

Monitor of Electricity Market Opening

July 19th, 2019

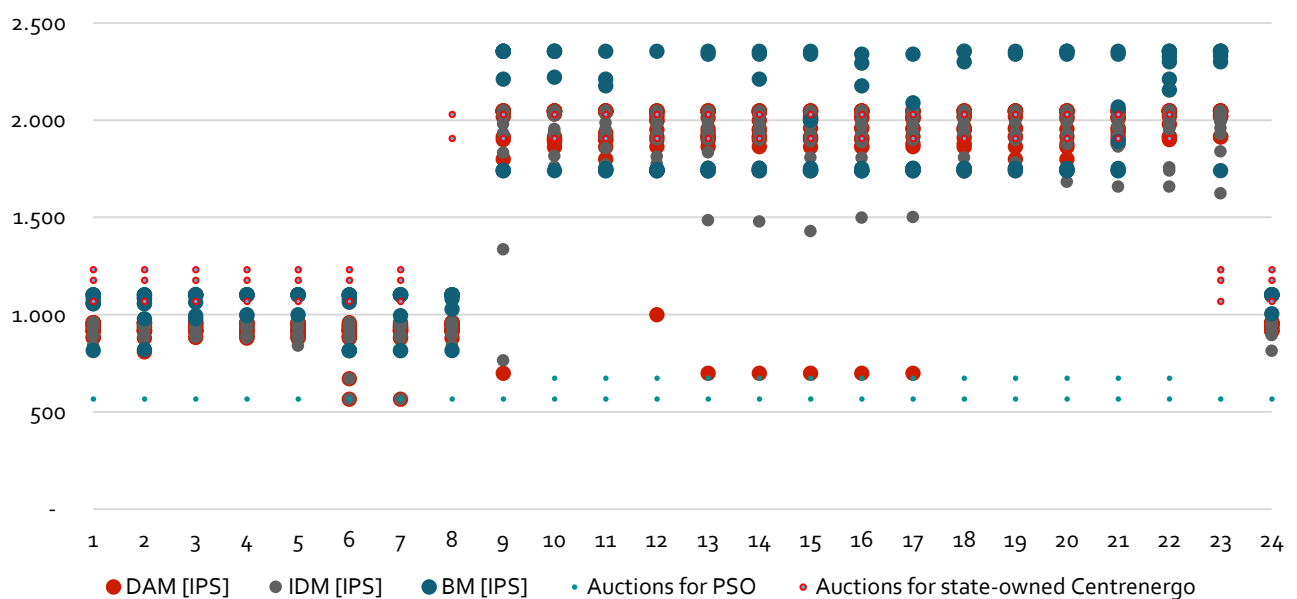
Ukraine opened its electricity wholesale market on July 1st 2019. This monitoring report is the first issue of an analytical publication series that aims to present and analyse key developments in the emerging market. The Monitor of Electricity Market Opening will appear regularly over the next months.

Executive Summary

- I. The Bilateral agreements segment mainly represented volumes traded under the Public Service Obligation (PSO) obligations during the first week, which correspond to more than one third of the market volumes. The centralised auction platform for bilateral agreements with state-owned generation showed mixed results, with only one company, aside from PSO obligations, being successful in selling electricity during week 1 and 2.
- II. While volumes traded in Burshtyn energy island [BEI] stabilised, volumes on the day-ahead market (DAM) in the united power system [IPS] decreased more than demand for electricity. This can indicate a gradual switch from DAM and Intraday Market (IDM) to Over-the-Counter (OTC) trading segments.
- III. Data availability is still mixed. Prices and volumes for key market segments (bilateral auctions, DAM and IDM) are published, as is information on electricity trade and dispatch by plant type. At the same time, information on the balancing market is limited and was not updated regularly. Information on cross-border hourly commercial volumes, OTC and bidding behaviour are not centrally available.
- IV. Day-ahead prices in Burshtyn were higher than those in the rest of Ukraine. Exchanges with the EU are not yet following a commercial logic - we see exports to the EU though EU-prices there being lower than in Ukraine.
- V. Finally, market opening has not yet visibly affected the dispatch of power plants.

As of now, it looks as if the "market" has been transferred from one regulated system organised through a single buyer, to another regulated system organised around different market segments.

