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# Ukraine on the way to a functioning electricity market – what is in place, what is missing?

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## About Low Carbon Ukraine

Low Carbon Ukraine is a project that continuously supports the Ukrainian government with demand-driven analyses and policy proposals to promote the transition towards a low-carbon economy. In particular, the project has the mandate to support the work of the Vice Prime Minister as he coordinates the implementation of the Energy Strategy 2035.

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## Executive summary

The Ukrainian electricity market is now opening for competition. This paper discusses the main features of a successful electricity market based on the twenty years' history in opening the EU electricity market. The paper draws lessons from various experiences in the EU countries to help to understand the approaches taken and to choose best practises for the Ukrainian context.

The main issues covered are:

- Structural measures including unbundling of the grid activities and organising the competitive part of the market, namely generation and retail supply, in such a way that no market player will be discriminated and real competition can take place.
- Guaranteeing a sufficient number of participants and liquidity in organised markets in all time frames: long term markets, day-ahead and intraday markets and balancing and ancillary services markets.
- Technical readiness of the metering and settlement systems and the trading systems necessary for an open market to function.
- Mitigating the risk of market abuse by introducing transparency and market monitoring measures to prevent and detect non-competitive behaviour by market participants.

The paper identifies several risks which might lead the Ukrainian electricity market opening to a failure which would be difficult to repair afterwards. These risks are due to the oligopolistic structure of the sector and due to lack of technical readiness of the metering and settlement system and the trading platforms.

The main recommendations are to postpone the market opening until the necessary technical and IT-systems are in place and an appropriate market information and monitoring system is operational.

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## 1 What does a good electricity market look like?

Electricity markets have many different varieties in Europe, not talking about other parts of the world. Even if the European electricity markets are governed by a set of common rules agreed at the European level, different national conditions, structure of the sector, local natural resources and choices of technologies result in some markets functioning better than others.

A good market can be characterised by having (i) several competing companies in generation and in retail supply, (ii) reasonably liquid wholesale markets, (iii) clear unbundling of networks from generation, storage and supply activities, (iv) a sufficient power plant and grid infrastructure to cover the needs even in severe weather conditions and (v) an appropriate regulatory oversight of the sector. Many markets have improved over time, partly following the market dynamics including new players becoming active in new markets, partly due to regulatory measures taken to improve the functioning of the market.

In this paper the main issues with the market opening in Ukraine are discussed. There are positive things to support market opening, but there are also many worrying things which need a lot of attention to get the market really working. This paper tries to identify the most important issues and give recommendations how to address them in short, medium and long term.

Issues that need immediate attention are (i) the risk of abuse of market power due to the very small number of companies in the market, at least on the generations side, and due to the lack of competition coming from abroad, (ii) lacking readiness for metering to support new suppliers to enter the market and (iii) lacking readiness of the wholesale market to support a non-discriminatory and transparent access to power by new players. Some legacy issues such as (iv) debt recovery might distort the market, also (v) Public service obligations might lead to distortions if they are badly implemented.

In the longer-term integration of Ukraine in the Central European grid and markets should be the target.

## 2 Structural measures necessary for an open market

Unbundling is the fundament of all electricity markets with the purpose to separate the monopoly activities from the competitive activities. Electricity grids, both transmission and distribution, are natural monopolies, thus competition is not possible. There are different ways and levels of unbundling, ranging from separating the ownership, or requiring legal and functional unbundling, or just obliging to keep separate accounts for the monopoly activities.

In the EU, the unbundling requirements for the TSOs are stricter than for the DSOs. Ownership unbundling is considered as the best way of unbundling giving the best guarantee of equal treatment of all connected customers. However, other models are allowed, namely ITO (Independent Transmission Operator) and ISO (Independent System Operator). In these cases, vertical integration of the TSO with competitive activities is allowed, accompanied with several mitigation measures to ensure equal treatment of all customers.

In the EU, ownership unbundling of TSOs is the most common (for example UK, Spain, the Netherlands, Nordic countries, two TSOs in Germany, Poland and Italy). ITO model is applied notably by two German TSOs and by the Austrian TSOs.

