

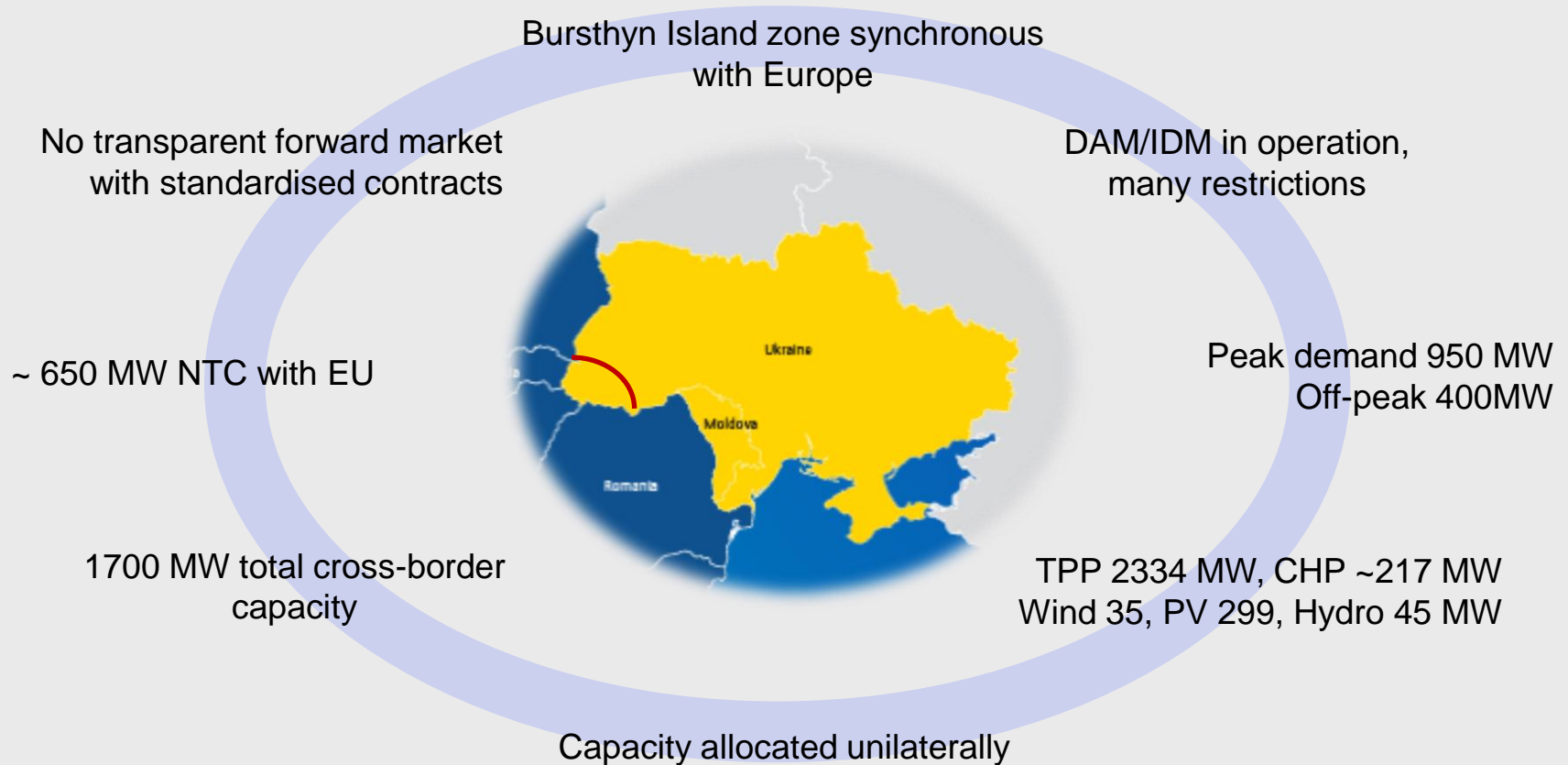
The background is a dark blue image of a globe at night, with glowing blue lines representing power grids or data connections overlaid on the continents.