Hourly prices of the liberalised Ukrainian electricity market (UAH/MWh), week 1&2



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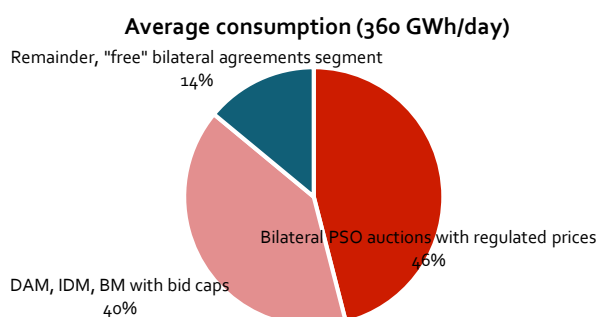
Latest developments

Start of the market

The Ukrainian electricity market started without any major problems which could not be overcome in a reasonable time. This was welcomed by many stakeholders as there had been a long discussion on whether it would be wise to postpone the market opening until various systems had been thoroughly tested.

The Ukrainian market is at its opening strongly regulated regarding both the role of different players and prices. One of its major roles is to keep the prices for households under control by obliging the two main state-owned generators to provide cheap electricity for households through bilateral auctions with tight price caps.

A rough share of each market segment at the wholesale market based on the first two weeks of trading is shown below:



On top of these figures, about 8% of the consumption was procured for losses, similarly as for PSO customers. Trading in IDM was about 2% of the consumption. Intraday electricity would include a high share of day-ahead electricity as it is used for readjusting the volumes according to the latest generation and load forecasts.

Bilateral agreements

The bilateral auctions for the household customers eligible for the PSO prices were held already on June 27 2019. The sellers were the state-owned companies Energoatom and Ukrhydroenergo. The auction prices aligned to the price caps set by the Regulator, represented in the table below. These auctions covered the month of July 2019.

Table 1: First successful bilateral auctions in the Ukrainian electricity market.

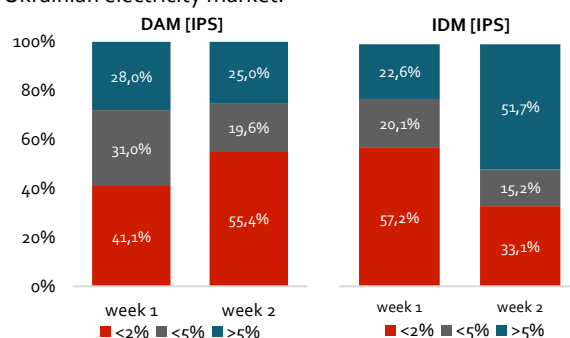
Date	Seller	Period of supply	Product sold	Volume, GWh	Av. price, UAH/MWh
27.06	Energoatom	31 days	PSO-losses base	829	567
27.06	Energoatom	31 days	PSO base	4,145	567
27.06	Ukrhydroenergo	31 days	PSO peak	138	674
02.07	Centenergo	27 days	off-peak	32	1,070
05.07	Centenergo	week 2	off-peak	85	1,232
05.07	Centenergo	week 2	peak	67	2,030
12.07	Centenergo	week 3	off-peak	92	1,178
12.07	Centenergo	week 3	peak	75	1,907

Notably, several other CHP operators auctioned their electricity in first two weeks, yet unsuccessfully. Ukrhydroenergo did not auction any power outside PSO auctions, although it is required to do so by Law.

Day-Ahead Market (DAM) and Intraday Market (IDM)

The DAM and IDM started with the prices aligning very close to the bidding caps set by the Regulator. DAM hourly price aligns very close to the regulator's bidding cap most time in the first 2 weeks. IDM hourly price starts deviating from the price cap at week 2. Figure 1 below shows distribution of hours according to price deviations from bid caps (in percentage). For more detailed representation please refer to figures 2 and 4.

Figure 1: Difference between the price cap and the hourly price in the DAM and IDM during the first and second week of the Ukrainian electricity market.



From the market point of view, it will be very interesting to follow what happens in the "free" bilateral market. Trades can take place through bilateral auctions, through bilateral contracts between sellers and buyers or as internal transactions between the production and retail sales departments of the same company. If the DAM caps prove to be low, generators have an interest to act on this free segment of the market to the extent they are allowed to do so.

