



REFERENCE PRICE REGULATION

ANNEX IV

OF

CEEGEX MARKET RULES

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1. GENERAL RULES

1.1. GOALS OF THE REFERENCE PRICE REGULATION

The Reference Price Regulation is set of rules applicable to calculation process and methodology for the Reference Price (also RP) of CEEGEX including parameters and prescriptions.

CEEGEX shall publish the Reference Price Regulation on its website.

1.2. PERSONS BOUND BY THE REFERENCE PRICE REGULATION AND EFFECTIVE DATE

The present Reference Price Regulation is binding on CEEGEX and on persons bound by the CEEGEX Rules and Regulations.

The present Reference Price Regulation will become effective as defined in the Section 1.1.4.7 of CEEGEX Market Rules.

1.3. DEFINITION

The definitions used in the Reference Price Regulation shall have the meaning as defined in the CEEGEX Market Rules.

1.4. PROTECTION OF THE REFERENCE PRICE

The Reference Price Regulation is protected by copyright.

1.5. PUBLICATION

Reference Price related information (Reference Price values, composition of Reference Price, calculation parameters, decisions, releases, etc.) are published via the website of the CEEGEX (www.ceegex.hu).

1.6. UTILIZATION OF REFERENCE PRICE

Utilization of Reference Price – in accordance with the relevant legislation – is primarily subject to the laws on copyright protection. Usage of the Reference Price by service providers within the framework of products is subject to the conclusion of a license agreement.





2. REFERENCE PRICE CALCULATION PRINCIPLES

2.1. BASIC PRINCIPLES

The Reference Price serves as a price indication for the market. The Reference Price is published on all business days.

The primary aim of the calculation methodology is to provide transparently established and robust Reference Prices.

CEEEX Reference Prices are established in line with the following principles:

- »» the calculation is based on market data;
- »» Reference Prices shall reflect the market situation close to the end of the Main Trading Period;
- »» objectivity is ensured by a fully automated calculation.

On every business days CEEEX determines Reference Price for the following Contract if tradable:

- »» Day-ahead products (Day-ahead, Saturday, Sunday, Weekend, Holiday) on the Hungarian Virtual Point (MGP) as defined in the Products List and Specifications.

The basic inputs of the primary Reference Price calculation are the CEEEX market data for the relevant Reference Window (trading and bidding activity), specified in Section 2.3.1.

The inputs for the primary Reference Price calculation are weighted by quality attributes: time, volume and spread.

A Trade's price spread is zero, thus its weight is the highest weight (value 1), otherwise a bid-ask pair's spread weight can range from 0 to 1 exponentially.

Using the weights of the three quality attributes CEEEX defines the overall quality for every input, which is a harmonic mean. The aggregated value of these overall qualities is the quality sum for every Contract, which indicates how sufficient the primary inputs are.

The Reference Price is arbitrage-free and is placed between the last observed bid and ask prices on CEEEX at the end of the Reference Window.

In case the Reference Prices cannot be established on this basis, indications by other price sources are considered during the calculation as well.

2.2. CALCULATION PROCESS

2.2.1. REFERENCE WINDOW

Reference Window is a time frame when trades and bid-ask pairs are considered.

The Reference Window is between 8.00 a.m. and 5.30 p.m. on each business day.





2.2.2. STEPS OF THE CALCULATION

The detailed steps of the calculations are the following.

No.	Calculation phase	Comment
1	Primary RP inputs	1.1, in absence 1.2, in absence 1.3
1.1	RP Estimate	Primary inputs: CEEEX Trades and bid-ask pairs
1.2	CEEEX technical price	If no RP Estimate available -> Primary RP = Last RP + price shifting, if the Contract is in arbitrage with a Contract, which price has moved since the last calculation
1.3	Incoming Contract Handling	In the absence of Last RP, based on the Primary RP of other connected Contracts
2	Preliminary RP	RP Estimate is settled between the last BA at CEEEX
3	Arbitrage-free RP	Arbitrage-free results
4	Final RP	Final RP, validated by the market operators

2.3. PARAMETERS FOR PRIMARY RP INPUTS

For the most accurate Reference Price results, CEEEX uses different parameters in different phases of the calculation.

2.3.1. BID-ASK PARAMETERS

The corresponding bid and ask pairs for a Contract is classified as a potential Trade in order to weight them along the same three quality attributes. While Trades have exact volumes and prices, bid-ask pairs have two different volumes and prices. CEEEX takes the minimum of the two volumes and uses the average of the two prices.

