



Polskie Sieci Elektroenergetyczne S.A.

**Foreign capacity participation in Polish capacity market
Target solution**

System Development Department



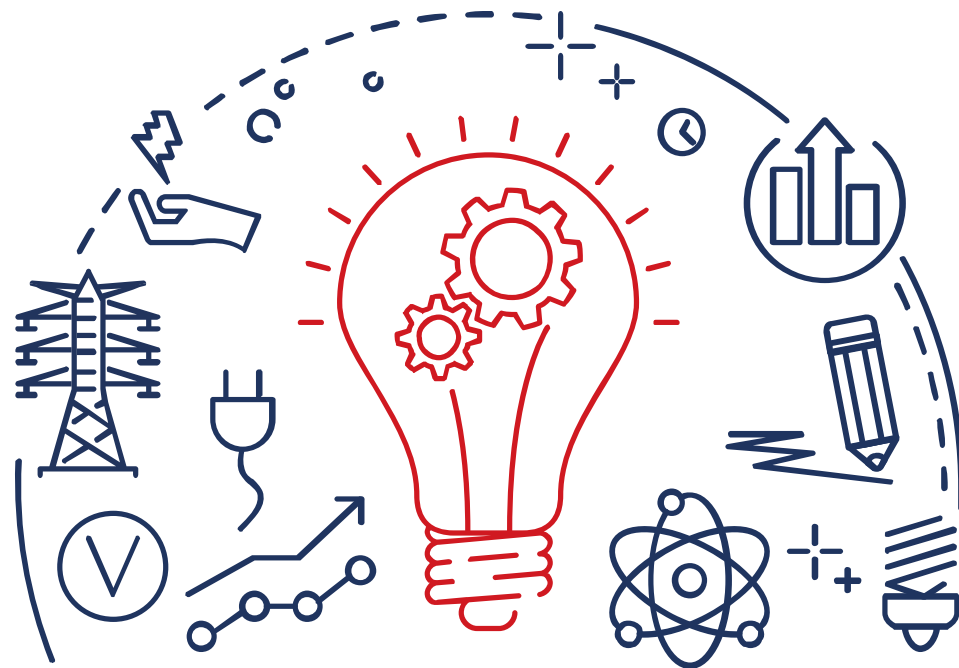


Purpose of the presentation

The purpose of this presentation is to acquaint entities from neighbouring Member States with the rules of foreign capacity participation in polish capacity market.

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General information on Polish capacity market





History of Polish capacity market

March 2016

- start of work on implementing capacity market in Poland

03.01.2018

- the Act on capacity market is signed by the President

07.02.2018

- capacity market approved by the European Commission

30.03.2018

- The President of the Energy Regulatory Office adopts a positive decision of the capacity market rules

03.04.2018

- capacity market process being operational

05.09.2018

- main certification for the main auctions for delivery years 2021, 2022 and 2023 begins

15.11.2018

- main auction for delivery year 2021

05.12.2018

- main auction for delivery year 2022

21.12.2018

- main auction for delivery year 2023

30.08.2019

- main certification for the main auction for delivery year 2024 begins

25.11.2019

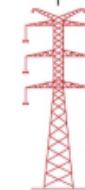
- main certification for the additional auctions for individual quarters of delivery year 2021 begins