On the buying side, industry and retail suppliers are very much dependent on this free segment as they have a strong interest to have some longer-term stability for the electricity purchase price. Usually the forward prices and day-ahead prices are linked together, but in the Ukrainian market context with day-ahead price caps this link might not be very strong.

Many similar measures, like the ones now implemented in Ukraine to protect customers from sudden price increases, can be found in the history of the EU electricity market, for example in France, Italy, Spain and several Eastern European countries. Still the Ukrainian market is quite unique in particular regarding the rather complicated way several restrictions to the price formation are imposed.

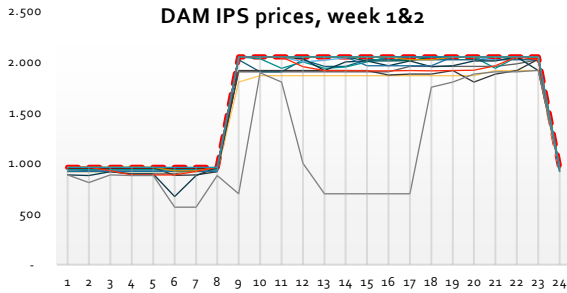
As the market is very oligopolistic, market power mitigation measures such as price caps are well justified to avoid abuse of dominant positions and market manipulation. However, it seems clear that at the start of the market these measures are limiting the scope of competition to a minimum, be it in power production, trading at the wholesale market or selling to the end customers.

Wholesale market: prices & volumes in IPS trading zone

Day-Ahead Market (DAM)

The DAM started with the prices aligning very closely to the bidding caps set by the regulator. This means that there was hardly any effect of competition on the market but the producers were aligning their offers to the price caps (see figure 2).

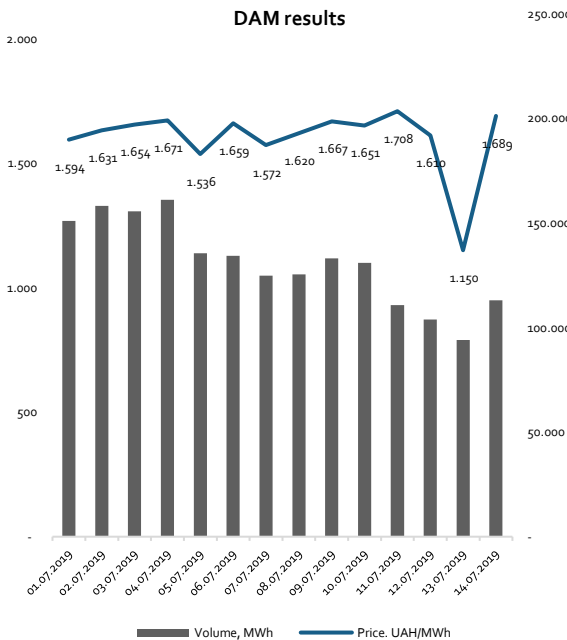
Figure 2: DAM results in relation to price caps in the Ukrainian electricity market in the first two weeks of market opening.



Note: red stroke line represents bid caps, each line represents individual day.

During the first two weeks there was a decline in volumes traded in the DAM. There might be several reasons combined for this such as less liquidity, moving to bilateral trading and changes in load forecast.

Figure 3: Daily DAM results in the Ukrainian electricity market in the first two weeks of market opening.

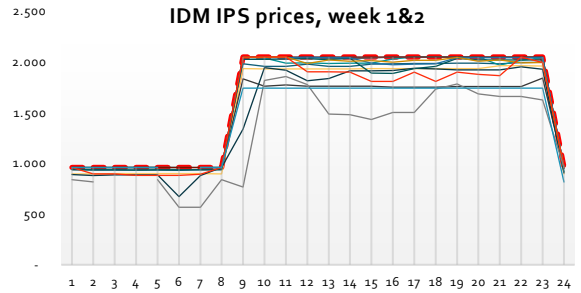


A one-off price drop on Saturday, 13th of July, occurred due to an unexpected decrease of demand of up to 30% compared to the previous Saturday and 20% to week average. Volumes went back to average next day, resulting in the second highest for the period average price for a Sunday which is an unusual result for weekends in developed markets.