# Addressing market concentration issues and facilitating liquidity in wholesale electricity market

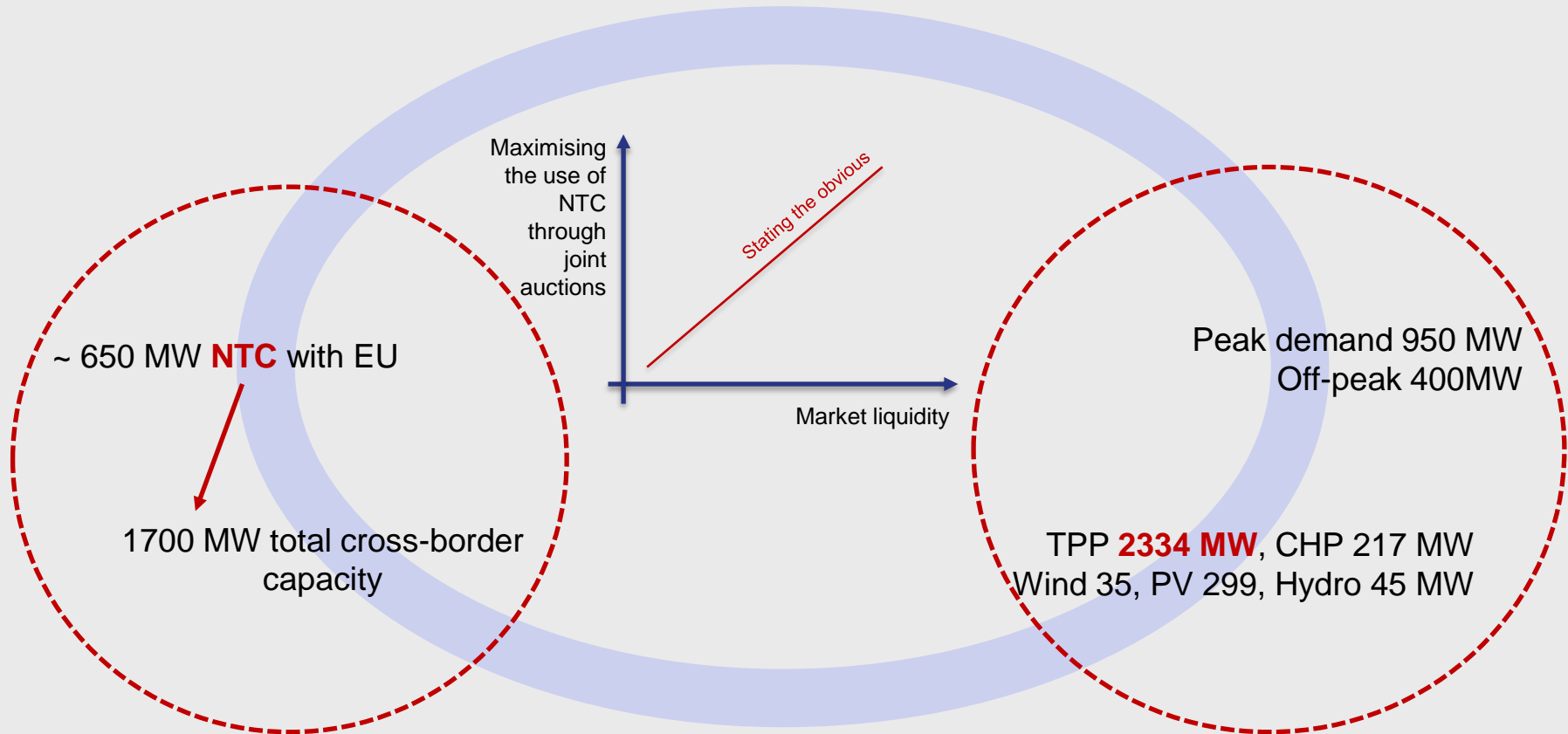
**ARBEN KLLOKOQI**  
**ENERGY COMMUNITY SECRETARIAT**

*Roundtable on Market Concentration in the Burshtyn Electricity Trading Zone, 29 Sept 2021*