06.12.2019

- main auction for delivery year 2024

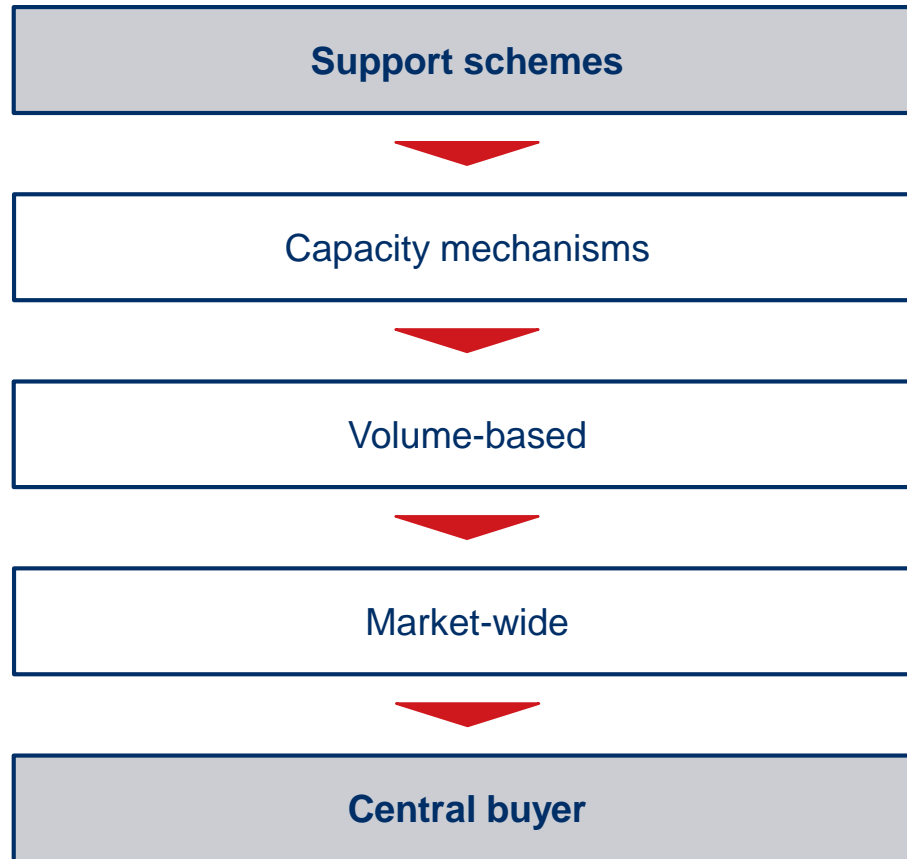
18.03.2020

- additional auctions for delivery year 2021





Polish capacity market principles



- The product (trading good): available capacity in every system stress period identified during day-ahead planning
- Forward market: „n-5” and „n-1” auctions
- **Open for cross-border participation**
- Technology neutral





European and national legislation

European documents

Document	Date of issue	Description
European Commission decision	07.02.2018	The Commission has found Polish capacity market compliant with EU State aid rules
Regulation on the internal market for electricity (articles 21 – 26)	14.06.2019	Document governing the general rules of all capacity mechanisms established in Member States

National documents

(Polish as well as English version of these documents can be found here: <https://www.pse.pl/rynek-mocy-dokumenty-powiazane>)

Document	Date of issue	Description
Capacity market act	08.12.2017	Capacity market act is a formal document establishing capacity market
Capacity market rules	30.03.2018	Document issued by PSE and approved by the President of Energy Regulatory Office
Regulations to the capacity market act	Q3 2018	Regulations containing rules established by the Minister of Energy





Definitions of terms

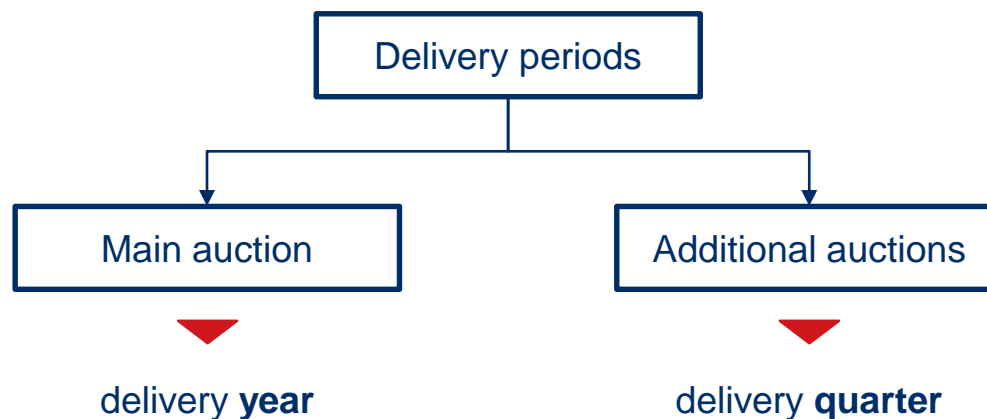
Capacity Agreement	- an agreement between a Capacity Provider and PSE
Capacity Market Unit	- a Physical Cross-Border Unit or a group of such units that has obtained a certificate for the Capacity Auction
Capacity Provider	- an owner of a Capacity Market Unit, being an owner of Physical Cross-Border Units constituting the Capacity Market Unit or being an entity authorised by the owners of such Physical Cross-Border Units to dispatch them in scope of capacity market processes
Delivery Period	- a calendar year or quarter for which a Capacity Auction is held
Physical Cross-Border Unit	- a Physical Cross-Border Generating Unit and a Physical Cross-Border Demand Side Response Unit
Physical Cross-Border DSR Unit	- a Physical Demand Side Response Unit located within TSO's territory
Physical Cross Border Generating Unit	- a Physical Generating Unit located within TSO's territory
Register	- capacity market register (IT system) held by PSE
TSO	- Transmission system operator relevant for the zone
Working Day	- any day from Monday to Friday, excluding statutory holidays in Poland