Intra-Day Market (IDM)

Regarding the IDM the aligning to the bidding caps was very similar to the DAM, with rare exceptions (see figure 4)

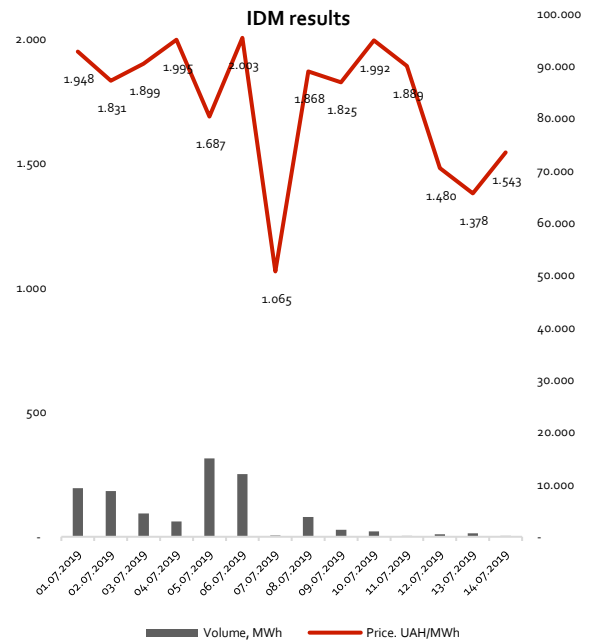
Figure 4: IDM results in relation to price caps in the Ukrainian electricity market in the first two weeks of market opening.



Note: red stroke line represents bid caps, each line represents individual day.

During the first two weeks there was quite a high volatility in volumes traded in the IDM. One-off price drop on Sunday, 7th of July was a result of a low demand, with 54% of volumes traded in the last hour of the day, under off-peak bid cap.

Figure 5: Daily IDM results in the Ukrainian electricity market in the first two weeks of market opening.



Overall, the weighted average price on the IDM segment was 15% higher than on the DAM. Nevertheless, the last 3 days of week 2 resulted in the IDM price being lower than DAM. Compared to week 1, volumes traded on IDM decreased significantly. This may pose a problem with liquidity in this segment. The impact on the balancing market cannot be assessed yet, as complete data will only become available later.

Cross-border trade

Trade with the EU countries

The Burshtyn Island (UA-BEI) is an important node in the Central European synchronous transmission system. The connection to Hungary, Slovakia and Romania allows imports to and exports from the Burshtyn Island, but also flows between these three EU countries. Burshtyn Island has been exporting for a long period of time, benefiting from an export price virtually aligned to the price in the mainland Ukraine.

In addition, the Dobrotviraska Thermal Power Plant is connected with a radial connection to Poland from the mainland power system (UA-IPS), allowing electricity exports.

Figure 6 gives an overview of the cross-border connection of Ukraine and the flows during the first days of market opening. In the period of 2016 -2018, the exports from Ukraine have been increasing from the level of about 4 to 5,5TWh/year. In figure 7 we see, that net exports declined in the observation period after market opening. This could indicate that cross-border trade gets more responsive to electricity price differentials.

Figure 6: Aggregated cross-border flow (GWh), 01.07. 00:00 - 12.07.2019 09:00.

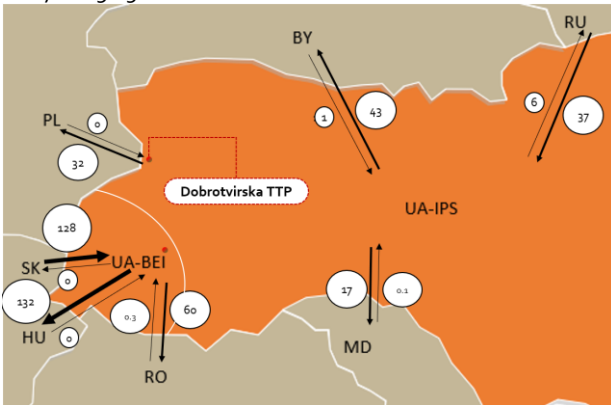
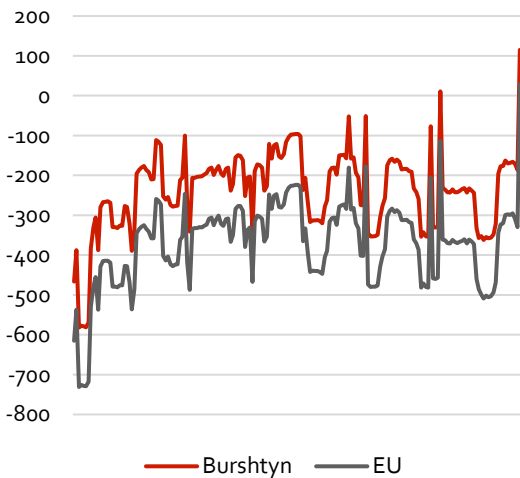


