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THE CHALLENGES TO THE BULGARIAN „GREEN TRANSITION“

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Abstract

The European citizen wants a better life for themselves and the planet. Our target is to keep the air we breathe, the food we eat, the resource we use, clean and safety.

The “green wave” has covered Europe and the rest of the civilized world. The proof of that are the elections in 2019 and the new course of Europe with so called “Green Deal”. The goal of the European green politics is to respond to the growing challenges of current post-industrial socio-economic model, which comes entirely at the expense of our planet and its resources. There is no going back and no one will wait for the Bulgarian energy transition. We must build ambition plan for many difficult and unpopular changes – strategic, technical and mental. The main target should be the usage of the local resources and their combining with the needs of the industry and the citizens. For more than decade the Bulgarian did not used the experience of our European partners. The time of the green economic has come and we must use this chance for a better life.

The document identifies the problematic units in the current Bulgarian energy model and provides potential solutions to make the much-needed green transition.

Keywords: Green Deal, transition, development

JEL: K32, P28

Introduction

Fossil sources (coal, gas, oil) are currently the largest primary source of energy. The main plan of the green deal is to bring us closer to the “circle economic”, which means less dependents to the standard fossil fuels. This, together with the growing rate of consumption, global pollution is leading to an intensification of the health and power crisis. Assumptions about the remaining fossil reserves differ in specifics, but optimists are rare, and are mainly from the fossil business community.

Forecast quantities by source:

Coal: 120 years;

Oil: 48 years;

Natural gas: 43 years (BP, 2022; US Energy Information Administration, 2024).

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The forecasting methodology is based on the assumption of a constant annual production of energy resources, reaching a maximum value within one district, country or worldwide, after which production will decrease until it reaches the point where it is already economically unacceptable or physically impossible to perform.

High wholesale electricity prices in South-East Europe during the Summer 2024

The data is focused on the „Southeastern Europe“ area, defined as the “Area” that includes Greece, Bulgaria, Romania, Croatia, Montenegro, as well as Serbia, Albania, North Macedonia, Kosovo, Bosnia-Herzegovina, for which data availability is lower. The area of South-East Europe (SEE area) has faced a period of very high electricity prices, experiencing significant price peaks in the evening, during and around hours 20, 21, 22 (CET), when generation from PV units drops to zero. In this time period, Day-Ahead Market electricity prices (ENTSO-E, n.d.), were frequently in the range of 400-800 €/MWh, sometimes even higher. Neighboring countries to the SEE area, such as Poland and Slovakia faced high electricity prices to a lower degree during this period. The following graph shows the Day Ahead Market prices (daily averages as well as average during the evening price peak) in European Markets during July and August 2024. The highest prices in the Area appeared in Albania, Romania, Bulgaria, Greece and Hungary.

Figure 1: Average DAM Prices (July and August 2024)

The phenomenon of high prices is focused specifically around the Area and Hungary, and is not pan-European, which would strongly indicate that the Area experienced market stress with regards to its electricity supply, especially during hours 20-22 (CET).

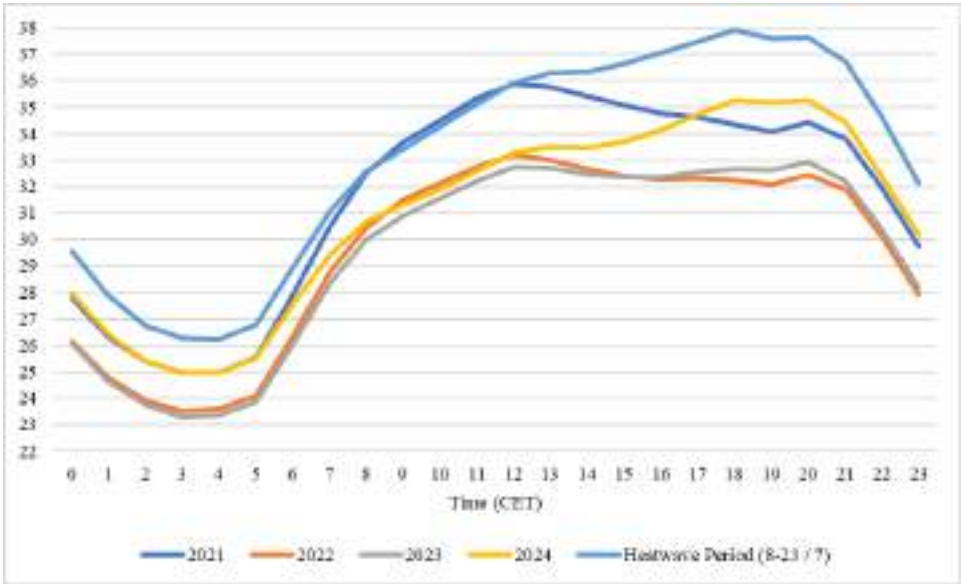
Source: ENTSO-E

Figure 2: Average DAM Prices (July and August 2024, 20-22 CET)