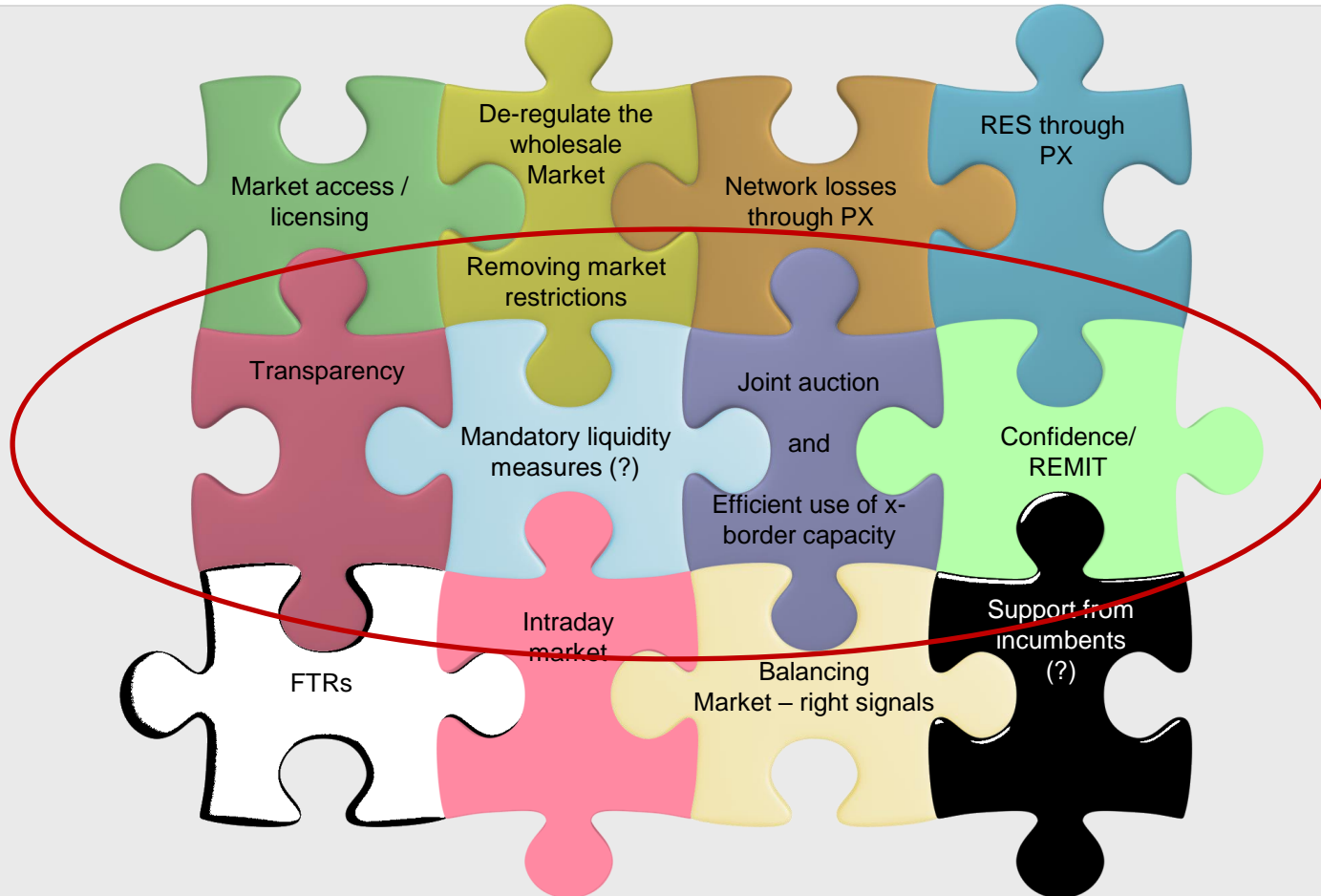
# Quick facts on Bursthyn



# Two sides of the coin



# No single solution for liquidity - every little helps



# What can be done?

1. Utilisation of full potential of cross-border capacity (a requirement)
  - Joint auction / allocation of firm cross border capacity (future market coupling)
  - Review the 650 MW restrictions (coordinate NTC calculation / future FBMC)
  
2. Mandatory liquidity measures (an option)
  - In May 2019 EnC issued Policy Guideline on increasing Competition and Liquidity of Wholesale Electricity Markets [https://www.energy-community.org/dam/jcr:6bb112a3-526e-4ebf-b265-84d6b392241c/PG\\_01\\_2019\\_ECS\\_WM\\_EL.pdf](https://www.energy-community.org/dam/jcr:6bb112a3-526e-4ebf-b265-84d6b392241c/PG_01_2019_ECS_WM_EL.pdf)
  - Obligation on the incumbent to offer on forward market standardised yearly, quarterly and monthly contracts (volume based or % based requirement) – to allow other market participants to build a long-term portfolio
  
3. Other equally important requirements
  - REMIT implementation and other transparency requirements

The background is a dark blue image of the Earth from space, showing the outlines of continents. Overlaid on the Earth are numerous glowing blue lines that form a complex network, representing energy connections or data flow. The lines are bright and have a slight glow, creating a sense of dynamic energy.

*Thank you!*

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Energy  
Security  
Project

# The Analysis on Market Power in Burshtyn Trading Zone

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Kyiv, Ukraine  
September 29, 2021

