CONTRADICTIONS IN ELECTRIC POWER SECTOR DEVELOPMENT: UKRAINE VERSUS EU

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INTRODUCTION:

UKRAINE STRIVES TO INTEGRATE INTO THE EUROPEAN ENERGY SPACE AND

- is being a member of the Energy Community since 2010;
- implemented the pro-European model of the electricity market since the mid-2019;
- has been synchronized electric power system with the entire European one since Feb 24th 2022
- has become an observer member of ENTSO-E since Mar 16th 2022

23 June 2022 the European Council granted Ukraine the status of a candidate for accession to the European Union.

But the Ukrainian electric system suffered more than 250 strikes (BBC calculations on Mar, 4th 2023)
The aim and methodology of the research

The aim of the research is to develop methodological support for the analysis of input-output electricity flows and compare key trends in the electric power sector development in Ukraine with the EU common ones. Its hypothesis is formulated as follow: existence of significant contradictions in the electric power sector development of Ukraine and the EU.

Table 1. Qualitative indicators of the electric power sector development.

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Notes: RES – renewable energy sources; OFF – organic fossil fuels.
EU SANKEY CHART OF ELECTRICITY FLOWS IN 2020

Available electricity

- Gross power generation
- Net power generation
- Gross heat generation
- Transformation losses

Main activities

- Autoproducers
- CHPs
- PPAs

Other sources
- Nuclear heat
- Natural gas
- Solid fossil fuels
- Biofuels and wastes
- Wind
- Import
- Hydro
- Solar
- Oil and petroleums
- Others

Transport

- Services
- Households
- Industry
- Export
- Own use
1. THE DECARBONIZATION OF THE EU ELECTRIC POWER SECTOR VS GAS-TO-COAL SWITCHING OF THE ELECTRIC POWER SECTOR OF UKRAINE

The structure of EU power generation accounted for 60% of low-carbon energy sources in 2020. In absolute terms, the volumes of all types of fossil-fired power generation, except for gas, declined, while unconventional power generation grew rapidly.

Ukraine is forced to abandon the more climate-friendly gas-fired power generation, and support dirty power generation based on solid fossil fuels at a sufficient level, and limit hydropower generation for the deployment of RES power generation. This phenomenon nowadays is known as the green-coal paradox.
2. DEPLOYMENT OF HIGHLY EFFICIENT COGENERATION IN THE EU VS REDUCING THE VOLUMES AND ENERGY EFFICIENCY OF COGENERATION IN UKRAINE.

In the EU there were also structural shifts towards an increase in the share of power generation in the structure of the gross output of cogeneration, on 40% in absolute terms. And technological shifts made it possible to increase the energy efficiency of cogeneration from 55% in 1991 to 63% in 2020.

In Ukraine electricity generation by CHP decreased by 47% from 1991 to 2020 and was accompanied by a 37% decrease in heat generation due to the lack of sufficient heat demand in the CHPs-related territories. And the energy efficiency of cogeneration decreased to 68% in 2020 and was associated with a decrease in the heat share in gross output, and the physical obsolescence of cogeneration.
3. Increasing the energy efficiency of the electric power sector at all stages

vs

Stable too low energy efficiency of the electric power sector in Ukraine.

The general energy efficiency increase of the EU electric power sector from 29% in 1991 to 40% in 2020.

The general energy efficiency increase of the UA electric power sector from 23% in 1991 to 26% in 2020.
4. DECENTRALIZATION OF THE EU ELECTRIC POWER SECTOR.

VS

CENTRALIZATION OF THE UA ELECTRIC POWER SECTOR DEVELOPMENT.

More and more EU electricity consumers aimed at being prosumers and self-providing their own electricity and heat needs. Surplus electricity is transmitted through the distribution grids which caused the increase the distribution losses in transportation losses of electricity.

Ukraine transmission networks have undergone upgrades to synchronize with ENTSO-E, which caused the decrease in transportation losses of electricity. The deindustrialization of Ukraine has led to a greater centralization of the electric power sector by the closure of a number of autoproducers of electricity.
5. OPENING THE BOUNDARIES OF THE EU MEMBER STATES AND INCREASING THEIR ELECTRICITY DEPENDENCY VS ISOLATION AND SELF-SUFFICIENCY OF THE UA ELECTRIC POWER SECTOR

The import and export electricity flows in the EU increased more than double in 1991-2020. Subsequently, the self-sufficiency of the EU electric power sector decreased to 93%.

Ukraine's electric power sector has been and remains self-sufficient. After the implementation of the European electricity market model in Ukraine became possible to opening external electricity trading with the EU and import dependency increased up to 2%, while the export dependency was at 4% in 2020.
6. ALL-AROUND ELECTRICITY PENETRATION IN THE EU

VS

CHANGES IN ELECTRICITY CONSUMPTION PATTERNS DUE TO DEINDUSTRIALIZATION OF THE UA

EU final electricity consumption increased by 26% in absolute terms from 1991 to 2020. It can be admitted the ongoing convergence of the shares of the three types of activity in the EU: industry, services, and households.

Final electricity consumption in Ukraine decreased by 43% in 1991-2020. In 2020, the total share of non-commercial electricity consumption exceeded the share of commercial electricity consumption by 6%, although in 1991 this ratio was reversed exceeded 4 times.
CONCLUSIONS: THERE IS STILL A SIGNIFICANT GAP BETWEEN UKRAINE AND EUROPEN ELECTRIC POWER SECTOR DEVELOPMENT

- The first one is that Ukraine is forced to keep coal-fired generation for demoting gas dependency and as for supporting RES-generation. At the same time the EU prioritizes the development of ecology-friendly generation, both gas and renewable, looking for more favourable market conditions to meet primary energy source needs.
- The second one is the falling of cogeneration in Ukraine while as the EU strives to support deployment of highly-efficiency cogeneration. But the solution to this issue in Ukraine depends on the comprehensive development of electric power and district heating sectors.
- The third one is outdated and low energy efficient electric power generation in Ukraine, while in European countries development of highly efficient generation supporting through capacity remuneration mechanisms or even green auctions. In Ukraine, such mechanisms aren’t implemented yet.
- The fourth trend is the centralization of the UA electric power sector vs the decentralization of the EU one. Ukrainian electricity consumers have restricted investment abilities and legal obstacles in deploying their own generation, while the EU strives to support the development of distributed generation.
- The fifth one is differentiation on energy security: whereas the EU aims at create single European electricity market, disregarding electricity dependency of member-states, Ukraine remains isolated but self-sufficient due to the lack of cross-border capacities. Synchronization of the Ukrainian electricity system with the European one poses new challenges for Ukraine: where and how to integrate into the European space.
- And the last but not least trend is divergence in the electricity consumption patterns in Ukraine and the EU. Unfortunately, it cannot be solve internally inside the electric power sector and it has to adopt to these challenges: through the develop more flexible capacities, provide incentives for consumers of levelling the electricity consumption schedule.
THANK YOU FOR YOUR ATTENTION

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