity systems
Office of Competition and Consumer Protection	• President of the OCCP	• Forming antitrust and consumer protection policies and tracking state aid • Controlling the conduct of policies that restrict competition and controlling mergers and acquisitions
Office for Personal Data Protection	• President of UODO	• Supervising and ensuring compliance of data processing with data protection regulations • Issuing decisions on the enforcement of data protection regulations
Electronic Communications Authority	• President of UKE	• Managing telecommunications activities
Agency for Cooperation of Energy Regulators	• Director of ACER • Board of Regulators • Administrative Council • Board of Appeals	• Supporting the development of common principles and initiatives • Energy infrastructure • Monitoring the energy market

Source: own study, Warsaw Enterprise Institute

Among the group of several investment barriers in Poland we can indicate:

Lack of transparency, quality and stability of the created law

Conducting consultations and talks with the industry on legal acts, laws, and regulations, as well as strategic documents affecting the development of the industry in recent years, has been a very poor process. After the government change, it is necessary to improve the quality of the created law and the quality of regulatory impact assessments prepared based on energy market analysis and verifiable data on this market. Additionally, and it should be emphasized, stable regulations reduce the costs of transformation for the entire economy - they provide certainty and predictability, which results in lower capital costs, greater willingness to provide financial support for projects, and an affordable offer for energy consumers. The stability of the law is a factor that investors in Poland would appreciate a lot.

Complexity of the investment process

Today's investment processes require deregulation due to the significant number of decisions and permits needed to be obtained before investing. For example, for onshore wind projects, it takes, on average, 6 years, and for the first offshore wind farm (Investor: Baltic Power), it took 13 years. The time of administrative proceedings and court and administrative proceedings should be shortened (especially if the regulations grant an increasingly broader catalog of rights to external entities, including ecological organizations). Examples:

- difficult rules for issuing permits for the construction of renewable energy sources in post-industrial areas;
- locating solar sources with a capacity above 1 MW only based on the local development plan;
- heating networks should be exempt from the obligation to conduct an environmental assessment, as with electricity and gas networks.

Centralization and monopolization of the energy market

Consolidation of some generation assets in one large enterprise may help accelerate the transformation of the country. Still, it is burdened with significant risk resulting from taking dominant positions (e.g., for many years, NABE was developed to concentrate coal assets responsible for 60% of energy production in Poland). There is a risk that asset valuations during monopolization processes will not be carried out reliably, and, as a consequence, public aid will be accumulated on uncompetitive terms. The employee programs planned at NABE give significant advantages to employees employed there compared to other companies and do not encourage them to change industries or acquire new competences. As a result of the not fully transparent energy market (the stock exchange obligation was abolished in Poland during the last energy crisis), this company would hold a dominant position in the market in terms of shaping energy prices and limiting connections to the network. After the last elections (October 2023), the idea of NABE has evolved, but there is no clear information on whether it will be continued.

Table 13. Market shares and concentration of the generation subsector*

Year	Number of companies holding at least a 5% share in installed capacity	Number of companies holding at least a 5% share in electricity fed into the grid	Share of three largest entities in installed capacity [%]	Share of three largest entities in electricity fed into the grid [%]	HH	
					Installed capacity	Electricity fed into the grid
2020	3	4	58,3	63,8	1 562,2	2 019,9
2021	4	4	54,5	67,1	1 370,6	2 198,9
2022	4	4	48,3	66,1	1 156,7	2 088,1

** For all entities operating in the generation sector, which are subject to an obligation of reporting statistics, including installed capacity and energy fed into the grid from wind and hydro sources. When calculating the market share ratios of the three largest entities and HHI ratios, both according to the energy fed into the grid and the installed capacity, the structure of the entities as at 31 December of the examined year was taken into account.*

Source: Data of the Ministry of Climate and Environment and URE.

Tariffing of heat prices

Currently, the pricing scheme for end users of electricity and heat is highly regulated. This is intended to ensure supply security to recipients and cover justified costs resulting from production and transmission/distribution. However, in the case of heat, the price formation mechanism and the tariff approval process do not reflect the dynamic changes in the market (e.g., the variable cost of CO_2 emission allowances) and do not constitute a sufficient incentive for investment. Actions that can be considered include:

- introducing tariff approval multiple times a year (e.g., twice - following the Czech solutions),
- controlling approved tariffs ex-post, not ex--ante (control of tariffs by the regulatory body after their approval),
- the ability to consider the most current economic indicators in tariff changes.

Subsidies from public funds to support the energy sector

Public support harms competition in the energy market. Reducing the mandatory share of green certificates submitted for redemption to 5% for 2024 (compared to the current level of 12-13%) well reflects the effect of unstable regulations: there is a drastic drop in certificate prices with a simultaneous decline in interest in trading in property rights, which leads to a decline in the actual level support for renewable sources. Other examples: in the past, the reference prices for renewable energy auctions published by the Energy Regulatory Office did not consider market realities, including those resulting from the inflation rate. The cogeneration support system is ineffective - once again, no entity submitted an offer for a cogeneration bonus last year. In Poland, it is urgent to support the development of Polish net zero industry and energy transformation using already available and new financial mechanisms, including EU financing.

Lack of transparency in issuing electrical grid connection conditions

The ability to connect new generating units to the power grid is currently the bottleneck of Poland's renewable energy sources industry. Currently, the process of issuing connection conditions is monopolized by electricity network operators under the supervision of the regulatory body. Distribution system operators do not consider the actual generation capacity of given installations depending on their type, which leads to an artificial increase in power (after considering the installed capacity) and limits the possibility of connecting new sources. The introduction in 2023 of tools such as cable pooling and direct line should be assessed positively. Still, a real revolution is required in managing already issued connection conditions so that connections are not blocked by investments that are implemented only in theory.

Lack of long-term, strategic planning

Updating the National Energy and Climate Plan and "Energy Policy of Poland" is crucial to ensure ambitious goals in the field of energy transition. Strategical planning also includes the need to supplement the "Polish Industrial Policy" with provisions regarding constructing a strong net-zero industry as an opportunity for the Polish economy and innovation. Updating the "Strategy for heating" has been a long process for several years. Updating the "Spatial Development Plan for Polish Maritime Areas" is needed to identify new areas where it would be possible to implement further offshore wind farm projects. Preparing staff necessary for the growing renewables sectors - providing tailored educational and reskilling programs is one of the most important tasks. Creating mechanisms enabling the involvement of local producers as part of tax deregulation and reducing the number of required licenses and permits determined at the EU level would be consistent with European industrial policy and the interest of the Polish economy. The provisions of EU regulations are usually not implemented in national law on time. It is crucial to create appropriate administrative support and coordinate work within ministries to accelerate investments in energy transformation, construction of new private sectors, and net zero industry, which will be one of the pillars of the economy. The new government in Poland, which is starting from scratch in many areas, seems to have a lot of work to do.

Insufficient regulations regarding green gases

This point differs from all the others because it is not about overregulation but under underregulation. This especially includes hydrogen - due to the lack of changes in the Energy Law in terms of the development of the hydrogen economy, many investments in the hydrogen value chain in Poland cannot be carried out. This is one of Poland's most important barriers to creating a low-emission (including renewable) hydrogen market. Regulations regarding biomethane entered into force only on October 1, 2023. We will have to wait for the effects (so far, no biomethane plant has been built in the country). Regulations should be simple and based on quick issuance of licenses and permits.

Barriers to the development of RES in particular

The development of renewable energy sources (RES) in Poland faces various economic, technical, and regulatory barriers. In almost the last decade, the energy transition was perceived by the ruling party as an externally imposed concept, and, unfortunately, the climate around investments in renewable sources was not favorable. There is even a saying that renewable energy was developed in Poland despite poor political intentions and unfavorable regulations. With the change of government after the October 2023 parliamentary elections, the situation seems to be changing. The new government declares that it is determined to accelerate the energy transition. This does not change the fact that the obstacles observed in recent years still remain in force.

- **Low energy efficiency:** In many areas in Poland, energy efficiency is low. For several years, despite existing EU requirements and regulations, Poland lacked adequate energy efficiency standards in buildings and industry - which may have made RES investments less profitable. Poland is only now, belatedly, implementing European directives focusing on the issue of energy efficiency.
- **Lack of stability and market reliability:** RES investors need stable and predictable market conditions. Changes in regulations and energy policy can increase investment risks and reduce the attractiveness of RES projects. Since 2016, several regulations can be cited that have lowered the profitability of investment in RES sources, resulting in a conviction in the RES industry that it does not receive sufficient government support for uninterrupted development (and, on the contrary, many decisions restrict its uninterrupted development).
- **Lack of an adequate financial support system:** Poland lacks a stable and adequate financial support system for RES projects, including supply chain development (for offshore wind, for example). Mechanisms

such as feed-in tariffs, auctions, or energy origin certificates are volatile. They may be insufficient to attract investors, as both RES companies and financing institutions are saying openly.

- **Lack of adequate grid infrastructure:** Developing RES requires adequate transmission and distribution infrastructure, which is inadequate or outdated. At the same time, the issue of "alternative grids" or "local grids" as a potential substitute for the national system is perceived by mainly state-owned distributors (DSOs) as a threat, making the topic virtually nonexistent in the public debate. A part of the debate is separating DSOs from vertically integrated energy firms.
- **Public opposition:** In some local communities and regions, there was resistance to RES projects, especially wind and biogas, with concerns about the impact on landscape, health, or property values. While public acceptance is rather observed in locations where these investments already exist, investors nevertheless find the public consultation process time-consuming and work-consuming.
- **Competition from conventional energy sources:** Poland is still dominated by coal-fired power production, and prices in the Polish market are regulated, which may affect the competitiveness ability of RES. Subsidies and support for conventional energy sources (e.g., the so-called "capacity market") can hinder RES development.
- **Complex bureaucracy and administrative procedures:** Obtaining the necessary permits and decisions for RES projects is complex and time-consuming, and it has taken many years. Poland lacks effective legislative solutions that would allow "fast--track" investment.

In the offshore wind, one of the most important topics is solving the issue of the possibility of crossing submarine cables. Currently, it is not legally possible for the connection infrastructure of offshore wind farms to intersect or partially overlap due to the requirement for a separate location. The authorities refuse to initiate proceedings regarding cable permits for infrastructure in locations that conflict with other permits issued. They justify their decisions by the impossibility of issuing another permit for even a partially identical location. The limited space at the bottom of the Baltic Sea makes this a significant problem that requires an efficient but well-thought-out solution. A good idea would be to enable investors to conclude agreements regarding the infrastructure for extracting power from offshore wind farms.[59]

It is also important to conclude the discussion on classifying offshore wind turbine towers as buildings or technical devices constituting an integral element of an offshore wind turbine. The perception of offshore wind turbine towers as buildings by construction administration and construction supervision authorities may cause practical difficulties in building farms and putting them into operation. This classification determines what standards and regulations these elements will have to comply with. This matter should be resolved by classifying these elements as technical devices, as is the case in other European Union countries.

The regulations on obtaining and amending permits for artificial islands should also be adapted to technological progress, the improvement of which should be our priority in the context of energy transformation goals and the implementation of sectoral policies. Looking ahead, we should now be talking about introducing simplifications into the procedure that could be used to install infrastructure such as energy storage facilities or electrolyzers as part of implementing an offshore wind farm. Expanding investments with this type of elements should be carried out with the least possible burden of administrative procedures.

[59] https://offshorewindpoland.pl/derlikiewicz-lasocki-interwencja-ustawodawcy-w-zakresie-permittingu-w-offshore-wind-jest-potrzebna-w-kilku-obszarach/

In the case of offshore wind auctions, the first of which are scheduled to take place in 2025, certain doubts arise regarding the regulations regarding the practical aspects of the rules for participation and selection of entities in auctions. These rules should be clarified as soon as possible, with an auction taking place next year.

Distance Law – 10H rule in Wind Energy Investments Act

Onshore wind power in Poland has been growing for two decades. The installed capacity of wind farms exceeded a symbolic 100 MW in 2005 and is now close to 10000 MW. However, a distance law introduced in 2016 blocked onshore wind development for the next 7 years due to the 10H rule. The law was controversial from the beginning, with calls for its liberalization continuing practically from the moment it came into force. The need for a transition from fossil fuels and the energy crisis caused by the Russian invasion of Ukraine required the government to accelerate its work in this regard. Finally, the Polish government in 2023 concluded liberalization of this 10h rule, which the 2016 Distance Law introduced. The President of Poland signed the windmill law amendment on March 13, 2023[60].

For nearly 2 years of discussions, power companies were assured by the government of a minimum distance of 500 meters from buildings. They were preparing new wind projects under this distance. Parliament, however, regardless of this wide consensus, increased this distance to 700 meters, which companies were not anticipating.

By the new rules, wind turbines may be located only based on a Local Spatial Development Plan (LSDP) at a minimum distance of 700 m from residential buildings. The exact distance between 10H (tenfold the turbine tip height) and 700 m from development will be determined based on the outcome of the strategic environmental impact assessment (SEIA) carried out within the LSDP procedure. Municipalities cannot waive the SEIA. Furthermore, the Act lays the minimum distance between wind turbines and power lines. The amendment maintains the 10H rule for national parks and establishes a limit of 500 meters for nature reserves. For other forms of nature conservation, the distance stems from the environmental decision for a given installation. The Act maintains the ban on building wind turbines in national parks, nature reserves, landscape parks, and Natura 2000 sites. It completely repeals the ban on the construction of residential buildings near existing wind farms.

By the new regulations, a wind farm investor will offer at least 10 percent of installed capacity to inhabitants of the municipality where the wind farm is to be built to be used in the capacity of a virtual prosumer.

The new works on another amendment to the Wind Energy Investments Act aiming for a 500 m minimum distance between wind turbines and development admissible under certain conditions. In IIQ2024, we expect open consultations regarding this new act.

Tax law threats to the energy industry

The possible introduction of a Windfall tax

A proposal to introduce a so-called windfall tax or Windfall tax, is increasingly being raised in Polish public discussions.[61] It is a form of taxation for companies that make unusually large profits by imposing a higher tax rate on such companies. The practice has already been applied in Austria and Italy, while in France, England, and Spain, it has mainly covered gas and energy companies. Undoubtedly, companies in the energy sector generate huge profits. Nevertheless, introducing a new tax for this industry could create several negative consequences. First, there is

60 https://www.trade.gov/market-intelligence/poland-onshore-wind-energy-10h-distance-rule-liberalized

61 See, for example, Windfall tax will make you run out of money. Will the Tusk government reach into the pockets of entrepreneurs? https://businessinsider.com.pl/biznes/windfall-tax-sprawi-ze-zabrakne-pieniedzy-czy-rzad-tuska-siegnie-do-kieszeni/tvqwc0l (accessed: 4.02.2024).

a fear that these companies will lose the incentive to continue developing in Poland, which may discourage them from investing in the country. The legislator should consider applying a subject exemption for green energy producers. The exemption would deplete revenues to the state budget and require the creation of appropriate conditions for the exemption application but it would encourage entrepreneurs to invest in renewable energy sources.

Carbon allowance, mine fuel support. Does the renewable energy industry have any chance?

According to a recent study, in 2023, coal's share of domestic electricity generation declined to 63%, renewables rose to 27%, and the share of gas was 10%.[62]

A huge problem is the continued government support for coal production. For example, it is worth pointing to the Coal Allowance Law. Its main purpose is to support households where the household's main source of heating is a solid fuel boiler, fireplace, goat, air heater, cooking range, stove, coal kitchen, or tiled stove. The use of any of the listed items hurts the environment.

Given the above, the government should expand tax exemptions and shorten the duration of procedures for installations and projects for selected renewable energy sources for those who want to use renewable energy sources. This is mainly because, in Poland, the coal lobby is very strong. Moreover, coal is an important backbone of the economy, so the process of making easier access to the market for renewable energy sources can be very long and complicated.

The development of RES in Poland requires action on many fronts, including adjusting regulations, creating stable market conditions, modernizing energy infrastructure, and educating the public. With these barriers overcome, Poland will be able to use the potential of RES more effectively and contribute to sustainable energy development.

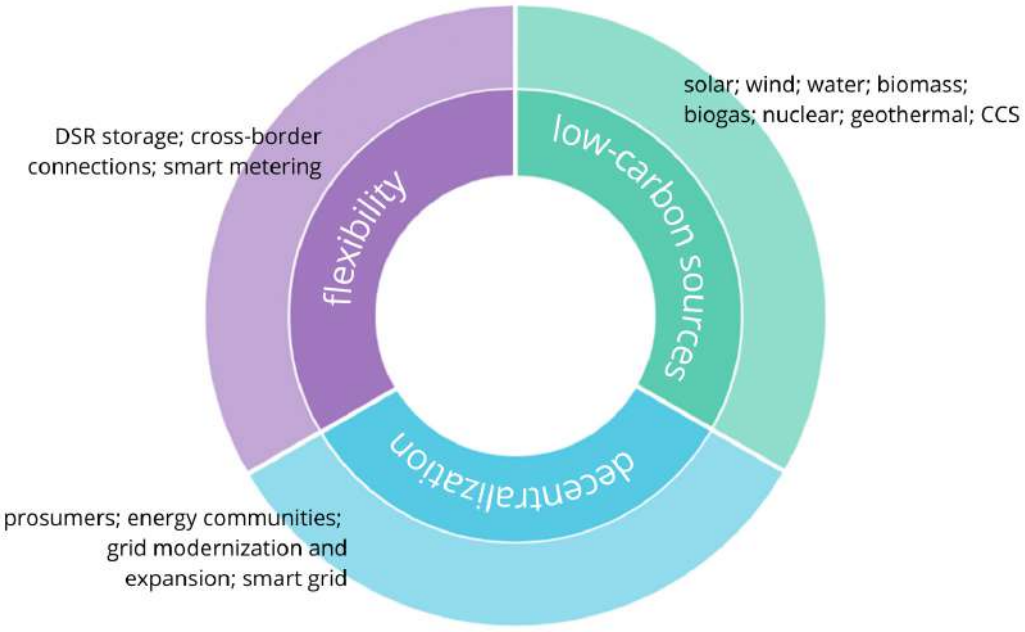
Recommended direction for the development of the energy market in Poland

In the coming years, the changes in the Polish grid system will be based on three pillars: flexibility, decentralization, and large-scale development of low-carbon energy sources. The following arguments support this:

- Predictions for the cost of fuels and CO_2 emission licenses indicate that RES sources will be the cheapest available energy source in the future.
- RePowerEU expects RES to contribute 45% of final energy consumption in 2030.
- In the coming years, Poland's key to energy safety will be its independence from fossil fuel imports.
- The idea of green strategic autonomy considers the need to work towards the EU's energy and strategic security through decarbonization.
- The removal of legislative and market barriers to RES development in Poland is an urgent need.

62 The share of coal in the power industry has fallen to 63%, https://wysokienapiecie.pl/96011-udzial-wegla-i-oze-w-polsce-2023/ (accessed: 5.02.2024).

Graph 31. Net zero power generation



Source: WiseEuropa

So, the goal of the gigantic investment campaign in energy infrastructure we are currently witnessing is to guarantee the Polish economy and all consumers an adequate supply of electricity from sustainable sources and at affordable prices at the same time. This is a time- and work-consuming process. When we look at the future with the perspectives of 2030-2040-2050, we lose sight of the next 3-5 years, in which the national power system will face more challenges and problems than before. There is a risk of system imbalance now, and prices are higher than in other European countries (including CO_2 costs). The actions and decisions taken should guarantee Poland's security during the transition period. Without a decrease in the availability of power in the system, without a generational gap from RES, and without exorbitant energy prices compared to Europe. At this point, it is essential to engage the financial potential of private investors, so the broad promotion of free-market solutions in all energy transition processes. Poland needs tools upon which industry can smoothly and unobstructedly guarantee its access to sustainable energy (own installations, cPPAs/vPPAs, participation in energy clusters, and energy communities). Hence, the crucial thing today is to clearly name the legislative, administrative, and financial barriers to developing private energy investments in Poland and guarantee the optimal environment for investors as soon as possible.

Romania

Law 123 / 2012 – The Electricity and Natural Gas Law[63]

To comply with the European Union's Third Energy Package requirements, the Romanian authorities adopted a new electricity and gas law (Law no 123/2012) in July 2012. This law outlines the legal framework for operating Romania's electricity and natural gas markets. This law impacts companies wishing to connect to the power grid in several ways, creating potential barriers to entry. These barriers are primarily regulatory in nature.

Barriers:

1. Companies seeking to connect to the Romanian power grid must obtain various licenses

[63] https://lege5.ro/Gratuit/gmzdenjwga/energia-electrica-lege-123-2012?dp=gyytmmbyha2tg

and permits from the Romanian Energy Regulatory Authority (ANRE). This process can be complex, time-consuming, and costly, which may deter smaller players or new entrants who lack the resources or expertise to navigate the regulatory landscape.

2. To ensure the stability and safety of the power grid, companies must meet stringent technical and operational standards. These requirements can include significant investments in infrastructure, technology, and expertise. Compliance with these standards can be a significant barrier for companies that do not have the necessary capital or technical capability.
3. The costs associated with connecting to the power grid can be high. These costs can include the physical connection and contributions to the development and strengthening of the grid infrastructure. These financial obligations can be prohibitive for smaller or newer companies attempting to enter the market.
4. In some areas, the power grid may have limited capacity for additional connections. This limitation can act as a barrier to entry, as new entrants must wait for grid expansion or enhancement before connecting. This can delay market entry and increase costs.
5. As in many countries, The regulatory environment for energy in Romania can be subject to change. Changes in regulations, policies, or incentives can introduce uncertainty for companies looking to connect to the grid, potentially affecting their business models and investment decisions.
6. The existing market structure and the presence of established players can also act as barriers. New entrants may face challenges securing access to the grid in a competitive market, where incumbent utilities may have preferential treatment or existing contracts that limit access for new competitors.
7. The law allows regulators to fine electricity and natural gas companies (producers, suppliers, and grid operators) up to 10% of their annual sales revenue. These fines address non-compliance with a set of obligations meant to protect the interests of end consumers
8. Limited PPA flexibility: Bilateral negotiated Power Purchase Agreements (PPAs) are only allowed for renewable projects commissioned after June 2020, potentially hindering investment in existing ones.

Overall, while Law 123/2012 aims to regulate the energy market and ensure the stability and safety of the power grid, its requirements and implications pose significant challenges for companies looking to enter the market.

Law 220/2008 on the Promotion of Energy Production from Renewable Energy Sources

This law establishes Romania's support scheme for renewable energy sources (RES). While it aims to encourage renewable energy development, the complexity of the accreditation process, the fluctuating nature of green certificates, and changes in support schemes can pose challenges for new entrants. Compliance with the specific requirements for renewable energy projects can also be a significant barrier, especially for smaller players or new entrants.

The law was designed to incentivize the development of renewable energy. However, despite its positive intentions, the law also inadvertently created several barriers to entry for companies looking to invest in the renewable sector. These barriers are largely due to the regulatory, financial, and administrative complexities the law introduces and its subsequent amendments.

Barriers:

1. Companies seeking to benefit from the support scheme need to undergo a detailed accreditation process with the Romanian Energy Regulatory Authority (ANRE). This process involves obtaining preliminary accreditation when the project is approved and final accreditation after completion. The process can be time-consuming and requires detailed documentation, creating delays and additional costs for new entrants.

2. The support mechanism, primarily through green certificates, has undergone several changes since the law's implementation. The price for green certificates and the number of certificates awarded have been adjusted multiple times, creating financial uncertainty for investors and developers. This volatility can deter investment in renewable energy projects due to difficulty forecasting returns and securing financing.
3. The value of green certificates is subject to market demand and supply. There have been periods when the market was oversupplied with green certificates, leading to a significant drop in value. This uncertainty in the green certificate market can pose a financial risk to new entrants, who rely on selling these certificates to ensure the profitability of their projects.
4. Projects often face administrative and regulatory delays, including the slow processing of permits and authorizations required for construction and operation. These delays can increase the project timeline and costs, impacting renewable energy investments' overall feasibility and attractiveness.
5. Similar to Law 123/2012, Law 220/2008 new entrants face challenges related to grid connection. The capacity of the grid to absorb renewable energy can be limited, and priority access is not always guaranteed. Additionally, the costs associated with connecting to the grid and potential required upgrades to accommodate new renewable energy sources can be significant.
6. The renewable energy policy landscape in Romania has seen several shifts since the enactment of Law 220/2008. Changes in policy, including adjustments to the support scheme and taxation, add an element of unpredictability, complicating long-term planning and investment decisions.

These barriers, resulting from the complexities and uncertainties within the law and its implementation, can significantly impact the willingness and ability of new companies to enter the Romanian renewable energy market.

