



ceegex
CENTRAL EASTERN EUROPEAN
GAS EXCHANGE



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REFERENCE PRICE REGULATION

ANNEX IV

OF

CEEGEX MARKET RULES

Version 1.01

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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 or CEEREP™) 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 (CEEREP™)

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.

Any index created or price calculated by CEEGEX Ltd. may be used freely and free of charge by anyone for internal calculations (not to be passed on or published) and for the settlement of contracts concluded outside of an organized or regulated market, in particular for the price determination of natural gas trading and supply contracts. If a user intends to use any index created by CEEGEX Ltd., in particular "CEEREP" and "CEENDEX", or intends to use a price calculated by CEEGEX Ltd. in any other way than the purposes expressly allowed above, in particular to incorporate them in products or services offered and/or traded on organized or regulated markets or similar platforms, he/she must conclude a contract with CEEGEX Ltd. for their use.



2. REFERENCE PRICE (CEEREP™) 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. CEEREP™ is an index based on end-of-day (EOD) market price, which reflects the true value of the Hungarian Virtual Point (MGP) at the end of business days. CEEREP™ follows European best practices by applying well-known qualification parameters, standardized algorithm and a definite reference window. CEEREP™ is comparable to European natural gas EOD indices, and increases usability compared to the previous MGP prices.

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

CEEGEX 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 CEEGEX 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 CEEGEX 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 CEEGEX 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 CEEGEX 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 (RW)

Reference Window is a timeframe when Trades and Orders are considered, which meet the qualification parameters. The reference windows indicate timeframes on business days according to the Trading Calendar. Reference Window is a time frame when trades and bid-ask pairs are considered.

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The Primary Reference Window is between ~~8.00 a.m.~~5.15 p.m. and 5.30 p.m. on each business day.

The Secondary Reference Window is between ~~3.30~~ p.m. and ~~5.30~~ p.m. on each business day.

If the calculation of the CEEGEX technical price according to 2.2.2 fails in the Primary Reference Window, the calculation can be repeated in the Secondary Reference Window.

If the calculation of CEEREP™ fails in the Secondary Reference Window, CEEREP™ is calculated based on the volume weighted arithmetic average price of Trades concluded between 8:00 a.m. and 6:00 p.m. (CEINDEX™). ~~If the calculation of the CEEGEX technical price according to 2.2.2 fails in the Secondary Reference Window, the calculation can be repeated in the Tertiary Reference Window.~~

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2.2.2. STEPS OF THE CALCULATION

The detailed steps of the calculations are the following.

No.	Calculation phase	Comment
1.	Primary RP inputs	CEEEX Trades, Orders and bid-ask pairs
2.	RP Estimate Calculated CEEREP™	1, in absence 2, in absence 3, in absence 4, in absence 5 2.a), in absence 2.b), in absence 2.c), in absence 2.d), in absence 3.
2.a)1.	Calculated CEEREP™ CEEEX technical price	At least 3 Trades fulfill the qualification parameters within the Primary Reference Window: 1 = arithmetic average price of Trades At least 3 trades fulfilling qualification parameters and any order fulfilling qualification parameters within the Reference Window: $0.75 * (\text{arithmetic average trade price}) + 0.25 * (\text{arithmetic average of time weighted best bid and time weighted best ask})$
2.b)2.	Calculated CEEREP™ CEEEX technical price	At least 3 1 or 2 Trades and Orders fulfill qualification parameters within the Primary Reference Window: 2 = $0.75 \times (\text{arithmetic average price of Trades}) + 0.25 \times (\text{arithmetic average price of duration weighted best bid and duration weighted best ask Orders})$ trades fulfilling qualification parameters, but no orders fulfilling qualification parameters within the Reference Window: arithmetic average trade price
2.c)3.	Calculated CEEREP™ CEEEX technical price	No Trades, but Orders fulfill qualification parameters within the Primary Reference Window: 3 = arithmetic average price of duration weighted best bid and duration weighted best ask Orders No trades fulfilling qualification parameters but any order fulfilling qualification parameters within the Reference Window: arithmetic average of time weighted best bid and time weighted best ask
2.d)4.	Calculated CEEREP™ CEEEX technical price	If the calculated CEEREP™ cannot be established on the basis of 1, 2, 3 steps in the Primary Reference Window: 4 = 1, 2, 3 steps are repeated in the Secondary Reference Window No trades fulfilling qualification parameters and no orders fulfilling qualification parameters within the Reference Window: Member indication

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5	Calculated CEEREP™	If no Trades or Orders fulfill the qualification parameters within either reference window: 5 = volume weighted arithmetic average price of Trades concluded between 8:00 a.m. and 6:00 p.m.
3	CEEGEX technical price	If no Member indication is available within the Reference Window: VWAP
4	Final CEEREP™ RP	Final price, validated by the CEEGEX Final RP, validated by the market operators
No.	Calculation phase	Comment
1	Primary RP inputs	1.1, in absence 1.2, in absence 1.3
1.1	RP Estimate	Primary inputs: CEEGEX Trades and bid-ask pairs
1.2	CEEGEX 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 CEEGEX
3	Arbitrage-free RP	Arbitrage-free results
4	Final RP	Final RP, validated by the market operators

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2.3. QUALIFICATION PARAMETERS FOR PRIMARY RP INPUTS

For the most reliable result, CEEGEX uses different qualification parameters to select the primary inputs for CEEREP™ calculation. For the most accurate Reference Price results, CEEGEX uses different qualification parameters in different phases of the calculation to select the primary input for the calculation of the RP estimate.

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Parameter	Value	Unit/Explanation
Minimum quantity of Trades	10,00	MW
Minimum quantity of Orders	10,00	MW
Minimum time duration of the Bid-Ask spread	0:03:00	min
Maximum value of the Bid-Ask spread	2,00	EUR/MWh

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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. CEEGEX 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 CEEGEX 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	0:00:04	The minimum duration [h:mm:ss] for a bid-ask pair.

2.3.2. — QUALITY PARAMETERS

CEEGEX 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	0,4	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	4	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	4	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.

CEEGEX 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, CEEGEX 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.

~~Deleted or cancelled Trades are not considered.~~

~~CEEEX reserves the right to exclude Trades or Orders that appear to be outliers, which have a suspected motivation to unfairly influence the price calculation process.~~

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~~2.3.4. — INCOMING CONTRACT HANDLING~~

~~For Contracts of incoming Products, without any primary RP inputs and without a last Reference Price, CEEEX 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~~

~~CEEEX 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.



2.6.2.4. FINAL RPP PUBLICATION

CEEGEX publishes CEEREP™ for each gas day on the last business day before delivery after 5:30 p.m. or after 6:00 p.m. in case of CEEREP™ is calculated based on the volume weighted arithmetic average price of Trades concluded between 8:00 a.m. and 6:00 p.m.

CEEGEX calculates CEEREP™ based on the Trades and Orders of Day-Ahead and the longest available block Product, i.e. Weekend or Holiday according to the Trading Calendar. In case of the absence of a block Holiday Product (i.e. Individual Holiday), CEEGEX calculates CEEREP™ based on the Trades and Orders of the respective Individual Holiday. 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.

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