The pairing rules and parameters for this process are the following.

Parameter	Value	Explanation
Minimum duration of Orders	0:03:00	The minimum duration [h:mm:ss], when CEEEX considers a bid or an ask to be a real offer. This parameter crosses out those actions, when someone makes an offer for a moment, then immediately takes it off.
Minimum duration of paired Orders	0:00:01	The minimum duration [h:mm:ss] for a bid-ask pair.





2.3.2. QUALITY PARAMETERS

CEEEX weights the inputs along the three attributes: time, volume and spread. Time and spread attributes have exponential distribution, while volume has linear.

Parameter	Value	Explanation
Spread divisor	0.1	Exponential distribution, which value indicates the spread [EUR/MWh], where the spread quality drops to half. If the input is a trade, the spread is considered as zero.
Time divisor	1	Exponential distribution, which value indicates the time [hour], when counting from the closing time of the Reference Window the time quality drops to half.
Volume divisor	50 – Day-Ahead, 50 – Saturday 50-Sunday 25 – Weekend 20 - Holiday	Linear distribution, which value indicates the volume [MWh/h], where the volume quality reaches 1. Volume quality cannot be greater than 1.
Spread zero threshold	1	In case the spread is greater than the value set for threshold [EUR/MWh], the spread quality is zero.
Time zero threshold	9,5	In case the time counting from the closing time of the Reference Window is earlier than the value set for threshold [hour], the time quality is zero.

CEEEX calculates the overall quality as the harmonic mean of each primary RP input and the weighted average price as an estimated price (RP Estimate) for each individual Contract. Each RP estimate has a quality sum, which is an aggregated value of the overall qualities.

2.3.3. TECHNICAL PRICE

In case there are no primary RP inputs available, CEEEX defines a technical price for that Contract. The technical price is based on the previous Reference Price of that Contract.

If the Contract has a tradable superior Contract (it means they are in arbitrage) the technical price considers the price movement of the superior Contract. In this case the technical price is equal to the last Reference Price shifted with the preliminary RP change of the superior Contract.

If the Contract has not any superior Contract, the technical price is equal to the last Reference Price.

In case there is RP Estimate available the technical price is not taken into consideration.

Parameter	Value	Explanation
Price shift factor	100%	This value shows the ratio of the price shifting in case of technical price determination.





2.3.4. INCOMING CONTRACT HANDLING

For Contracts of incoming Products, without any primary RP inputs and without a last Reference Price, CEEGEX determines an Incoming Contract Price based on the Primary RP of the connecting Contracts according to the predefined rules below:

- Incoming Day-Ahead Contracts: The Day-Ahead Contract can't be an incoming Contract, because Reference Price is calculated on every business day (so last RP is available);
- Incoming Saturday and Sunday Contracts: The incoming Contract's price will be equal to its superior Contract's price (Weekend);
- Incoming Weekend and Holiday Contracts: The incoming Contract's price will be equal to the Day-Ahead Contract's price.

2.4. PRELIMINARY RP

CEE GEX checks whether the primary RP is greater than the last bid Order's price or smaller than the last ask Order's price. The observed timeframe is 15 minutes before the end Reference Window, thus between 5:15 p.m. and 5:30 p.m. If the primary RP is not lower than the best bid and not higher than the best ask the Primary RP is equal to Preliminary RP. If the Primary RP is out of the range the Preliminary RP is calculated as 0.01 EUR higher than the last best bid or 0.01 EUR lower than the last best ask.

2.5. ARBITRAGE-FREE RP

The Reference Price must be arbitrage-free. In order to define arbitrage-free Reference Prices it may be needed to shift the preliminary RP. This shift is limited by two parameters. No-arbitrage is ensured in case of a difference of EUR 0.00 between the Contracts with an overlapping due date after standard rounding.

Parameter	Value	Explanation
Max. price change (without trading activity)	3%	The maximum price deviation from the preliminary RP in order to have arbitrage-free Reference Prices when there isn't RP Estimate.
Max. price change with trading activity	0.05%	The maximum price deviation from the preliminary RP in order to have arbitrage-free Reference Prices when there is RP Estimate.

2.6. FINAL RP

The market operators validate the results of the calculation. In case of any technical malfunction occurs CEEGEX is entitled to modify the Reference Price. For Saturday and Sunday products, the final Reference Price is always equal to the Weekend Contract's price. In the case of Holiday Contracts consist of more days, the final Reference Price may be the same for more than two days.