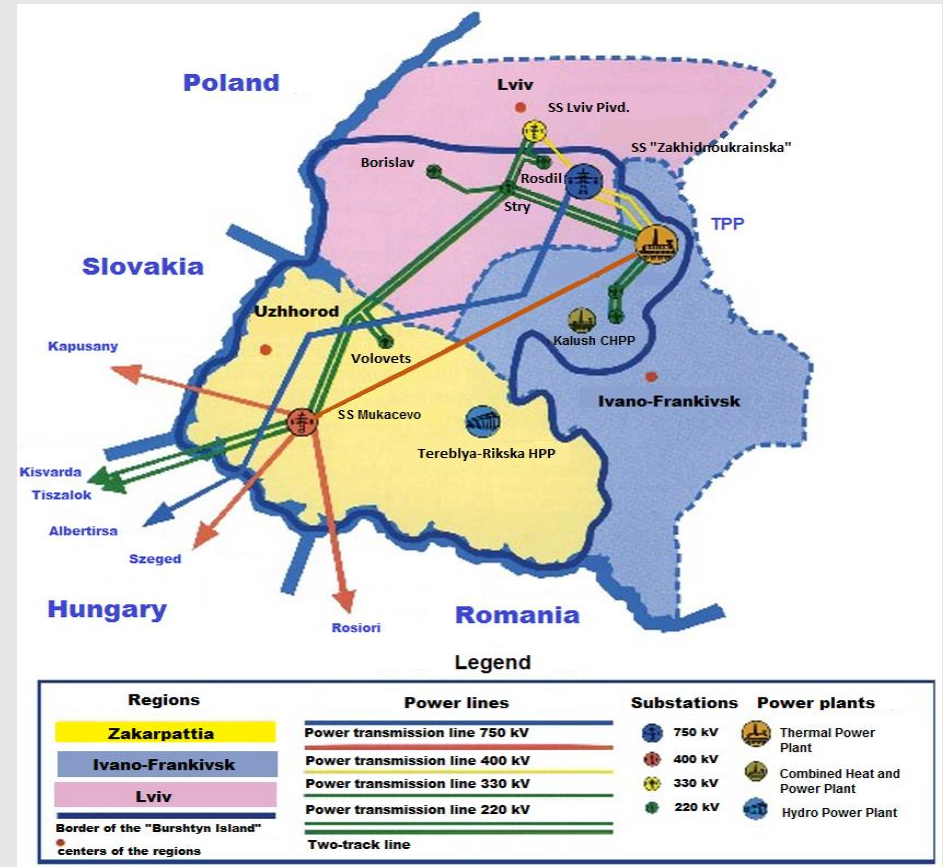
## DISCLAIMER

The analysis in this document has been prepared upon the request of NEURC and aims solely to demonstrate tools to address the high concentration in the Burshtyn (BEI) trading zone. USAID ESP underlines that reaching concrete conclusions on the matter requires a thorough analysis of the issue, market trends, and market participants' behaviors by the relevant commissions, Anti-Monopoly Committee of Ukraine (AMCU) and NEURC.



# Basic Conditions for Import and Export

- The algebraic sum of electricity flows from/into BEI zone shouldn't be more than 650 MW (at the same time in all directions) due to the system security reasons.
- The Net Transfer Capacity (NTC) is determined by the auction office of TSO. Access to the cross-border capacity is provided through electronic auctions.
- The auction office has the authority to reduce the allocated capacity to a value that ensures the prevention of operational security breaches.
- Auctions are held for the long, medium, and short term. Access to the cross-border capacity is through explicit auctions.



# The Measures to Prevent Operational Security Breaches

- According to the requirements for interconnection of BEI with the ENTSO-E, the largest operating unit should be supported by a “hot reserve” to secure the supply in case of emergency shutdown.
- On D-I, the auction office assesses the operational safety of the power system, considering the required reserves and the secure operation of generation.
- Power plants in BEI Trading Zone:
  - Burshtyn TPP (coal) installed capacity 2351 MW
  - Kalush CHP (coal) installed capacity 200 MW
  - Tereble-Rikaska HPP 27 MW
  - RES  $\approx$  280 MW
- The largest unit in BEI belongs to the thermal power plant and only this thermal power plant can provide the required “spinning reserve” via its other units. In case of low consumption, the sum generation in BEI covers internal consumption and leaves no capacity for electricity import.
- In such periods, the TSO restricts imports through the previously allocated cross-border capacity.

# The Definition of Market Power

Analysis of the bids at BEI DAM was performed by using commonly utilized indices that can determine whether the main supplier in the market seems to have market power.

3 most used indices to reach a determination on market power:

- The Herfindahl-Hirschman Index (HHI)
- Residual Supplier Index (RSI)
- Pivotal Supplier Index (PSI)

In general, the analysis of these indicators showed the same result, which depends entirely on the volumes of imports.

Given these indicators for the market concentration/power depending on the imports, it is concluded that the BEI zone might require alternative measures compared to IPS to ensure fair price formation.

Detailed elaboration on these indicators is provided next.

# Herfindahl-Hirschman Index (HHI) (1/3)

This index allows assessing the level of monopolization in a particular market. Therefore, in several countries (particularly in the United States), it is used as an indicator to determine the need to obtain permission for mergers and acquisitions by the antimonopoly service.

It is calculated by squaring the market share of each firm competing in the market and then summing them up. It can range from close to zero to 10,000:

$$\text{HHI} = S_1^2 + S_2^2 + \dots + S_n^2$$

Where  $S_i$  is the percentage for a market share of a company  $i$ . For example, when there are 10 equal-sized companies in the market, the HHI would be equal to  $10 \cdot 10^2 = 1000$ .

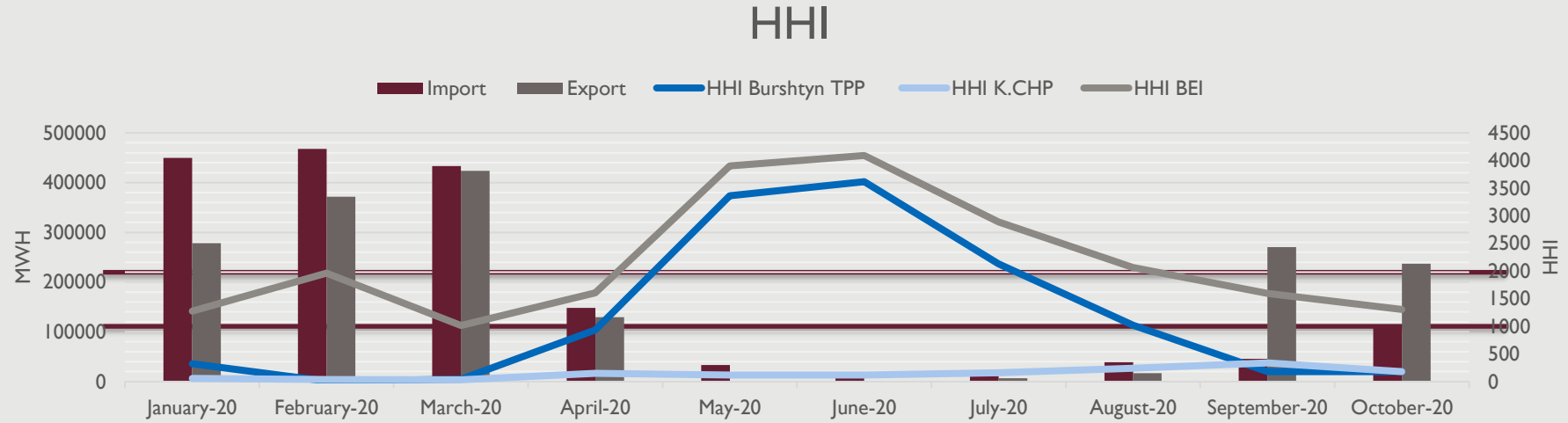
Categorization of markets based on HHI:

- unconcentrated (HHI below 1000)
- moderately concentrated (HHI between 1000 and 1800)
- highly concentrated (HHI above 1800)

The primary advantage of the Herfindahl-Hirschman Index (HHI) is the simplicity of the calculation and the small amount of data required for the calculation. The primary disadvantage of the HHI stems from the fact that it is such a simple measure that it fails to consider the complexities of various markets in a way that allows for a genuinely accurate assessment of competitive or monopolistic market conditions.

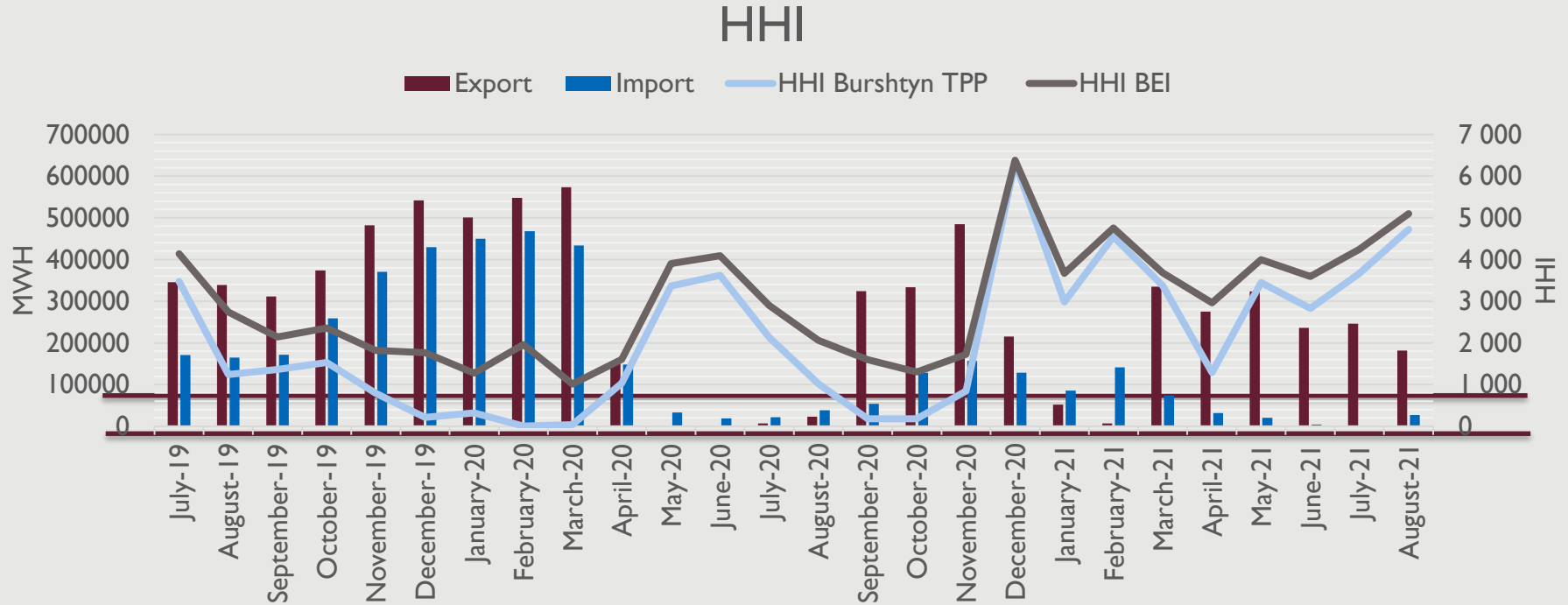
The calculations were done for the common HHI index and separately for the main suppliers to define an exact share of each participant in the HHI which would better represent the concentration level.

# Herfindahl-Hirschman Index (HHI) (2/3)



- As shown above from the preliminary selective calculation for two main bidders at DAM, market concentration in BEI highly depends on the availability of import. Accordingly, limiting import due to decreasing consumption and the obligations to provide reserves required by ENTSO-E have led to high market concentration.
- In case of significant imports and exports, the main supplier did not have high market power. However, in parallel to decreasing imports for the above-mentioned reasons, the HHI index significantly exceeded the threshold, indicating high market concentration.

