



## **Cross-period netting model for initial margins on the Electricity Forward Market and the Gas Forward Market – calculation examples**

In connection with the launch of the cross-period netting model for the initial margins on the Electricity Forward Market and the Gas Forward Market by Izba Rozliczeniowa Giełd Towarowych S.A. (“IRGiT”), we hereby present examples of application of the netting mechanism, for different designs of a contract portfolio.

The implementation of the cross-period netting mechanism will allow the amount of initial margins to reflect the existence of opposite positions in different delivery periods in the electricity or gas market. According to the provisions of the Detailed Clearing and Settlement Rules of the Exchange Clearing House (hereinafter: “Detailed Clearing and Settlement Rules”), cross-period netting can be divided into:

- a) intra-delivery-group cross-period netting, in which netting applies to initial margins within the same type of contracts assigned to opposite positions in delivery periods classified in the same delivery group (DAILY/SHORT/MEDIUM/LONG), depending on the intra-delivery-group correlation parameters,
- b) inter-delivery-group cross-period netting, in which netting applies to initial margins within the same type of contracts assigned to opposite positions in delivery periods classified in different delivery groups, depending on the inter-delivery-group correlation parameters and the delivery groups inclusion parameters.

Currently, in order to optimize the amount of required initial margins, IRGiT applies group netting within Power Groups and cross-product netting at the level of a Clearing House Member and at the level of a Power Group. After the cross-period netting mechanism is implemented, initial margins will be netted in the following order:

1. Cross-product netting at the Clearing House Member level.
2. Group netting (if applicable).
3. Cross-product netting at the Power Group level (if applicable).
4. Intra-delivery-group cross-period netting at the Clearing House Member/Power Group level.
5. Inter-delivery-group cross-period netting at the Clearing House Member/Power Group level.

Partial results of each of the above netting components are included in the clearing system in the “Initial margin - Position netting offsets” report.

The sample calculations below refer to the net position in the portfolio of a Clearing House Member that is not a Power Group member, after taking into account cross-product netting (for the electricity market). All designations and formulas refer specifically to the provisions of Sections 17b and 17c of the Detailed Clearing and Settlement Rules. The calculations have been made as at 11 December 2023.

### Example No. 1 Intra-delivery-group cross-period netting

We are considering the following portfolio of BASE contracts for the following delivery periods  $i, j, k$  (synthetic net positions after cross-product netting), in which long positions (purchases) are presented as positive, while short positions (sales) are presented as negative:

$$BASE-Mar-24 = Position''_i = 150,$$

$$BASE-Apr-24 = Position''_j = 50,$$

$$BASE-May-24 = Position''_k = -100,$$

Delivery period	Net positions	Number of hours per delivery period ( $h$ )	Clearing price ( $Kr$ )	Risk parameter ( $P$ )
BASE-Mar-24	150	743	483.16	0.1028
BASE-Apr-24	50	720	483.04	0.1158
BASE-May-24	-100	744	483.05	0.1199

Sample values of intra-delivery-group correlation parameters:

	BASE	PEAK	OFFPEAK	GAS
DAILY	25%	49%	38%	42%
SHORT	41%	51%	39%	74%
MEDIUM	76%	56%	69%	88%
LONG	51%	38%	49%	61%

- Pursuant to § 22 item 10 of the Detailed Clearing and Settlement Rules, in order to assign the above delivery periods to a specific delivery group, it is necessary to examine the number of days until the end of delivery in a given delivery period as at the margin calculation date. For the delivery periods under analysis, that number is 110, 140 and 171 days, respectively. Accordingly, all delivery periods end within the horizon of the last delivery date of the last listed monthly instrument and all fall into the MEDIUM delivery group.
- Pursuant to § 17b item 2 of the Detailed Clearing and Settlement Rules, two sums of initial margins are calculated in accordance with the following formulas:

$$DW\_Long_{GD} = \sum_{j \in GD} MAX(Position''_j; 0) * P_j * h_j * Kr_j$$

$$DW\_Short_{GD} = \sum_{j \in GD} MIN(Position''_j; 0) * (-1) * P_j * h_j * Kr_j$$