Emergency Ordinance No. 33/2007

This ordinance outlines the organization and functioning of the energy sector, including the regulatory authority's roles and responsibilities. It sets forth licensing requirements, market access conditions, and operational rules for energy companies. The regulatory obligations and procedures established by this ordinance can be cumbersome and present entry barriers, particularly for companies not well-versed in navigating the regulatory environment.

Barriers:

1. The ordinance stipulates that entities engaging in energy production, transmission, distribution, supply, and trading must obtain specific licenses and authorizations from ANRE. These can be complex, requiring detailed documentation and adherence to stringent criteria. This represents a significant administrative and regulatory hurdle for new entrants, necessitating considerable time, resources, and expertise to navigate.
2. Companies must comply with various technical and operational regulations set forth by ANRE. These include standards for system operation, market participation, and consumer protection. Ensuring compliance with these detailed requirements can be challenging for new entrants, particularly smaller companies or those new to the Romanian market, requiring them to invest in legal, technical, and operational expertise.
3. The ordinance also sets the conditions for access to the energy market, including the rules for market participation and power grid utilization. Due to the regulatory, technical, and financial requirements, these conditions can limit market access for new entrants. Companies must demonstrate their ability to meet these conditions, which can be particularly challenging for non-established players without existing infrastructure or contracts.
4. ANRE can set or approve tariffs and prices for energy services, including transmission, distribution, and supply. This regulatory oversight can impact the business models of new entrants, who must align their pricing

strategies with regulatory expectations, potentially affecting their competitiveness and profitability.

5. The ordinance gives ANRE significant regulatory authority, including the power to modify licenses and authorizations, enforce penalties, and implement new regulations. While necessary for market oversight, this regulatory power can introduce uncertainty for investors and companies considering entering the market, as regulatory changes can impact business models, investment returns, and operational costs.

Law 50/1991 for the Authorization of Construction Works

Although not specific to the energy sector, this law impacts companies aiming to develop new energy infrastructure or facilities. Obtaining construction permits and complying with zoning and environmental regulations can be a complex and time-consuming process, which may deter or delay project development.

Barriers:

1. Obtaining construction permits under Law 50/1991 can be a lengthy and complex process. Companies must navigate through multiple stages of approval involving various local and national authorities. The process requires submitting detailed documentation, including environmental impact assessments, urban planning approvals, and safety assessments. Delays in obtaining these permits can lead to significant project setbacks.
2. 2Projects must comply with strict environmental and zoning regulations. Companies are required to conduct environmental impact assessments and obtain environmental approvals, which can be challenging, especially in ecologically sensitive areas or regions with strict land-use policies. Ensuring compliance with these regulations can add complexity and time to project timelines.
3. Law 50/1991 mandates public consultations for certain construction projects. While this is important for ensuring community involvement and addressing public concerns, it can also introduce delays and uncertainties in the project approval process. Opposition from local communities or environmental groups can lead to further scrutiny and potential project modifications.
4. Under Law 50/1991, the permitting process can be fraught with bureaucratic hurdles and legal challenges. Companies may encounter inconsistencies in how different authorities interpret and apply regulations, leading to delays and increased costs. Additionally, the potential for legal challenges or appeals against issued permits can create uncertainty and jeopardize project timelines.
5. The various challenges of obtaining construction permits under Law 50/1991 can significantly impact project costs and feasibility. Delays in the permitting process can lead to increased expenses, affecting the overall financial viability of energy projects. Moreover, the requirement for additional studies, consultations, and modifications to comply with regulatory requirements can add further costs.
6. Companies must navigate local administrative practices and comply with local urban planning and construction standards, which can vary significantly across different regions and municipalities. This requires a deep understanding of local regulations and often necessitates the involvement of local experts or consultants, adding to the complexity and cost of projects.

Law 17/2014 provides Measures to Regulate the Sale and Purchase of Extra Land for Agricultural Purposes

While not directly related to the energy sector, this law can impact renewable energy projects, especially wind and solar farms that require large land areas. The law imposes restrictions on the sale of agricultural land to non-residents and outlines a preferential right to purchase for various categories of buyers. This can complicate land acquisition for projects, adding another layer of complexity for new entrants.

Barriers:

1. The law prioritizes the agricultural use of land, making it difficult for energy companies to acquire land for non-agricultural purposes. This is particularly challenging for large-scale renewable energy projects that require significant land areas, as they may compete with agricultural uses for the same plots.
2. Law 17/2014 grants pre-emptive rights to existing lessees, neighboring landowners, and certain state entities to purchase agricultural land before it can be sold to others. This can significantly complicate and delay the acquisition of land for energy projects, as companies must navigate the process of offering the land to these parties first and wait for their decision before proceeding with the purchase.
3. The requirements for notifying various parties of the intention to sell land and processing their responses add layers of bureaucracy and increase the time it takes to complete land transactions. These delays can affect project timelines and increase costs for energy projects with tight development schedules.
4. The restrictions on land sales can also lead to increased prices for agricultural land as the pool of available land for purchase becomes more limited. For energy companies, higher land costs can affect the financial viability of projects, particularly in highly competitive energy markets with tight margins.
5. For renewable energy projects that require contiguous pieces of land, the law can complicate the process of land consolidation. Dealing with multiple landowners and navigating the pre-emptive rights can make it difficult to assemble the needed parcels, leading to potential project delays or cancellations.
6. The complexity and uncertainty of acquiring agricultural land under this law can deter investment in energy projects. Investors may perceive increased risks due to potential delays, higher costs, and the possibility of not being able to secure the required land, impacting the overall attractiveness of energy projects in Romania.

Barriers of private (in particular) investments in the energy sector in Romania:

Complex and Time-Consuming Permitting Process (Law 50/1991)

Private sector companies, especially smaller ones or foreign investors unfamiliar with the local regulatory landscape, can find the lengthy and complex process for obtaining construction and operation permits particularly daunting. This can significantly delay project timelines and increase costs, affecting the financial viability of energy projects.

Licensing and Authorization Requirements (Emergency Ordinance No. 33/2007)

The requirement to obtain various licenses and authorizations from the ANRE imposes a substantial regulatory burden on private companies. The process can be time-consuming and resource-intensive, requiring detailed documentation and adherence to stringent criteria.

Fluctuating Support Mechanism (Law 220/2008)

The volatility in support mechanisms for renewable energy, particularly the changes in green certificate values and numbers, poses significant financial uncertainty for private sector investors. These fluctuations can impact the predictability of investment returns, making it harder for private companies to secure financing and plan long-term investments.

Pre-emptive Rights and Restrictions on Land Use (Law 17/2014)

The restrictions on selling and purchasing agricultural land for non-agricultural purposes, including the development of renewable energy projects, directly impact private companies looking to develop such projects. The law makes land acquisition more challenging, time-consuming, and potentially more expensive, which can deter private-sector investment in renewable energy.

Grid Connection Challenges

Private sector companies, particularly new entrants and those involved in renewable energy may face significant challenges connecting to the

grid, including high connection costs and limited grid capacity. These challenges can disproportionately affect smaller private companies that may not have the resources to navigate these issues as effectively as larger or state-owned entities.

Regulatory and Policy Uncertainty

Private companies are particularly sensitive to changes in regulatory and policy frameworks, which can impact investment decisions, project viability, and operational costs. Uncertainty in regulations, including potential changes in energy policy, licensing requirements, and environmental regulations, can pose significant risks for private sector investments.

Grid congestion for RES

Grid congestion in key areas for renewable energy sources (RES), caused by a lack of investment in the national transmission network, has left strategic regions for developing renewable projects without the technical capacity for integrating new production capabilities. This situation has hindered the completion of solar and wind industrial projects. Although legally, the network connection is not blocked, the earliest date when new electricity injections could be possible in regions like Dobrogea is 2025-2026.

According to a report done by the Competition Council,[64] the associations of energy producers signaled a series of challenges met when connecting to the grid

- The development of investments with potential speculative character. Many economic operators/investors have requested and obtained the technical connection agreement without continuing/completing the projects, leading to the development of a speculative market.
- Delay in grid expansion/strengthening works by the Distribution Operator. In cases where the connection solution requires network strengthening, the producer must pay a specific tariff.
- The lengthy duration of the connection process stages for renewable energy production capacities to the electricity transmission/distribution grid constitutes a significant part, about 30-40% of the total duration of the authorization process for a renewable energy power plant.
- The tariffs for grid strengthening works (also mentioned in the "RES Simplify" Report[65] of the European Union). The high level of these tariffs has prohibited the development of large-scale projects. Without support schemes, this tariff involves a significant risk for renewable energy project developers, which has hindered their development in Romania.

Regarding grid congestion in the most important areas for renewable energy sources (RES) for the connection of new electrical energy capacities to the electrical network, it was noted that the lack of investment in national grid infrastructure has left the most important regions for RES development without the technical ability to integrate new capacities, which has hindered many investments.

Slovakia

General description of barriers for investments/activity connected with energy transition processes:

Access to the power grid

In this context, the transmission network must be considered in terms of its two natural levels, the core transmission grid and three regional distribution grids. From the point of view of the development of new sources of electricity, both of these networks represent a constraint. Managing

64 RAPORT privind Studiul referitor la identificarea unor posibile bariere legislative la intrarea pe piață din perspectiva racordării noilor capacități de producere a energiei electrice din surse regenerabile la Sistemul Electroenergetic Național, inclusiv la rețelele de distribuție a energiei electrice, în ceea ce privește emiterea avizului tehnic de racordare la rețea https://romaniascout.ro/wp-content/uploads/2022/11/GEO-153_2022-Official-Journal-of-Romania-no.-1091-of-11.11.2022_en.pdf

65 Technical support for RES policy development and implementation https://op.europa.eu/en/publication-detail/-/publication/0e9db9fa-d653-11ec-a95f-01aa75ed71a1/language-en

the main transmission network means maintaining the frequency and balance of supply and demand. The advantage of the Slovak transmission grid is the relatively intensive interconnection with foreign countries. Except for Austria, there are 400 KV interconnections to 4 other neighboring countries. This represents a reserve for trading and accommodating any surplus resulting from the intermittency of renewable sources in electricity generation. **Completing the 400 kV connection to Hungary allowed the transmission network manager to end the long-standing ban on connecting new RES to the grid.** To boost cross-border flows, new investments are being prepared for the Czech Republic to replace the existing outdated interconnection with a new one with higher capacity; this project is under consideration as could be a project of common interest (PCI).[66]

Two PCI projects have recently been carried out at the distribution grid level in cooperation with the transmission network. The result is the "smart" grids that connect Slovakia with the Czech Republic and Hungary. At the same time, the TSO network operator (SEPS) is invested in long-term national infrastructure renewal by replacing 220 kV transmission networks with modern high-capacity 400 kV lines.

The transmission system operator sets maximum limits for the connection of new sources, taking into account the ability of other generators to provide sufficient regulating energy and ancillary services. Based on these assumptions, the volume of new resources could already increase by about 1 GWe today, and this limit only applies to large resources (it does not limit the development of household installations). If it were all run out by the end of 2030, the Slovak Republic would reach a combined installed capacity of 1700 MWe of solar and wind power, thus a 22% share of the energy generation mix.[67] However, the current installed capacity does not even reach 600 MWe. According to the updated NECP, the cumulative installed capacity of solar and wind power is to reach 2150 MWe by 2030, so additional connection capacity must be secured.[68]

The major constraint for connecting new sources is thus on the capacity side of the distribution networks. These must consider larger sources and rooftop installations with the possibility of selling off surplus electricity. On the positive side, **the pace of issuing connection permits has increased considerably in the last year, and their issuance has accelerated considerably. However, overcoming the distribution networks'** technical capacity constraints will require large infrastructure investments, which would imply a significant increase in distribution charges. This means, in particular, the renewal and construction of new distribution transformers. Therefore, The government is preparing subsidy schemes to finance transmission networks from several funds, mainly from EU sources.

A separate barrier is the bureaucratic complexity of processing projects and applications. Several Recovery and Resilience Plan milestones, described below, foresee legislative changes that should partially remove these barriers.

Finally, we should note that the main transmission network operator has a monopoly position, and the regional distribution networks also have a monopoly in their territory. Like any artificially created monopoly, Slovakia has an endless debate about the appropriate investment development, the appropriate level of profit, and the appropriate price for the transmission and distribution of electricity.

Access to land, inclusion of a given investment in the spatial development plan

With a population density of 118 people per squ-

66 https://tyndp2022-project-platform.azurewebsites.net/projectsheets/transmission/330
67 https://www.sepsas.sk/tlacove-spravy/seps-pristupi-k-navysovaniu-kapacity-pre-pripajanie-novych-obnovitelnych-zdrojov-po-zmenach-v-systeme
68 https://commission.europa.eu/publications/commission-recommendation-assessment-swd-and-factsheet-draft-updated-national-energy-and-climate-3_en

are kilometer, lower than that of France and half that of Germany, Slovakia should have no problem with the lack of land to develop renewable resources. Indeed, the sunniest area of the country is also an area with high agricultural land use, but this should not be a problem for the development of at least wind energy. Especially in a situation where the state, through the State Land Fund, owns 142 000 hectares of agricultural land and 137 000 hectares of hunting areas.[69]

However, the installed capacity of wind power is only 3 MWe, and there have been no new installations recently. The main reasons in the past were the grid operator's reluctance to connect new variable sources (ban until 2018), unclear rules, and the opposition of the municipalities' inhabitants.

The financial payback of these sources is significantly complicated by the lengthy approval process, which requires a rigorous environmental impact assessment (EIA). Uncertainty of approval and additional stakeholder requirements prolong the permitting process for several years. This, in turn, results in higher capital costs for projects.

These constraints are well known, so the Recovery and Resilience Plan milestones include measures to accelerate the construction of new wind electricity sources. **The government is tasked with developing a methodology by the end of 2024 to identify the 'go-to' areas in which new plants should be built. At the same time, specific simplified permitting and grid connection procedures are to be established to develop facilities in such areas. New areas with a potential of 300 MWe should be defined by the end of 2025. These areas should include digital maps with wind intensity, flight regimes, bird flyovers, and migration corridors, simplifying project preparation for investors and limiting possible conditions and third-party requirements. At the same time, the environmental impact assessment of small wind sources up to 1 MW should be changed, where a full EIA study should no longer be mandatory but only a fact-finding procedure.** In any case, even these changes may not guarantee sufficient development of wind energy due to the pervasive NIMBYism that is also carried over into the regulation of the construction of new sources.

The first phase of solar energy development (2009-2012) was accompanied with the construction of large solar parks. The emergence of these parks was met with quite strong public opposition due to the taking of agricultural land.

The administrative hurdles with land transfer for this purpose are quite high, requiring either temporary or permanent removal of land from the land or forestry fund. Permanent exclusion requires the payment of a high fee. The new legislation has made it possible to extend the temporary exclusion for the purpose of a solar power plant to 20 years. The change further requires a zoning change, which is a complicated process, as even a relatively simple solar power plant installation is considered a full-fledged building that can only stand on a building plot. Agrovoltaics is not yet defined by law (unlike in the Czech Republic). In the last auction to support new solar sources, the state applied the condition that new sources cannot stand on agricultural land, thus expressing its reluctance to support construction on such land.

On the other hand, Slovakia has a relatively large area of roofs that can be used for this purpose. The theoretical (feasible) production of all rooftops is 37 GWh, more than Slovakia's current electricity consumption.[70] This figure assumes a 20% ability to use the incident radiation and the impossibility of using the entire roof area. Therefore, The unanswered question is whether taking agricultural land is necessary. The argument in favor is that the investment costs of solar parks per MWh produced can be many times lower.

[69] https://pozfond.sk/wp-content/uploads/2020/06/SPF-v%C3%BDro%C4%8Dn%C3%A1-spr%C3%A1va-2019.pdf

[70] https://www.sapi.sk/files/Rooftop-Photovoltaic-Energy-Potential-in-Slovakia.pdf

Access to funding, bank guarantees and ratings

A key factor for the development of new resources is their profitability. The energy crisis has driven prices to astronomical heights, which, for many manufacturing companies and households, has significantly shifted the calculation of the return on new investment from the red to the black. The number of new applications for connection of domestic photovoltaics in 2023 has increased tenfold. However, the market price of electricity fell by 50% over the year and was already below €100/MWh in December 2023. Many projects whose calculations were based on the expectation of high prices are thus likely to fall into the red.

Electricity price regulation is also a separate issue. Household investment is hampered by the regulation of power price at the non-market level of €62/MWh, which is expected to reduce the demand for connecting new sources next year. Investment in new power plants is hampered by the taxation of excess profits above the €199/MWh ceiling.

However, from the perspective of industrial producers (unaffected by the electricity price regulation), their island systems are still likely to represent an interesting investment in potential savings. These investments can obtain subsidies from various state funds, mainly financed by EU sources. The heat sector will receive €1 billion in state aid by 2030. The decarbonization of the industry should be supported by EUR 750 million from the Modernization Fund in the period 2022-2030. The Recovery and Resilience Plan should include a further €357 million to improve energy efficiency. In addition, more than EUR 2 billion will flow to support green investments from the new programming period 2021-2027. In 2023, the Ministry of Economy announced two calls from the POO aimed at the construction of new solar sources (up to 50 MWe) or the reconstruction of pumped storage power plants and the construction of battery storage facilities.

Specific support for investments in RES should reach EUR 400 million by 2030. At the same time, companies and households can benefit from soft bank loans (with EIB support), which have, unfortunately, a relatively short maturity (2-3 years). Banks need to meet their ESG targets, the trend of supporting RES construction is reflected in the Slovak banking sector.

The form of state support raises more obstacles than benefits. Previous calls have been of an investment nature; the funds were awarded to the investment with the lowest cost per MWh produced. This means a risk for the investors in the form of future return on investment if the market price of electricity drops compared to the current situation. **Although the EC has long announced using PPA or two-way CfD contracts, which would be technology-neutral, the State has not yet used these instruments.** They would allow investors to obtain long-term bank or equity financing. For this reason, forward contracts for electricity supply are also minimally traded in Slovakia, with most trades taking place on the

spot market. Another reason for these contracts could be the growing share of negative price hours on the spot market, there were 2 hours in 2022 but already 90 hours in 2023.[71]

The state tries to encourage private household investment through non-refundable subsidies. However, compared to the Czech Republic, these subsidies are lower, limited by a ceiling, while the Czech Republic supports 50% of investment costs. However, we cannot consider this approach feasible and in line with free market principles. New investments should primarily be financed by savings in one's consumption. Adequate state support should not, therefore, take the form of subsidies but of soft loans. **The current situation is primarily the result of EU pressure to radically accelerate the construction of new resources, even at the cost of economic inefficiency.**

Limitations of revenues (put in place via dedicated acts – temporary/long term)

A major problem in the Slovak renewable energy sector has been the extremely high surcharge (FiP) on the price of electricity produced for owners of solar power plants. Ten years ago, 0.5 GWe of sources were installed, and the state had to pay EUR 200 million annually for produced power. One ton of CO_2 emissions saved thus cost a whopping EUR 957. The cost of these subsidies was reflected in the final price to the consumer, which increased the price of electricity for both households and businesses. These surcharges fell significantly with the advent of the energy crisis, but the crisis brought the opposite problem. Several producers in the original surcharge regime decided to leave it because they could earn more on the spot market.

The government reacted rather quickly to this under the 'high profit belongs to the state' rule and introduced the concept of 'excess income' into the Energy Act. This is defined as net revenue, i.e., the difference between revenue and the cost of production. At the same time, the decree defines the maximum revenue rates for individual sources. **In the case of PV, it was EUR 120/MWh; in the case of wind or hydropower, EUR 180; in the case of biomass, EUR 240 and in the case of nuclear energy, EUR 180. The government taxed net revenues exceeding this value at a rate of 90%. In 2023, the tax office should raise around EUR 30 million by taxing excess revenues.** The low revenue is due to an enforced 'agreement' with the nuclear power producer, which has to provide electricity at a fixed price of €62/MWh to households and vulnerable consumers and, therefore, does not pay excess revenues tax.

The tax is expected to remain in force in 2024, but a minimum revenue of €1.5 million is expected due to the fall in prices. Such revenue is understandably negligible and is likely to be lower than the administrative costs of taxpayers and tax administrators. Unfortunately, the government is not yet considering abolishing this tax.

The introduction of this tax was conditional on the European Directive 1854/2022, which defined a ceiling and allowed states to decide whether to apply the 90% cap/rate rule. The Government has not used the option to impose a lower tax.

This tax policy is the biggest enemy of investment in new resources. The energy sector underinvested in the pre-crisis period due to low profits. Higher electricity prices could have provided the needed capital into the power sector, but tax regulation took away part of that profit.

In addition, Slovakia has a special levy on business in regulated sectors, which must be paid by entities with more than EUR 3 million in profits. Many electricity producers, as do distribution network operators, fall into this category. These companies thus face a **real income tax rate of 24.4%,** as opposed to the standard 21% rate for unregulated entities.

Another way the state regulates investment in the sector, particularly by investors in transmission and distribution networks and providers of

[71] https://www.energiaweb.energy/2024/01/01/rok-2023-z-pohladu-ceny-na-slovenskom-spote

ancillary and system services, is by regulating a reasonable profit or maximum cost of capital. The Regulatory Authority defines the pre-tax rate of return on the regulatory asset base of WACC at 4.99%. From 2024 to 2027, a value of 5.18% should apply based on the higher market risk premium.[72]

Extended bureaucracy

The bureaucracy related to new energy sources in Slovakia can be divided into three groups: environmental, construction, and energy.

Environmental bureaucracy results primarily from the Environmental Impact Assessment (EIA) Act for new sources. **This law is 18-year-old, places very high demands on the preparation of impact studies and does not distinguish between small and large sources.** The biggest cost of this legislation is the time lost (capital costs) by waiting for the Ministry of Environment (or specific authorities) to review the EIA analysis and the time lost due to law enabling constant appeals by the affected entities.

It often takes over a year for a decision to be issued on EIA. State-imposed bureaucracy is an obstacle to the construction and investment process, and it is not surprising that the first of the milestones of the Green Transformation in Recovery and Resilience Plan is the government's commitment to reinforce the staffing of the responsible authority with 115 new employees. Unfortunately, with a deadline for delivery only at the end of 2026.

The good news is that the new Environment Minister has expressed an interest in modernizing the Act. The increase in staff may speed up the approval of EIA documents, but it will not eliminate the unnecessary cost of preparing them in projects for which they have no relevance. Another milestone, therefore, includes removing unnecessary gold-plating, i.e., ensuring that Slovak legislation does not require a more stringent impact assessment than the relevant EU directive. For example, for wind and geothermal sources with a capacity below 1MWe, mandatory EIA would no longer have to be carried out; it would only be a fact-finding procedure.[73] Market operators are asking for this threshold to be increased to 5 MWe.

The new legislation should also limit the scope for repeated appeals, which exists in all current permitting processes (EIA phase, planning permission, construction permit, and operational permit). The intention to issue a single permit, which would combine the issuance of both the environmental permit and the construction permit, should also speed up the construction of new RES sources.

Another type of bureaucracy that hinders, complicates, and makes the development of new sources more expensive is the bureaucracy associated with construction. A major constraint is the complicated process of rezoning and the necessary requirement to reclassify affected land as building land. This regulation would be less costly if the requirement for rezoning were eliminated if development is to occur in the outskirts of municipalities. Limiting the requirement for a construction permit to non-major changes to the distribution system would expedite the process of connecting new sources. Another unresolved issue is who should finance additional changes to the distribution system: the new investor or the power line manager.

A separate issue is the dispute over whether or not the applicant for the connection of a new source should be the landowner or tenant at the time of the application. Suppose the applicant has to change the zoning plan and issue a building permit after the grid connection permit has been granted. In that case, the construction of the new source may be delayed for several years. Investors argue that they do not want to invest in the land if they don't know whether or not the new source can stand there (enough

[72] https://www.urso.gov.sk/data/files/630_20230731_wacc_oznamenie_elektrina_final.pdf
[73] https://www.planobnovy.sk/site/assets/files/3632/2023-k19_-_repowereu.pdf

powerline capacity). This dispute should be resolved by creating digital capacity maps where investors can easily find suitable sites for new construction without the additional costs of developing the distribution network. Consequently, the requirement of ownership or control of the land would eliminate speculative applications for allocation of spare capacity, which are not intended to build but rather to prevent competing investments from occurring.