Product on the capacity market

- The product on the capacity market is the **net dispatchable capacity** during **Delivery Period** along with the obligation to deliver it during **system stress events** within the Delivery Period. This obligation is called **capacity obligation** and is the subject of the capacity agreement concluded with the PSE



- Verification of product delivery / capacity obligation performance:**
 - applies to 7:00 a.m. - 10:00 p.m. on working days
 - takes place during system stress events
 - includes demonstration
 - can be the subject of a test system stress event at the PSE's request





**Target solution for foreign
capacity participation**





Cross-border participation

- European Commission decision states that Polish capacity market shall be open for foreign capacity from neighbouring EU TSOs, whose power systems are electrically connected with Polish power system (PPS)
- The regulations foresee direct participation of foreign capacity in the capacity auctions as so called „**target solution**”
- Before each capacity auction, PSE will pre-select those Capacity Providers which will be allowed to participate
- Target solution is compliant with the provisions of the regulation on the internal market for electricity

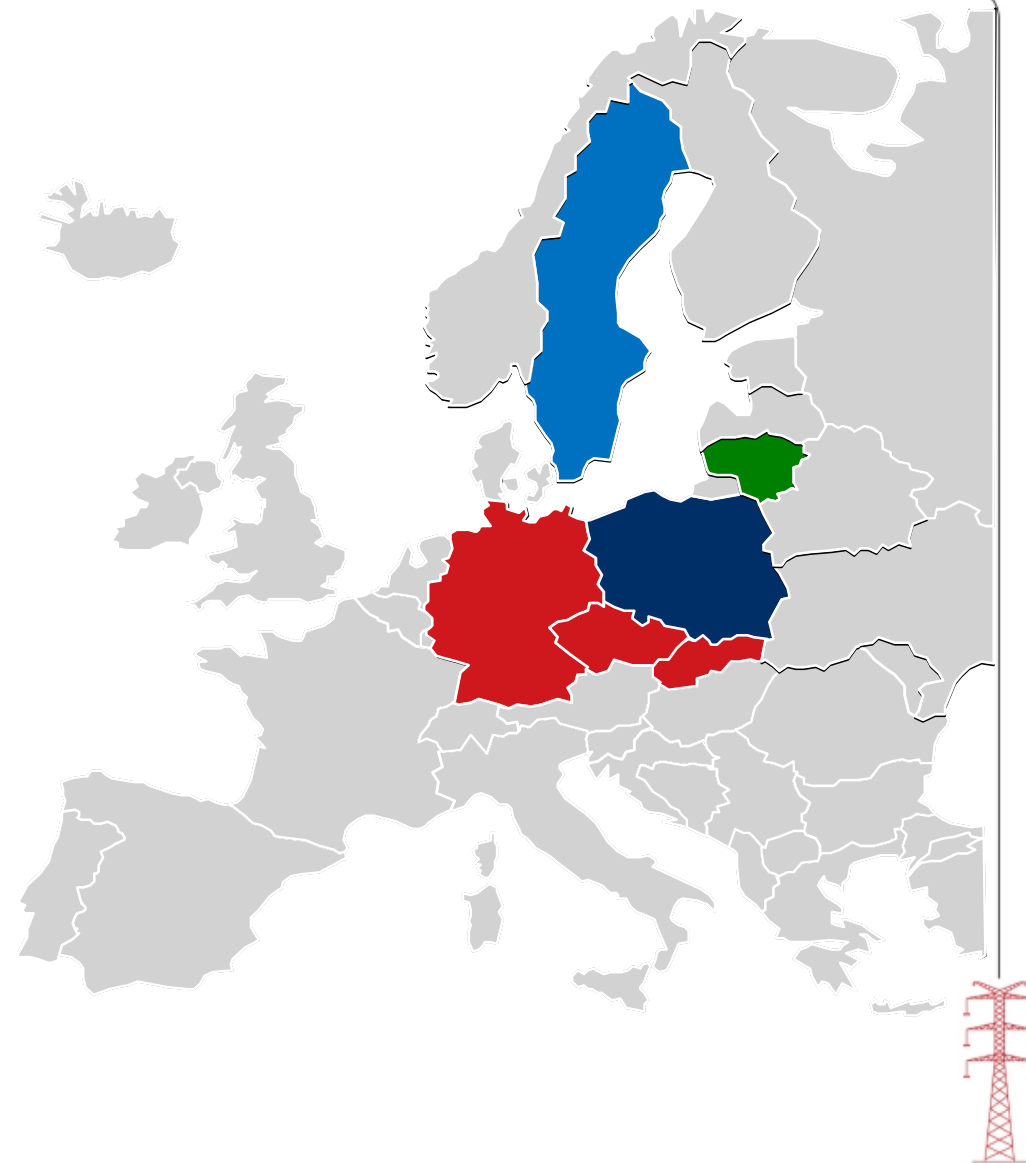
Implementing the target solution in a given zone requires bilateral agreements between PSE and TSOs to be signed