Electricity Supply and Demand in SEE area

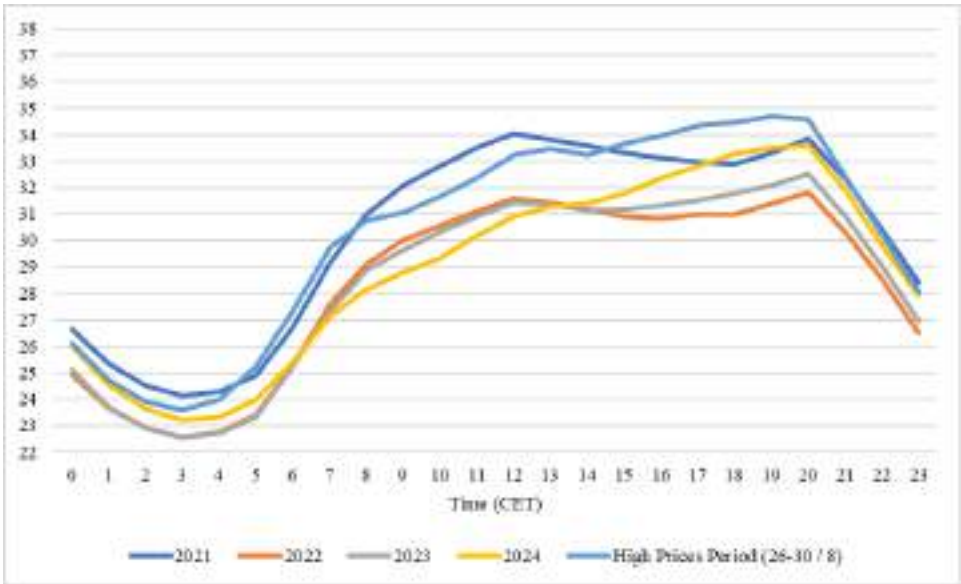
Local Energy Demand

During the period a prolonged heatwave has affected the Area and Hungary, leading to high temperatures and to a significant increase in electricity demand (air-conditioning), while at the same time the availability of thermal generation units has being reduced. The following graphs shows the average aggregated daily demand of Greece, Bulgaria, Romania, Hungary, Montenegro, Croatia, Serbia, North Macedonia, Bosnia-Herzegovina for July and August during years 2021 to 2024. In addition, the July heatwave period (8/7 to 23/7) as well as the August high prices period (26/8 to 30/8) are indicated as separate curves.



Source: ENTSO-E

Figure 3: SEE Aggregated Load (GW) – July, (GR, BG, RO, HU, ME, HR, RS, MK, BA)



