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INTERNATIONAL ENERGY PRICES VOLATILITY AND DIGITALIZATION APPLICATION

The actual world economic growth is still unstable and disrupting under influence by the new COVID-19 spikes and specifics of post-pandemic recovery.

The pandemic economic recession since mid-2020 till 2021 have been resulting of global shocks generated by COVID-19 fast spread. Such shocks were complex and included medical, psychological, social, economic and financial shocks because of international spillover of new dangerous infection. Shocks seriously changed or disrupted supply and demand conditions on the global and domestic markets, supply chains, created the imbalances in the economic sectors.

In most countries the depression has been replaced by an economic recovery since the beginning of 2021. But the resumption of growth was accompanied by new shocks which bringing risks to the current and future state of various national economies.

This necessitates an analysis of the nature of shocks and risks, their features during the recovery period, especially in the fields of energy, food and industry.

Economic shocks can be considered as endogenous (internal) and exogenous as shocks caused by external factors. Endogenous shocks can be caused by significant changes in macroeconomic

parameters, such as rising inflation or business conditions, demand imparities. Endogenous shocks are influencing on supply, demand, output and productivity in the economy.

External (exogenous) shocks come from unexpected fluctuations in international markets: commodity prices, changes in supply and demand, value chains disruptions, trade wars, global financial markets and exchange rates fluctuations.

Pandemic lockdowns and economic depression affected shocks to the energy sector and demand depression primarily for oil, natural gas and electricity. The last two have some similar features such as a strong technological requirement for balancing supply and demand to keep operational resilience, a need to have reserved capacity, differentiated price structure, seasonable and weather adjustments, others. Therefore energy sector is sensitive to supply-demand movements and difficult for regulation.

Post-pandemic economic recovery has influenced on the demand increase for all types of energy. But such changes became asymmetric in countries and regions due to differentiated economic growth, structural problems, new waves of pandemic.

Second part of 2021 was marked with the energy sector volatility in many regions and especially in Europe in the form of a sharp rise of prices for energy resources, mostly for natural gas, and electricity.

The main systemic causes of energy prices volatility in Europe are the following:

- increase of demand for energy due to the restored economic growth;
- changes in global energy flows in 2021, in particular the reorientation of liquefied natural gas and coal for supply to Asia;
- insufficient mobility of renewable energy – dependence on natural conditions, limited storage of «green energy»;

- decommissioning of some coal-fired power plants important for balancing electricity market, the plans for closing nuclear power plants;

- insufficient filling of natural gas storage facilities in Europe and negative expectations of high energy demand in the event of a cold winter;

- large share of Russian natural gas on the European market has created a dependence from one source, at the same time in 2021 it was accompanied with limitations of natural gas supply from Russia such as cancellation of gas supply to spot market at current electronic auctions, accidents at Russian gas fields and pipelines, periodic stops of gas transportation for maintenance, political pressure for certification of Nord Stream-2 gas pipeline;

- imperfection of natural gas pricing system, use of different types of natural gas prices such as for long-term contracts by benchmarking to oil prices and for spot contracts based on quotations of the main gas trading platforms and commodity exchanges.

The price volatility is represented by the basic data on increase of average energy prices in the EU at the end of 2021 in comparison with 2019 [1, p. 4]:

Wholesale prices for natural gas: 429%

Retail prices for natural gas: 14%

Wholesale electricity prices: 230%

Retail prices for electricity: 7%

Energy prices volatility in Europe carries risks for private consumers and businesses. The main risks could be considered as the following:

- increased energy costs will cause risks to household solvency and challenges to corporate financial stability;

- negative expectations regarding the stability of energy supply;

- risks of maintaining the balance of gas supply and electricity systems;
- risks of instability due to insufficient diversification of energy supply sources;
- risks of reducing output and rising prices for gas- and electricity-intensive industrial products such as fertilizers, chemical products, power generation, ferrous and non-ferrous metals.

In response to such risks, the EU is implementing regulatory measures to address energy prices and overall sector stability. First of all, short-term measures include maintaining the solvency of energy consumers, stability and balance of supply, rationalization of energy consumption, reduction of energy losses etc.

Medium-term measures in energy sector should include: investments in renewable energy and energy efficiency, development of energy storage capacity to maintain of renewable energy: improve security of supply and operation of gas storage facilities in Europe; enhance a risk analysis and management in energy sector.

The complex nature of risks in the energy sector and economic impact of the current energy prices volatility have enforced the multi level activities for the digitalization of energy. Application of advanced digital technologies should improve a data processing in energy sector, identification of risks and effective response in order to improve stability of production, generation, distribution and use of energy. Electricity is a key area of digitalization application in Europe.

Advanced digital technologies could support energy system optimization and cost savings, system integration, enabling the data and operational design to balance supply and demand of energy locally and internationally. Digitalization could improve the utilization of the generating, reserve and grid capacity.

Digitalization of the energy system is carrying on the international, national and industry levels, maintaining cross-level coordination and integration, research and innovation cooperation, data and systems networking.

On the international level in response to current price volatility is expecting a multiple effects from the digitalization development and implementation according to the decision of the European Commission of the Digitalisation of Energy Action Plan [2, p. 3] started in 2022. The major outcomes in result of such digitalization plan implementation are expecting such as:

- creating the European data infrastructure to support a balanced and effective market for energy services;
- promoting of the best practices and innovations for servicing customers in energy;
- enhancing the application of digital technologies¹ in the energy sector by research and innovation;
- enhancing the cybersecurity of the energy sector;
- supporting the development of climate neutral solutions for the Information and Communication Technologies sector, promote cooperation between the energy sector and the digital sector.

On the national level digitalization application is targeting on the data management of the country's energy systems, balancing supply and demand, capacities better utilization, energy saving and customers servicing.

On the industry level digitalization application including different technologies for energy management, data processing, integrated technological systems. In order to provide digitalization integration, the technology companies developing or partnering or acquiring the software development capacities and firms.

The impact of energy prices volatility in European countries is differentiated by domestic and international factors, such as the intensity of COVID-19 cases, border and transport restrictions, conditions of international trade. Digitalization of energy would apply the advanced technologies such as Big Data and Artificial Intelligence in order to improve the system stability and efficiency. Digitalization of energy is requiring of fostering international coordination and cooperation for development and scaling of advance technologies for energy sustainability.

References:

1. 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. Tackling rising energy prices: a toolbox for action and support European Commission. Brussels, 2021. 21 p. URL: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2021%3A660%3AFIN&qid=1634215984101>
2. Action plan on the digitalisation of the energy sector. European Commission. Brussels 2021 4 p. URL: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13141-Digitalising-the-energy-sector-EU-action-plan_en