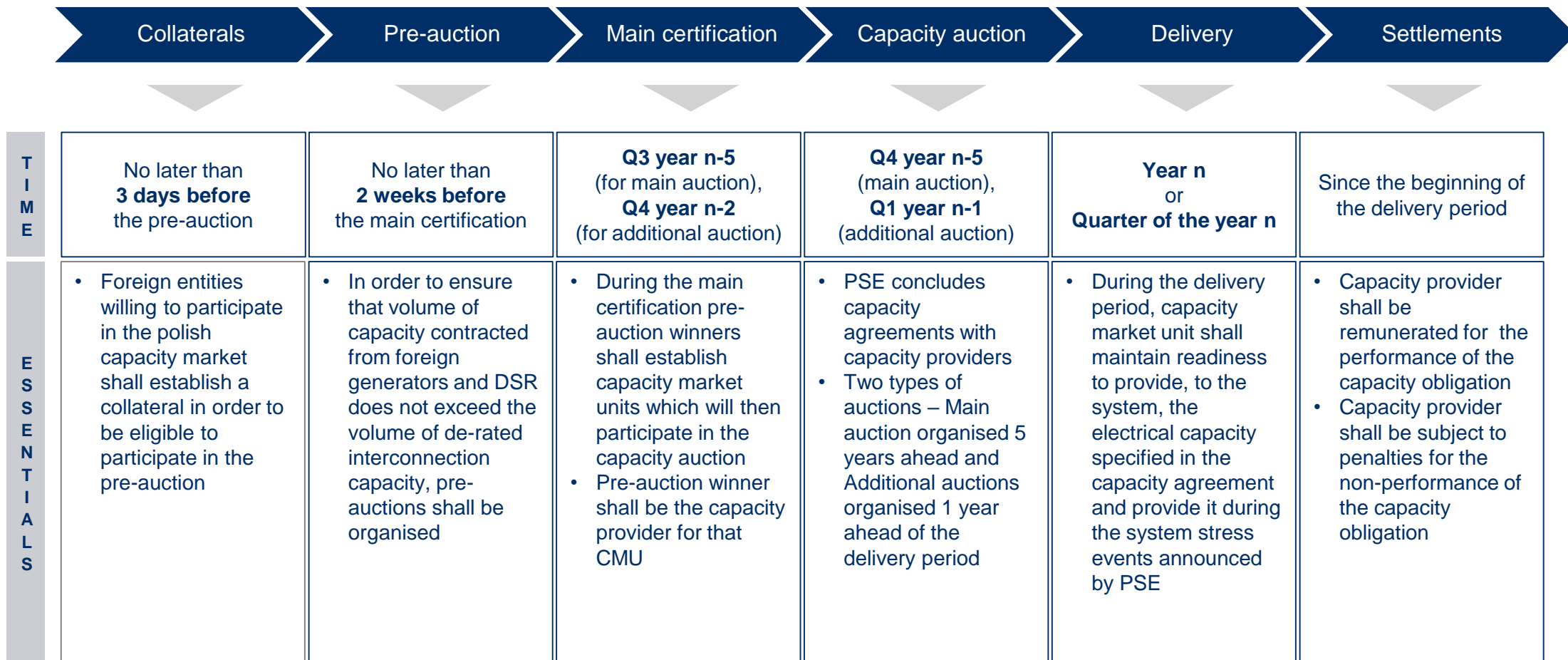
Cross-border participation

- There are three interconnection zones:
 - **PL-CZ/DE/SK** – synchronous profile zone comprising transmission systems of 50Hertz, ČEPS and SEPS
 - **PL-SE** – transmission system of Svenska Kraftnät
 - **PL-LT** – transmission system of Litgrid
- In case of Germany, only units located within 50Hertz territory are allowed to participate
- Cross-border capacity can be contracted up to the volume of de-rated interconnection capacity
- Volume of de-rated interconnection capacity for the main auction for delivery year 2025 will be published in the Regulation issued by the Minister relevant for Energy during the Q3 2020