This brings us to the third group of bureaucracy, which is the connection permit. It is completely unnecessary for an investor to have to apply for and wait for a certificate of compliance with the energy policy of the Slovak Republic, as required by the law.[74]

Low-emission sources such as PV and Wind installation cannot be non-compliant. Currently, **consent must be given not only by the distribution network but also by the transmission system operator and the Office for the Regulation of Network Industries** for PV plants with a capacity of more than 0.5 MWe and wind resources of more than 1 MWe. Three of these authorities are fully under the control of the state; why this process has not yet been unified can only be explained by bureaucratic theory.

The process of concluding a contract for connection/access to the distribution grid did not have clear rules until recently and is still not legislatively unified in all three distribution territories. Although there has been a significant shortening of the approval of connection applications for small sources and the digitalization of the whole process, investors face different timelines for connection decisions. Although the Office for Regulation of Network Industries had prepared such a change in legislation as early as September 2023, its issuance process has stalled.

Lack of stable law, high regulation risk

Almost 20 years ago, Slovakia saw a relatively large-scale privatization of the energy sector and a thorough separation of the generation, transmission, and trade components (the unbundling rule). The state has retained ownership stakes but intervenes more significantly in the energy market through its regulation. Unfortunately, the Office for the Regulation of Network Industries management has been politically nominated for most of this time. The price of electricity or gas for households has long been the subject of political debate and is not independent but rather a government decision. The budgetary populism of most of the past governments has caused no targeted assistance to households in energy poverty, but ineffective blanket regulated prices for everyone. This, of course, increases the cost to the public budget and reduces the amount of resources available to support infrastructure development.

The forced memorandum between the government and the main electricity producer, Slovenské elektrárne sadly illustrates the dominance of political power over market players. The latter had to commit to supplying electricity well below the market price for at least 2 years, with expected prolongation.

Previous government inaction kept the legislation in a state that was consistent with the old energy model of large producers and predictable consumers. Only the energy crisis forced the government to react and update the relevant laws based on emerging legislation. However, new laws were adopted in haste, often without adequate public debate. One of the few areas in which the government has been able to react promptly is the introduction of new taxes in the energy sector.

In general, the Slovak energy market suffers from strong state influence, a permanent subliminal risk of expropriation, or the risk of a state-enforced agreement, typical of the corporatist model of economic governance. It

[74] https://www.polacekpartners.sk/clanok/kde-stop-stav-konci-tam-vystavba-zacina-par-rad-ako-postavit-zdroj-na-vyrobu-zelenej-energie

is, therefore, not surprising that significant new investments in Slovakia are rare in this sector.

Other

The state's policy of keeping households in a "cotton wool" is reflected in the overall slow uptake of innovative technologies, particularly in the electricity market. Dynamically changing prices, which could partially reduce the cost of grid support services and simultaneously create pressure for domestic investment in efficient insulation or reduction of consumption, are used by 0.1% of households in Slovakia.

Expanding the list of potential suppliers of support services is a positive step. The transmission network manager has already tested the possibility of aggregation of support services for suppliers with an installed capacity of more than 10kWe. With the recent launch of the Energy Data Centre, large energy consumers will also be able to participate more actively in providing these services.

An area where development in Slovakia is lagging behind legislation is the development of energy communities. Their legislative definition is not attractive, moreover, the Energy Data Centre has only recently been launched, which is a prerequisite for real electricity sharing and billing. Therefore, after 13 months of this possibility, only one community has been registered.

All of the above-mentioned barriers sound rather piquant in the context of the December assessment of the draft update of the National Energy and Climate Plan. In it, the government foreseas an increase of one-third of the share of RES in total energy consumption. According to the European Commission, this is insufficient, and it requires the Slovak Republic, in an extremely demanding way, to double its share to 35%.[75]

Detailed description of selected, most important barriers

- **Act 251/2012 Coll. on Power Engineering (31.7.2012).[76]**

The Act defines the conditions of doing business in the energy sector, the rules of access to the market, the obligations of energy market participants, the state administration powers

The Act influences investors' decisions when investing in the energy sector in several ways:

(a) §25a- §25k The excess revenue levy with a rate of 90% is a disincentive that reduces the volume of investment in the sector. Investors have to bear the costs of low prices but cannot generate profits from temporarily high prices. **These profits could be reinvested to improve overall performance.**

- **Act No. 235/2012 Coll. on the special levy on business in regulated sectors (26.7.2012).[77]**

The Act defines the obligation of a regulated person to pay the special levy on business in regulated sectors; the energy sector is considered regulated under the Act.

The Act artificially increases the tax burden on energy entrepreneurs. By reducing profitability, it crowds out potential investors into unregulated industries and allows for a higher return on invested capital. The multiple changes in the rate of this levy over the past 10 years also increase **the uncertainty for existing investors in the sector.** The high government deficit creates the risk that this rate will increase in the coming period.

- **Government Regulation No 463/2023 Coll. establishes the maximum price for part of the regulated gas supply for household gas end-users, the maximum price for part of the regulated electricity supply for selected vulnerable electricity customers, and the maximum price for part of the regulated gas supply for selected vulnerable**

[75] https://commission.europa.eu/system/files/2023-12/Recommendation_draft_updated_NECP_Slovakia_2023.pdf
[76] https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/2012/251/
[77] https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/2012/235/20231231

gas customers and the conditions for their application.[78]

Based on a declaration of general economic interest, the Energy Act allows the definition of maximum prices for gas, heat, and the regulated part of the electricity supply for households and selected vulnerable customers for 2024. These prices were defined by Government Regulation No. 463/2023.[79]

The price of gas for Slovak households increased by only 15% compared to the beginning of 2022 (before the outbreak of the Russian aggression against Ukraine). The price for electricity supply (regulated under the Memorandum with Slovenské elektrárne) has not changed at all. **Households have no reason to change energy suppliers or to consider investing in insulation, changing the heat source, or installing photovoltaics.** The 2024 regulation does not only regulate the price of electricity, heat, or gas but also the price of distribution and the regulated point-of-use charge, which has been fixed at the 2023 level. **This creates an artificial market barrier to developing new sources and technologies and naturally increases the cost of subsidies from the state budget.**

- **Act 24/2006 Coll. on Environmental Impact Assessment and Amendments and Additions to Certain Acts.**[80]

The law provides, inter alia, bureaucratic requirements in the field of environmental impact assessment for the construction of new energy sources

Annex 8 of this Act identifies the bureaucratic obligations for new electricity sources. For example, the intention to build new thermal power plants with a capacity of 50–300 MWe must undergo a fact-finding procedure, larger sources must be accompanied by a full mandatory assessment.

However, there is no distinction for wind power plants; **the law requires a more complex process from investors for any installed capacity, even for a small 0.1 MWe turbine. The law thus puts investments in wind-generated electricity at a disadvantage**. The Recovery and Resilience Plan intends to introduce a threshold for a simpler discovery procedure for new installations with a capacity of 1 MWe. However, it would be preferable for sources up to 0.1 MWe not to need this complex assessment at all.

The outdated law allows any entity in the country to raise a complaint and enter the process of assessing the environmental impacts of a new investment. The reality is that even associations not affected by the new construction can block or disproportionately delay the decision of the state authorities. By entering the procedure, this person acquires the status of a party to the procedure and, consequently, the status of a participant in the permit procedure for the proposed activity or change, i.e., including the relevant provisions of the construction legislation, and thus up to the approval of the construction itself.[81] The issuance of final decisions is thus prolonged by an order of magnitude in years, which complicates the investment process and interferes with other parts of the process - when the investor has to sign a reserved connection capacity agreement, which has a time-limited validity.

Therefore, an amendment to this law is desirable to balance the rights of the public to comment on the plan and the rights of property owners/managers.

- **In this context, it will be necessary to update the Directive No. 3/2010- 4.1., issued on 21 April 2010 by the Ministry of Environment of the Slovak Republic, which establishes standards and limits for the location of wind power plants and wind parks in the territory of the Slovak Republic. The Directive**

78 https://www.zakonypreludi.sk/zz/2023-463
79 https://rokovania.gov.sk/RVL/Material/29084/1
80 https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/2006/24/20211101#prilohy
81 https://www.sapi.sk/files/studia-rozvoja-veternej-energetiky-na-slovensku.pdf

defines areas that are too vaguely suitable and unsuitable for wind energy. It imposes vague or even meaningless requirements on new installations, which must not, for example, interfere with the visual appearance of significant horizons in important visually exposed areas, war graves, scattered settlements in the hills, or tourist centers. Overall, this reduces the transparency and predictability of the decisions of state authorities in assessing the environmental impacts of new resources.[82]

- **Building Act No 50/1976 Coll.**

The law defines the procedure and requirements for granting a building permit.

Construction of new RES faces bureaucratic obstacles in obtaining construction permits. The outdated law imposes overly complex requirements for obtaining a building permit and requires complicated and unnecessary changes to the zoning plan. **To build a wind power plant, the land must be reclassified in the zoning plan as a so-called production area**, which unnecessarily prolongs the investment process by many months or even years. In the same way, installing solar power plants requires a change in the zoning plan if the construction is in the outskirts of municipalities, even if it occupies a relatively small area. Although solar power plants can also be built on agricultural land, high fees are paid for removing the land from the land pool and transforming it into building land. Although it is natural that if there is a large area of building roofs, these should be the primary use, **the state should reduce these fees to encourage the development of renewable energy sources** (and greater efficiency of solar power plants), unless it is land of the highest agricultural productive value.

The building law should be amended so that sources up to 5 MWe do not require a zoning change. The permitting processes (environment, building permit) should also be merged into one procedure, which should speed up the approval phase of an investment project. The definition of Go-To zones, also foreseen in the Recovery and Resilience Plan with a 300 MWe capacity limit, could help in this respect.

Opinion on the characteristics of the barriers especially private actors

The energy sector is one of the most tightly regulated markets. On the one hand, this is due to the limited scope of the monopolized transmission infrastructure, on the other hand, the need for permanent availability of energy of the necessary quality. Moreover, the complex regulatory skeleton suffers from the 'good old days' effect. In the past, the state fully controlled the energy sector in many countries, which made it possible to plan production, transmission, and consumption precisely from the table. Despite several decades of energy market liberalization, this traditional thinking still influences the approach to regulation, specifically of new energy sources. The regulator "has" the need to plan the construction of new sources, to back up in sufficient capacity (risk aversion), and to accept new developments with reluctance. **The dominant position of transmission and distribution network owners leads to pressure to maintain the status quo.** This effect is compounded in Slovakia by frequent political interference, whether in energy price manipulation or inefficient subsidies. **The pressure to decarbonize and meet the targets set in Brussels will further strengthen the state's role in shaping the energy market.**

In such an environment, systemic inefficiencies are not surprising. They are relatively difficult to eliminate, and this applies not only to Slovak legislation but also to legal acts adopted at the EU level.

However, specific inefficiencies resulting from bureaucratic requirements, gold plating, poor quality, unpredictable legislation, or the dominant position of some market participants are

[82] https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/1976/50/

a particular problem. Removing these types of barriers would help the development of the energy market in Slovakia.

The conservative approach of the public administration is also a particular problem. **State representatives refuse to take responsibility for decisions; every stamp issued is conditional on submitting endless documents, analyses, and permits from other entities**. This effect is most evident in environmental impact assessments. **There is great concern that if the state defines Go-To Zones for wind energy, the regulator will treat the rest of the country as No-Go Zones.**

New resource development needs more transparency and predictability in legislation. Connecting RES should have a level playing field in every corner of the country, which is not the case today. Although a new decree was prepared in December 2023 to unify these processes, the newly appointed new leadership of the regulator has stopped it and will prepare a new one. **It would be desirable for the new decree to introduce clear time limits to approve the connection of new sources.** It should include a presumption of approval in case of non-compliance by the state or regulated entities (distribution networks). Of course, the whole process should be digitized so that the applicant submits the necessary documents only once.

The energy market in Slovakia will need new instruments if the objectives of renewable energy development are to be met. **There is still no market for corporate PPA contracts in Slovakia**, and capacity payments are still not discussed. There is only a functional spot market on the stock exchange, and there is no market for longer contracts (derivatives). Thanks to generous resources from the EU treasury, only investment subsidies are still in place, and there is no discussion of two-way CfD contracts despite soaring state revenues from auctioning carbon permits. Large-scale investments in distribution networks are often cited as an argument against the development of new resources; their owners expect a need to increase the number of transformer stations by a third. **These costs should be borne mainly by consumers and partly by the state budget. Still, the current legislation is set up so that new electricity producers are mainly responsible for financing them through grid connection fees.** On the other hand, these investment costs can be reduced by greater support and simplification of the establishment of energy communities and island systems.

Ukraine

General description of the MOST IMPORTANT SET OF BARRIERS for investments/activity connected with energy transition processes.

The ongoing genocidal Russian war against Ukraine is the most important barrier to a comprehensive and sustainable energy transition. In the spring of 2024, Russia began to use tactics of total destruction of civilian infrastructure (tactics first used by the Russian Federation in Aleppo, Syria), an example of which is Kharkiv, whose energy infrastructure was destroyed. Energy infrastructure must keep functioning despite substantial damages and existing threats of new Russian missile and drone attacks. Repairs and substitution of destroyed units must be done quickly with available equipment, often outdated and kept in storage for emergencies. Ongoing financial expenses are directed without guarantees of return and profit rather on survival than energy sector transition.

War-related risks reduced direct foreign investments in Ukraine in general and private investments into new energy infrastructure in particular. Only a few projects (Tyligulska Wind Power Plant, Hals Agro biomethane plant, household PV installations) were implemented by domestic investors in 2022-2023.

Ukraine's energy sector remains the core basis for the survival of the national economy, citizens, and effective defense against the Russian aggressor. **State-owned energy enterprises are subject to public service obligations (PSO) under martial law. The PSOs help to keep regulated energy**

prices but reduce the earnings of market players, disbalance the entire financial flow in the energy sector, and reduce reinvestments and the appearance of new investors.

Other potential areas for investment barriers:

1. **Access to the power grid** remains a significant barrier for investors in Ukraine due to outdated and destroyed infrastructure and regulations, which lowered interest from local authorities and distribution system operators to more tax-payers and customers in their areas. In 2021, Ukraine introduced electronic services to simplify grid connection and calculate costs. Local communities received more rights due to the decentralization process and more interest in attracting investments. It was expected that local communities, in cooperation with distribution system operators, would build up grid infrastructure on their costs to attract investors with ready-to-use connections. However, full-scale Russian aggression reduces the incomes of both parties and requires redirecting nearly all available resources for infrastructure restoration.
2. **The Land Code of Ukraine regulates access to land**. It is provided by authorized executive bodies on land plots of state ownership and local self-governance bodies – on communal ownership. In 2019, Ukraine amended legislation to simplify land leasing for renewable energies without changing the purpose of the land plot. **Russian war of aggression deteriorated access to land both in terms of unacceptable risks and contamination.** Ukraine's land cadaster is functioning under martial law restrictions. The public cadastral map of Ukraine is closed because of security reasons.
3. **Access to information/technology/value chain** was limited due to undeveloped digital services and outdated regulations. In 2021, Ukraine launched a data hub for the electricity sector. A similar platform is also being developed for the gas sector. The National Geological Data Portal was being made public in the subsoil area. However, under martial law, all resources work with limited access because of security reasons.
4. **Inclusion of a given investment in the spatial development plan.** The decentralization process unlocked the possibility of joining local communities by working out spatial development plans in Ukraine.
5. **Access to funding**, bank guarantees, ratings, subsidies, and mandates (for example, on preferable conditions or not). Bank loans are quite expensive in Ukraine, as in many other developing countries. Foreign and domestic investors prefer to work with international loan institutions and request other preferences for their investments in Ukraine, such as tax and fee exemptions for substantial investments. **Bank guarantees are provided in most cases by state-owned banks and state-owned enterprises to realize publicly important projects**, including critical infrastructure and energy market reforms. Ukraine used to provide green feed-in tariffs for renewable energy as a form of preference in the energy sector, which is still valid until 2030, and it has marked premium and direct access to the electricity market as ongoing incentives.
6. **Access to the public bidding process** is provided first via the Prozorro platform, one of Ukraine's most successful reforms in public procurement, and supported by international donors.
7. **Revenue limitations (put in place via dedicated acts—temporary/long term) occur in cases of legislative amendments to taxation. They occur** due to energy resource price fluctuations or state budget deficits. Under martial law, Ukraine introduced temporary restrictions to private persons and commercial entities' financial flows from the country.
8. **Limitations** in free access to a specific type of activity (for example, secured for public entities only) are related mostly to special licensing/permitting due to hazardous nature, substantial environmental risks, or utmost importance for energy security (transmission

system operator). More restrictions appeared under martial law for security reasons, but they should have temporary applications.

9. **Limited access** to certain resources. Access to certain resources in Ukraine is not limited, provided that an applicant is compliant with legislative requirements and has no relation to the aggressor state, Russia.
10. **Overwhelming costs/taxes.** The instability of tax legislation is one of the most challenging issues for investors in Ukraine. Ukraine also has a segmentation by taxation modes ("single taxpayers" of all groups, non-payers of VAT, VAT payers, etc.) among legal entities. It creates possible tax gaps, which may lead to substantial financial advantages and accusations of violating tax requirements and penalties. VAT administration is still not sufficiently digitalized. Blockade of tax invoices by fiscal authorities can create unexpected financial gaps for investors. It is also a challenge to calculate the costs of an investment project based on period assumptions for permissions, access to the grid, land plot allocation, and environmental assessment.
11. **Extended bureaucracy.** Ukraine made significant progress in recent years in removing bureaucratic obstacles to business. Digitalization of procedures, fewer inspections, tax exemptions for significant investment projects, and clean technologies supported the recovery of business activities in 2021. After the Russian full-scale invasion, Ukraine removed many restrictions on imports and investment projects, among others, for energy sector reconstruction and enforcement.
12. **Corruption/lack of transparency/influence of a strong interest group**. Russian full-scale invasion reshaped Ukraine's groups of influence and strengthened state control over all sectors, in particular, the energy sector. Many assets in the gas and electricity sectors were returned to state property. Ukraine introduced electronic auctioning for mining licenses and made transparent procedures to determine winners. Similar approaches are expected for future renewable energy tenders and balancing capacities in the electricity sector.
13. **Lack of stable law, high regulation risk.** After the Association Agreement with the EU, Ukraine implemented the Third Energy package, which includes the legal framework for liberalized gas and electricity markets, a stable and predictable business environment, and reduced regulatory pressure. European integration will facilitate and streamline further changes in accordance with the Fourth Energy Package conditions and requirements. Ukraine commits to these reforms even under war threats and martial law conditions.
14. **Lack of proper definitions** in the law (for example of PPA's, CfD's, cable pooling, direct line, sector coupling, hybrid installations, etc.). Ukraine's "On electricity market" provides the possibility for renewable energy producers to conclude power purchase agreements (PPA), get support for renewable projects through a contract for difference, install direct lines to final consumers as well and construct hybrid installations for producing green electricity. Cable pooling is a new instrument aimed at supporting renewable energy, but it is still not incorporated into Ukrainian legislation. Sector coupling is widely discussed in Ukraine and partially implemented in cogeneration projects. Much more opportunities are related to the broader utilization of renewable energy in the commercial sector, multiapartment housing, and private households.
15. **Other** Ukraine introduced a new instrument—net billing—for supporting renewable installations in private households and commercial entities for self-consumption. The recent amendments to the Law of Ukraine on alternative energy resources also provide a legal basis for establishing a market of guarantees of origin for produced green energy (art.9-1).
16. Ukraine should also improve the legal basis for future public-private partnerships, accelerate the corporatization of state-owned enterprises, and ensure the independence of supervisory boards, transparency of decision-making, and accountability.

To unlock substantial foreign direct investments, the wholesale electricity market reform should be completed according to recent European legal acts (Directive EU/2019/944 and Regulation EU/2019/943); further amendments to tariffs and energy prices should take place to enable profitable business in energy generation, transmission, and distribution, with further improvements of targeted monetized subsidies for vulnerable consumers. Local authorities should open free access to networks for local renewable fuels in district heating.

However, the ongoing Russian war remains the most influential burden for foreign direct investments in Ukraine. It requires external guarantees to cover war-related risks of investment projects and substantial financial support from partner countries to start and carry out reconstruction projects.

Detailed description of selected, most important barriers:

1. **Uncertainty** remains the most important barrier to investments in the energy sector. It relates to several dimensions: war risks and security situation, legislative and regulatory environment, consumer's ability to pay. The war initiated by Russia against Ukraine is becoming protracted. Missile and drone attacks against critical infrastructure happen for the third year onwards, destroying generation, transmission, and distribution infrastructure in different regions of Ukraine. Active war hostilities (now frontline is ~1200 km) can be enlarged at any time on the entire length of the borderline from the north, east, and south of Ukraine (~3200 km). War-related expenses remain predominant in the state budget, reducing the possibility of supporting investors with tax exemptions or privileges. Citizen welfare has degraded significantly and remains the most important prerequisite for resuming governmental social protection policy based on regulated prices and special public obligations for energy companies.
2. Martial law (2015 with amendments) introduced substantial security measures and exceptional power to regional civil-military administrations, reducing at the same time access to public information, tenders, auctions, and possibilities of civil control. Transparency and independence of energy stakeholders decreased, and limitations were introduced to regulate energy exports and imports, as well as internal prices and tariffs. **The focus is made on the availability and affordability of resources in the short-term period with less attention to the medium and long-term profitability of investment projects and the financial stability of energy enterprises.**
3. **Public service obligations** on the gas market (Resolution of the Cabinet of Ministers of Ukraine No. 222 On approval of the Regulation on imposing special obligations on natural gas market entities to ensure public interests in the process of functioning of the natural gas market, dated March 6, 2022) and electricity market (Resolution of the Cabinet of Ministers of Ukraine No. 483 On approval of the Regulation on imposing special obligations on the electricity market participants to ensure the public interests in the process of functioning of the electricity market, dated June 5, 2019) players should be temporary measures for protecting end consumers from price volatility and resource deficits. **Preserving public service obligations for a long time negatively impacts the financial stability of energy companies, increases cross-subsidies among consumers, deteriorates technical conditions of energy facilities, and reduces investments in repairs and renovation.** Given the protracted nature of the war, Ukraine must introduce market-based solutions to enable private investments in the restoration of infrastructure and the construction of modern and resilient energy systems. It includes cost-reflective energy pricing and gradual substitution of public service obligations with targeted and monetized support for vulnerable energy consumers.
4. Ukraine's **energy regulator** is, according to the Law of Ukraine No. 1540-VIII On National

Energy and Utilities Regulation Commission (NEURC) (2016), a central executive authority with a special status established by the Cabinet of Ministers of Ukraine. The existing legal framework does not guarantee the functional and financial independence of NEURC. The regulator is expected to strengthen its role after adopting the REMIT law and the Clean Energy Package. **Therefore, it is important to ensure fair and transparent regulator decision-making** to enable the energy markets to function properly.

5. The Law of Ukraine No. 2019-VIII, the electricity market (2017) with amendments, provides for a competitive nature of functioning for generation, wholesale, and retail supply of electricity, excepting natural monopolies in transmission and distribution. Parts of state-owned generation (Energoatom, Ukrhydroenergo) are constrained by public service obligations that restrict market-based price formation and distort price signals. **Price caps affect wholesale market functioning, negatively impact investment decisions, limit access to electricity imports, and are incompatible with market coupling (of the day-ahead and intraday markets).** Regulated prices for households keep a substantial part of the retail market closed to competition, discourage efforts to use electricity in an economically efficient way, and create additional debts in the electricity market.
6. The Law of Ukraine No. 555-IV On alternative energy resources (2003) with amendments provides for a legal framework for the development of renewable generation in Ukraine. The green feed-in tariff was used to incentivize investments in household and industrial renewable energy. **Rapid capacity increases distorted financial stability in the electricity market and leads to retroactive legislative amendments, accumulation of debts, and investors' withdrawal.** Through law amendments of No. 3220-IX, dated June 30, 2023, Ukraine introduced a legal basis for the return of investors. In particular, the market premium mechanism is introduced to supplement green feed-in tariff as the stimulus for new renewable investment projects based on auction results and market prices. Active consumers can also use a self-generation mechanism with net billing. It should stimulate renewable energy investments on the level of private households and businesses to cover self-consumption on the yearly balance of produced and consumed electricity.
7. The above law amendments (Art. 9-7) establish a new guarantee of the origin of electricity produced from renewable energy sources. **A special register of guarantees of origin should be established, based on register of electricity facilities and procedures, approved by the NEURC**. NEURC is an authorized body for the issuance, circulation and cancellation of guarantees of origin. They will be generated automatically based on commercial metering data and issued free of charge.
8. The national energy and climate plan of Ukraine is a pending obligation that should be developed and adopted in line with the 2030 Energy Community energy and climate targets. The plan should cover the period up to 2030 and include a forecast up to 2050 in line with the adopted Energy Strategy until 2050. The new document will have to be drafted taking into account the impact of the war on Ukraine's energy infrastructure and overall consequences for its energy system, which needs to become more resilient, decentralized, efficient, and based on renewables. However, it is impossible to predict future impacts and set out concrete policies and measures. Therefore, the document should become scenario-based and flexible, ensuring at the exact time compliance with European standards and the long-term decarbonization goals.
9. The Law of Ukraine No. 1803-2021-p On National energy efficiency action plan until 2030 (2021) is generally aligned with European legislation. It provides broad possibilities for investment projects into energy-efficient modernization of industrial entities and renovation of buildings and infrastruc-

ture. However, **Ukraine cannot establish and support incentive mechanisms yet without the participation of foreign donors and affordable loans from international financial institutions.** The Government of Ukraine should adopt a long-term strategy for the renovation of buildings, development of district heating systems based on efficient cogeneration, utilization of local renewable resources, industrial waste heat, and municipal waste. Public buildings should become subject to numerous ESCO agreements with mandatory high energy efficiency criteria.