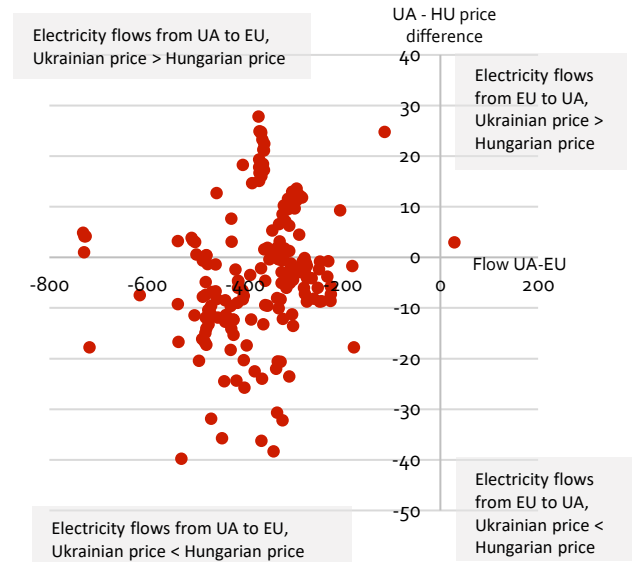
Figure 7: Electricity trade from Ukraine to the EU, in MW, 01.07. 00:00 - 12.07.2019 09:00.



Note: Positive values represent Ukrainian imports.

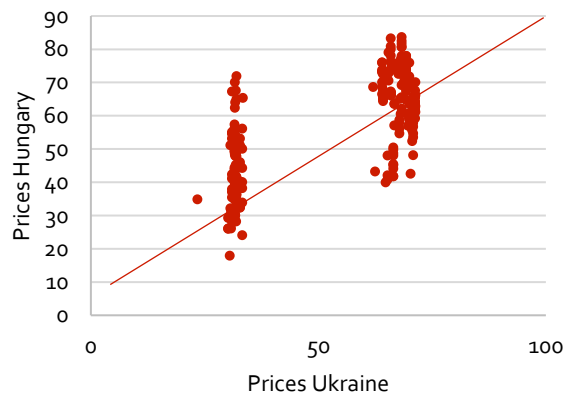
But still, a lot of the electricity flows between the EU and Burshtyn occur from high-priced Ukraine, to lower priced Hungary (33% of the flows), indicating some underlying inefficiency in the trading arrangements.

Figure 8: Flow UA-EU and day-ahead price difference between Ukraine and Hungary.



The comparison of Hungarian and Ukrainian electricity prices highlights the artificial nature of Ukrainian prices, which are never between 40 and 60 EUR/MWh (see figure 9). Ukrainian baseload prices are typically lower than Hungarian ones; while Ukrainian peak-load prices are typically higher than Hungarian ones. The import and export signals follow the administratively set price caps with a high risk of electricity in the interconnections flowing into the wrong direction as the real dispatching costs in the areas connected are not taken into account.

Figure 9: Electricity prices in Hungary and Ukraine in EUR/MWh, 01.07. - 11.07.2019.