For distribution, the situation is much more varied. It is common that the DSO is a legally unbundled part of a utility also producing and selling electricity. For small local companies the EU legislation allows minimal unbundling requiring only functional and account unbundling. This tends to create confusion between the monopoly and competitive parts of these companies. There has been positive progress in most EU countries regarding problems due to lack of unbundling. New suppliers have increased their market share even in countries with a dominant DSO/supplier, such as in France and Italy. In countries

with many small DSOs, some consolidation has taken place. In several countries' DSOs have joined their forces to establish joint sales companies for electricity retail supply.

In Ukraine the question of TSO unbundling is relatively clear as Ukrenergo is a state-owned company without activities in power generation or energy sales. On the contrary, proper enforcing of unbundling rules for the DSOs is crucial to get the retail competition starting and to avoid cross-subsidies between the monopoly part and the competitive part of the activities, a phenomenon that unfortunately has been common in the 20-year history of the EU electricity market. This question is particularly critical for the independent suppliers who are facing a major risk if the DSOs are in any way favouring their own supply arm. Also, quality and timeliness of metering data and data on customer switching, for which the independent suppliers are dependent on the DSOs, are critical.

### 3 Enabling competition in generation and supply

Competition in power production requires a sufficient number of producers who can make offers to the power market. The reference price – for electricity contracts of different length - in the EU is the hourly spot price. This price is determined by the most expensive power-plant that is needed to meet the demand. The bids at the margin are on most markets based on the marginal costs of coal or gas fired power plants. This implies that in most markets generation technologies which have low marginal costs, such as wind, solar and nuclear, do not participate in setting the marginal price. Hydro producers are an exception because they are limited by the amount of water available, thus often placing their bids based on the cost of an alternative fossil producer (at the so-called water value).

In the EU, monopolistic or oligopolistic situations<sup>1</sup> were very common at the beginning of opening the markets, and they still exist in many countries. There were several different ways to introduce sufficient preconditions for competition where the structure of the sector did not allow competition to start naturally. In the UK, the government forced the creation of three generation companies with portfolios enabling them to compete also regarding setting the price at the margin. In Italy, the incumbent ENEL was forced to sell a substantial part of their power plants to competitors. In some countries, such as in the Netherlands, foreign acquisitions happened and were favoured, to bring strong new players to the incumbent market. Other measures to enable competitive suppliers to start activities and survive in the market have been capacity release programmes, for example so called "virtual power plants" in France and Belgium in which the incumbent has been forced to sell a part of their production to their competitors in an auction.

In Ukraine, the preconditions for competition in the market hardly exist. Nuclear production, with a low marginal cost, will not determine the market price, thus Energoatom will only influence the market price through the volume it is able to bid in the market. Ukrhydroenergo will logically bid at the marginal cost of an alternative producer which in case of Ukraine is mostly a coal fired power plant. Ownership of coal plants in Ukraine is very concentrated which means that it is not realistic to expect many competing bids at the marginal price. There is a high risk of abuse of dominant position at least in certain periods of time.

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<sup>1</sup> That is situations where some companies could significantly increase their profits by causing higher prices by either reducing production (withholding) or increasing bids (overbidding).

## 4 Technical readiness is a precondition for an open market

Metering and settlement of metering data are fundamental for an electricity market. The EU countries are moving towards generalised hourly metering and smart meters, which allows spot-based pricing, rapid switching of supplier and supports self-consumption and demand response. Some countries (for example the Nordic countries) have opted for a centralised data hub operated by the TSO for metering data management. Other countries such as Germany and Austria have opted for a distributed data management with a centrally organised data exchange.

The history of the European electricity market has shown that retail competition is possible even without generalised smart metering. Monthly or yearly data was transformed to hourly values through consumer load profiles, which was not perfect but which allowed competitive suppliers to win market share. Other methods were used as well, such as sharing the non-hourly metered supply proportionally to the volumes supplied by each supplier. In the EU, allegations were often made towards the DSOs that their supply arm was better served as the competitive suppliers for example in timeliness and accuracy of the data. The situation has become better with the further unbundling and with moving the settlement functions to independent organisations such as data hubs. Complaints still exist, though.