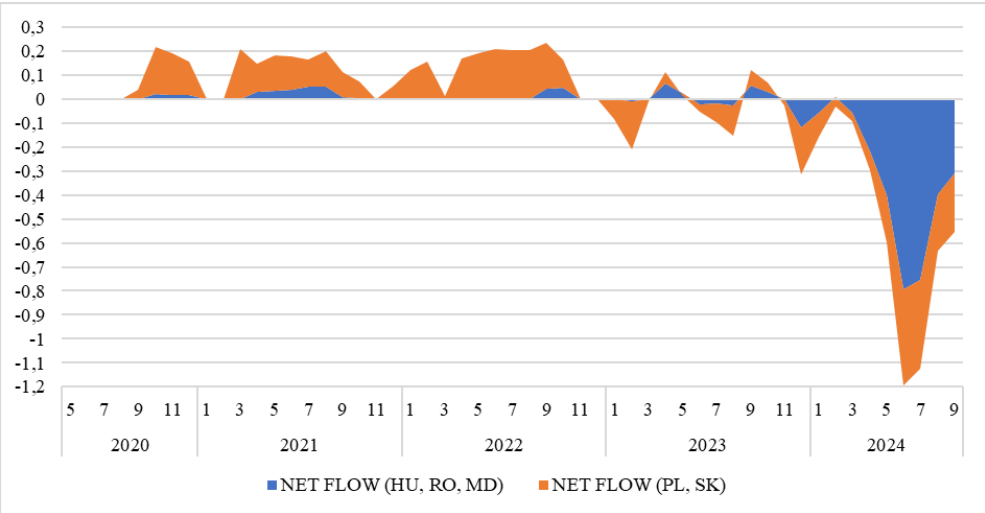
Source: ENTSO-E

Figure 4: SEE Aggregated Load (GW) – August
(GR, BG, RO, HU, ME, HR, RS, MK, BA)

For July, it can be observed that in 2024 electricity demand exceeded that of years 2022 – 2023 by up to 2 GW, while in the evening it also exceeded the electricity demand of year 2021 by around 0.5GW. During the heatwave period, electricity demand was even higher.

Ukraine

In addition to meeting its local demand, in 2024 the Area and Hungary also exports electricity to Ukraine (through Poland, Slovakia, Hungary, Romania and Moldova interconnections). This has amounted to an average flow of 0.7-0.8GW during the summer while, in the recent past, Ukraine was exporting approximately 0.2GW to the area.

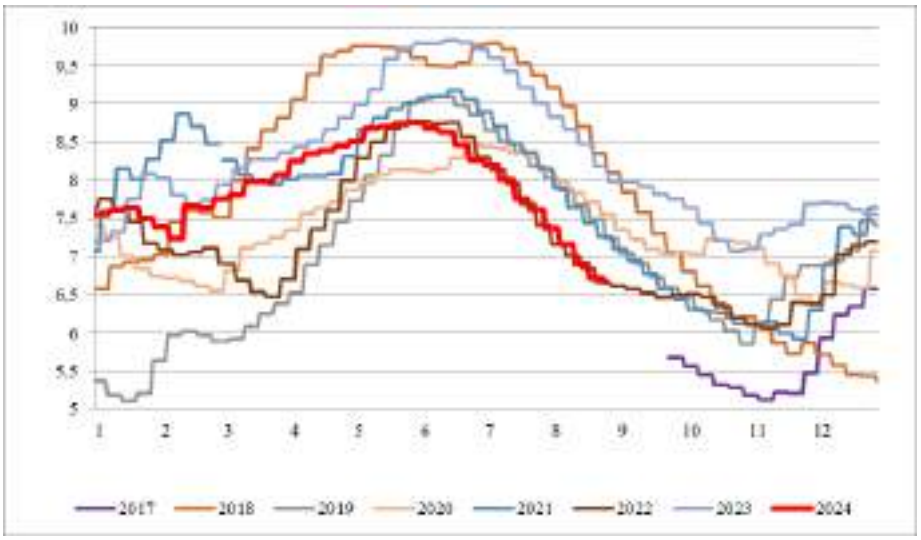


Source: ENTSO-E

Figure 5: Net Power Flow to Ukraine (GW)

Available Hydroelectric Supply

As regards available hydroelectric supply, the area has faced a drought, which, combined with increased demand has sapped the available energy resources (ENTSO-E, n.d.). As shown in the following chart, the available hydroelectric energy in the Area is very low, in comparison to typical volumes of most previous years. As hydroelectric units tend to be fast and flexible, this drop in their availability can have a disproportional impact on the market, because the pool of available flexible generation resources that can take over when generation from Photovoltaics drops to zero is limited.