Calculated sums of initial collateral margins for the MEDIUM delivery group:

$$DW\_Long_{MEDIUM} = 150 * 0.1028 * 743 * 483.16 + 50 * 0.1158 * 720 * 483.04 = 7,549,290.26$$

$$DW\_Short_{MEDIUM} = (-100) * (-1) * 0.1199 * 744 * 483.05 = 4,309,076.51$$

- Pursuant to § 17b item 3 of the Detailed Clearing and Settlement Rules, a margin is calculated for the dominant position and the netting position in terms of risk, using the following formulas:

$$DW\_Dominant_{GD} = MAX(DW\_Long_{GD}; DW\_Short_{GD})$$

$$DW\_Netting_{GD} = MIN(DW\_Long_{GD}; DW\_Short_{GD})$$

Margins calculated for the Dominant and Netting Position for the MEDIUM Delivery Group:

$$DW\_Dominant_{MEDIUM} = MAX(7,549,290.26; 4,309,076.51) = 7,549,290.26$$

$$DW\_Netting_{MEDIUM} = MIN(7,549,290.26 ; 4,309,076.51) = 4,309,076.51$$

4. Pursuant to § 17b item 4 of the Detailed Clearing and Settlement Rules, the excess margin on account of intra-delivery-group cross-period netting is calculated using the following formula:

$$NW\_MO1_{GD} = DW\_Netting_{GD} * 2 * Correlation\_coefficient_{GD}$$

Excess margin calculated for the MEDIUM delivery group:

$$NW\_MO1_{MEDIUM} = 4,309,076.51 * 2 * 76\% = 6\,549\,796,30$$

5. Pursuant to § 17b item 5 of the Detailed Clearing and Settlement Rules, the excess margin on account of intra-delivery-group cross-period netting is assigned to the market using the following formula:

$$NW\_MO1_e = Parameter_{cross-period} * \sum_{PROD} \sum_{GD} NW\_MO1_{PROD,GD}$$

Assuming that the portfolio contains only BASE contracts in the MEDIUM delivery group and that the cross-period netting recognition parameter ( $Parameter_{cross-period}$ ) is 80%:

$$NW\_MO1_e = 80\% * 6,549,796.30 = 5,239,837.04$$

### Summary

Using the first assumption of the cross-period netting mechanism, i.e. the netting of initial margins in the same type of contracts assigned to opposite positions in delivery periods classified in the same delivery group, we net 200 long (150 for BASE-Mar-24 and 50 for BASE-Apr-24) and 100 short (for BASE-May-24) synthetic positions in the MEDIUM delivery group for BASE contracts, taking into account the clearing prices, risk parameters and delivery hours corresponding to the given delivery period.

### **Simulation of benefits from cross-period netting for the example presented above, using market data as at 11 December 2023.**

- a) The value of the required initial margin for the portfolio before applying the intra-delivery-group cross-period netting:

$$Dw_e = 150 * 0.1028 * 743 * 483.16 + 50 * 0.1158 * 720 * 483.04 + (-100) * (-1) * 0.1199 * 744 * 483,05 = 11,858,366.77$$

- b) The value of the required initial margin for the portfolio after applying the intra-delivery-group cross-period netting:

$$Dw_e = 150 * 0.1028 * 743 * 483.16 + 50 * 0.1158 * 720 * 483.04 + (-100) * (-1) * 0.1201 * 744 * 481 - 5,239,837.04 = 6,618,529.73$$