In Ukraine metering covers all generation, except the small solar (tbc). There is no metering settlement system yet in place designed for competitive supply. This means that there is a high risk for confusion, errors in settlement and impossibility for independent suppliers to charge their customers in a reasonable time. This could create mistrust among consumers towards the market in general, very difficult to repair afterwards. This could also be used by some consumers as an excuse to not to pay bills or delay their payment. Readiness of a metering and settlement system is relatively easy to be tested in a reasonable scale before going live. These difficulties in metering are a reason to wait with the market opening until a proper system is in place.

## 5 Legacy issues

When electricity markets were opened in the EU, there were various legacy issues, mostly known as stranded costs. These were usually former investment obligations on some companies who would not be able to recover the costs in a competitive market. In most cases stranded costs were ignored, in some countries they were compensated, notably in the Netherlands, Austria and Spain.

In Ukraine, debts accumulated in the sector is a stranded cost issue. The way the debts will be covered has potentially a disturbing effect on the market. The way it is intended (tbc).

## 6 Retail supply

The question how new suppliers can get a market share is fundamental for the success of an electricity market. The risks related to unbundling were already elaborated above, non-discriminatory access to DSO grids and a functioning metering and settlement systems are very important. The other important question is how suppliers can procure the electricity which they sell to end customers.

In most European countries the procurement of electricity for retail supply takes place from organised markets, long-term and short-term markets. Even when the supplier has her own production, this production is often bought by the supply arm of the company from the generation arm of the same company at a competitive price. Long term markets have evolved naturally on a commercial basis. This includes organised forward and futures markets such as EEX and NASDAQ, and bilateral OTC (over-the-counter) markets offered on several platforms. Short term markets have developed through a

combination of voluntary commercial activity and regulatory push to have a liquid day-ahead and intraday market in all EU countries. A market price that can be trusted by all parties is of key importance and allows competition even at the presence of incumbent players. What has happened in many EU countries is that the incumbents starting with a high market share have seen the market share diminishing because of the competitive pressure, though often seeking new markets from neighbouring countries.

In Ukraine, conditions for competition in retail supply are far from optimal. The first difficulty is to create a trustworthy wholesale market from which all suppliers can procure electricity in equal terms compared to the competitors. This is because some generators are in a dominant position regarding setting the marginal price and are at the same time retail suppliers. In Ireland, a somewhat similar situation is managed by imposing bidding rules to generators, in principle obliging them to bid all their generation in the day-ahead market at the marginal cost of each generation unit.

## 7 Political management of prices for certain consumers

Protecting customers from excessive pricing has been an issue during the whole history of the EU electricity market. Approaches by the governments and regulators have been quite different. In cases when conditions for competition have been rather good, such as in Sweden, Finland and the Netherlands, only normal consumer protection measures have been applied, without explicit price caps etc. In the other extreme, for example in France and Italy, prices for end customers including industrial customers remained regulated for a long time, often using price caps. Under pressure from the EU, coverage of regulated prices today, if they are applied, is mainly limited to small households. For big industrial users, some other mechanisms have been invented in political pressure to drive the price below the normal market price. Methods used have been for example an obligation on the incumbent to sell at cost price (France), relieve from electricity taxes (many EU countries) and lower grid tariffs for large consumers (Germany).

Ukraine introduced public service obligations to supply small customers. As these customers get their electricity below the market price, competition in this customer segment will probably not happen. Thus, it is very important that all suppliers can procure electricity for this subsidised segment of customers under the same conditions. The experience from the EU shows that the end customers have very little or no interest to change the supplier if there is no difference in price. Thus, the default supplier usually keeps all these customers enjoying the regulated price.