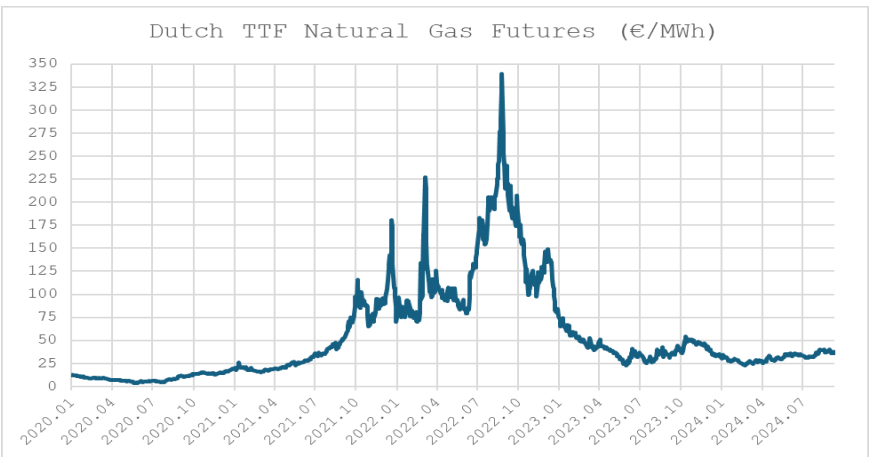


Source: ENTSO-E

Figure 6: SEE Aggregated Hydro Energy in reservoirs (TWh)
(GR, BG, RO, HR, RS, ME)

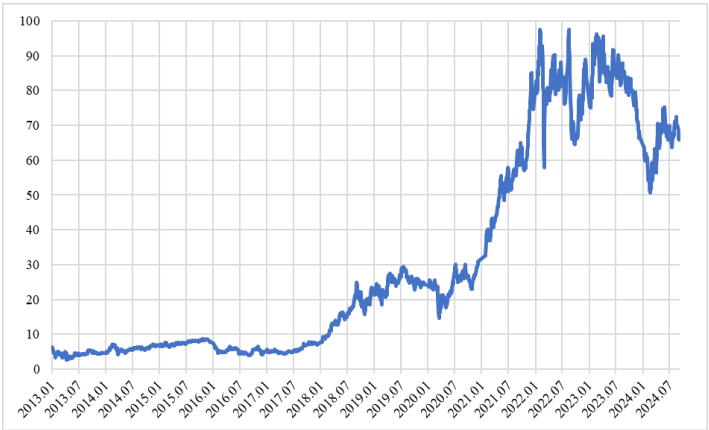
Generation Costs

When assessing the issue of high prices, it important to evaluate the evolution of the cost of generation in the SEE area. The following graphs present the evolution of the natural gas (ENTSO-G, n.d.) as well as the CO2 emissions cost over the years.



Source: ENTSO-G

Figure 7: Dutch TTF Natural Gas Futures (€/MWh)



Source: European Energy Exchange

Figure 8: EU ETS CO2 Auction Prices (€/tn)

From these graphs it can be concluded that even though the cost of natural gas is at reasonable levels, the cost of CO2 emissions (EEX, n.d.) which is a main driver of the cost of generation from coal is very high. This increase pushes prices higher when the capacity of such units is required to meet demand.

Cross Border Flows

In cases of electricity market stress, strong interconnections may help increase supply and mitigate the problem. The following graphs show the aggregated net flows in the Area and Hungary (ENTSO-E, n.d.).

Source: ENTSO-G

Figure 9: Average Daily SEE Net Cross Border Flows (GW) – July (GR, BG, RO, HU, ME, HR, RS, MK, BA)

Source: ENTSO-G

Figure 10: Average Daily SEE net cross border flows (GW) – August (GR, BG, RO, HU, ME, HR, RS, MK, BA)

Realized cross border schedules indicate that energy imports into the Area and Hungary in 2024 during the evening hours were the highest in recent years. In comparison to years 2022 – 2023, imports increased up to 3GW, while in comparison to year 2021, the increase was about 1-1.5GW.

Bulgarian green transitions – problems and solutions

Energy consumption accounts for 75% of the European countries emissions and also in Bulgaria the Energy Sector has the largest share in total greenhouse gas emissions – about 72%. So measures and initiatives to ensure a green transition are mainly focused on this sector. The ambition to transform the energy system is fundamental for achieving climate goals and at the same time affects all sectors of the economy. Undoubtedly, saving more energy and using more renewable sources for energy production to be used in all spheres of public life is the main adopted approach in achieving climate neutrality. They are a key factor, not only for reducing emissions but for economic growth, generating investment and developing innovation.

The European Green Deal (European Commission, n.d.), outlined the main policy initiatives to achieve non-carbon economics to 2050. According to this

strategy Europe will be the first climate-neutral continent and take the EU‘s leadership role in tackling with global challenges.

In the field of energy, the activities arising from the European Green Deal are focused on the principle of transition to clean energy by ensuring secure energy supplies at affordable prices, building a integrated and digitized market. The main priority is to encourage the efficiency of the energy and the construction sector, according to the new renewable requirements.