10. The Law of Ukraine No. 2768-III On the Land Code (2002) with amendments provides for procedures for land plot allocation. Current procedures remain quite complicated and require obtaining permission from executive bodies for state-owned and local self-government bodies for communal land plots, registration in the state land cadaster, participation in public tenders for leasing the land plot, etc.
11. The Law of Ukraine No. 132/94-BP On Subsoil Code of Ukraine (1994) with amendments remains in force despite several efforts to adopt new legislation. With the Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine on Improving Legislation in the Field of Subsoil Use" No. 2805-IX dated December 1, 2022, some progress in deregulation was achieved by abolishing several outdated and irrelevant regulatory instruments. Local communities received the right to obtain part of rent payments, and the permit owners to alienate a special permit to another subsoil user and to access to land plots through land easements.

III My country vs. EU – national perspective

Bulgaria

Do European regulations, decrees and directives make it easier or harder to bring disruption and innovation to energy markets in my country?

In general, the EU acquis and its implementation in national laws have been the main driving force behind the RES boom both during 2011–2012, as well as during 2022–2023. This has been the case for hard RES targets for 2020 and 2030, support schemes, administrative barriers, etc. Member States have to enact a National Integrated Energy and Climate Plan (NIECP) based on their National Energy Strategies. The development and enactment of the NIECP is closely monitored by and coordinated with the European Commission, which in the past has had strong suggestions regarding unambitious RES, energy efficiency targets, and CO_2 reduction targets.

Furthermore, with the approval of the National Recovery and Resilience Plan, Bulgaria has committed a considerable effort, both in terms of reforms as well as investment projects, to the energy sector. This includes measures such as the complete liberalization of the electricity market but also:

- developing a Road Map to Carbon Neutrality;
- creating a National Decarbonization Fund;
- cutting red tape for new RES projects;
- developing grid infrastructure specifically focused on RES connections, as well as digitalization of the power grid;
- support programs for new RES installations coupled with storage facilities;
- support programs for RES installations for households and others.

One major flaw resulting from its policy is the lack of tech agnosticism, leading to "technology winners." In the past two decades, photovoltaics (PV) and onshore wind have been left behind, while offshore wind, hydro, waste, geothermal, and other technologies have been left behind. We see the results in their small share of all RES installations in Bulgaria and their overall share in the power mix. Other technologies that could have complemented the energy transition, such as storage facilities, including hydro-pumped storage and carbon capture, utilization, and storage (CCUS), were deemed economically unfeasible and left entirely out of public support mechanisms.

Is there anything that the EU is doing or plans to do that could spoil or help the effort to revitalize the energy sector with private initiatives in my country?

The sharp rise in ETS prices in 2021 and their relatively high levels in the past months until 2023 has increased market prices and reinvigorated new RES investments. Due to lagging infrastructure development, lack of sufficient storage facilities, insufficient technological development, and other factors, the current energy systems in the EU Member States are not ready for a completely CO_2-free mix. Coal- and natural gas-fired power plants are still necessary, and due to the high ETS prices, some technologies, such as CCUS, are becoming economically viable. Their utilization can increase further in the industry sector, with the ETS entering its next stage.

CBAM looks good on paper, but its implementation still involves many variables, and it is difficult to predict its effects on green investments.

The EU is about to enact severe changes to its market model, including "decoupling from natural gas," the reintroduction of regulated prices, including below cost, market price caps for pro-

ducers, new RES support mechanisms through contracts for differences, etc. All of these will distort the market and its price signals, which would hinder private investors from making **informed and economically efficient decisions.**

Czech Republic

As in other Member States, the influence of European legislation on the shape of the energy market has been significant in the Czech Republic. This influence can be observed throughout the 20 years of the Czech Republic's membership in the EU. Significant changes in the Czech market have been brought about, in a positive sense, mainly by the energy liberalization packages, which were gradually adopted by the country at the instigation of the EU before and especially during its membership. This effectively led to a greater liberalization of the Czech market and a gradual connection to the European market (MPO 2019).[83]

In recent years, particularly due to the EU's' increasing pressure on member states to commit to reducing the impact of human activity on the planet, the positive impact of European legislation has gradually turned negative. This is, of course, assuming that we see greater liberalization, competition, and innovation in the marketplace as positive, rather than regulation and restrictions on free enterprise. As a result of initiatives such as the Green Deal or Fit for 55, the Czech Republic has produced several documents and strategies that outline how the Czech Republic could achieve the desired goals. One of these is the Czech National Energy and Climate Plan. This plan was last updated in October 2023 and submitted to the European Commission for review, which approved it with minor reservations. Here are some of the points of the submitted plan.

In line with the EU's Fit for 55 package, the Czech Republic aims to reduce greenhouse gas emissions by 55% from 1990 levels by 2030 and achieve climate neutrality by 2050. The WAM3[84] scenario models suggest a potential reduction of 63% by 2030 and further reductions in sectors such as LULUCF[85] and waste. Another EU target is to use 42.5% renewable energy by 2030. The Czech scenario shows a potential contribution of 30% to the EU renewable energy target, with specific challenges in some sub-targets. The European Commission has criticized the Czech Republic for such a low target (Ekonomický deník 2023).[86]

The Czech Republic is also focusing on maintaining and strengthening the interconnection of its electricity grid, which is in line with EU market integration and infrastructure development. At the same time, however, the aging and insufficient capacity of the Czech transmission system continues to hamper greater integration. In particular, the EU ETS, the development of renewable energy sources, the strengthening of grid flexibility, the decarbonization of central heating systems, the renovation of buildings, the development of nuclear energy, the use of biogas and hydrogen, and carbon capture and storage technologies are all expected to help the Czech Republic meet its targets. The total additional costs of the full decarbonization scenario by 2050 are estimated to be significantly higher than for existing measures. Still, they bring several benefits, including resilience and improvements to the indoor environment (MPO 2023).[87]

Tanil and Jurek, in their work on the influence of the EU on the Czech Republic in the field of policies supporting the development of renewable energy sources, argue that the Czech political representation has only adopted European directives and regulations and has not even attemp-

83 https://www.zakonyprolidi.cz/media2/file/2006/File37299.pdf?attachment-filename%5Cx3d6832453-2020-06-19-text-navrhu-6833418.pdf
84 Name of the resulting scenario to meet the requirements.
85 Land use, land use change, and forestry.
86 https://ekonomickydenik.cz/jste-malo-ambiciozni-vytkla-cesku-evropska-komise-pozaduje-vic-zelene-energie-a-min-emisi/
87 https://www.mpo.cz/assets/cz/energetika/strategicke-a-koncepcni-dokumenty/2023/10/Aktualizace_NKEP_10_2023_final.pdf

ted to bring them closer to the Czech public and to Czech cultural and social specificities during the fourteen years under review. According to the authors, this will lead to a gradual decline in support for renewable energy sources among the Czech public (Tanil, Jurek 2020).[88] If this institutional approach works in practice, it could be argued that the legislation adopted by the EU to achieve its environmental goals is doing a disservice to renewable energy sources in the member states.

Even though the Czech Republic only implemented the European legislation without taking into account the social and cultural aspects of the country, the implementation has been successful. This can be seen, for example, in the liberalization of the gas market, which took place as part of the third liberalization package. Although the Czech Republic had been under investigation by the European Commission since 2006, the investigation was closed in 2007, mainly due to the Czech Republic's efforts to implement liberalization measures that not only increased competition in the market but also led to the expansion of functional infrastructure and improved connectivity with other EU member states (Lyapina 2018).[89]

Although this short chapter cannot cover all aspects of the impact of EU legislation on the Czech energy market, it is clear that EU regulation is a double-edged sword. On the one hand, there are liberalization efforts that increase competition and cultivate the whole market. On the other hand, there are top-down solutions that try to increase the involvement of renewable energy sources. In the face of ongoing climate change, the transition to a green economy is a desirable step. Still, we know from economic history that bottom-up solutions tend to work better.

In recent years, we have seen a huge upsurge in demand for green solutions from the general population, the use of solar panels in homes, or a general push for companies to produce fewer emissions and be more environmentally friendly. A simple economic lesson is that a healthy environment is a luxury good. Once a society has satisfied its basic needs, it can move on to other areas that directly impact the quality of life, including improving the environment.

Whether European society is already rich enough to afford to move away from fossil fuels depends not on a handful of bureaucrats in Brussels but on ordinary people.

The EU's plans will certainly achieve the desired goal, but the question is at what cost and whether it would not be better to leave this change to entrepreneurs, who are usually able to achieve the same results at less cost.

Hungary

EU directives and laws significantly impact the Hungarian energy market as well; without them, such an expansion of RES would not have occurred. The National Energy Strategy 2030 and the National Energy and Climate Plan lay down the frameworks for decarbonization.

One apparent issue is the proliferation of certain RES sources (such as biogas, geothermal energy, etc.) at the expense of others that have undergone the most significant technological revolution in the last two decades. These are photovoltaic systems and wind energy, although the latter could not be established in Hungary for political reasons. Steps towards RES technology neutrality would help stabilize the electrical network. In photovoltaic systems, Europe is dependent on China for batteries, inverters, technology, and, increasingly for metal structures. These impacts are also felt in Hungary. Logistic and geopolitical problems also emerge in Hungary (increased transport costs due to war, the impossibility of

88 https://consensus.app/papers/policies-energy-level-governance-assessing-policy-tanil/2192dd033d5a5d82a8d2185cada38b84/?utm_source=chatgpt

89 https://www.researchgate.net/publication/326208794_The_EU_gas_regulations_and_their_influence_on_the_legislation_of_the_Czech_Republic

previous rail transport routes). The EU could have assigned a more significant role to supporting storage capacities.

Hungarian energy producers commonly highlight one particular issue: **the challenges with the ETS (Emissions Trading System) system. CO_2 quotas have become a derivative product, with prices being influenced by speculative traders, leading to a significant price increase over the past few years. T**his situation causes increasing costs and uncertainties for producers, leading to inflation. Due to Hungary's nearly 6000 MW solar power capacity, there is a need for large-scale regulatory capability, in which gas power plants perform well due to their good inertia properties (they can ramp up or down more slowly, allowing time for other producers to compensate).

A less significant issue, with many unresolved questions, revolves around the European Commission's forthcoming biofuel certification and traceability system.

The European Commission's recommendations aim to improve the Hungarian energy market. The document on approving the assessment of Hungary's Recovery and Resilience Plan proposes constructive reform plans.[90] Without the Commission's determination, there likely would still be no theoretical possibility for installing wind turbines in Hungary. At the end of 2023, the Council approved Hungary's RRF REPowerEU plan. A significant issue in Hungary is that these funds have not yet been utilized due to political problems. There's a fear that there won't be enough time for the complete drawdown of the funds or that a portion of the RRF funds will remain frozen. Even if the funds are successfully drawn down, the temporal loss remains a concern, as several billion euros worth of investments could already be in the preparation or implementation phase. **Two-thirds of the 10.4 billion euros are intended to target the green transition. With a 50% funding intensity, the RRF supports decarbonizing domestic industrial, scientific, technological, and logistics parks. This includes developing microgrid networks, improving buildings' energy efficiency, facilitating waste heat use, etc.** For example, the call for proposals for the nearly 503 million euro element of the Hungarian RRF, which needs to be concluded by the second quarter of 2026, has not yet been issued. The same applies to another half-billion euros element aimed at manufacturing renewable energy devices and renewable fuels, as well as technologies providing related services for the energy transition and the development of associated support services. **Extending the timeframe for using RRF funds would be crucial for Hungary.**

Poland

In assessing the impact of EU regulations on the Polish energy market, it is important to point out that the new EU law is necessary to carry out the energy transition, including the implementation of energy innovations. The legitimacy and consensus on the need to carry out the energy transition stems primarily from accepted international legal obligations in the field of climate protection.[91] As all European Union member states are United Nations member states, the EU's legal order is determined by international commitments; moreover, the EU is expanding these commitments and raising its climate ambitions, as reflected in the cited European Climate Law, among others.

At this point, it should be noted that the climate targets adopted by the EU are expected to be revised, including at least in terms of their implementation period and the introduction of mitigation measures in areas particularly vulnerable to the energy transition. The European Commission has directed a proposal to significantly increase

90 https://eur-lex.europa.eu/resource.html?uri=cellar:aaafc026-70cb-11ed-9887-01aa75ed71a1.0002.02/DOC_2&format=PDF

91 United Nations Framework Convention on Climate Change, drawn up in New York on May 9, 1992 (Journal of Laws 1996, No. 53, item 238).

the EU's average greenhouse gas emissions reduction target of at least 90% by 2040,[92] which poses a challenge for most member states with still low RES energy shares and many identified barriers to reducing emissions. At the same time, the ongoing discussion on reducing the impact of greenhouse gas emissions from third countries or supply chains beyond the EU's borders that deviate from sustainable standards requires the search for new solutions.

Examples of EU regulations supporting the energy transition

Examples of EU energy regulations and their impact on the Polish energy market will be indicated below.

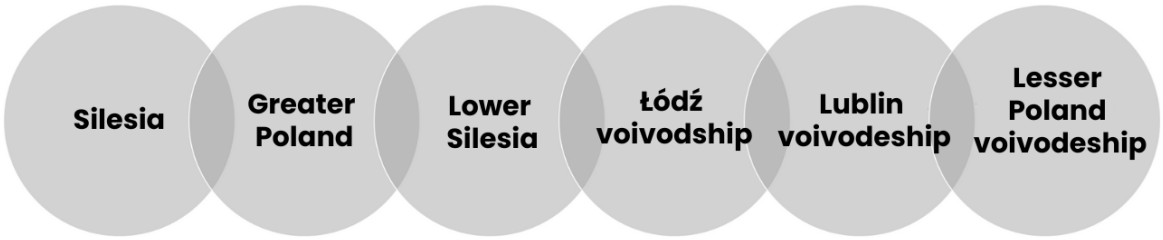
One of the first EU regulations, issued following the European Green Deal's definition of a long-term vision for the development of the EU economy in a climate-neutral and sustainable direction, is the Regulation establishing the Fair Transformation Fund.[93] The above-mentioned regulation implements a mechanism for financing the social, economic, and environmental challenges associated with the energy transition of so-called "difficult to decarbonize" territories.[94] The European Commission has identified these territories. In Poland, the financing covered: Silesia, Greater Poland, Lower Silesia, Łódź, Lublin, and Małopolska provinces:

92 Statement from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions Securing our Future The European 2040 Climate Goal and the Road to Climate Neutrality by 2050 Building a Sustainable, Just and Prosperous Society (COM/2024/63 final).

93 Regulation (EU) 2021/1056 of the European Parliament and of the Council of 24 June 2021 establishing the Fund for a Just Transition (Official Journal of the EU. L. 2021 No. 231 as amended).

94 European Commission, European Semester 2020, Overview of Investment Guidance on the Just Transition Fund 2021-2027 per Member State (Annex D).

Graph 32. Polish provinces covered by financing



Source: Kochański & Partners

The Fair Transformation Fund (FST) is a response to inequalities among member states and differing so-called "starting points" of the energy transition. FST funds support only activities specified in the regulation, which include investments leading to economic diversification, modernization, and restructuring, investments in the deployment of technologies and in systems and infrastructure for affordable clean energy, including the deployment of energy storage technologies, and in the reduction of greenhouse gas emissions; investments in renewable energy and in energy efficiency; renovation and modernization of district heating networks to improve the energy efficiency of district heating systems, and investments in thermal energy production, provided that thermal energy production facilities are based exclusively on renewable energy sources (RES). As a condition for receiving funds, territorial plans for equitable transformation (TPST) must be submitted to the European Commission. It is important to note that individual regions preparing TPSTs independently identify in them the challenges of carrying out the regional energy transition. Polish regions participate to the greatest extent in the budget of FST funds, as the scale of the challenges of the Polish energy transition is the greatest.[95] Similarly, the allocation of FST funds to individual regions is proportional to the scale of the challenges. Therefore, Poland has an opportunity not to change its situation relative to other EU member states, but to compete in the EU market in energy innovation. The FST budget is currently more than EUR 26 billion,[96] and Poland is expected to receive more than EUR 4.777 billion under the FST. Poland will receive the first pool of funds under the National Reconstruction Plan[97] (whose total budget for Poland is €59.8 billion) in April this year, which is especially awaited by local government units because it is at the local government level that key investments in decarbonization and electrification of regions based on RES energy will be carried out. FST funds are urgently needed by local governments, which are preparing fair transition plans from 2020 to obtain funds for regional energy transition. Given the dynamics of changing technologies, volatility of energy and fuel prices, and supply chain disruptions, local government is now in a different socio-economic reality, and the long wait for FST funds may cause the need to revise the challenges and needs identified.

A second example of EU regulation accelerating energy innovation is the revision of the[98] Directive on the promotion of energy from renewable sources (RED III Directive). The changes resulting from the directive can be read as a challenge, focusing only on increased targets, such as raising the minimum RES target from min. 32% to min. 42.5% by 2030. In contrast, the RED III directive introduces several changes that can significantly accelerate the development of renewable energy investments. In this regard, one can define an accelerated renewable energy development area as an onshore, offshore or inland waterway area that a member state may designate as particularly suitable for the installation of renewable energy power plants. As a result, member states have been obliged to identify by February 21, 2026, in their land use plans areas of accelerated energy development from renewable sources for at least one type of RES. In this regard, priority is given to rooftops and building facades, transportation infrastructure areas and their immediate surroundings, parking lots, farms, landfills, industrial areas, and mines, among others. In addition, an increasingly widely used renewable energy purchase contract has been defined. Member

95 Total budget by country of Just Transition Fund [EUR], https://cohesiondata.ec.europa.eu/funds/jtf/21-27#

96 The current budget amount after the increase: https://www.europarl.europa.eu/factsheets/pl/sheet/214/fundusz-na-rzecz-sprawiedliwej-transformacji

97 Annex to the Council's Executive Decision amending the Executive Decision of June 17, 2022 on the approval of the assessment of the plan for reconstruction and increasing the resilience of Poland (15835/23).

98 Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC with regard to the promotion of energy from renewable sources and repealing Council Directive (EU) 2015/652 (Official Journal of the EU. L. of 2023 No. 2413).

states have been required to assess regulatory and administrative barriers to these contracts, remove unjustified barriers, and work to make the aforementioned contracts more widespread, including seeking ways to reduce the financial risks associated with them, particularly through credit guarantees. Member states are required to ensure that these contracts are not subject to disproportionate or discriminatory procedures and fees and that any associated guarantees of origin can be transferred to the purchaser of renewable energy as part of the renewable energy purchase contract.

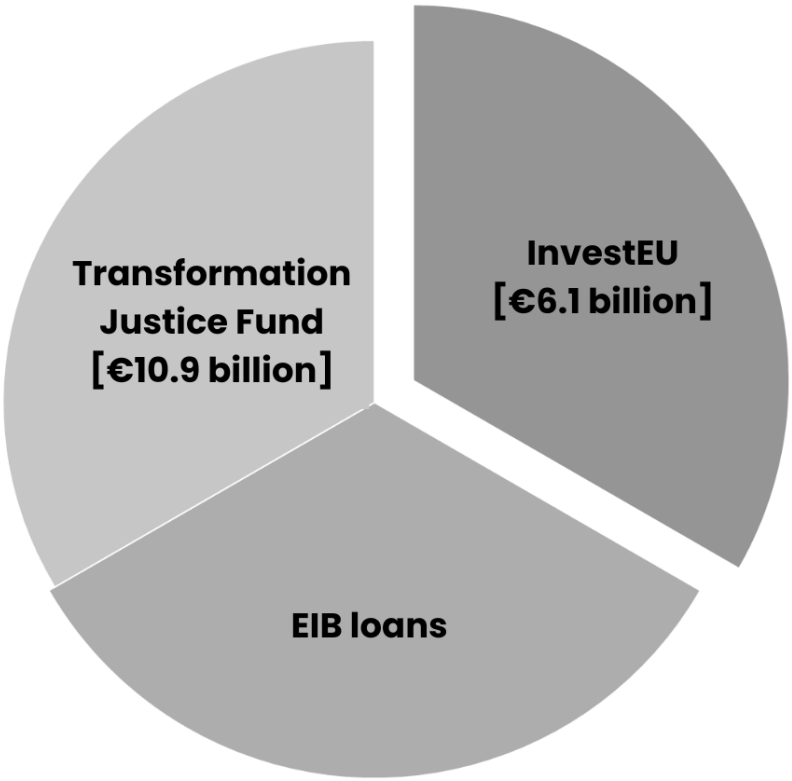
It is important to note that although the EU is dynamically implementing changes in the energy market, it is simultaneously (i) putting in place the necessary mechanisms to implement these solutions, (ii) predominantly implementing legal changes through directives, leaving the Member States free to transpose these solutions in a manner appropriate to national circumstances, and (iii) implementing financing mechanisms for the energy transition, allocating the largest pool of funds to countries facing the greatest challenges in this regard.

A mechanism for a just transition

The vision alluded to earlier of transforming the EU economy into a climate-neutral one assumes that the goal in question can be achieved by channeling a stream of support from public funds and large-scale private investment. By way of example, the Fair Transformation Fund indicated above is part of the Fair Transformation Mechanism,[99] which consists of two more instruments, i.e., a special scheme within InvestEU and a loan scheme from the European Investment Bank.

[99] Proposal for a Regulation of the European Parliament and of the Council establishing the Fund for a Just Transition (COM/2020/22 final).

Graph 33. Three parts of the Fair Transformation Fund



Source: Kochański & Partners

In line with earlier indications, FST funding is aimed at so-called regions difficult to decarbonize. Loans from the EIB are to support public investment. In contrast, InvestEU funds (€6.1 billion) are dedicated support for private investment, i.e., the implementation of energy and transportation infrastructure projects, including gas infrastructure and district heating systems, as well as decarbonization projects. InvestEU finances private investments in the areas of sustainable infrastructure, research, innovation, and digitization, conducting social investments, and acquiring the necessary skills for the energy transition. To make it easier for entrepreneurs to apply for InvestEU funds, the InvestEU Advisory Center has been launched as a point of contact for project managers and advisory centers. Currently, more than 2,500 projects have been submitted for InvestEU funding in the areas of:

- knowledge and digital economy,
- energy union,
- transportation,
- social infrastructure, and others,
- resources and environment,
- funds for small and medium-sized enterprises and small capitalization companies.

Polish projects are also applying for InvestEU support. In this regard, one can point out, among others, (i) the project "SOLAR CONTROL" - home solar control solution, (ii) "One-Stop-Shop" - components for offshore wind farms, (iii) "Next--generation fuel cell based generators" - fuel cell generator solution, providing renewable energy with applications in the marine, automotive and military sectors.[100]

There is no doubt that the nature of the challenges of the energy transition requires diversification of resources due to the change in the model of energy market operation, i.e., from centralized energy production to the prevalence of distributed generation. Therefore, public entities need resources to transform the generation structure and implement new flexible energy services. On the other hand, the pillar of the energy transition is the private sector, which will develop renewable energy by operating in various models, i.e., energy companies (including joint ventures), energy clusters, or energy cooperatives, among others. The private sector, including those working with public administration, science, and NGOs, will give direction to the energy transition, as it will be the generator of innovations created in multidisciplinary expert teams best suited to the needs of a given sector or region.

Fitfor55 – a regulatory package to accelerate the energy transition

Based on the vision outlined in the European Green Deal, a consequence of the energy transition path set out is the adoption of the so-called Ready for 55 package (Eng. Fitfor55). The announcement[101] underscores that the budget directed to the energy transition within the EU's multi-year financial framework[102] is unprecedented. Including private investment will be key to sustainable economic development. In addition, the desirability of revising the greenhouse gas emissions trading system (ETS) was pointed out, thus influencing changes in the private sector (extending the ETS to more sectors or also supporting energy private investments from the modernization fund) and consumer behavior.