The way the regulated electricity flows from the nominated producers Energoatom and Ukrhydroenergo to the end-customers and its relation to the organised markets does not seem to be clear yet, for example whether these companies are also balancing responsible parties for the small customers. These questions are important not only for these companies but for the functioning of the electricity market as a whole.

Liabilities is another important issue in any electricity market. For organised markets to function, reasonable guarantees to honour the transactions need to be in place. If the requirements are too high, it dissuades trading from organised markets to less transparent bilateral trades. If the requirements are too low, organised market places themselves are in danger of bankruptcy. In Ukraine, giving a monopoly on guarantees to one bank potentially increases the prices of these guarantees.



## 8 Long term trading

### 8.1 Bilateral contracts

Allowing bilateral contracts is the quickest way to get the wholesale market starting. In most EU countries bilateral trading exists, either through direct contacts between traders or through trading platforms. One potential downside is lack of transparency compared to organised forward markets, but when both coexist, prices are usually closely linked to each other.

In Ukraine, bilateral auctions are proposed as mandatory tool to sell nuclear and hydro power. Even if similar forced selling has been used in the EU in the context of capacity release programmes (for example in France and Belgium), it does not seem to be clear how these auctions in Ukraine would work. As this would not happen naturally in a free market, results will depend very much on the rules imposed.

### 8.2 Forward markets

As explained above, forward markets have usually developed as voluntary commercial activity based on the needs of the market players. Forward markets are important for hedging the price and volume risks for the producers and for the buyers. Hedging protects from unexpected price movements thus stabilising the income or the costs. Usually hedging is possible three years ahead, the closest year and months being the most liquid. In the EU, there is a high level of concentration of forward markets, EEX and NASDAQ having the highest market shares. Forward markets have different liquidities depending on the market. Germany being highly liquid also serves as the as a proxy trading place for the electricity in the neighbouring countries.

Liquidity is very important for a functioning market; in several cases it has taken time before a new market place has reached a sufficient liquidity. Sometimes market places boost liquidity by making contracts with so called market makers who against some benefits are committed to place offers in the market. This is important at least for the products that are less traded.

Starting forward trading in Ukraine would technically not be too complicated, but some more stability regarding the establishment of the market is probably needed before the commercial exchanges are ready to open a marketplace. The proposed bilateral auctions are a type of forward trading even if they are mandatory. It is important to discuss whether the bilateral auctions and voluntary forward markets can exist in parallel.

## 9 Day-ahead and intraday markets

Day-ahead and intraday markets are the core of the European electricity market. National markets are linked through the so-called market coupling. For day-ahead, most of the EU countries are linked through a single algorithm which determines the hourly prices in each price zone and the electricity flows between the zones. Intraday markets are important to manage forecast errors and unexpected events in the system. For intraday markets another European system called XBID provides the single platform for continuous trading of electricity. This allows adjusting generation and load portfolios cross border up to one hour before real time.

There are two types of day-ahead markets in the EU: firstly, voluntary markets and secondly mandatory (or semi-mandatory) pools. Even in voluntary markets, trading has often been promoted by regulatory measures to increase liquidity and transparency. For example, the German TSOs were obliged to sell on the day-ahead market all the renewable feed-in electricity they were obliged to buy. Also, market

coupling as such can be considered as regulatory support to the day-ahead market as cross-border capacity remaining from long term allocations is made available to the market coupling thus increasing the liquidity of the market.

For Ukraine, market coupling is not a feasible solution in the short term, as the connection to the EU system is weak and there are legal obstacles to expand market coupling outside the EU. However, most of the benefits can be captured by using the day-ahead and intraday market tools internally in Ukraine. In longer term, with synchronisation with the EU system, integrating day-ahead and intraday markets with the EU market is an obvious choice. Thus, already now the Ukrainian electricity market should aim to become EU compatible.

For the success of the day-ahead and intraday markets, achieving sufficient liquidity is a critical issue. To achieve a credible price reference, at least 20% of the physical electricity consumed in Ukraine should be traded through the day-ahead market. It does not seem to be clear whether the current market arrangements would lead to this result. Several questions remain, for example will bilateral auctions be financial or physical, or is there an interest and possibility to sell the electricity destined to customers under Public Service Obligation through the day-ahead market to increase its liquidity?