Bulgaria supports the European politics for zero pollution economic up to 2050. The Bulgarian government is carefully considering planning strategic actionst for non-carbon public and private sector by focusing on energy efficiency and developing of new renewable projects.

The strategy leads to implementation of the green politics, approved at the Paris conference in 2021. Later in 2023 EU updated the targets from Paris conference with main goals for 2030 as follows:

- Reduction of greenhouse gas emissions by at least 55% compared to 1990;
- Increasing of the energy efficiency by minimum 32.5%;
- At least 32% of gross final energy consumption in the EU should be from renewable energy sources;
- Ensuring a minimum 15% connections (gas and power) between the member states.

The European Commission has presented a package of measures called “Fit for 55”, which covers various policy areas to reduce carbon emissions by 55% compared to 1990. The common goal, binding all Member States, is to promote the use of renewable energy in its energy mix from the current to 32% to 40%. Member States must use local RES resources, striving to integrate them according to the socio-economic needs of society.

The main goal of the community is to reduce greenhouse gases by reducing consumption. With such a pan-European energy efficiency strategy, consumption will be reduced by 9% compared to initial forecasts.

In order to meet the goals of the community, the Republic of Bulgaria has prepared its integrated plan in the field of energy and climate, which it presented to the European Commission.

Bulgaria takes into account the accumulated European experience in the implementation of policies promoting the production of energy from renewable sources. As an important part of the adopted policy for low-carbon economy, Bulgaria is developing the generation of renewable sources, striving to reach the pan-European target of 32% and the total mix by 2030. Thanks to early efforts in renewable energy, Bulgaria will have an easier task for transition to a green economy compared to other European countries. In the period until 2030, the Bulgarian energy sector will strive to regulate decentralized electricity

production, fully liberalize its energy market and provide consumers with the most acceptable price of energy produced.

The national priority is the construction of renewable sources entirely on a market basis. In order to stimulate investors, Bulgaria is committed to adapting its legislation to the European one, to simplify the accession procedures as much as possible, to improve its electricity market by ensuring equality and transparency among all market participants. A strategy is being developed for the participation of household consumers to unite in „energy communities". The purpose of these communities is to promote the production, consumption, accumulation and sale of renewable energy. All these policies must be integrated into the energy sector by 2030. In order to the national target, the share of energy from renewable sources in the electricity sector should be 30.33%.

An increase of 2 645 MW in the renewable power capacity is expected. This growth is accompanied by an increase in installed capacity in photovoltaic power plants by 2,174 MW and in wind power plants by 249 MW. The projected increase in this type of generators related to the rapid development of technologies and reduction of investment costs for their construction.

An increase is also expected for biomass power plants with 222 MW, as the fulfillment of the sustainability criteria is essential for the reporting of the energy produced by them for the national goal and the sectoral goals.

The Republic of Bulgaria creates special points – desks, which make it easier for investors to go through the administrative procedures for commissioning of the energy power plants. The desks save time, money and speed up the investment plans of entrepreneurs.

Priority is given to high-efficiency heating and cooling systems. Innovative technologies using geothermal, hydrothermal and solar energy are with high priority in the strategy for business and household users. The share of the energy mix of this type of systems should reach 42.6%.

Biofuels are very important for the transport sector. Consumption of this type of energy should help for the main target – 14.2% of the green energy for the mix in this sector. The main focus is on eclectic mobility, stimulating the use of public transport and the introduction of modern technologies in the railway industry.

To achieve the goals of climate neutrality,the state will be part of the organization for Pure Hydrogen. Participation in the European Alliance for the Development of Pure Hydrogen will support producers of hydrogen. Hydrogen is an almost zero-emission energy source that can have many applications with high socio-economic effect. Efforts will be focused on the development of projects for the use of hydrogen for the production of heat and / or electricity, in the transport sector, as well as for the storage of energy from renewable sources.

In accordance with the EU priorities for high efficiency of the economic, Bulgaria puts energy efficiency first and plans to achieve a reduction in primary energy consumption by 27.89% and a reduction by 31.67%. The comparison is based on the PRIMES 2007.

In order to create the necessary conditions for achieving the national goals for increasing energy efficiency by 2030, the necessary changes in the regulatory framework will be made.

Our country sets a new goal on an annual basis of 0.8% of final energy consumption. Mechanisms are being sought for its implementation using the methods of Directive (EU) 2018/2002. The end result should be an overall improvement in final energy efficiency in every area of society.