ETS revision

Staying with the ETS, the adopted revision of the ETS Directive[103], among other things, extended the rules on the aviation sector's obligation to obtain GHG emission allowances also to the

100 See https://ec.europa.eu/investeuportal/desktop/en/index.html

101 Statement from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions, "Ready for 55": achieving the EU's 2030 climate target on the road to climate neutrality (COM/2021/550 final).

102 Council Regulation (EU, EURATOM) 2020/2093 of December 17, 2020, defining the multiannual financial framework for 2021-2027 (Official Journal of the EU. L. 2020, item 433, as amended).

103 Directive (EU) 2023/959 of the European Parliament and of the Council of May 10, 2023, amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 on the establishment and operation of a market stability reserve for the Union's greenhouse gas emission allowance trading scheme (OJ L. 2023, No. 130).

maritime transport sector, which accounts for about 13.5% of GHG emissions from the transport sector.[104] Accordingly, entities operating in the marine transport sector were required to purchase emission allowances and burdened with relevant reporting obligations.

On the other hand, it is impossible to consider such regulation as unjustified or delaying the energy transition process. Especially since players in the sector are entering into multilateral agreements, for example, for the implementation of renewable fuels, which may reduce their participation in the ETS. Importantly for this analysis, in 2024-2030, 2.5% of the total number of greenhouse gas emission allowances will be sold for the modernization fund. The modernization fund allows for financing the modernization of the national energy system. It increases energy efficiency by (i) supporting investments in the generation and use of electricity from RES, (ii) supporting investments in energy storage and the modernization of energy networks, including pipelines belonging to district heating systems or electricity transmission networks, and increasing interconnections between EU member states, (iii) supporting, in cooperation with social partners in regions dependent on solid fossil fuels, equitable transitions to facilitate worker transitions and the acquisition of new and specialized skills, support education and employment initiatives, and new startup business initiatives, and (iv) support investments in energy efficiency, including in the transport, construction, agriculture, and waste sectors. Poland, the largest contributor to the modernization fund[105], is capable of mobilizing large-scale investments in the energy sector.

CBAM

As part of the Fitfor55 regulatory package, a mechanism has been established for adjusting prices at the borders to consider CO_2 emissions.[106] The regulation aims to enable member states to realistically meet their climate commitments, reducing the impact of emissions resulting from trade with third countries, i.e., emissions related to the import of goods into the EU customs territory, when the risk of carbon leakage arises. The regulation will be implemented in two stages, i.e., a transitional period has been provided (from October 1, 2023, to December 31, 2025), during which importers' emissions reporting obligations will be simplified. Emissions reporting applies to goods specified in the catalog indicated in the regulation. These are specifically defined commodities within sectors, i.e., cement, electricity, fertilizers, iron and steel, aluminum, and chemicals. Importers will be required to report (in the case of Poland to the National Center for Balancing and Emission Management) greenhouse gas emissions associated with the production of the goods in question (direct and indirect emissions), without having to make any payments or financial adjustments to account for the emissions. On the other hand, ultimately, importers of the aforementioned goods will be required to obtain the status of "authorized CBAM notifier" and annually report the number of goods imported into the EU in the previous year and the associated embedded GHG emissions, and then settle the aforementioned emissions with CBAM certificates (one certificate will be equivalent to one ton of CO_2 emitted). CBAM should be understood as an extension of the ETS, as free ETS allowances will be phased out in l. 2026-2034 with the planned achievement of climate and energy targets. At that time, GHG emissions will be declining in the EU internal market, and measures will be needed to prevent the spillover of emissions from third countries into the EU. Consequently, introducing the CBAM system should not be seen as an unnecessary and unreasonable burden on businesses since countries outside the EU are also obliged to meet GHG emission reduction targets, remaining bound by climate-related international obligations.

104 European Environment Agency, European Maritime Transport, Environnemental Report 2021, Copenhagen 2021, p. 155.
105 Annex IIB of the Directive of the European Parliament and of the Council (EU) 2023/959, *op.cit.*
106 Regulation (EU) 2023/956 of the European Parliament and of the Council of May 10, 2023, establishing a mechanism for adjusting border prices to take account of emissions (OJ L. 2023, No. 130).

At the same time, it should be pointed out that mechanisms such as the ETS and CBAM, and probably in the future other systems for burdening emissions-intensive and environmentally harmful activities, generate costs on the part of companies whose specific activities require a longer transition period. Such activities include, in the case of the ETS, fuel combustion; oil refining; production of coke, aluminum, and certain chemicals; maritime transport or aviation, among others. In the case of CBAM, on the other hand, imports of certain commodities are charged: cement, electricity and fertilizers, iron and steel, aluminum, and chemicals. Entrepreneurs, the largest emitters, bear the highest responsibility and cost of negative environmental impacts, so innovation and investment are urgently needed in this regard and need support.

In conclusion, the private sector benefits from the EU's energy transition budget. Entrepreneurs doing business in Poland will benefit the most from the instruments supporting the implementation of energy projects, as the budget of funds is distributed in proportion to the challenges of the energy transition and the so-called baseline position of the member states' ability to achieve climate and energy goals. Implemented regulations will burden high-carbon sectors and support projects based on innovative and clean technologies. Therefore, commitment to the energy transition process will determine companies' market position.

The challenge is the availability of funds to carry out the energy transition. According to the current national energy policy until 2040[107] (PEP2040), the energy transition will cost Poland about PLN 1.6 trillion.[108] Only the cost of capital expenditures for expanding individual generating capacities was set at more than PLN 342 billion, and a higher estimate can be expected after the PEP2040 update. The NIP funds for Poland amount to about EUR 60 billion. The EU budget funds for Poland amount to EUR 76 billion[109], which will not fully cover the growing needs of Poland's energy transition, especially since these funds also support other needs of the economy. Therefore, it is crucial to accelerate the implementation of energy investments and to identify the needs of the Polish energy sector in a far-sighted manner, as the current EU Multiannual Financial Framework budget is valid until 2027. Poland faces the challenge of "making up" for the period when it could not benefit from EU support and should negotiate a large pool of funds for the next financing period, the so-called transition period of the energy transition.

Realizing ever-higher climate ambitions while protecting the sectors most affected by the energy transition is also a challenge. Accelerating low—and zero-carbon investments while upholding the principles of a fair and inclusive transition is necessary.

The challenge is also reconciling the two growth values and economic and environmental protection. The introduction of burdens on high-carbon businesses must be gradual, tailored to the specifics of the activity and individualized national circumstances. At the same time, the existing principle of "do no harm" and "polluter pays" is expected to support the emerging RES sector and reduce emissions in the so-called "difficult to decarbonize" sectors. In contrast, the needs of companies in greatest need of transformation, which are now strategically important to the economy, are proportional to the burden. Regulations adopted based on the European Green Deal strategy require balancing the aforementioned values and supporting companies facing the greatest challenges of energy transition.

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107 Announcement of the Minister of Climate and Environment of March 2, 2021 on the national energy policy until 2040 (M.P. of 2021, item 264).

108 Cf. https://finanse.gazetaprawna.pl/artykuly/9340429,polska-realizuje-najwiekszy-w-historii-proces-transformacji.html

109 Cf. https://www.rp.pl/fundusze-europejskie/art39899711-polska-dostanie-23-mld-euro-z-kpo-w-tym-roku-musi-sie-spieszyc

Romania

It must be stated, however, that the actions of national regulatory agencies in the energy sector in Romania are often more harmful than those of their EU counterparts when it comes to encouraging innovation in the energy sector. **The Romanian Government controls too much of the energy market directly, and ANRE regulates the sector too heavy-handedly for any private companies to be truly disruptive in a positive sense.** Very often, the best thing that can be said about the Romanian regulatory agencies is that they are doing a better job of transposing the EU legislation than they used to.

The *Clean energy for all Europeans package*[110] aims to facilitate the clean energy transition, covering aspects like the electricity market design, renewable energy, energy efficiency, and governance of the Energy Union. This package is meant to encourage the integration of renewables into the grid and to support the decarbonization of the energy sector, through innovation in smart grids, energy storage, and other clean energy technologies. **The package has had a positive effect regarding increased adoption of renewable energy solutions and improved energy efficiency for residential buildings.**

Romania suffers from energy poverty.[111] The need for significant investment in new technologies, grid upgrades, and renewable energy infrastructure can place a financial burden on the government, businesses, and, ultimately, consumers. The costs of transitioning to cleaner energy sources and improving energy efficiency can often lead to higher energy prices in the short term, exacerbating our aforementioned energy poverty.

The "Fit for 55" package is a comprehensive set of policy initiatives introduced by the European Commission in July 2021, aimed at revising and expanding the European Union's climate and energy legislation. The package's name reflects its central goal: to reduce net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels, putting the EU on a path to climate neutrality by 2050, in line with the European Green Deal's objectives.[112]

The "Fit for 55" package ensures that the EU's climate, energy, land use, transport, and taxation policies contribute to the 2030 emissions reduction target, laying the groundwork for a sustainable, resilient, and climate-neutral economy. It represents a significant overhaul of the EU's climate policy architecture and includes new proposals and existing legislation revisions.

There are many components to this package. The following is a short list which includes only some of the more problematic:

- Revision of the EU *Emissions Trading System (ETS)*, expanding the ETS to cover more sectors, including shipping, and reducing the overall emission cap more rapidly.
- Introduction of the *Carbon Border Adjustment Mechanism (CBAM)*, a mechanism to put a carbon price on imports of certain goods outside the EU to prevent carbon leakage.
- Revision of the *Effort Sharing Regulation (ESR)* by setting more ambitious binding annual greenhouse gas emission reduction targets

110 European Commission (2019). Clean energy for all Europeans package Available at: https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en

111 Sinea, A. (2023). Sărăcia energetică se extinde în rândul clasei de mijloc din România. Energynomics.ro. Available at: https://www.energynomics.ro/anca-sinea-saracia-energetica-se-extinde-in-randul-clasei-de-mijloc-din-romania/#:~:text=Aproximativ%20jum%C4%83tate%20din%20popula%C8%9Bia%20Rom%C3%A2niei,mult%20c%C4%83tre%20clasa%20de%20mijloc.

112 European Council (2021). Fit for 55. Available at: https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition; https://cleancapitalistleadershipcouncil.org/wp-content/uploads/climatefreedomaccord-straw-230202.pdf; https://copenhagenconsensus.com/post-2015-consensus/trade; https://archive.nytimes.com/tierneylab.blogs.nytimes.com/2009/04/20/the-richer-is-greener-curve; https://www.obserwatorfinansowy.pl/tematyka/makroekonomia/trendy-gospodarcze/ocieplenie-klimatu-degradacja-srodowiska-kapitalistyczny-rynek-jest-odpowiedzia

for Member States for sectors not covered by the ETS.

- Revision of the *Renewable Energy Directive (RED)*, increasing the EU-wide target for renewable energy sources in the EU's energy mix to make the bloc's ambition for renewable energy deployment consistent with the new 2030 climate target.
- Revision of the *Energy Efficiency Directive (EED)* by setting more ambitious binding annual targets for reducing energy consumption at the EU level.
- Amendment of the *Land Use, Land Use Change, and Forestry (LULUCF)* Regulation by increasing carbon removals by natural sinks to complement emission reductions.
- Introducing the *ReFuelEU* Aviation and *FuelEU* Maritime initiatives, which promote sustainable fuels in aviation and maritime transport.
- Revision of the *Energy Taxation Directive (ETD)* to align the taxation of energy products and electricity with EU energy and climate policies.
- Creation of the *Social Climate Fund* to support citizens most affected by energy and mobility poverty, mitigating the social impacts of the climate transition.

Most, if not all, of these components sound great, and we would not deny that they could bring some benefits and that we expect them to have some positive effects. The key question is, "At what cost"? It's not even the direct costs we must worry about most, but the indirect costs. **Imposing such an ambitious agenda does not consider the fact that our level of technological readiness may simply be insufficient to meet the required timelines. Forcing such broad changes with an aggressive timeline will hurt energy prices, further damaging social equity and increasing energy poverty.**

More importantly, increased operational costs due to higher carbon prices and stricter regulations **will further affect the global competitiveness of EU industries**, particularly energy-intensive ones. The damage to the EU's competitiveness will be significant, and the subsidies given to the industries will not help offset it. On the contrary, **they will more likely create additional market distortions and strain EU and national budgets, which are already impoverished by the overall agenda.** Similarly, consumers will struggle with higher costs and reduced incomes, while the Social Climate Fund will transfer a self-inflicted problem from the few to the many.

Slovakia

The energy sector in Slovakia has undergone quite extensive privatization. The main electricity producer, owning a nuclear power plant and providing more than 60% of electricity production, has been taken private in early 2000s. The state retained only a one-third stake in the company. In the three regional electricity distribution system operators, the state has a majority stake, but managerial control is in the hands of private investors. The state retained 100% ownership in the transmission system operator, in the largest gas trader and in the six large municipal heating plants. Thanks to the favorable connection to pipeline imports of Russian natural gas and oil, together with the favorable price of electricity, there has been no significant pressure for innovation in the energy sector in Slovakia. Most private resources over the last 15 years have been invested in completing a nuclear power plant and constructing a new, large gas-fired power plant. However, alongside this, the state, through the regulatory policy implemented by the Office for Regulation of Network Industries, significantly interferes in the energy market for final consumers, especially households. **Through the low regulated price of electricity and gas, it has thus created. It continues to create an environment where there is a lack of incentives to invest in the often more expensive renewable sources.** Economic policy in the pre-crisis period favored a conservative approach to "proven, well-known sources," specific support for the cogeneration of electricity and heat (installed power in cogeneration represents 30% of total electric power in Slovakia). In this economic policy setting, the European Union's pressure to decarbonize forced Slovak politicians to take action to reduce emissions.

The first important step was to support the construction of solar parks in 2009-2012. The production of these plants was massively subsidized and still represents a significant burden for the state budget or consumers, who have to finance these plants through the higher price of electricity. However, this leapfrogging of costs and the burden on grid regulation has forced the government, in cooperation with the transmission grid, **to declare a stop-state, effectively preventing the connection of new renewables to the grid.** The government's reluctance to adequately support the development of new renewables was also evident in handling the proceeds from the sale of emission permits. Over the years, the Environmental Fund has accumulated more than EUR 1.2 billion of these revenues, mainly used to reduce the budget deficit. Although some of these resources have been used to finance, for example, insulation of buildings and decarbonization of industry, in terms of new resources, such as biogas production support, these have always been rather smaller projects. Paradoxically, the government has continued subsidizing electricity from unprofitable lignite mining, contrary to its long-term decarbonization objectives. This single direct subsidy of fossil fuel combustion thus ended only in 2024.

Only the energy crisis and, subsequently, the initiative Fit for 55, and thus more intense pressure from the EU, forced Slovak politicians to more actively support the implementation of new energy resources. Last year, 240 MWe of new photovoltaic resources were connected, but this is still only a quarter of the installed capacity in the Czech Republic in the same year. The government's low interest is also reflected in the zero addition of wind power plants, whose development is hampered primarily by a failing state permitting system.

Meanwhile, by agreeing the Renewable Energy Support Directive 2023/2413, the Slovak government has committed itself to achieving a 35% share of renewables in final energy consumption by 2030. However, the approval of this directive was contrary to the government's real intentions, which subsequently stated a target of 23% in the updated National Energy and Climate Plan. **Even this significantly lower target will be difficult to achieve, given that the electricity sector is heavily decarbonized due to the high share of nuclear. Renewables are needed to meet this target, especially in industry, heat generation, and transport, where the share of RES is relatively difficult and costly to increase due to the small size of these generators/consumers.**

Thus, there is a significant discrepancy in the assessment of the potential and ambition of the development of renewable energy sources in Slovakia in relation to European and Slovak energy policy. **Achieving the European targets would mean supporting high subsidies for constructing currently unprofitable sources or support for electromobility.** On the other hand, they put pressure on the Slovak executive to remove regulatory barriers to their development.

Ambition vs. risks and costs

The ETS is not only the world's most comprehensive CO_2 charging system, it is also the system with the highest price of ton of CO_2. Through CBAM, the system is effectively being extended to the whole world. A major advantage of ETS over a carbon tax is the existence of a cap, which enables the EU to reduce the total emissions of the sectors concerned permanently and to meet its targets. The second advantage is that businesses facing low abatement costs are incentivized to invest in decarbonization. This leaves 'free' allowances (or allowances previously allocated free of charge) on the market, purchased by companies for whom decarbonization is too costly. This achieves the objective of reducing emissions where it is cheapest, making the ETS technology-neutral.

Like any other government regulation, the ETS system has a flip side of costs and unintended consequences.

First of all, the allowances purchased by power plants are directly reflected in the price of electricity. The electricity market operates on the merit order principle, i.e., the price of electricity

is determined by the most expensive electricity produced. This is usually the electricity produced by gas-fired power stations. The price of 1 MWh of electricity produced with emissions of 0.35 t of CO_2 is thus burdened with a cost of EUR 20 (at the current allowance price of EUR 58 – March 2024). As a result, every single MWh produced from a nuclear or hydropower plant is more expensive by at least part of this EUR 20. Although this premium means a higher incentive for emission-free production, the EUR 20 contribution takes the form of a tax from the consumer's point of view. Although many years ago, there was a discussion about replacing the standard tax burden with environmental taxes, this has only happened to a limited extent. The Slovak state will collect EUR 342 million from the auctioning of permits in 2023, by which, in fact, the tax burden on companies and, therefore, on final consumers has increased. On the contrary, **instead of reducing the tax burden, the state's influence on the economy will expand.**

ETS2 revenues will be spent by new governmental funds (bureaucrats) to provide new subsidies to low-income households, which will be threatened by higher heat prices.

There is also the question of the reasonableness of the price of an emission allowance. None of the European Commission's documents envisaged that the price of an allowance would rise to EUR 100 as early as this decade, as happened during the energy crisis. The current value is still higher than the initial expectation of EUR 50. Even the Nobel Prize winner William Nordhaus did not foresee such prices in his models.

High electricity prices have caused a significant decline in industrial production. **In Slovakia, low-emission aluminum production was interrupted at a plant that was directly connected to a nuclear power plant by a power line.** The production curtailment was not limited to Slovakia; the activity of energy-intensive companies in Germany fell by 15%.[113] If this production has been shifted abroad, it is likely that the final emissions will ultimately rise due to lower emission requirements outside the EU.

It would be misleading to attribute high energy prices solely to emission allowances; the substitution of relatively cheap piped imported fossil fuels from Russia was the main reason for the price rise. However, energy prices will remain well above pre-crisis levels in 2024, and allowances will contribute to this.

Moreover, the price of allowances is difficult to predict, making it difficult for producers to prepare investment plans. One week after the Russian invasion of Ukraine started, the price dropped to EUR 58. A year later, in February 2023, the price had risen over 95 Eur. In the last three months, the price fell by 1/3 to reach EUR 58 in February 2024. A weak forecast of growth of EU economy will probably lead to further decline. Unless the European Commission will start to manipulate the price by regulating supply.

The European Commission can influence the allowance price through a market stabilization reserve. Furthermore, an increase in the linear reduction factor will contribute to downward pressure on emissions for the better or to export emissions for the worse. These macroeconomic impacts are not adequately considered; the political ambitions, couched in terms of 'the EU as a world leader in decarbonization', carry considerably more weight.

A particular problem with the ETS is its use of revenues. Although the principle of electricity pricing incorporating carbon costs provides an incentive for producers from zero- and low-emission sources to invest and sell the electricity, governments use the auctioning funds for large-scale subsidies, either to electricity producers or directly to industrial producers. This contradicts the neutral principle of promoting technology;

[113] https://www.economist.com/europe/2023/03/15/germany-is-finally-tackling-its-long-standing-economic-weaknesses

the government bureaucrat, through its decisions, selects specific winners. If these funds are not to be used to reduce the direct tax burden, they should, in principle, be provided in the form of auctions. These will make it possible to fund projects delivering the highest carbon emissions reductions at the lowest cost.

Moreover, decarbonization efforts are complicated by secondary objectives. The Climate Act obliges countries to reduce emissions, achieve a minimum share of RES in final energy consumption, and reduce overall energy consumption. The main shortcoming of these targets is that **they force countries to make sub-optimal choices.** Slovakia has been a net exporter of electricity since 2023 due to its high production of essentially emission-free nuclear electricity. In Slovakia, there are no more coal sources of electricity that RES could replace. Even if heavy industry could be electrified (thus significantly reduce emissions), the RES target will remain unmet because nuclear is not counted as RES. For the same reason, the switch to electric vehicles will not help. **The government will, therefore, be forced to finance the construction and use of renewable heat sources (biomethane, wood chips, or geothermal), which have limited potential and are more financially demanding.** It will be necessary to insulate all the buildings in the country in a short time, which will impinge on the availability of materials and manpower. Even if this will not be enough, it will be necessary to radically expand the production of electricity from the sun and wind, and this is a situation when the country is already a net exporter of electricity.

The launch of ETS2 is, on the face of it, a logical extension of EU ETS carbon pricing. Households heated through the district heating system have to pay an emission allowance for the natural gas used in the price of the heat. However, there are hundreds of thousands of households in Slovakia with their own gas boiler that do not pay the carbon tax. However, the taxation of transport emissions is controversial. The consumption tax on mineral oils is at least partly an environmental tax. A comparison of investment in road construction and maintenance and the inclusion of other revenues the state receives from charging for road use shows that **in Slovakia, only one-third of the excise duty ends up 'on the roads.'[114] Two-thirds are general state budget revenue, but economically, it has the same effect as a carbon tax.** They increase the price and thus reduce the demand for motor fuels. An additional tax would thus be duplicative, taxing what is already taxed.

A cap and trade system is probably the most effective system for reducing emissions, and it is more effective than a carbon tax because of the cap. However, this system should be based on technology neutrality and predictability. Radical leaps in cap and target setting, such as we have seen in recent years, make it very difficult for the industrial and manufacturing sectors to adapt, **leading to a decline in competitiveness and a fall in economic growth**. This is too expensive for the political objective of trying to lead the way in decarbonization. **Subsidies should be replaced by technology-neutral support (in the form of auctions), as well as by reducing the direct tax burden, cutting bureaucratic costs, simplifying permitting processes, speeding up depreciation of new technologies, and promoting long-term power purchase agreements (PPAs).**

[114] https://iness.sk/sk/nova-dan-ktoru-uz-davno-mame

Ukraine

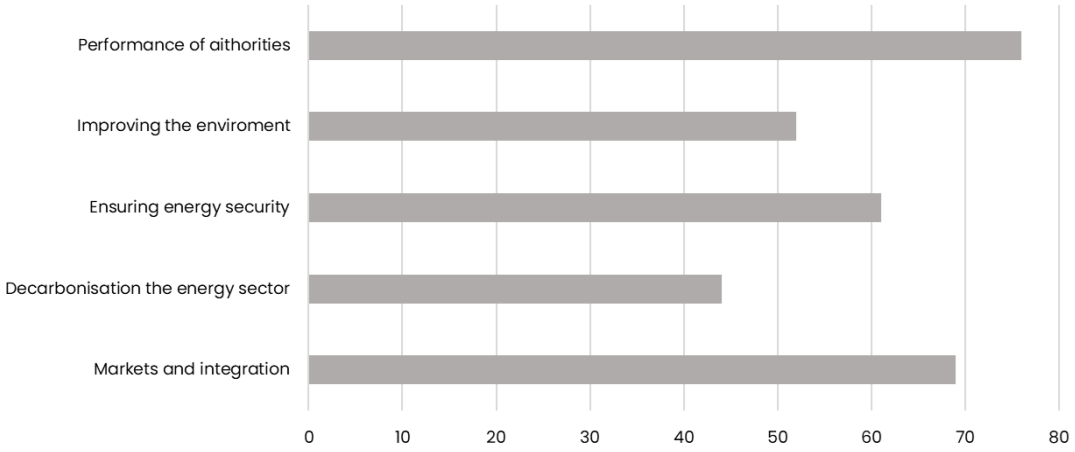
Ukraine is a party to the Energy Community Treaty and the Ukraine-EU Association Agreement, so it is obliged to comply with European energy legislation. The country's status as a candidate for the EU and the EU's decision to start negotiations strengthen sectoral integration in the field of energy.[115]

Ukraine, as a Party of the Energy Community, already implements EU legislation[116] on electricity (15 Directives and Regulations), natural gas (7), oil (1), security of supply (2), infrastructure (1), renewable energy (1), energy efficiency (3), competition (3), environment (8), statistics (3), climate (6) and cyber security (1). After gaining membership in the EU, Ukraine will have the obligation to adapt the energy legislation to the European one fully, making it clearer and more attractive for investors. As of November 1, 2023, the overall implementation result is estimated at 59% (see Graph 44).