For Ukraine, probably the quickest and the cheapest solution is to buy the day-ahead and intraday market operation/infrastructure as a service. One should quite easily find competing offers for this service. The markets can start covering first only Ukraine and later on include interconnections when their capacity will be substantial. It is important to have market coupling with the EU as the long-term goal.

The comparison with the intended Ukrainian Trading systems with the ones used in Europe is not straightforward as the role of the different actors is not clear yet. In principle the role of the Market Operator and the role of the Guaranteed buyer is known, but without detailed information on how the market should work, it is difficult to judge whether all important features are in place and whether they need adjustments. Readiness of the IT system is critical for the start, reaching a sufficient number of participants quickly is an important target. The volumes left for State owned companies to sell to the day-ahead and intra-day markets after fulfilling their public service obligations is important for the liquidity.

## 10 Balancing and ancillary services markets

In EU countries there are ongoing developments regarding balancing and other ancillary services markets mainly due to three reasons, (i) increased demand due to increasing volume of volatile renewable generation, (ii) new tools offered by digitalisation of the energy systems and (iii) the regulatory push at national and EU level. Due to historic reasons and differences in the national systems, balancing and other ancillary services are still procured very differently depending on the EU country. In some countries some services are procured through obligations, even if the trend and the regulatory push is towards having markets for balancing and other ancillary services, with voluntary participation and with market-based compensation of the service. The increasing volatility of the system has been addressed by innovative solutions, for example applying probabilistic methods, procuring more at short term when the needs are better known and engaging more demand response. Also, European integration is a tool to keep the costs reasonable. Three European balancing platforms, PICASSO (for automatic Frequency Restoration Reserve), MARI (for manual Frequency Restoration Reserve) and TERRE (for Replacement Reserves), are in development.

For Ukraine, balancing is, on top of technical issues, a complicated political issue as long as Ukraine is in the IPS/UPS synchronous system. Synchronisation with the EU's Central European system will determine many technical details which have to be aligned with the EU practises. There remains, however,

important choices to be made regarding the balancing and other ancillary services markets which will influence the cost and the reliability of the system. Competition is one of the key issues, as balancing and other ancillary services markets tend to be much thinner markets than the day-ahead, intraday and forward markets. The TSO needs to do a lot of active marketing to get potential service providers interested.

## 11 Competition and market power

Market power is a longstanding problem in most electricity markets. As explained in Chapter 3, in some EU countries structural measures were taken to improve competition, but some markets were started by leaving the incumbent unchanged hoping that competition would balance market shares in longer term, such as in France and Belgium. There have been improvements but the development has been very slow. Also, in countries with a larger number of players, market power can appear in specific circumstances, for example during peak load periods, or regarding certain products such as balancing services.

National authorities have been hesitant to take structural measures to mitigate market power, and the EU has powers to act only in merger cases or if abuse has been detected. Many merger cases have ended up in the companies involved having committed to structural measures to improve competition. Equally, several market abuse cases have been investigated and some of them have led to important remedies to be fulfilled by the company investigated.

In Ukraine the market is oligopolistic with a structurally high risk of abuse of market power. As explained in Chapter 3, only a few companies have power plants which potentially set the marginal price on the day-ahead market, the possibilities for abuse and the potential gains from it are evident.

Two basic approaches can be applied to reduce the risk of abuse of market power. Firstly, the bidding behaviour of the companies can be regulated, for example by capping the price at which any production unit can bid into a day-ahead or intraday market. This method is used for example in Ireland. Secondly, an ex-post monitoring can be imposed where all companies will report to the competent body their bids in organised markets and the bilateral contracts they have made with any party. This allows investigating any anomalies by the competent body.