# Herfindahl-Hirschman Index (HHI) (3/3)



Given that the results of the calculations showed that the HHI of Kalush CHP is very low, analysis focuses on the dominant players in this trading zone.

# Residual Supplier Index (RSI) (1/2)

The Residual Supply Index (RSI) is a static concentration measure that monitors market power. The energy market exhibits several special features, such as non-storability of electricity, significant daily and seasonal fluctuations as well as a (short-term) price-inelastic demand. For this reason, concentration measures solely focusing on the supply side of a market have only limited explanatory power.

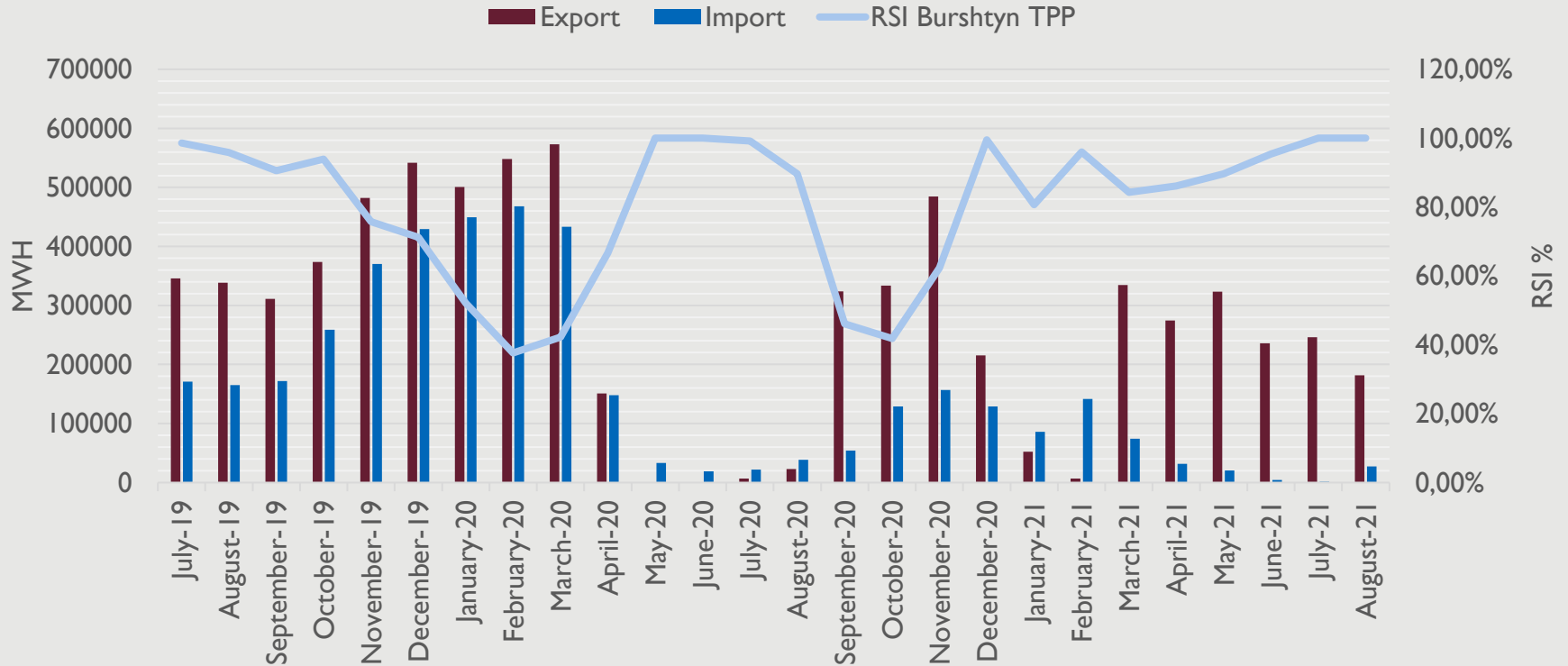
Particularly in energy markets, concentration measures that explicitly take the demand side into account are more appropriate. The RSI has been established as a reliable measure and has been used by regulators and competition authorities as a market power indicator in different electricity markets.

Specifically, the RSI measures to which extent the competitors of a given producer can meet the current demand with their installed generation capacities. Thus, the RSI is a measure of the “pivotalness” of firms. For a particular firm “i” the RSI is defined as follows:

$$\text{RSI} = (\text{Total Supply} - \text{Largest Seller's Supply}) / (\text{Total Demand})$$

# Residual Supplier Index (RSI) (2/2)

## RSI





# Pivotal Supplier Index (PSI) (1/2)

The Pivotal Supplier Index (PSI) considers the demand in addition to the supply side. Basically, the PSI answers the question if a particular supplier, the "pivotal supplier", is needed to supply the demand: Would it be possible to supply the prevalent demand also without this supplier, or is it required?