The market for energy efficient services will continue its development, encouraging the implementation of contracts with guaranteed results (ESCO contracts).

With high priority is the renovation of the building stock. The state is targeting for more efficiency with combining of renewable sources and new building technologies. In this regard, new strategy is developed. The horizon of the document is 2050. It is aiming for significantly contribute in achieving energy efficient and decarbonised building sector of the National Fund of Residential and Non-Residential Buildings and support the modernization of all buildings with intelligent technologies. The strategy envisages the renovation of 60% of the residential building stock and nearly 17% of the non-residential building by 2050, which will lead to energy savings of 7,329 GWh/year. The expectation is for 3,274,453 tonnes of CO2 greenhouse gas savings. In addition to saving energy and reducing CO2 emissions, the implementation of the Strategy will lead to the creation and maintenance of 17,600 new jobs and additional annual GDP growth of 557 million BGN by 2030 for the period 2021 – 2030.

The national strategy will be financially supported on the basis of the available financial framework, depending on the priorities set by the state. The main mechanism will be a financial fund that will promote the decarbonisation of Bulgaria and will be financed by the European cohesion policy. This financial institution will adapt financial instruments or structure additional ones if identified as necessary, referring to the same possible sources and appropriate funding schemes in order to dynamically address barriers toward increasing energy efficiency. The fund will unite a circle of shareholders, financing the executors of the the “green” goals. The organization will consist of three interconnected units responsible for the public sector, commercial purposes and residential buildings.

Central heating and cooling systems are considered major solutions to improve energy efficiency in the country.

A campaign to inform consumers about the benefits of implementing renewable energy sources and high technologies is forthcoming. The campaign will focus on energy efficiency education.

In connection with the legislative initiative "Fit for 55" the states should submit their draft of an updated Integrated Plan.

Energy transformation will pose serious challenges to our country related to the implementation of energy efficiency measures and the introduction of renewable energy sources.

Especially for Bulgaria, as one of the countries with low gross domestic product and the lowest levels of income in the EU per capita, any change in the direction of further increasing ambition will have a strong impact, both economically, due to the need for significant investment and socially.

In this regard, the our government should envisages in-depth consideration and search for effective solutions to the assessment of the implementation of the recommendations in the final version of the Integrated Plan presented by the EC in the context of the new legislative package "Fit for 55".

The new higher requirements the Legislative Package "Fit for 55", which focus on significantly reducing greenhouse gas emissions. In this regard, the updated Integrated Plan in the field of energy and climate of the Republic of Bulgaria 2021 – 2030 will provide targets for decarbonised, sustainable and flexible energy system in a cost-effective manner,according to the national specificities, as well as targeted measures and incentives to achieve the ambitious European climate targets by 2050.

These measures demonstrate the need to introduce new clean energy technologies. Our goal is to accelerate the transition to cleaner and highly efficient energy technologies. This is one of the mechanisms for achieving secure, sustainable, environmentally friendly and highly efficient energy. The introduction of new will reduce the technological losses in the networks, expansion of the energy market, will help solving the challenges of decarbonisation, reduce energy costs for consumers, reduce harmful emissions, resulting in increased quality. of people's lives.

In conclusion

Overall, the Area and Hungavry have experienced scarcity in the electricity markets, due to a combination of factors, i.e. unusually high demand, low hydro resources & wind production and reduced supply availability (e.g. due to decarbonization). This scarcity, especially from flexible generation resources, coupled with cross border flow limitations and an increase of supply costs for some generation technologies, such as hard & soft coal units, led to extreme price spikes. The price spikes apparently occurred because, in periods of scarcity, electricity

prices stop exhibiting linearity and may exhibit sharp peaks, even after small changes in their fundamental drivers, or due to strategic participant bidding. In these cases, they are not only caused by higher generation costs, but also by the profit-driven nature and the risk aversion of the participants of the electricity markets.

The current difficulties in the sector are proof that the achieving of the new higher goals by 2030 will require a systematic transformation throughout the whole economy. The implementation of the proposals of the new legislative package requires active actions in all areas of public life, in energy, industry, transport, the building sector, waste and changes in land use and forestry. The policies supported by each Member State will change the behavior of end-customers and will lead to an innovation, digitalization and optimal management of the infrastructure.

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