115 **European Council conclusions on Ukraine, enlargement, and reforms:** "In the face of continued Russian attacks against Ukraine's civil and critical infrastructure, the European Union and its Member States will intensify the provision of further humanitarian and civil protection assistance to Ukraine, as well as **assistance to ensure the resilience of its energy sector** through the winter». «... the European Union remains committed to supporting Ukraine's repair, recovery, and reconstruction». «15. The European Council decides to open accession negotiations with Ukraine. ... invites the Council to adopt the respective negotiating frameworks..» https://www.consilium.europa.eu/en/press/press-releases/2023/12/14/european-council-conclusions-on-ukraine-enlargement-and-reforms/

116 AIR, ECs, 1 Nov. 2023, https://www.energy-community.org/dam/jcr:3da7c4f8-ea23-4169-b1e9-66b0ed05fcb7/EnC_IR2023.pdf

Graph 34. Ukraine. Implementation Overview, % (1 November 2023)



Source: Own study, Centre for Global Studies "Strategy XXI", UKR

72% of directives and regulations in the field of electricity are fulfilled, although 38% of the requirements for regional integration (TEN-E Regulation (EU) 347/2013) were fulfilled. In the gas sector, requirements are met by 65% in general, including in terms of regional integration. EU legislation is implemented by 88%. The gas network has good connectivity with the gas infrastructure of neighboring countries.

The Independent Operator of the GTS of Ukraine (OGTSU) is an observer member of ENTSOG. On 28 November 2023, the ENTSO-E acknowledged that the transmission system operator (TSO) NEC "Ukrenergo" implemented the key technical actions needed to synchronize Ukrainian and European energy systems continuously. It is extremely important to further integrate into the European electricity market and to ensure the resilience of the Ukrainian energy system.[117] On December 14, 2023, NEC "Ukrenergo" became a full member of ENTSO-E. This provided an opportunity to significantly strengthen the stability of the energy system of Ukraine and the EU.

Implementation of the European regulations, decrees, and directives facilitates the integration of Ukraine into the EU and improves the EU's assistance in strengthening the sustainability of Ukraine's energy industry in times of war. The Energy Community continues its efforts to supply equipment for repairing and restoring energy facilities in Ukraine through the UESF (Ukraine Energy Support Fund). Candidate status in the EU provides an opportunity to receive financial assistance from the EU for the systematic restoration of energy infrastructure and grant funds for the implementation of decarbonization and energy-saving measures.

Private investments in the energy sector. DTEK Renewables is one of the largest investors in the Ukrainian RES sector. The Memorandum of Understanding between Ukraine's DTEK and Vestas, the world's leading manufacturer of wind turbines, stipulates that the Danish company will supply wind turbines to Ukraine to construct the second stage of the Tyligulska windfarm. The plant will be 500 megawatts, with an investment of over 650 million euros.[118]

[117] https://energysecurityua.org/news/the-ukrainian-energy-system-finalized-synchronization-with-the-european-network/

[118] https://dtek.com/en/media-center/news/dtek-and-vestas-ready-to-implement-ukraines-largest-private-investment-project-in-the-energy-sector-since-gaining-independen

National perspective. Main possibilities for investments:

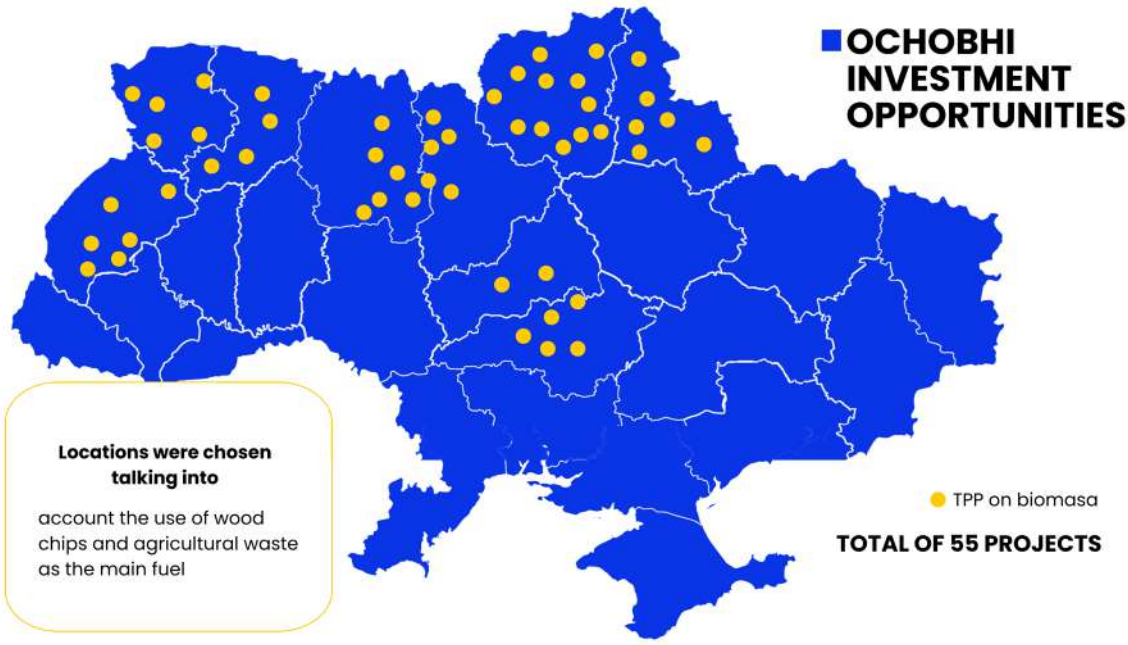
1. Ukraine fulfills its obligations regarding the withdrawal of coal generation. Create a network of biomass power plants with a reasonable geographical distribution and a capacity of 1.1 GW to provide energy to local communities and municipalities.

Graph 35. Biofuel power plant (pilot project for 5–30 MW)

Source: own study, Centre for Global Studies "Strategy XXI", UKR

Proposed locations of the future biomass power plant were selected with the use of wood chips and agricultural waste as biofuel:

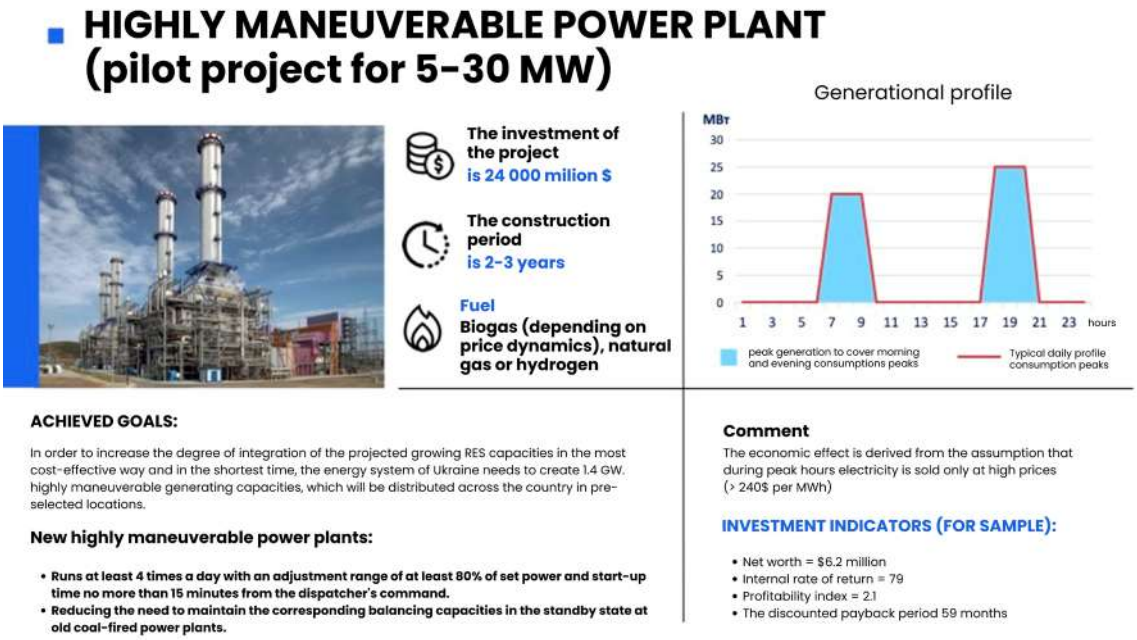
Map 6. Biofuel power plant (pilot project for 5–30 MW)



Source: own study, Centre for Global Studies "Strategy XXI", UKR

2. To increase the degree of integration of growing RES capacities in the most cost-effective way and in the shortest possible time, the energy system of Ukraine needs to create 1.4 GW of highly maneuverable generating capacity, which will be distributed across the country in pre-selected locations. This will help to reduce the need to maintain balancing capacities at old coal-fired power plants.

Graph 36. Highly maneuverable power plant (pilot project for 5-30 MW)



Source: own study, Centre for Global Studies "Strategy XXI", UKR

Seats for potential highly maneuverable power plants were chosen based on the availability of the gas distribution network and industrialization of the region:

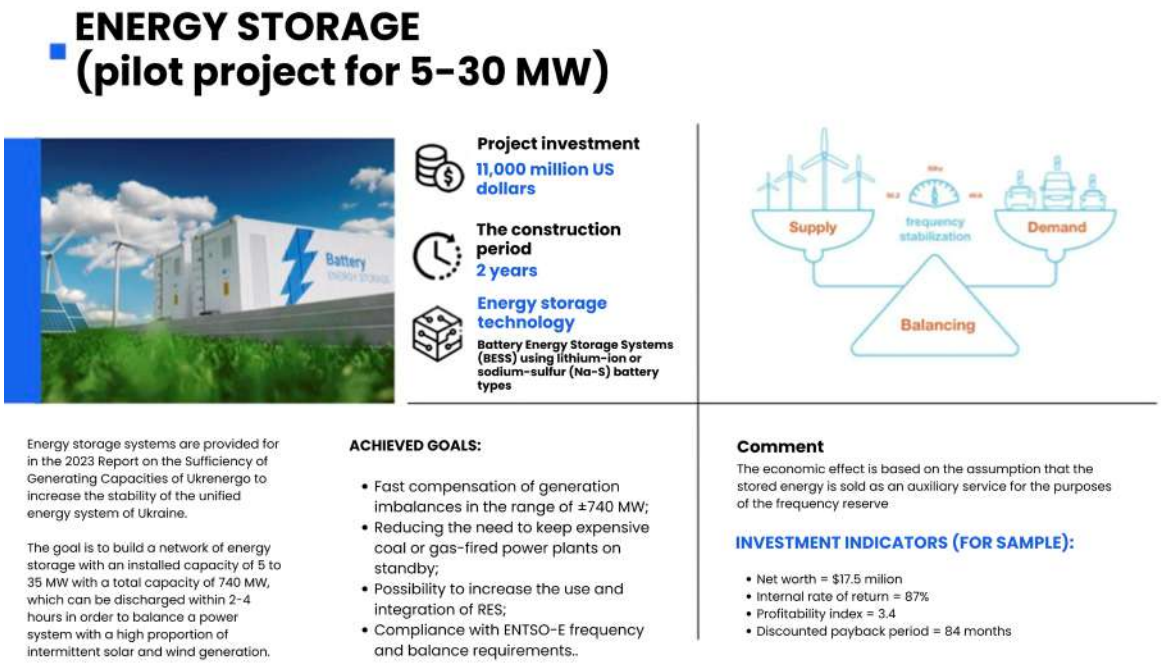
Map 7. Ochobhi Investment Opportunities

Source: own study, Centre for Global Studies "Strategy XXI", UKR

3. Energy storage systems are provided for in the Report on the Sufficiency of Generating Capacities of Ukrenergo for 2023[119] to increase the stability of the Unified energy system of Ukraine. The goal is to build a network of energy storage with an installed capacity of 5 to 35 MW with a total capacity of 740 MW, which can be discharged within 2-4 hours with the aim of balancing the energy system with a high proportion of periodic solar and wind generation. This will help to solve the following tasks: Fast compensation of generation imbalances in the range of ±740 MW; reducing the need to keep expensive coal or gas-fired power plants on standby; possibility of increasing the use and integration of RES; compliance with ENTSO-E frequency and balance requirements.

[119] https://ukraine.un.org/sites/default/files/2023-04/UNDPUkraineEnergy_ExecutiveSummary_eng.pdf

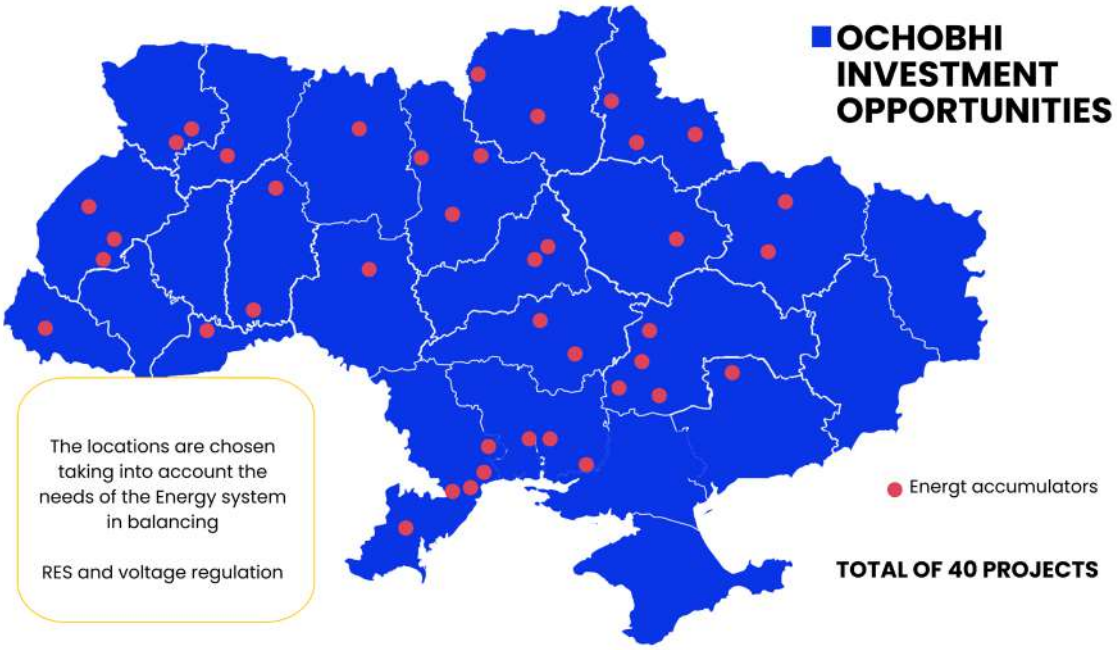
Graph 37. Highly maneuverable power plant (pilot project for 5-30 MW)



Source: own study, Centre for Global Studies "Strategy XXI", UKR

The locations are chosen to take into account the needs of the energy system in balancing RES and voltage regulation:

Map 8. Ochobhi Investment Opportunities



Source: own study, Centre for Global Studies "Strategy XXI", UKR

Is there anything that the EU is doing or plans to do that could spoil or help the effort to revitalize the energy sector with private initiatives in my country?

ETS

The Ministry of Environmental Protection and Natural Resources of Ukraine plans to develop an Emissions Trading System (ETS) in 2024. In particular, it plans to adopt a framework law that implements European standards for reducing carbon emissions.

The European Commission's vision was published on November 8, 2023, in its report on Ukraine as part of the enlargement package. In particular, the compliance of Ukrainian legislation with EU law in terms of environmental and climate protection was assessed as containing a "certain level of preparation," i.e., a D. Plans are as follows: adopt the law on the emissions trading system in 2024, launch the ETS in 2025 in pilot mode, fully launch the STV in 2026.[120]

CBAM

Even before the full-scale invasion, the EU identified Ukraine as one of the countries that would be most affected by the implementation of CBAM. According to pre-war estimates by EY, the CBAM could potentially cost Ukrainian producers $300 million. Under current conditions, such a financial burden would be excessive for the Ukrainian economy. The industries and enterprises subject to the CBAM are already among the most affected by the hostilities. It should also be noted that due to the blockade of the Black Sea ports, Ukrainian companies have limited options for exporting to countries other than the EU. For example, before the war, 45% of mining and metals exports went to the EU, and in 2023, 85% of exports went to the EU.[121]

120 https://ecopolitic.com.ua/en/news/there-are-two-necessary-prerequisites-for-launching-the-emissions-trading-system-in-ukraine-olga-boyko/

121 https://eba.com.ua/en/chomu-ukrayina-prograye-klimatychnu-torgivelnu-vijnu-i-yak-zahystyty-natsionalnogo-vyrobnyka/

IV How to finance energy investment?

Bulgaria

Currently, the EU is in the process of finalizing a market reform, which would limit any new RES support mechanisms to contracts for differences. Other measures could be added, but they will constitute state aid, and the European Commission would have to notify them. As we have seen in the past two years – new RES installations have skyrocketed, meaning that access to financing, or any sort of red tape for that matter, is not a barrier for investors **as long as there is an objective price signal on the market.** As already mentioned, the market reform, in our view, would stunt the market price and distort its signal for investors.

The new RES installations in the past two years do not benefit from any support mechanisms, yet we have seen considerable investor interest. If we introduce new horizontal measures, e.g., tax cuts, the most benefit would be concentrated in the technologies – solar and wind – which need them the least. Furthermore, tax cuts would only work if investors have a steady revenue stream, which is increasingly not the case. In any case, **such incentives would have a comparatively low impact as Bulgaria currently has a flat 10% corporate profits tax rate**. Market prices are highly unpredictable, and they are becoming more so due to both the large increase in solar installations and their generation profile, as well as the unpredictability of wind generation. To top it off, 2022 was a rather dry year when hydro generation, and by extension – nuclear generation, decreased, leading to higher prices in that year and lower prices in the following year. There is also a seasonal effect during the spring and autumn when solar generation is high but demand is low, which leads to zero or even negative prices. Projections show that negative prices in some markets could be seen in over 30% of hours by 2026.

Taking into account the present institutional and market environment, we should focus on developing and strengthening power markets, increasing cross-border capacities, and improving business and investment environments. Suppose the price signals are there and are not distorted. In that case, investors will find financing, as almost all financial institutions have already committed a firm share of their portfolios to green investments.

Czech Republic

The following chapter examines the issue of investment in the energy sector and how countries can contribute to greater freedom and competition in the sector. It focuses, in particular, on the approaches mentioned in the Climate & Freedom Accord (CFA) and the possibilities of their implementation in the Czech Republic.[122]

As far as the openness of the Czech energy market is concerned, it has to be admitted that the market has been considerably liberalized due to EU membership.[123] However, there are still some barriers, which are quite natural given the nature of the sector.[124] Despite these natural barriers, we see potential for improvement, particularly in the area of **simplifying the licensing system and creating a more conducive business environment without unnecessary government intervention.**[125] At the same time, as in many other

122 The full text of the CFA can be found here: https://cleancapitalistleadershipcouncil.org/wp-content/uploads/climatefreedomaccord-straw-230202.pdf
123 See the previous chapter.
124 E.g. high fixed costs for energy suppliers.
125 Licensing and the impact of the state on the business environment were discussed in detail in Chapter 2.

sectors of the economy,[126] **there is a space for the removal of national subsidies. This would lead to several things. First, the state would not be supporting the largest companies, which tend to have the best access to subsidies. Second, it would reduce the budget deficit, which is a daily topic of discussion in the Czech Republic. Third, if the state was to cut taxes in line with the reduction in subsidies, this would lead to a better allocation of resources in the economy.**

In order to compensate for the reduction in subsidies to the economy in other ways, it is proposed that the savings be used to reduce taxes. The so-called CoVictory Funds proposed by the CFA could be one form of such relief. In a nutshell, the CoVictory Funds would **reduce the cost of capital for companies, which is likely to accelerate the use of newer, more efficient, and, in particular, low-emission technologies** that meet local standards. This form of tax credit would not necessarily target a specific technology. If the subsidies were removed, only the willingness of politicians would prevent the implementation of these changes in Czech legislation.

Among the many areas covered by the CFA, there should be few obstacles to implementing at least some of them in the Czech Republic.

The issue of setting growth-enhancing tax rates is a long-distance race in the Czech Republic, as is in other European economies. Any Czech government has only a little room for maneuver, as the level of its annual spending is mandated, and it cannot simply be cut. Of course, this also creates a problem in the area of tax cuts, which could ultimately cause many problems for the Czech economy and society, especially regarding the rising debt ratio. Nevertheless, the current government and all future ones should not give up on the gradual reduction of mandated spending and, consequently, taxes. This is the only way to sufficiently stimulate economic activity and find new solutions to the climate crisis.

Another form of support for companies is the accelerated depreciation for science and research, which is part of the proposal of the government's National Economic Council (NERV) that saw the light of day in January 2024 (NERV 2024).[127] The members of NERV argue that the tax benefits associated with accelerated depreciation would cost the Czech state budget about CZK 3.5 billion per year if about three thousand companies operating in the Czech Republic took advantage of them. **On the other hand, their existence would lead to a greater focus of companies on research and development and higher employment in this area, as well as higher wages.** If this measure is introduced into legislation, it is expected that it will take about five years for it to become fully effective. Accelerated depreciation for science and research would certainly help companies throughout the economy, including those whose activities directly impact the environment and climate.

In general, the Czech Republic is not currently prevented from adopting at least some of the CAF proposals. Still, an important prerequisite for these measures is the abolition of the subsidy system in the energy sector, which is rather unlikely in the foreseeable future, as the vast majority of subsidies for the green economy come from the EU. At the same time, however, some smaller measures, such as the accelerated depreciation mentioned above, are already appearing in the proposals of expert groups, and their implementation can be expected shortly.

Hungary

Some specific features of the Hungarian tax system:

The Hungarian government tends to prefer consumption-type taxes. Consequently, the corporate tax rate is only 9%, the lowest in the EU. Taxes on employees and employers used to be relatively high, but the burden on employers, in particular, has tended to decrease in recent years. Regar-

126 For example, in agriculture.
127 https://vlada.gov.cz/assets/ppov/NERV/aktuality/navrhy-NERV.pdf

ding the tax-to-GDP ratio, Hungary has been in the top third of the EU27 in recent years, ranking 8th/9th (2021=33.9% of GDP, 2022=35.1% compared to the EU average of 41-42%).

In contrast, the VAT is the highest in the EU at 27%. As the Hungarian government has pursued a pro-cyclical economic policy, there is no room for fiscal slack in the current recessionary environment. The general government deficit could be 6.5% of GDP in 2023, and the outlook for 2024 is not much better. The government's response to the difficult situation has been mainly to impose special taxes, either by increasing existing ones or extending them. Given the state of the central budget, no substantial tax cuts are expected shortly. In addition, another specific feature of Hungary is that the government does not favor tax reliefs, preferring to provide subsidies and soft loans to economic operators.

The essence and message of the Proposals of Climate and Freedom Accords is more freedom. However, in 2010 the government declared that it considers the energy sector as a strategic sector, where an increase in state or Hungarian but not state ownership is necessary. In addition, the government is in favor of strong, rapid, and decisive state intervention, regulation, and strong control, which conflicts with the message of the document. Of course, there are significant foreign players in the energy market in Hungary, and it is not impossible for them to emerge as new market players. Still, the primacy of domestic players, the so-called national champions close to the state or the government, is not questionable at present.

R&D spending accounted for 1.33% of GDP in 2023 (a 0.3 percentage point decrease compared to 2022). The state is withdrawing from R&D funding, based on trends in recent years, and is increasingly shifting it to the private sector. Hungarian tax laws have long allowed companies to claim R&D tax credits for R&D projects carried out, and businesses of all sizes can benefit from tax incentives. While a tax base discount can be used in the case of corporate tax, local business tax, and innovation contribution, a tax discount can be used in the case of social contribution tax.

From 2024, a new corporate tax credit will come into force. 30, 40, or 50% (for large, medium, and small companies, respectively) of the investment in energy storage facilities installed alongside own renewable production, and at least 75% of which is charged with energy can be deducted from the corporate tax payable, up to a maximum of EUR 30 million (Act LXXI of 1996).