The Pivotal Supplier Index is expressed as the following:

$$\text{PSI} = I[\mathbf{C}_x > \sum_{i=1}^n \mathbf{C}_i - \text{Total Consumption}]$$

where  $C_x$  is the capacity of the potential pivotal supplier and the sum of  $C_i$  the capacity of all suppliers. The function  $I[.]$  is the indicator function, which takes the value 1 if the expression "." contained in it is true.

An equivalent expression is the following:

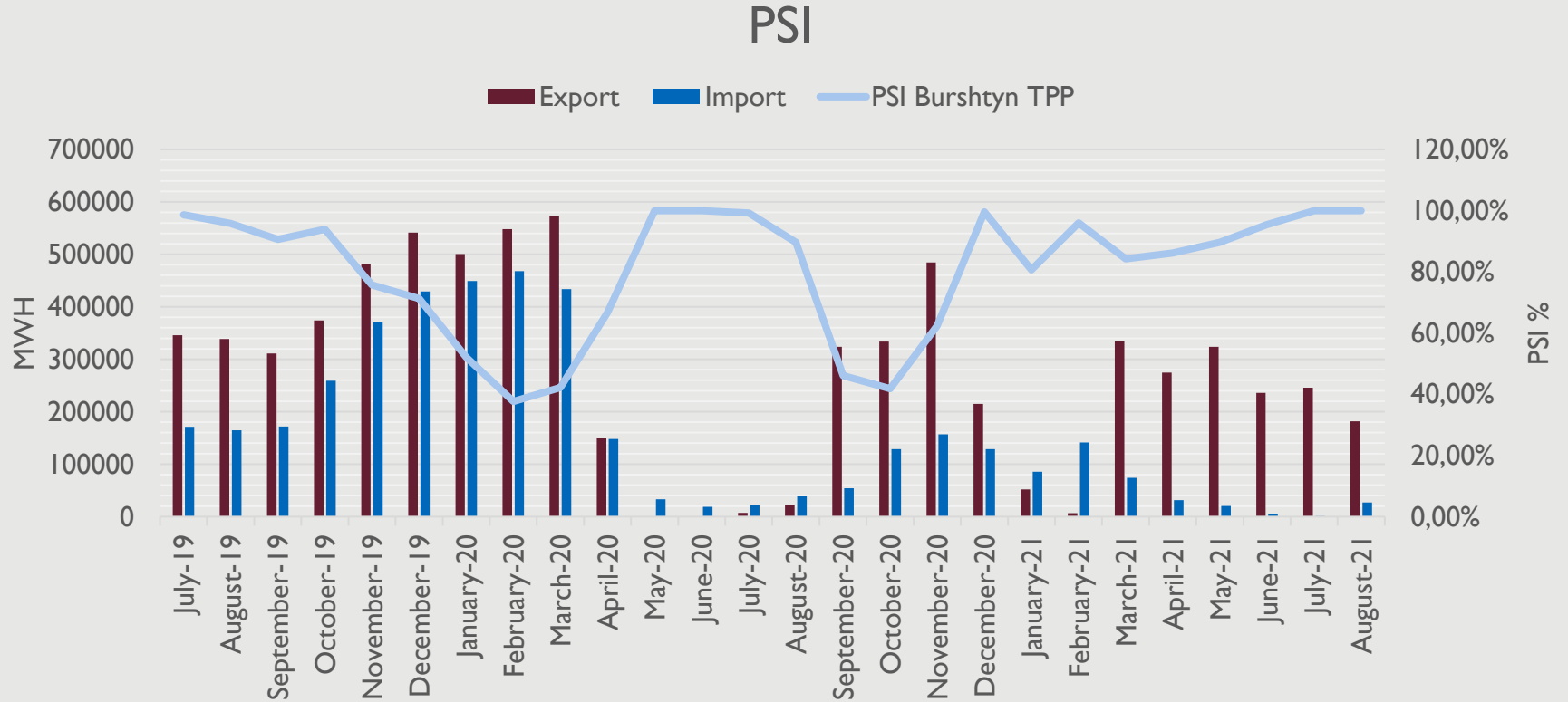
$$\text{PSI} = I[\text{Total consumption} > \sum_{i \neq x} \mathbf{C}_i]$$

where the sum of capacities is taken over all suppliers apart from  $x$ .

The PSI is a binary indicator that can be calculated hourly. If the supplier  $C_x$  is needed to supply the demand, it is pivotal and the index takes the value "1". If he is not pivotal, it takes the value "0".

The pivotal supplier indicator is an attempt to incorporate demand conditions, in addition to supply conditions, to obtain a measure of potential market power. This indicator examines whether a given producer is necessary (or 'pivotal') in serving the demand. Particularly, it investigates whether the capacity of a producer is larger than the surplus supply (the difference between total supply and demand) in the wholesale market.

# Pivotal Supplier Index (PSI) (2/2)



# Measures to Mitigate the Market Power

Several legal and regulatory measures could be considered in order to introduce and/or increase liquidity and reduce concentration on organized segments, given that the market power in BEI of the main electricity supplier seems to be significant. These measures can be divided into **short-term** (not requiring substantial legal changes) and **long-term** (requiring comprehensive amendments in legislation).