## 12 Market information and market monitoring

The EU legislation obliges TSOs to publish fundamental data on their grid, consumption forecasts and availability of power plants. The purpose of this fundamental data transparency is to give equal access to data to all market players in order to promote fair competition. Another important area covered by EU legislation is market monitoring. REMIT (Regulation on wholesale energy market integrity and transparency) requires market players to report to ACER (Agency of co-operation of energy regulators) on their actions in the electricity market. ACER, with the help of specialised IT-systems and with the help of national regulators, searches for any anomalies and starts an investigation in case of suspicion of market abuse.

Ukraine cannot be part of the ACER monitoring system in the foreseeable future, so logically the Ukrainian regulator should fulfil the market monitoring function. The activity can be started with relatively simple tools, adding sophistication and IT-systems with time. For the system to function, it is crucial that the regulatory framework is in place to oblige the reporting by the market players to the regulator, including the details of the process and the data formats.

## 13 Cross-border trade

In the EU about 13% of electricity crosses country borders. The biggest exporters in the EU are Germany and France. Cross border trade is important to bring economies of scale, allow exports in times of surplus and imports in times of deficits. Cross border trade is also an important factor to increase price convergence between the EU countries. Cross border trading is enabled by the capacity of cross border Alternating Current lines in a synchronous system or Direct Current links between synchronous systems (some Direct Current links exist within synchronous systems in special circumstances).

The Ukrainian electricity system is part of the IPS/UPS synchronous system thus technically allowing cross border trade with its IPS/UPS neighbours. Burstyn Island is synchronously connected with the Central European system allowing an export of about 500 MW. Burstyn Island exports a conducted at the market price of the Ukrainian main system, thus making exports profitable for the owner of the power plants in Burstyn Island, even if the production costs are usually higher than the electricity wholesale price in the neighbouring countries. As the volume exported is relatively high, about 5 TWh/year, the indirect subsidy is considerable and questionable whether it should be maintained.

Synchronisation with the Central European system will open more possibilities for cross-border trade of electricity. The direction of trade might change seasonally and is strongly dependent on whether Ukraine is able to maintain surplus capacity at reasonable cost in longer term. Synchronisation should be seen as a long-term project which will bring social welfare benefits be it from import or exports at times.

An electricity market to function efficiently requires proper price zones. If the system requires a lot of must run generation or frequent redispatching, splitting the country in several price zones might be the most economically and technically efficient solution.

As synchronisation of Ukraine with the Central European system will take quite some time, some interim DC links which could serve also after synchronisation could be envisaged to boost the cross-border trade possibilities with the Central Europe, subject to a cost-benefit analysis.

Regarding the Inter-TSO compensation mechanism, Ukraine pays fees a so-called perimeter country fee for the access to the EU market. This contribution is comparable to the fees paid by the EU countries, so there is no urgency to change this even if the Energy Community countries should become part of the ITC system in the longer term.

## 14 Security of supply

Generation adequacy is a constant issue in the EU electricity market. Fear of lack of electricity has led to implementing capacity mechanisms in several EU countries in order to ensure availability of generation assets in the medium term.

Ukraine has enough generation capacity for the moment, even if there is a lot of old coal fired power plants which might not be operational in the future without major upgrades. Recent capacity problems have been linked to availability of appropriate coal for power plants.

With the current grid situation Ukraine cannot count too much support from the neighbouring countries in scarcity conditions.

It is recommended to make a deeper analysis on generation adequacy using the methodologies developed by ENTSO-E. The analysis should take into account realistic power plant availability in the short and medium term.

## 15 Summary of actions proposed

### Short term

- Delay the market opening at least three months, or until the following systems have been tested to be operational:
  1. Metering and settlement system
  2. Bilateral auction system
  3. Day-ahead and intraday system
  4. The scheme of serving the PSO customers
  5. The TSO has established a balancing platform
  6. Establish an independent market monitoring committee

### Medium term

- Investigate interim solutions (DC links or radial connections) to increase cross-border capacity with the EU.
- Do a generation adequacy forecast based on the ENTSO-E methodology.

### Long term

- Synchronise with the Central European EU system
- Participate in the European market coupling and balancing platforms