

In practice, in terms of competition evaluation and market participants' strategies assessment market monitoring is linked to analysis and monitoring of day-ahead electricity market prices. First, bids submitted by market participants for the day-ahead electricity auction are monitored on the daily basis before the market is cleared. This process corresponds to **the first stage of** the proposed Market Monitoring System where we detect outliers or monitor the behavior of a predefined list of participants. It is done automatically, and an analyst receives a report containing significant changes in bidding strategies. This stage is important for two reasons. First, if outliers and questionable values are observed, the market monitor can contact a market participant and request clarification. This can prevent a market participant from further proceedings for instance if the offer price rise is caused by the fuel change. Or if a mistake was made, a market participant still has time to correct his bid before the gate closes. Second, knowing general power flow peculiarities and main flow constraints, the market monitor gets a hint what generators and territories will demand a more detailed study at the stage of market outcomes analysis.

The subsequent monitoring process deals with market outcomes and is fulfilled on the daily, weekly, monthly, quarterly, and yearly basis. Each period of analysis has its own specificity, but since participants' behavior effects the price, the backwards analysis of price formation may reveal the change of the strategies. Price dynamics analysis for a particular day is mainly based on the study of nodal marginal pricing, optimal power flow and hourly results of market participants. However, price trends that occur in longer terms are of greater concern and cannot be assessed with the help of an optimal power flow for a particular hour. For this purpose, the system of analytical reporting was developed. One part of it focuses on the shifts of supply structure (both volumes and prices) and provides information about where and how much bid prices of generators change, whether bids correspond to the same unit commitment results, whether a structure of a bid is changed or only price parameters. Additional information about weather, heating load and facts of fuel change is also assessed. Bids that are close to the marginal prices are examined since they may affect the market price. For a market with marginal nodal pricing, bids in the mid part of supply curve which contains volumes offered at prices lower than the market cleared should also be screened. For monthly and longer-term analysis, the reports include aggregated information about the dynamics of parameters of load duration curves, price duration curves, price-setting bids, supply curves and the changes of strategies of generators particularly the price-setting ones. This short and midterm analysis corresponds to **the seconds stage** of Market Monitoring System and utilizes statistical methods on the market data to identify patterns that signal significant and systematic participants' behavior change.

Another aspect of market monitoring is monitoring and assessment of competition. To reveal characteristics of the market structure (both supply and demand), competition indices are used based on day-ahead market data. They include typical competition measures as well as adjusted Residual Supply Index and Parameters Dependent Index. This is a yearly monitoring to assess a possibly achievable level of market competition and to identify participants that generally have a strategic position on the supply curve and are potentially able to economically withhold capacity. This part of the monitoring process corresponds to **the third stage** of the proposed system.

Cross-border transactions are taken into account at the second and the third stages. As for the second stage, the imported or exported volumes surely influence the nodal prices in the corresponding areas and may incentivize some changes in the behavior of market participants. As for the third stage, the exported and imported volumes are included in formulas for structural indices calculation. Given Russian day-ahead market rules and structure (geographical location of cross-border flows and nodal pricing, small volumes of cross-border trade) cross-border transactions are considered price-taking in the analysis. However, there is an ongoing process of development of cross-border trade within Eurasian Economic Union Common Electricity Market. It is slated to be launched gradually by January 1, 2025 and must consider significant differences of EAEU Member States' electricity market structures, models, and pricing mechanisms. These will require correct incorporation of cross-border transactions into national day-ahead market and the corresponding study and monitoring.

Perfect competition is an ideal type of a market structure. For uniform-price auction in such a market, the profit maximization strategy of any participant is to reveal participant's true marginal costs which mainly consist of **fuel costs**. However, real-life markets are oligopolistic and some form of control over the economical justification of generators' bids is needed. In short term, some market participants proactively report rise in fuel prices or usage of a more expensive fuel type. In mid-term, the market monitor uses corresponding governmental Orders that set limits for some types of fuel prices or stock quotes, as well as it makes regional comparison for benchmarking. In case of a concern about a particular participant's bidding strategies, a formal request of supporting information including fuel used and its costs as well as accounting proof is made. If the case is escalated, the Federal Antimonopoly Service decides on the need of detailed proceedings.