The main **short-term** could be the revision of bidding caps. This could help to avoid potential abuse of market power in the BEI trading zone. It should be noted, short-term measures are aimed at mitigating the effect of unfair pricing policy caused by potential market power in the trading zone and do not solve the problem of such market power.

According to the Policy Guidelines by the Energy Community Secretariat, several options might be considered as **long-term solutions** to limit the market power and ensure liquidity in the BEI trading zone. These measures aim to provide mitigation for the dominant position of the main marker player.

Improvement of the bilateral contracts segment and addressing contractual issues in the retail market might also be used to facilitate liquidity, hence reduce market power and protect customers.

In addition to all the regulatory and legislative design measures, competition rules shall be actively applied as a complementary tool to sector-specific rules, i.e., in mitigation of anti-competitive behaviors.

# Recommendations for Short-Term Measures

- “Bidding caps” were designed as a safeguard measures for the market opening and did not aim price regulation. Therefore, the “Bidding Caps Methodology” should aim to achieve “market-based” price formation for reliable price signals in the market instead of introducing strict price restrictions.
- BEI zone demonstrates a complex character and is affected by market concentration when import decreases. Differentiation of the bidding caps for the BEI and IPS zones could be considered. E.g.:
  1. Consider **benchmarking with the DAM prices in the neighboring countries**
  2. Preferably, consider introducing requirements for **market players to bid at their marginal costs**
- For the first option, a dynamic approach can be considered while avoiding cost recovery problems for producers. E.g.: a trigger based on import reductions by the TSO on D-I (before DAM gate closure)
- For the second option, which is recommended, **NEURC should perform ex-post monitoring of price spikes in BEI continuously**, identify abusive behavior and take regulatory action accordingly.

# Overview of Long-Term Measures - I

Long-Term Measures look more prioritized for the purpose of the reduction of the market power and dominant position. Several options might be considered (based on positive experience in the EU and/or US markets);

1. **Regulated access to electricity** (on the example of the French ARENH mechanism) – used to limit the influence of participants with significant market power and concentration, via regulated volumes and prices on which energy from such facility could be sold to counterparties;
2. **Direct-trading obligations** (as used in Great Britain) - an obligation to trade on equivalent or comparable fair terms with specifically chosen “eligible suppliers”;
3. **Virtual Power Plant (VPP) auctions** (VPP mechanisms have also been implemented in several EU Member States - the Netherlands, Denmark, Italy, Greece, Germany) – a requirement imposed on dominant producers to sell a proportion of their power plant’s output through auctions with specified conditions;
4. **Specific market-maker obligation** - obligation to offer for sale/to trade certain volumes of electricity on the organized market via regulated price (for instance as in Nordic countries, Poland, France, Great Britain).

or a combination of the above options.

# Overview of Long-Term Measures - II

- Given the significant level of market power by main energy provider when imports and export, thus supply diversity, decrease and considering ENTSO-E obligations to keep some capacity online to ensure system stability, long-term measures can mitigate the market power and in turn increase the liquidity at DAM.
- The approach can be based on introducing specific obligations for the main energy provider to sell energy, **generated by facilities required to be in operation** due to ENTSO-E constraints for synchronous operation, to suppliers **with end-customers** under regulated prices and volumes.
- The mechanism can allow customers to benefit from sharing the cost advantage of the dominant player with other suppliers.
- When competitive, liquid, and a transparent forward segment becomes available, administratively set trading rules can be replaced with contracts traded in the corresponding trading platform(s).

# Long-Term Measures - Implementation

The following actions could be considered in order by the policy/decision-makers (e.g., NEURC,AMCU, MoE, Ukrenergo):

1. Identification of the market concentration and potential market power through quantitative analysis.
2. Define the number of must-run units (and corresponding capacity, e.g., 3 units at minimum operation level) due to technical and security reasons on a long-term basis.
3. Establishment of adequate cost calculation and determine a fair remuneration for the dominant player.
4. Setting strict limits on the volumes that each supplier can access through the mechanism (for example based on volumes proportional to their customers' load).
5. Introduction of special bilateral agreements between corresponding entities.
6. The measures for monitoring and surveillance.

# What is Next?

- NEURC started to calculate and publish the indices developed for BEI analysis on their website (for IPS and BEI)
- Market liquidity and concentration study on IPS is ongoing, results to be shared soon in a report
- 2-year comprehensive assessment of the new market model is underway. Previous report available on ESP website: [https://energysecurityua.org/wp-content/uploads/2021/03/usaid\\_esp\\_wem-assessment-report-2020-08-26-eng-reva.pdf](https://energysecurityua.org/wp-content/uploads/2021/03/usaid_esp_wem-assessment-report-2020-08-26-eng-reva.pdf)
- Project on adoption of the secondary regulation to start joint cross-border capacity allocations
- REMIT implementation (adoption of law and secondary legislation to be followed by IT infrastructure)
- Continuous market monitoring and ad-hoc analysis to support regulatory decision making
- Development of the regulatory framework for standardized forward trading (standardized bilateral contracts to be followed by physical futures with secured settlement/clearing)



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# THANK YOU!

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