The following problems would arise in the tax-free bond market. Firstly, there is a difference in perception, with the government reluctant to give up national sovereignty, which requires close cooperation between several countries to open up the market. And there are many open questions on the economic side. For example, the liquidity of the secondary market for bonds or the problem of potential bondholders in different countries paying different tax rates also raises further questions. As indicated in the chapter describing investment barriers, there is a wide range of options for investment financing. This includes the green bond market, which is supported by the Public Debt Management Centre (ÁKK)[128], the Hungarian National Bank (MNB)[129]. Green bond issuance in Hungary, which will start in 2020, is also becoming more widespread, but not primarily in the energy sector, as more than half of green bond issuance is linked to real estate companies. The EU can do more to improve green bonds' transparency and fight greenwashing.[130] It should also improve the accessibility of these bonds for small investors and reduce the significant administrative burden and time needed for issuance. The MNB also has a green capital relief program (banks can apply green capital relief on their disbursed green loans for up to five years, currently

128 https://akk.hu/zold-kotveny
129 https://www.mnb.hu/letoltes/mnb-zold-kotveny-utmutato.pdf
130 https://www.europarl.europa.eu/news/hu/press-room/20230227IPR76596/legislators-strike-deal-on-new-standard-to-fight-greenwashing-in-bond-markets

until 2030). The MNB produces an annual Green Finance Report.[131]

Tax Cuts

The abolition of the Robin Hood tax, or at least its abolition/mitigation for RES projects, would be an incentive. Another approach would be reducing the rate through investments contributing to climate goals. The amount paid steadily increased; when the tax was introduced in 2008, the projected revenue was a few billion. In 2021, energy market players paid roughly 77 billion HUF; in 2022, 203.8 billion HUF; in 2023 (including other energy taxes), 434.7 billion HUF. Electricity projects using renewable energy (solar, wind, biogas, etc.) that are purely market-based (outside the KÁT/METAR system) will be taxed at the same rate as non-renewable energy producers. Differentiation of the tax is necessary to encourage RES investments. Some progress has been made, such as exempting on-site power plants from the tax. The tax base can be reduced where appropriate, but it can still be a deterrent for market players.

Reducing the extremely high VAT rate of 27% is necessary for activities related to RES projects. In 2022, the Council of the European Union adopted a directive allowing Member States to reduce the VAT rate for goods and services that align with EU environmental and health policies. However, it remained at 27%.

On the one hand, the tax incentives discussed so far would bring results against market concentration, for example, combined with certain measures that strengthen market confidence, such as canceling the state right of first refusal for solar power plants. This would encourage new investments and the emergence of new market players. There would be a strong need to increase competition in certain market segments, such as the reserve and regulation markets. In recent years, market players (e.g., MVM, MET, ALTEO, etc.) have emerged and strengthened, which can exert significant market power ("JPE"); overall, market concentration in these segments has increased. MEKH has had to intervene in several cases in recent years.[132]

The environmental product charge on solar panels is particularly high. In several European countries, the rate is 5-10 euro cents per kilogram; in Hungary, it is twice this amount (63 HUF / kilogram = 16 euro cents). A solar panel weighing around 20 kilograms contains a product charge of 1260 HUF, which means a residential solar panel costs 12,600 HUF. If we take the installed capacity of 1632 MW installed in 2023, this is about 4.5 billion HUF (own calculation).

Wind power development scenario

Typical topics of domestic research are the Paks II project, the possibilities of installing wind power plants, the possibilities of reducing dependence on fossil fuels, the consequences of a possible failure or slowdown in the energy transition, and grid development.

The studies on wind energy were emphasized more because they could not be installed because of the 12km buffer zone. A study by the Regional Energy Economics Research Centre[133] states that the economic potential for wind power (16 GW) is many times higher than the 1 GW capacity currently targeted for 2030. A calculation of electricity prices has been carried out. Assessment of electricity market impacts of an enhanced wind deployment. As expected, due to the merit order effect, the higher penetration of wind capacity reduces the wholesale price in Hungary in all modeled years. This price effect is moderate in 2030 (2.9 EUR/MWh between the low and high penetration scenarios), but increases significantly over the years, reaching 11.9 EUR/MWh in 2050. Like the wind market value, the PV market value decreases over time in all scenarios, from 74-78 EUR/MWh in 2030 to 25-28 EUR/MWh in 2050.

131 https://www.mnb.hu/kiadvanyok/jelentesek/zold-penzugyi-jelentes
132 https://www.mekh.hu/download/3/98/01000/MEKH2502-2021_JPE%20határozat.pdf
133 https://rekk.hu/downloads/projects/ECF%20Study%20on%20the%20Assessment%20of%20Wind%20Potentials%20-%20Country%20Report%20Hungary%20(AIT,%20REKK%20-%202023-11-30).pdf

Energy Club's study[134] looked at the grid development steps that the industry is definitely planning for the next decades and what additional investments would be needed for Paks II or more decentralized renewable power plants. According to Energiaklub, the "Green" scenario is the cheaper alternative for Hungary until 2050. The "Nuclear" scenario involving the Paks II project would cost €132 billion in total, mainly due to its high fuel costs. In comparison, the "Green" scenario could be implemented and operated between 2016 and 2050 at a total cost of €108 billion, thanks to energy efficiency and renewables.

The report, Paris Pact Payoff[135], shows that the co-benefits of a pathway with an average global temperature increase threshold of 1.5°C far outweigh the costs. Hungary can save 8.8% of its GDP (by 2030) by increasing its climate ambition, accelerating the energy transition and decarbonization to reach the 1.5°C target.

Unstable investing environment

The previous chapters already discussed taxes, price caps, and other charges, the amount of which is known. Unexpected regulatory decisions should be avoided, and political risks should be mitigated. Suddenly introduced or increased special taxes, government decrees that appear overnight without consultation, sometimes with retroactive effect, create uncertainty for market players. At the same time, state-right pre-emption reduces the value of investments and restricts competition in the market. It is also important not to decide only on a political basis whether solar or wind energy is preferable among renewables.

The importance of grid development cannot be overemphasized. This would, for example, avoid the need to suspend the possibility of connecting newly installed solar systems. This would help the energy transition but would also have the additional benefit, for example, of making the operation of trading companies more predictable so that they would not have to send out salesmen from time to time. There is also a political risk with grid development, as the government intends to finance major grid development projects from RRF funds (thus relieving the burden on market players). Still, these funds have not yet been delivered, or the projects are due to be completed by Q2 2026, which is very close.

On the EU side, it is particularly important that there be no change at the directive level, as this will discourage banks from providing loans. For example, in the biofuels business, only the biggest players in the market, such as MOL, are investing out of necessity.

In Hungary, MAVIR and MEKH have a very strong base, as do the largest energy companies in Hungary. There are many other think tanks in universities and beyond. The Hungarian Energy Society, the Regional Energy Economics Research Centre, and the Energy Club are also worth mentioning. With the advance of renewables, organizations such as the Hungarian Solar Association have grown in size. What is most needed is an improved dialogue between these actors and policymakers. This would lead to slower legislation making and allow actors to be better prepared for the changes that affect them.

The legal environment is constantly changing. Constantly changing market and technical conditions, EU obligations are a major pressure. Transposition of Fit for 55 in Hungary is ongoing (e.g. Refuel EU). An amendment to the Electricity Energy Act (VET) is imminent. The electricity market design has been changed recently, this needs to be transposed into the VET. The Renewable Energy Directive has also been amended and should be transposed into the VET.

134 https://energiaklub.hu/files/news/Energiaklub_Bixpert_Hálózatfejlesztési%20tanulmány.pdf
135 https://mtvsz.hu/uploads/files/MTVSZkiadvany-Parizsi-M_Gazdasagi-merlege_CAN-E-MTVSZ_2024jan_magyar-kivonat.pdf

Poland

Advantages of the Polish Tax System: Support for Sustainability and Innovation in the Energy Industry

Poland offers various tax breaks, which certainly bring numerous benefits, especially for companies in the energy sector. Facilitation in the form of reliefs and exemptions is the essence of support for modernization and innovation processes. For this reason, it is worthwhile to carefully analyze packages of reliefs and exemptions that bring real benefits to those operating in the energy industry.

1. R&D (research and development) tax credit

This relief allows the taxpayer to deduct certain expenses related to research and development activities from the tax base, even if these expenses have already been classified as deductible.

The realization of this relief in practice allows the taxpayer to deduct as much as 200% of the expenses incurred for research and development. The value of this deduction depends on the type of eligible costs.

To illustrate the impact of the R&D tax credit on energy companies' activities, it is worth using the example of a Polish manufacturer from the power engineering sector. In 2021, Poland's largest manufacturer of grid equipment for High-Voltage, Medium-Voltage, and Low-Voltage lines requested an individual interpretation with respect to its research and development.[136]

The company indicated that it is taking steps to optimize the production process by reducing costs, increasing efficiency, reducing labor intensity, and improving production quality. It is automating processes, introducing new management systems, and implementing projects to save energy and reduce waste. The company is becoming more competitive in its industry and improving existing processes through these activities.

The company pointed to the development of new products for the French market, the validation of a hydraulic press, the implementation of induction heating processes, and technology for forging processes, among other examples, as examples of research and development activities. The authority concluded that the expenses incurred on such projects are eligible costs, and, therefore, the Company is entitled to take advantage of the R&D tax credit.

As a result of the above, qualified costs related to the energy industry are eligible for the R&D tax credit. And it is worth noting that these are not the only interpretations that indicate this.[137] In addition to individual interpretations, the application of R&D relief in the energy industry has also been confirmed in case law. Voivodship Administrative Court in Gliwice[138] recognized that the results of employees' activities are the result of their individualized and creative activities, which can lead to, among other things:

- the most technically advanced electricity distribution systems, such as switchgear and enclosures, automation and photovoltaic switchgear and enclosures, main switchgear, modular apparatus, and electricity management systems, among others. As a result, the Court allowed the application of R&D relief in the area of employment of specialists engaged in the development of apparatuses and tools necessary for the electricity production process.

It is worth noting that R&D relief is particularly attractive for the energy sector. This is because the sector is characterized by great innovation and is focused on developing new solutions aimed at optimizing processes related to energy generation and storage, introducing methods

136 Letter dated 12.07.2021, issued by: Director of National Fiscal Information, 2461-IBPB-1-3.4510.102.2017.9.IZ, R&D tax credit - salaries as eligible costs, http://sip.mf.gov.pl.

137 See, for example, Letter dated 12/07/2021, issued by: Director of National Tax Information, 2461-IBPB-1-3.4510.102.2017.9.IZ, R&D tax credit - salaries as eligible costs, http://sip.mf.gov.pl.

138 Judgment of the WSA in Gliwice, 25.06.2021, I SA/Gl 307/21, LEX nr 3214258.

to reduce carbon emissions, or producing non-biodegradable waste. The approach of both the courts and the authorities strongly suggests a high potential for the application of R&D relief to companies operating in this sector.

2. Other tax reliefs

Other reliefs may apply to the operations of energy companies in Poland.

The IP BOX relief deserves a special place. The essence of the relief is the possibility of applying a reduced tax rate applicable to income derived from intellectual property (IP) rights. Taking advantage of the relief allows for a reduction of up to 5% in the effective tax rate applied to income derived from intellectual property rights. The condition for taking advantage of the IP BOX is that the taxpayer carries out research and development activities directly related to creating, developing, or improving a qualified intellectual property right. The relief is available to businesses regardless of their size.

The relief indirectly applies to the energy industry, particularly companies supporting the energy sector. A good example is Companies that provide network asset management solutions for the network industries (power, heat) and telecommunications.[139] Management of the designated systems includes the provision of a paid software license and access to the software.[140] Innovative solutions created by companies often benefit from patent protection; thus, the use of IP BOX allows for tax optimization of sales or licensing of such projects.

3. Exemption of electricity from excise tax

In the Polish tax system, electricity generated from renewable energy sources, based on a document confirming the redemption of a certificate of energy origin, is exempt from excise taxes.[141] It is worth noting that this is energy from renewable energy sources, i.e., wind, sunlight (photovoltaics), precipitation, tides, or waves, among others (Article 3(20) of the Energy Law[142]).

It is important to emphasize that this regulation does not include refunding excise taxes paid for exempt energy, but allows the subsequent deduction of overpaid excise taxes.[143] In other words, this exemption becomes effective only after receiving a document confirming the redemption of the certificate of origin of electricity, which allows for a reduction in the upcoming billing periods.[144]

However, the following prerequisites must be met to qualify for the excise tax exemption[145]:

- entity at the time of realization of this exemption has excise tax status;
- excise tax liability for electricity (excise due);
- documents confirming redemption of certificates of origin.

First, the excise tax exemption applies only to the excise taxpayer. Therefore, even if another entity meets the other conditions, it cannot benefit from the exemption. It should also be remembered that electricity must have a certificate document confirming the origin of the energy.[146]

139 See, for example, Letter dated March 4, 2020, issued by: Director of National Tax Information, 0114-KDIP2-1.4010.498.2019.1.JS, IP Box - rationale for 5% CIT rate, http://sip.mf.gov.pl; Letter dated 3.07.2020, issued by: Director of National Fiscal Information 0111-KDWB.4011.8.2020.2.AW, IP Box - przesłanki 5% stawki PIT, http://sip.mf.gov.pl; Letter dated 28.07.2023, issued by: Director of National Fiscal Information, 0114-KDIP2-1.4010.283.2023.2.MW, IP Box - the premises of the preferential PIT rate - IT services, http://sip.mf.gov.pl.

140 https://www.mnb.hu/letoltes/mnb-zold-kotveny-utmutato.pdf

141 Article 30(1) of the Excise Tax Act of December 6, 2008 (i.e., Journal of Laws 2023, item 1542, as amended).

142 Law of April 10, 1997. - Energy Law (i.e., Journal of Laws 2022, item 1385, as amended) hereinafter: the Energy Law.

143 W. Modzelewski, *Commentary to the Excise Tax Law*, ed. W. Modzelewski, Warsaw 2023, art.30.

144 Ibidem.

145 Judgment of the Supreme Administrative Court of 16.01.2020, I GSK 862/17, LEX No. 2799052.

146 See more https://www.biznes.gov.pl/pl/opisy-procedur/-/proc/264.

In light of the above, the use of this exemption is not widespread, as it requires having the status of an excise taxpayer, which limits the circle of recipients of this exemption. In addition, using this exemption involves extensive documentation, making it even more difficult to take advantage of the exemption. To make the use of the exemption more widespread, it is necessary not only to expand the catalog of recipients of the exemption but also to reduce the record-keeping obligations associated with the redemption of the certificate of origin of electricity.

Elements of the tax law favoring the energy industry that need to be changed

1. Accelerated depreciation for Fixed Assets related to green energy

As pointed out in The Climate & Freedom Accord, one element driving green energy investment development is accelerated or immediate depreciation.

Polish tax law includes the so-called accelerated depreciation. It is regulated respectively by the provisions of Article 22i paragraphs 2-4, 6 and 7 of u.p.d.o.f.,[147] and Article 16i (2)-(4), (6) and (7) u.p.d.o.p.[148]

As a general rule, accelerated depreciation of fixed assets involves an increase in depreciation rates. Fixed assets that may be subject to accelerated depreciation are those used in conditions indicating their rapid wear and tear or those subject to rapid technical progress.[149]

Accelerated depreciation makes it possible to increase the basic depreciation rates set forth in Appendix No. 1 to the A.P.D.O.P. by means of appropriate coefficients. For buildings and structures used in deteriorated conditions, depreciation coefficients up to 1.2 can be applied, while for those used in poor conditions, the coefficients do not exceed 1.4. The list of annual depreciation rates for fixed assets in the energy industry is in Group 3 under the name "Boilers and power machinery." It includes wind engines, other turbine and generator sets, nuclear reactors, steam turbines, and machinery.

As an example of use in the energy industry, consider nuclear reactors, which fall under fixed asset classification symbol 349. If they are subject to use in deteriorated or poor conditions, they can be depreciated at a rate of 14% using the appropriate factor of 1.2 or 1.4. However, we assess that the main problem is the lack of a literal indication in the Fixed Asset Classification of photovoltaic panels or windmills. An example of this is an individual interpretation, in which the taxpayer asked whether photovoltaic installations should be depreciated for corporate income tax purposes as separate fixed assets, at the rate of 10% resulting from Appendix 1 to the CIT Law?[150] The Central Statistical Office confirmed that 669 is adequate for photovoltaic panels. Despite this, the taxpayer had doubts that had to be resolved through a request for individual interpretation.

Depreciation is one element of tax law that should be subject to a broad review that will take into account many other structures, buildings, or machinery that are exposed to poor or deteriorated conditions in their daily use in the energy or offshore industries. Technologies in the energy field are developing extremely rapidly, so lawmakers should consider these changes on an ongoing basis by proposing higher depreciation coefficients.

Such accelerated depreciation with higher coefficients or shorter depreciation periods would

147 Act of July 26, 1991 on personal income tax (i.e., Journal of Laws 2022, item 2647, as amended), hereinafter: u.p.d.o.f.

148 Law of February 15, 1992 on corporate income tax (i.e., Journal of Laws 2023, item 2805, as amended), hereinafter: u.p.d.o.p.

149 P. Małecki, M. Mazurkiewicz [in:] P. Małecki, M. Mazurkiewicz, *CIT. Commentary. Podatki i rachunkowość*, ed. XIV, Warsaw 2023, art. 16(i).

150 Letter dated March 11, 2022, issued by: Director of National Tax Information, 0111-KDIB1-1.4010.26.2022.1.SH, Depreciation of photovoltaic installations, http://sip.mf.gov.pl.

certainly contribute to saving many millions of zlotys invested in renewable energy sources. Additionally, it would attract foreign capital, which would be more inclined to build green energy farms in Poland.

2. The law on support for new investments and the need to amend its restrictions

In Poland, there is also a law that regulates the rules for providing support to entrepreneurs for the implementation of new investments.[151] A new investment is an investment in tangible or intangible assets related to the establishment of a new plant or an increase in the production capacity of an existing plant. The regulation described focuses on supporting new investments related to job creation and supporting the region.

The form of support for the implementation of a new investment is an exemption from corporate and personal income tax.[152] The conditions for issuing a decision on support, the Council of Ministers shall determine by decree. In the said decree, the Council of Ministers shall also determine the types of economic activities for which a decision on support will not be issued.[153]

As of the date this report was prepared, the Decree of the Council of Ministers dated December 27, 2022, is in effect, even amended by a minor amendment on December 27, 2023. It is worth looking at the above regulation to understand whether the energy industry has the opportunity to benefit from support for new investments.

Unfortunately, already in §2 of the Ordinance, the legislator excluded the possibility of issuing a decision on support if the entrepreneur is engaged in business activities for which a license is required, according to Article 32(1) of the Energy Law.[154] Therefore, energy industries, energy generation, except electricity in sources with a total installed electrical capacity not exceeding 50 MW not classified as renewable energy source installations or cogeneration units, electricity in a micro installation or small installation, electricity, cannot benefit from this assistance.

Given the above, some energy industries are statutorily excluded from benefiting from support. However, it is worth noting other companies in the energy area and their potential to receive support under the program for supporting new investments.

Obtaining a rebate requires meeting specific qualitative criteria for a new investment in the service sector. If the new investment in the industrial sector is eco-building, it receives 1 point, which is extremely low in relation to the total score. In addition, new investment in renewable energy sources that can provide at least 15% of the

151 Act of May 10, 2018 on Support for New Investments (i.e., Journal of Laws 2023, item 74, as amended) hereinafter: the Law on Support for New Investments.
152 Article 3 (1) of the Law on Promoting New Investments.
153 Article 14(3)(1) of the Law on Promoting New Investments.
154 Law of April 10, 1997. - Energy Law (i.e., Journal of Laws 2022, item 1385, as amended) hereinafter: the Energy Law.

plant's average annual electricity consumption also receives 1 point. This is an extremely low score, which excludes the energy industry from receiving actual support.

As in the case of depreciation, the law in this area requires several changes. First, the possibility of obtaining support for the energy sector should be expanded by adjusting the criteria to take into account the ecological nature of the investment carried out. For example, award additional points for the use of renewable energy sources in the production process. Such investments deserve support not only because they create new jobs but also because of their ecological nature.

3. Amounts of VAT rates on goods in the energy industry in comparison with selected EU countries

Currently, the standard rate of the VAT is 23%. If tax rates are reduced, this is exceptional and is reflected in the VAT law[155] or implementing regulations to this law.[156]

As of today, the rates for energy commodities are at an appropriate level:

- Hydrogen 23%;
- Natural gas 23%;
- Electricity 23%.

Unfortunately, compared to other members of the European Union, these rates are still very high and often hinder the energy industry's development. As of today, the VAT rate in Germany is 19%. However, this rate has been reduced to 7% for the supply of gas and heat through natural gas and district heating networks.[157] Moreover, the zero VAT rate applies to the photovoltaic systems indicated in the law.[158]

In France, on the other hand, the standard VAT rate is 20%.[159] However, the supply of electricity with a maximum output of 36 kilovolt-amperes or less, thermal energy and combustible natural gas distributed through grids, and heat when at least 50% is generated from biomass, geothermal energy, solar energy, waste, and reclaimed energy are taxed at a rate of 5.5%.[160]

Legislators should follow the example of member states and reduce the VAT rate on certain goods originating from renewable energy sources. Otherwise, Poland will cease to be competitive in the green energy business.

However, the assumptions of tax cuts (Game-Changer Tax Cuts/ Clean Product Tax Cuts) for the energy industry based on sustainability factors seem unattainable at this point anyway. In other words, establishing incentives in the form of a lower effective tax rate or exemptions is not currently possible.

If we assume that we want to make such reductions, the first step is to introduce reporting of sustainability indicators. Next would be to introduce an external audit of whether the reported indicators correspond to the actual state. Only at the end would it be necessary to make the granting of reductions contingent on achieving an indicator at an appropriate level.

4. Basic pro-growth tax rates or pro-growth tax rates

The Climate & Freedom Accord article pointed out that countries could commit to basic growth-friendly tax rates at or below the OECD average to unleash the innovation, dynamism, and wealth needed to fight climate and poverty.

155 Law of March 11, 2004 on tax on goods and services (i.e., Journal of Laws 2023, item 1570, as amended) hereinafter: the VAT Law.
156 J. Matarewicz [in:] *Law on Goods and Services Tax. Updated Commentary*, LEX/el. 2023, Article 41.
157 The indicated rate is applicable until March 31, 2024.
158 Steuersätze international und national: Umsatzsteuersätze, https://www.ihk-muenchen.de/de/Service/Recht-und-Steuern/Steuerrecht/Umsatzsteuer/Umsatzsteuers%C3%A4tze, accesed 4.02.2024.
159 Art. 278 Code général des impôts : Section V : Calcul de la taxe (Articles 278-0 à 281 octies).
160 Art. 278-0 bis Code général des impôts : Section V : Calcul de la taxe (Articles 278-0 à 281 octies).

In other words, modifying such rates, would result in more favorable taxation, and investors would be more willing to invest, but also to meet their tax obligations.

However, in the Polish tax system, it would be difficult to modify CIT rates. This is primarily because modifying the rates would disrupt taxation efficiency on a European scale. The Polish tax system already provides for reduced CIT for so-called small taxpayers, at 9%, which is preferential taxation and a pro-growth rate.

5. Deduction of donations for sustainable development purposes

In the Polish tax system, donations for selected purposes can be deducted from income. These goals are indicated in Article 4 of the Law on Public Benefit Activity and Volunteerism. There, you will find social welfare, charity, rescue, and civil protection, among others. However, it is vain to find organizations related to sustainable development. It is also worth noting that the indicated purposes constitute a closed catalog, so there is no possibility of deducting for any purpose.

In this regard, it would be crucial to amend the scope of the catalog indicated in Article 4 of the Law on Public Benefit Activity and Volunteerism. Changing the law in this regard, after including additional organizations related to sustainable development, could contribute to direct assistance by taxpayers to them.

Certainly, many taxpayers would opt for such a deduction, which would help organizations involved in sustainable development to expand their activities, as well as promote new renewable energy solutions among citizens.

Relationship between European Union and Polish law on green energy investment support

On March 9, 2023, the European Union introduced regulations establishing temporary guidelines for state aid for key zero-emission technologies. These special measures, approved on the same day, will be in effect until December 31, 2025.

The new European rules will enable the development of financial support for the sector pursuing climate neutrality. In particular, they cover the production of strategic devices and equipment, such as batteries, solar panels, wind turbines, heat pumps, and electrolyzers, the manufacture of key components for these devices, and the production or recovery of critical raw materials necessary for the manufacture of said devices and components.[161] It remains to be believed that the Polish legislature will use the full room for maneuvering to assist the energy industries with tax changes.

Loosening the current European state aid rules is an obvious response to China's hegemony in clean energy technology and its storage. The Net Zero Industry Act regulation provides additional support in building the potential and competitiveness of the European zero-emission industry.