Gain from applying the intra-delivery-group cross-period netting:

$$11,858,366.77 - 6,618,529.73 = 5,239,837.04 [PLN]$$

### Example no. 2 Inter-delivery-group cross-period netting

We are considering the following portfolio of GAS\_BASE contracts for the following delivery periods  $i$ ,  $j$ ,  $k$  (synthetic net positions), in which long positions (purchases) are presented as positive, while short positions (sales) are presented as negative ones:

$$GAS\_BASE\text{-Feb-24} = Position_i = 150,$$

$$GAS\_BASE\text{-Mar-24} = Position_j = 50,$$

$$GAS\_BASE\text{-Q2-24} = Position_k = -100,$$

Delivery period	Net positions	Number of hours per delivery period ( $h$ )	Clearing price ( $Kr$ )	Risk parameter ( $P$ )
GAS_BASE-Feb-24	150	696	184.63	0.1841
GAS_BASE-Mar-24	50	743	184.67	0.1713
GAS_BASE-Q2-24	-100	2184	185.88	0.1714

Example values of inter-delivery-group correlation parameters:

Type of contracts	BASE	PEAK	OFFPEAK	GAS
	40%	28%	44%	65%

- Pursuant to § 22 item 10 of the Detailed Clearing and Settlement Rules, in order to assign the above delivery periods to a specific delivery group, it is necessary to examine the number of days until the end of delivery in a particular delivery period as at the margin calculation date. For the delivery periods under analysis, that number is 79, 110 and 201 days, respectively, where two delivery periods end within the horizon of the last delivery date of the last listed monthly instrument and all fall into the MEDIUM delivery group, and the third contract is classified in the LONG delivery group.
- Pursuant to § 17c item 1 of the Detailed Clearing and Settlement Rules, the sides of the dominant positions in terms of risk each delivery group are determined using the following formulas:

$$Position_{GD} = 0, \text{ if } \sum_{j \in GD} Position_j = 0$$

$$Position_{GD} = 1, \text{ if } DW\_Dominant_{GD} = DW\_Long_{GD}$$

$$Position_{GD} = -1, \text{ if } DW\_Dominant_{GD} = DW\_Short_{GD}$$

Calculated sums of initial collateral margins and margins for the dominant and netting position for the MEDIUM delivery group:



$$DW\_Long_{MEDIUM} = 150 * 0.1841 * 696 * 184.63 + 50 * 0.1713 * 743 * 184.67 = 4,723,798.01$$

$$DW\_Short_{MEDIUM} = 0$$

$$DW\_Dominant_{MEDIUM} = MAX(4,723,798.01; 0) = 4,723,798.01$$

$$DW\_Netting_{MEDIUM} = MIN(4,723,798.01; 0) = 0$$

Dominating position side for the MEDIUM delivery group:

$$Position_{MEDIUM} = 1$$

Calculated sums of initial collateral margins and margins for the dominant and netting position in the LONG delivery group:

$$DW\_Long_{LONG} = 0$$

$$DW\_Short_{LONG} = (-100) * (-1) * 0.1714 * 2184 * 185.88 = 6,958,187.31$$

$$DW\_Dominant_{LONG} = MAX(0; 6,958,187.31) = 6,958,187.31$$

$$DW\_Netting_{LONG} = MIN(0; 6,958,187.31) = 0$$

Dominating position side for the LONG delivery group:

$$Position_{LONG} = -1$$

- Pursuant to § 17c item 2 of the Detailed Clearing and Settlement Rules, the initial margin subject to cross-period netting at the level of delivery groups, assigned to a given delivery group account is calculated using the following formula:

$$DW\_Delivery\_groups_{GD} = DW\_Dominant_{GD} - DW\_Netting_{GD}$$

The calculated initial margins subject to cross-period netting at the level of delivery groups, for the MEDIUM and LONG delivery groups.