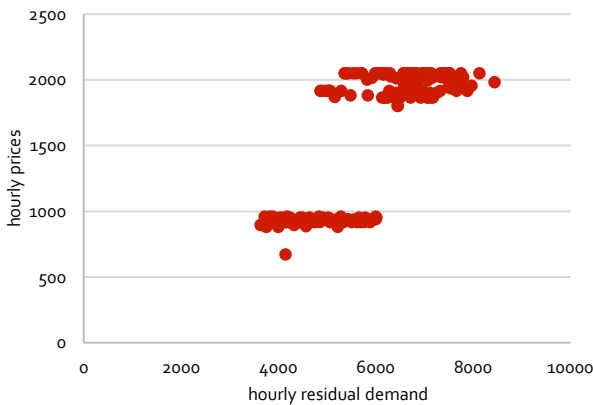


Impact on dispatch

One main purpose of a functioning electricity market is to optimise the usage (dispatch) of the power plants. A sequence of markets – as introduced in Ukraine – should provide good information on the expected demand and supply situation in the far (year, month ahead), near (day ahead) and nearest future (intraday) and hence allow operators to run their power plants only when consumers are willing to pay more for the power than production costs them. Given clear financial incentives, plant operators are often able to change the way they are running their plants more than anticipated – e.g., more or less ramping; higher or lower capacity usage.

As can be seen from figure 10, the day-ahead prices do not behave in a way that would be a result of a competitive market. In a competitive market with different generators using different power generation technologies prices would increase step-wise with increasing electricity demand.

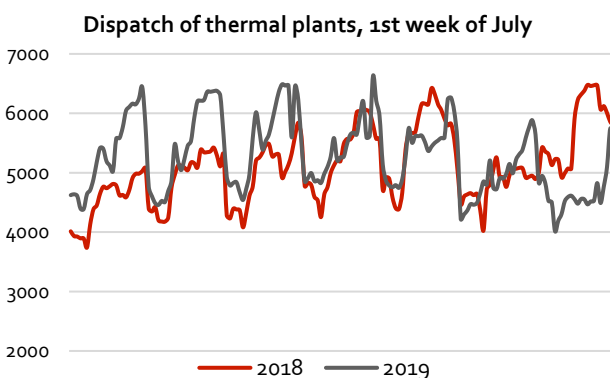
Figure 10: Demand not met by renewables and nuclear vs. DAM prices (UAH/MWh).



In the Ukrainian DAM, by contrast, prices do not necessarily increase with demand (at a residual demand of 6,000 MW the price can be 1,000 UAH/MWh; while at a residual demand of 5,000 MW the price can be double) and prices do not correspond to the marginal cost of the generation technologies.

This reconfirms that the DAM is not a true market, which could be one reason why this regime does not incite thermal power plants to run markedly different from the way they were dispatched a year ago (see Figure 11), fluctuating between 4,000 and 6,500 MW most days.

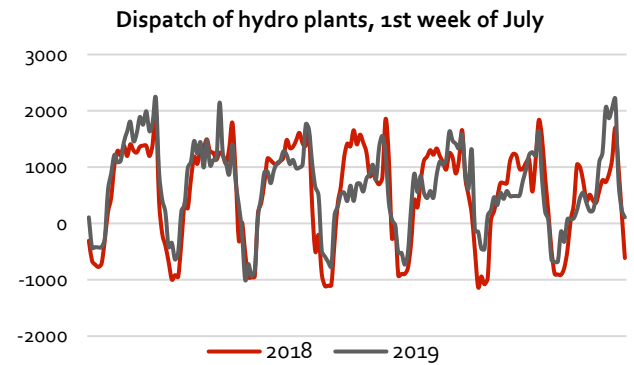
Figure 11: Dispatch of thermal power plants, first week of July Monday-to-Sunday comparison.



Source: Ukrenergo

The same goes for hydro power plants and hydro pump storage, as seen in figure 12. The main change for hydro dispatch is an increased frequency of hourly load changes due to an increased number of commands from Ukrenergo's dispatch controls.

Figure 12: Dispatch of hydro power plants (with pumped storage), first week of July Monday-to-Sunday comparison.



Source: Ukrenergo

Overall, Ukrenergo continues to run the system the old way. A lack of an ancillary market segment both creates potential risks to system stability at certain hours and resulted in TSO giving commands to generators violating balancing market rules. This resulted in a number of hours where the balancing market segment runs without a defined price.

It is too early to assess the full impact of a new market on power plants dispatch without a working ancillary service incentive. But it is clear that, combined with current limitations of other market segments, little changes are expected in the coming months.

This project is part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative on the basis of a decision adopted by the German Bundestag.

All results of the project are available online at www.LowCarbonUkraine.com.

We will be grateful for your feedback on the Monitor of Electricity Market Opening, in particular comments how to make it even more useful for parties interested in understanding processes and outcomes in the emerging electricity market in Ukraine.

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