The European Commission proposed to create an appropriate financial support system: up to a specific percentage limit and nominal amount of investment costs, depending on its location and the size of the beneficiary. Thus, in the case of subsidies for large enterprises, support may reach 35% of eligible costs for most locations and 20% for investments carried out in Lower Silesia and Greater Poland. If the aid takes the form of tax benefits, loans, or guarantees, this percentage can be increased by 5 percentage points for individual locations. Additionally, when the investment is made by a small enterprise, the aid intensity may be higher by 20 percentage points, and when it is a medium-sized enterprise - by 10 percentage points.

The first EU country to benefit from the relaxation of European state aid rules was France.

[161] Subsidies and tax breaks for Poland's zero-emission industry - EU gives green light, http://psew.pl/dotacje-i-ulgi-podatkowe-dla-polskiego-przemyslu-bezemisyjnego-unia-daje-zielone-swiatlo/, accessed 05.02.2024.

A special tax relief was introduced there, valid, in accordance with new EU regulations, until the end of 2025. The effect is to generate private investments in environmentally friendly projects with a total value of EUR 23 billion by 2030 and, at the same time, create 40,000 new jobs. The French government's action is also aimed at revitalizing the industrial sector in the face of increasing pressure from Chinese and American companies supported by the so-called tax subsidies IRA Act. The French tax relief will cover the capital expenditure of companies at the level of 25-40% of investments in wind and solar power plants, heat pumps, and batteries. Moreover, under the new act, it is planned to provide 2,000 hectares for new industrial areas and halve the time needed to approve a new industrial project from 17 to 9 months.

Summary

It is worth noting that current tax incentives are an important catalyst for the development of the energy sector in Poland. Tax breaks and exemptions from specific taxes create favorable conditions for companies in this industry. However, for the tax system to truly meet the challenges posed by dynamic technological advances in the energy field, significant transformations in the tax law are needed.

The introduction of accelerated depreciation for new fixed assets would be a key boost, enabling companies to adapt their businesses to modern standards more quickly. In addition, a reduction in VAT rates would provide a significant investment incentive, encouraging companies to make new investments in the energy sector.

Unfortunately, there are risks associated with the energy sector's tax aspects. The possibility of taxation on excess profits or entrenched coal-based policies certainly create obstacles to the further development of tax policy in the energy area. Therefore, it is necessary not only to adjust legislation but also to increase public awareness of the use of renewable energy sources.

In conclusion, the effective modernization of Poland's tax law related to the energy sector requires decisive reforms that will encourage innovation in the energy area. We have a solid foundation, such as credits, accelerated depreciation, the possibility of reducing VAT rates, and numerous laws supporting new initiatives. However, they need to be properly expanded and modified to promote sustainable development fully.

Romania

Concerns over market distortions caused by subsidies and concerns regarding the challenges of significant government intervention are justified. So are concerns regarding the energy sector's substantial investment requirements and environmental impact. While private entrepreneurs can play a pivotal role in innovating and modernizing the energy industry, reducing costs, and promoting decarbonization, they face a significant obstacle in that investments in the sector require substantial capital to be impactful. To avoid market-distorting subsidies, better solutions must be found.

The tax code often discourages such investments by not providing incentives for risk-taking ventures and capital allocation toward energy projects. Additionally, Romania's recent history, its government, and its tax system have instilled the idea in the minds of Romanians that it is the government's job to do certain things. We pay our taxes so that someone else has to deal with big, complicated things. Unfortunately, we always seem to find out, after the fact, that bureaucracies are less able to solve complex problems than well-incentivized entrepreneurs and that governments end up mandating some entity in the private sector to solve those problems in a non-competitive and inefficient way.

Technology-neutral supply-side tax cuts could address these issues and encourage private-sector investment without the drawbacks associated with subsidies or selective government mandates. This approach would reduce the overall cost of capital, making it more attractive for private investors to commit substantial funds

to the energy sector. By ensuring these tax cuts do not favor any specific technology, we can foster an environment where all forms of low-emission energy can compete on a level playing field, enhancing market efficiency and spurring innovation across the board.

Such tax incentives could significantly reduce the financial barriers to entry for private investors looking to participate in the energy market, even in the absence of direct subsidies. By lowering the cost of capital through these tax cuts, a broad range of investments in energy infrastructure, technology development, and deployment can be encouraged, thereby accelerating the transition to a more sustainable, competitive, and economically beneficial energy landscape.

The following are examples of such technology-neutral supply-side tax cuts that could be implemented or are already implemented in Romania:

Basic pro-growth tax rates

Lowering the overall tax burden on companies could increase available capital, encouraging broader investment in the energy sector. Unfortunately, this is contrary to the current trend in fiscal policy in Romania.

Accelerated depreciation or immediate expensing of PP&E and R&D

Accelerated depreciation or immediate expensing for large investments in critical projects can be highly effective in promoting investment in new energy technologies and infrastructure. By allowing companies to recover costs more quickly, one could reduce the net worth of investments in capital-intensive projects, such as renewable energy facilities and research into new energy technologies. While Romania does allow businesses to use accelerated depreciation, for certain assets under specific conditions, many companies avoid using such accounting methods since the fiscal code can be interpreted by fiscal inspectors in different ways. As a result of the lack of clarity in the legislation and the severe penalties that can be imposed by the National Agency for Fiscal Administration (ANAF), many companies opt to use the interpretation of the law, which is most disavowable to them by default.

Things are somewhat better when it comes to the immediate expensing of R&D expenses as, in most cases, these are immediately deductible for all companies. This, however, also means that there is no special incentive given to energy research & development projects.

Innovation Acceleration Bonds, Loans & Savings (InABLS)

Offering financial instruments that provide favorable terms for investments in innovative technologies could significantly boost funding for R&D and deployment of new energy solutions.

Game-Changer Tax Cuts

Tax cuts for projects or technologies deemed to be "game-changers" because of their potential to dramatically reduce emissions or enhance energy efficiency could drive targeted investments. The challenge lies in defining what qualifies as a "game-changer" without introducing bias towards specific technologies or companies.

Additionally, the type of tax cuts that would be implemented is also very important. It's one thing to say that companies developing game-changing technologies are allowed to immediately expense their investments in PP&E, and it's completely different to offer them a profit tax exemption for 10 years.

Overall, it is unlikely that this would be a good solution for Romania.

Harmonized Access to International Charitable Uplift (HAICU)

Encouraging international philanthropic investments in energy innovation through tax incentives could attract additional capital. This would require changes in the legal and fiscal framework at EU level. Currently, obtaining the recognition of charitable donations made outside a company's national jurisdiction can be problematic. Workarounds can be employed.

Demonopolization Tax Cuts

Tax incentives designed to break down monopolies and encourage market entry of new players can foster competition, leading to innovation and lower prices. The effectiveness of such tax cuts would likely be diminished in Romania as most monopolies in the energy sector are not just the result of government intervention; they are government-owned. Therefore, before considering tax cuts the Romanian Government should consider exiting the sector or, at the very least, diminishing its stake.

Clean Product Tax Cuts

Reducing taxes on low-emission energy products and technologies can make them more competitive against traditional energy sources, potentially accelerating adoption. There are two notable examples:

Introduced in the late 2000s, Romania's green certificate scheme incentivized investments in renewable energy by requiring electricity suppliers to purchase a certain number of green certificates representing renewable energy generation. Although not a direct tax cut, this mechanism effectively reduced the cost and increased the competitiveness of renewable energy in the market.

Romania has also offered fiscal incentives, including VAT reductions, for energy-efficient materials and equipment (like solar panels and inverters). However, as with other recent changes in fiscal policy, the Romanian Government appears to be shifting away from these incentives.

Slovakia

Funds (sources of funding)

In the previous chapter, we described the public resources, mainly EU-funded, to be used to finance decarbonization investments and investments in new renewables. This will amount to more than EUR 4 billion by the end of 2030. A further EUR 0.4 billion in grants is allocated to the Fair Transformation Fund. This is the first pillar of the so-called Fair Transformation Mechanism, which complements the second pillar in the form of repayable aid through the Invest EU program and the third pillar of concessional loans from the European Investment Bank.

The Fair Transformation Fund aims to support regions that will be economically and socially affected by the impact of the decarbonization of the energy and industrial sectors. In the case of Slovakia, this mainly concerns support for the Upper Nitra region (ending the mining and burning of brown coal), the Košice region, and the Banská Bystrica region. The Fund will thus primarily support the retraining of redundant workers, the creation of new jobs, and investment in revitalizing the areas concerned.

Taxes

Achieving Europe's decarbonization targets will require multi-billion dollar investments, especially from the private sector. The way the tax system is set up may hinder these investments significantly or only slightly.

Slovakia, with a 21% rate, has one of the highest corporate income tax rates in the CEE region. This is quite a significant difference from Hungary's 9% rate or Bulgaria's 10% rate. A higher tax rate extends the payback period for investment projects. A reduction would be desirable, but unfortunately, Slovakia's record deficit of the public sector in the EU in 2023 reduces the chances of a reduction to a minimum. As described in the previous chapter, **the tax burden is further increased by the tax imposed on entities in regulated sectors, which effectively face a 24% rate. The record rise in energy prices and, thus, the revenues of selected producers have been further burdened by the excess profits tax (WFT) based on the adopted European legislation.** It would be desirable for the EU to repeal this 'justification' for the new tax, given the fall in prices of energy commodities and revenues of suppliers.

Depreciation

The tax legislation is unnecessarily complicated when it comes to the depreciation of solar power installations and makes it difficult to calculate

the return on these projects. Photovoltaic panels are in depreciation group 2 and are depreciated over 6 years. The power converter (inverter) is in the third depreciation group and is depreciated over 8 years. The supporting structure (if fixed to the ground) is in depreciation group 5 and depreciated over 20 years. The fencing of the photovoltaic plant is in Group 4 and depreciated over 12 years.[162] **It would be desirable to standardize the depreciation groups, at least for the technological components of solar power plants, i.e., panels and inverters. An even better solution would be to allow accelerated depreciation for 4 years.** Similarly, to standardize the depreciation of support structures and fencing to a common period of 12 years.

Excise duty

Another tax that weighs on utilities is the tax on electricity, coal, and natural gas. The rates of this tax, which have also been adopted in accordance with European legislation, are:

1. The rate of excise duty on electricity is EUR 1.32/MWh.
2. The rate of excise duty on coal is set at EUR 10,62/t.
3. The rate of excise duty on natural gas is set if:

- used as a fuel for the production of heat, or supplied for the production of compressed natural gas intended for use as a fuel for the production of heat, at the rate of EUR 1.32/MWh,
- supplied for the production of compressed natural gas intended for use as a fuel at the rate of EUR 9,36/MWh.

The rate of excise duty on compressed natural gas (CNG) supplied or used as fuel shall be EUR 0,141/kg, and if CNG is used as a fuel for the production of heat, it shall be EUR 0,01989/kg.

However, households are exempted from these taxes if they use these fuels for their consumption. In addition to this fundamental exemption, which reduces the total collection of this tax to a budgetary irrelevant EUR 34 million in 2023, the legislation of this tax contains several paradoxes. **Although households are exempted from the tax, apartment buildings using gas for the common preparation of domestic heat are not. The second paradox is the taxation of electricity production from renewable sources. Households with a solar power plant capacity of up to 10 kW are exempted. The tax thus unnecessarily creates a barrier to installations on domestic roofs with a higher installed capacity.** These households must then keep records and regularly report their production to the customs office. It is surprising that the government has not yet lifted this burden, given its failure to meet the target for the share of renewables in final energy consumption.

Conclusion

The decarbonization process is economically costly and often unprofitable for private companies. The benefits of decarbonization are difficult to measure from an individual or firm perspective, as are the marginal costs of negative externalities caused by an additional tons of greenhouse gases. For this reason, a system of charging for these emissions and a process of gradual reduction of the maximum amount has been introduced. Because of the weakening of the natural disapproval of both the general public and companies of the price of energy commodities, an extensive system of compensation and subsidy measures has been set up. These are also intended to encourage the construction of new renewable energy sources.

Despite initial expectations, **the energy crisis has led to a significant tightening of emission targets, which has increased the uncertainty of industrial and energy companies, which had hitherto calculated slower emission reductions in their plans**. This, combined with still above-average energy prices, has led to a reduction in industrial production in many countries and a weakening of economic growth. On the other hand, the tightening of emission targets has been associated with an expansion in both

[162] Another nonsensical condition for doing business in the energy sector is a minimum age of 21 years.

the number and volume of sources of subsidy programs. The process of decarbonization thus strengthens the political class, which, through its subsidy decisions, directly or indirectly determines the survival of individual firms. However, the politically attractive redistribution of resources has obscured the debate on what the state can do for decarbonization and the development of renewables **without taxpayer funds**. Based on this analysis, we have arrived at the following proposals:

1. Any tightening of emissions targets should be discussed well in advance, not adopted in haste and in conjunction with generous funds. In such a situation, politicians will easily succumb to pressure and approve even unachievable targets.
2. Climate targets should focus solely on reducing emissions, targets for the share of renewables should not be enforced. Emission targets should, therefore, be based on final consumption (including imports), not production.
3. The tax system can support the implementation of new renewable sources in several ways:

- by reducing corporate income tax
- by accelerating the depreciation of the technologies used
- removing the obligation to pay excise duty on electricity for producers from low-emission sources

4. The state can encourage the construction of new sources by shortening bureaucratic procedures and speeding up permitting processes.
5. The support system for the construction of new sources and the decarbonization of enterprises should be technology-neutral, using auctioning principles to achieve emission reductions at the lowest possible cost.
6. Renewable energy source construction should be supported by guarantees on PPA contracts rather than direct price premiums.
7. The program of administratively manipulating the market price of electricity and natural gas for households is one of the biggest barriers to extensive RES adoption and should, therefore, be eliminated.

Ukraine

It is difficult to say about the possibilities of applying the principles of the **Climate and Freedom Accords** in Ukraine because the mechanisms of their functioning are not clearly prescribed but outlined in general terms. In general, according to the authors, these principles are not timely for Ukraine as a country that is experiencing the worst economic decline since independence (the country's GDP fell by more than 30% in 2022) and that is forced to respond to existential threats, caused by Russia's war of aggression.

Game-Changer Tax Cuts

According to Climate and Freedom Accords, in part «Game-Changer Tax Cuts: A Supply Side Tax Cut for Breakthrough Innovation»: *Accord nations would agree that in the next 15 years, if any firm achieves unsubsidized profitability from sales of zero-emission fuels, zero-emission concrete alternatives, or new machines that run on any fuels while producing zero harmful emis-*

sions, such firm and its debt and equity investors would be completely tax-free with respect to their profits from these products, for the first 15 years of profitability. Such exemption would be well deserved, for the service to humanity and the planet.

Ukraine is among the top ten leaders in terms of the rate of growth of electric vehicles, and the topic of electric transport is already gaining significant scale. On January 1, 2018, the VAT and excise tax on the import of vehicles equipped with electric motors into Ukraine's customs territory were abolished.

Bills No. 8159[163] and 8160[164] were registered in the Verkhovna Rada, which provides for and offers various benefits to stimulate the sales and production of electric vehicles in Ukraine. The bills were withdrawn in a year. In the bills it was proposed to provide a number of benefits for enterprises. These are temporary (until 2033) exemptions from income tax for enterprises that extract and sell lithium, manufacture lithium-ion batteries for electric vehicles, and manufacture charging stations for electric vehicles or electric cars. It is also proposed to exempt goods intended for the production of electric vehicles from payment of import duties by 2029.

Demonopolization Tax Cuts

Only one company has signs of a monopoly on the Ukrainian electricity market —the state-owned Energoatom, whose share of production in the total amount of electricity exceeds 50%. During martial law, the monopoly provides a certain guarantee of consumer protection.

Harmonized Access to International Charitable Uplift (HAICU)

According to the Climate and Freedom Accord, «Accord nations could optionally empower their people to solve problems, with streamlined access to international giving, via a charitable tax deduction system harmonized to the US model (the most generous) with an Accord registry allowing simplified direct giving to verified charities across all Accord nations.»

Post-war recovery is one of the main priorities for Ukraine. Since the beginning of the war, international partners have allocated almost 170 billion euros for Ukraine.[165] In this context, Harmonized Access to International Charitable Uplift, under conditions of the clear rules of application of this mechanism, could be considered for use in Ukraine after careful study.[166]

163 https://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=63677
164 https://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=63678
165 https://t.me/minre_ua/3656
166 For more references look here: https://www.ey.com/news/2023/08/recai-61edycja-2023; https://top-oze.pl/raport-polroczny-1p-2023-odnawialne-zrodla-energii-w-polsce/; https://www.rynekelektryczny.pl/moc-zainstalowana-fotowoltaiki-w-polsce; https://wysokienapiecie.pl/78693-klimat-siluje-sie-z-rozwojem; https://enerad.pl/aktualnosci/najwieksze-farmy-fotowoltaiczne-w-polsce-ranking; www.agropolska.pl/aktualnosci/polska/spoldzielnie-energetyczne-wazny-element-energetyki,15106.html; https://www.parkiet.com/firmy/art38444061-kto-w-polsce-rozdaje-karty-w-branzy-oze

About the authors

Bulgaria

RES development in Bulgaria has been improving both in terms of cutting red tape and increasing investor confidence. However, it is already facing three main challenges. The main one is slow grid development – while RES investments have seen a considerable improvement in administrative procedures and financing, the same does not apply to building transmission and distribution networks. The approach by which they are regulated needs to change – from a reactive one, based on perfect information about new generating capacities connections, to an anticipatory one, based on strategic documents, security of supply, and investors' interest. The second one is a single technology focus – all new RES installations were of photovoltaic parks - and consequently – low/negative power prices at certain hours of the day. Sooner rather than later, investors will see their cash flow decline and will have to be on the lookout for new business models, including providing ancillary services for the TSO/DSO. The third one is unwarranted political interventions, which hinder market development. Currently, this is related to price caps, both for producers and consumers, which disincentivize developing long-term, new hedging products and limit trading to Day Ahead Markets. Lack of long-term guarantees for investor cash flows could further hinder their ability to secure financial support for their projectsn – said **Kaloyan Staykov is a Chief Economist at Energy Management, Bulgaria**

As network interconnectivity deepened throughout the last decade domestic prices became more and more dependent on the conditions of the regional energy market. Although natural gas plays an insignificant role in power generation, gas prices in Europe and their impact on electricity prices on the continent are almost directly transmitted to the domestic market. Barriers to new green investments in Bulgaria are almost entirely physical – grid connections, rather than administrative, financial, or other. The power grid has become the new red tape for RES development not only in Bulgaria but for the EU in general. The process of connecting to the grid is long and has to run parallel to other administrative requirements, such as acquiring a construction permit, and isn't streamlined. Grid operators still must adhere to numerous administrative procedures and special laws, for example, coordination with the Road Infrastructure Agency, and application of the so-called tacit consent for building permits under the Territorial Planning Act, taking into account the fact that network operators are required to apply public procurements, stipulated in the Public Procurement Act, when choosing suppliers and contractors, etc. The whole process needs to be revamped and fitted to the new reality of higher RES investment intentions, accelerated grid development, and cutting down on red tape – said **Latchezar Bogdanov, Chief Economist, Institute for Market Economics, Sofia (www.ime.bg)**

Czech Republic

With time we see again that the free market works, and the energy sector should not be an exception to this rule. Simplifying the licensing system, creating a more favorable business environment, or accelerating the depreciation of capital are just a few examples of measures that would greatly improve the energy market, not only in the Czech Republic but also in the rest of Europe. If we take climate change seriously, we should try to create an environment in which companies and individuals can solve the related problems from the bottom up, instead of politicians trying to solve them from the top down - said **Jan Šincl, Analyst, Liberální institut**

Hungary

Since 2019, Hungary has seen a very significant annual expansion in the installed capacity of Renewable Energy Sources (RES). The biggest further limitation to the spread of renewables is the grid network. Instead of the current annual or project-based plans, a complex, multi-year network development plan/strategy is needed. There are significant political risks related to network development, such as the arrival of RRF sources or their time constraints on use. It would be a good step in the right direction if certain renewable sources – which could also appear in the balancing market – were not discriminated against, with wind energy being the most critical issue. However, there is a need for further development and diversification of storage capacities and the balancing market, inviting more new economic players. Although the energy sector is highly dynamic, there should be understanding towards the government, the relevant ministry, or the Hungarian Energy and Public Utility Regulatory Authority - just think of the crisis in 2022 - policies and regulatory institutions need to create greater predictability to make the sector more attractive for new entrants or existing players. For example, the state's preemptive right to purchase solar power plants sends a very negative message to businesses planning to enter the market. Although there were many forward-looking steps, especially in 2022-2023, the political risk in Hungary is exceptionally high, deterring new entrants - **Zoltán Levente Ember, CEO and researcher at the Iránytű (Compass) Political and Economic Research Institute**.

Zoltán Levente Ember is the CEO of the Compass Political and Economic Research Institute. He has been an analyst and then the research director at the Institute since 2012. The Institute is a think tank that focuses on political, social, and market research. Originally a geographer, his daily activities focus on territorial and social inequalities, macroeconomic issues, and energy issues.

Ukraine

For the third year in a row, Ukraine continues to experience the largest complex terrorist attack on an energy system ever recorded in the world. As a result of the unprovoked aggression of the Russian terrorist state, the Ukrainian energy system suffered serious damage and loss of capacity. In these conditions, in coming years high priority would be given to "war-resistant" distributed power generation, which would be more difficult to disable with missiles or UAV attacks, and the development of which in the coming years should become the main vector for investments in the power system for its reconstruction. Small highly maneuverable gas or biogas power plants with a capacity of 5-30 MW, an increase in RES generation, electricity storage systems - all these projects will be the top-priority in the coming years together with the protection of existing generation capacities and energy grids - said **Oksana Ishchuk, Executive Director of the Centre for Global Studies Strategy XXI, Ukraine.**

Poland

Dominika Taranko, Managing Director and Vice President of Wind Industry Hub Foundation, founded by Polish Wind Energy Association, the largest sector organization in Poland and member of WindEurope, established in 1999. The mission of the Wind Industry Hub is to support the development of a strong supply chain for the wind sector and the involvement of local content in Polish and European wind investments.

Dominika has been involved in the energy market for 15 years. Previously, she worked in the capital group structures of the largest Polish company, Orlen, an LNG importing terminal in Świnoujście operator – Polskie LNG, gas transmission system operator Gaz-System, and Finish company Fortum. She also acted as the Director of the Energy and Climate Forum at the Union of Entrepreneurs and Employers, one of Poland's three largest business organizations. She graduated from three faculties of the University of Warsaw and Lazarski University, including degrees in MBA Energy.

Romania

Christian Năsulea teaches economics at the Department of International Relations and Universal History at the Faculty of History of the University of Bucharest. He is also the Executive Director of the Institute for Economic Studies—Europe and a fellow of the Institute for Research in Economic and Fiscal Issues. His areas of research interest include public policy and stimuli for economic development, political and commercial negotiation in international relations, behavioral economics, and decision processes.

The Institute for Economic Studies Europe (IES-Europe) was founded in 1989 in France. IES-Europe took on the mission of spreading the ideas of freedom & liberty to students and scholars worldwide and supporting the freedom movement through educational programs meant to increase awareness concerning the importance of individual rights, free markets, and the rule of law. After the fall of communism in Central and Eastern Europe, many participants at IES seminars were people from ex-communist European countries. IES-Europe's first program abroad was held in Romania in 1991, and IES-Europe maintained a presence in the country, albeit intermittently, starting in the late 1990s. Since 2022, IES-Europe's Romanian branch has been very active in publishing policy papers and informing the public through social media and mainstream media channels.

Slovakia

Radovan Ďurana Radovan Ďurana is co-founder and member of INESS - Institute of Economic and Social Studies since 2006. He is the Director of the Public Finance Research Center at INESS. Before joining INESS, he worked in a commercial financial institution specializing in corporate lending. He is a free-market oriented economic policy analyst focusing on taxation, energy issues, the welfare state and public budgets. For 18 years he has directed the internationally award-winning educational project The Prize of the State, which has been adopted in many European countries. He is one of the most frequently quoted economists in Slovakia. He is the author of dozens of studies and publications, and hundreds of articles in the major media. He is also a Fellow of the Brussels-based EPICENTER Network.

The Institute of Economic and Social Studies (INESS) began its activities in January 2006 as a non-governmental, independent & non-political civic association founded by concerned individuals and financed by private donations and revenues from its activities.

INESS monitors the functioning and financing of the public sector, evaluates the effects of legislative changes on the economy and society, proposes policy reforms, and comments on current economic and social issues by publishing articles, studies, and podcasts and organizing events and educational programs. Its goal is to emphasize the importance of free markets for prosperous societies.

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