$$DW\_Delivery\_groups_{MEDIUM} = 4,723,798.01 - 0 = 4,723,798.01$$

$$DW\_Delivery\_groups_{LONG} = 6,958,187.31 - 0 = 6,958,187.31$$

- Pursuant to § 17c item 3 of the Detailed Clearing and Settlement Rules, a margin is calculated for the dominant position and the netting position, using the following formulas:

$$DW\_Long = \sum_{GD} MAX(Position_{GD}; 0) * DW\_Delivery\_groups_{GD} * Inclusion\_coefficient_{GD}$$

$$DW\_Short = \sum_{GD} MIN(Position_{GD}; 0) * (-1) * DW\_Delivery\_groups_{GD} * Inclusion\_coefficient_{GD}$$

$$DW\_Dominant = MAX(DW\_Long; DW\_Short)$$

$$DW\_Netting = MIN(DW\_Long; DW\_Short)$$

Margins calculated for the dominant and netting position, assuming that all delivery group inclusion parameters<sup>1</sup> are equal to 1:

$$DW_{Long} = 1 * 4,723,798.01 + 0 * 6,958,187.31 = 4,723,798.01$$

$$DW_{Short} = 0 * (-1) * 4,723,798.01 + (-1) * (-1) * 6,958,187.31 = 6,958,187.31$$

$$DW_{Dominant} = MAX(4,723,798.01 ; 6,958,187.31) = 6,958,187.31$$

$$DW_{Netting} = MIN(4,723,798.01; 6,958,187.31) = 4,723,798.01$$

5. Pursuant to § 17c item 4 of the Detailed Clearing and Settlement Rules, the excess margin on account of inter-delivery-group cross-period netting is calculated using the following formula:

$$NW_{MO2} = DW_{Netting} * 2 * Correlation\_coefficient$$

Excess margin calculated on account of inter-delivery-group cross-period netting:

$$NW_{MO2} = 4,723,798.01 * 2 * 65\% = 6\,140\,937.41$$

6. Pursuant to § 17c item 5 of the Detailed Clearing and Settlement Rules, the excess margin on account of inter-delivery-group cross-period netting is assigned to the market using the following formula:

$$NW_{MO2}_g = Parameter_{cross-period} * NW_{MO2}_{GAS\_BASE}$$

Assuming that the cross-period netting recognition parameter ( $Parameter_{cross-period}$ ) is 80%:

$$NW_{MO2}_g = 80\% * 6,140,937.41 = 4,912,749.93$$

### Summary

Using the second assumption of the cross-period netting mechanism, i.e. the netting of initial margins in the same type of contract assigned to opposite positions in delivery periods classified in different delivery groups, we net 200 long positions (150 for GAS\_BASE-Feb-24 and 50 for GAS\_BASE-Mar-24) in the MEDIUM delivery group and 100 short positions (for GAS\_BASE-Q2-24) in the LONG delivery group for GAS\_BASE type contracts, taking into account the clearing prices, risk parameters and delivery hours corresponding to the given delivery period.

### **Simulation of benefits from cross-period netting for the example presented above, using market data as at 11 December 2023.**

- a) The value of the required initial margin for the portfolio before applying the inter-delivery-group cross-period netting:

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<sup>1</sup> Delivery groups inclusion parameters determine which of the delivery groups are included in the calculation. They can be either 0 or 1, where 0 means no recognition and 1 means recognition of the delivery group in calculations.



$$Dw_g = 150 * 0.1841 * 696 * 184.63 + 50 * 0.1713 * 743 * 184.67 + (-100) * (-1) * 0.1714 * 2184 * 185.88 = 11,681,985.32$$

b) The value of the required initial margin for the portfolio after applying the inter-delivery-group cross-period netting:

$$Dw_g = 150 * 0.1841 * 696 * 184.63 + 50 * 0.1713 * 743 * 184.67 + (-100) * (-1) * 0.1714 * 2184 * 185.88 - 4,912,749.93 = 6,769,235.39$$

Gain from applying the inter-delivery-group cross-period netting:

$$11,681,985.32 - 6,769,235.39 = 4,912,749.93 [PLN]$$