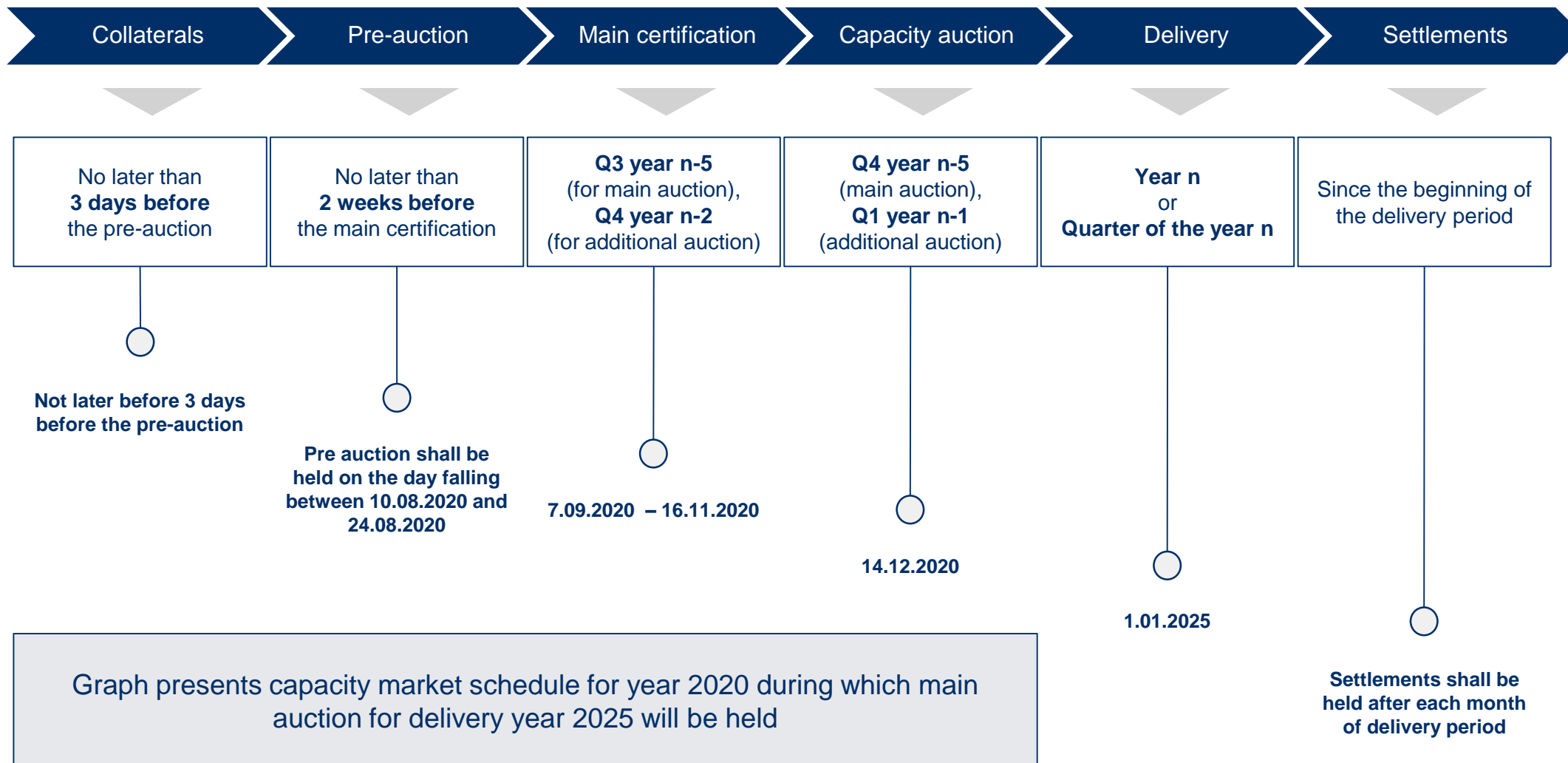


Capacity market essentials





Capacity market essentials





Collaterals



Collateral establishment

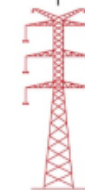


Pre-auction



Further capacity market processes

- In order to participate in pre-auction, Capacity Provider shall establish a collateral equal to 43 PLN for each kW of capacity that is to be offered during the pre-auction
Collateral = Volume of capacity × 43 PLN/kW (c.a.10 EUR)
- Collaterals are to be submitted in cash, no later than 3 days before the pre-auction
- Collateral established by Capacity Providers, whose offers were not accepted is released within 7 days of pre-auction result's publication
- PSE releases the remaining collateral, if offers submitted by a given Capacity Provider were not accepted in full, within the time limit mentioned above
- Collateral corresponding to the volume of offers accepted in the pre-auction shall not be released at this stage





Collaterals



Collateral establishment

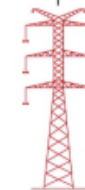


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Collaterals



Collateral establishment

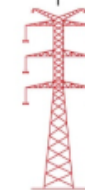


Pre-auction



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Collaterals - example



- Capacity Provider is willing to participate in the pre-auction
- Volume of capacity in offers to be submitted in the upcoming pre-auction shall be 100 MW

Example

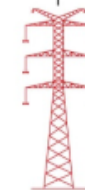
Capacity provider shall establish a collateral in amount of:
 $100\,000\text{ kW} \times 43\text{ PLN/kW} = 430\,000\text{ PLN}$ (c.a. 100 000 EUR)

- All offers exceeding the volume corresponding to the established collateral shall be rejected in the pre-auction
- During the pre-auction, not all offers submitted by the Capacity Provider were accepted
- Volume of capacity in offers accepted in the pre-auction is 80 MW

Example

PSE shall release a collateral corresponding to the volume of capacity in rejected offers in respect to which a collateral was established:
 $(100\,000\text{ kW} - 80\,000\text{ kW}) \times 43\text{ PLN/kW} = 86\,000\text{ PLN}$ (c.a. 20 000 EUR)

- Collateral, corresponding to the volume of capacity in the accepted offers shall be released after the main certification

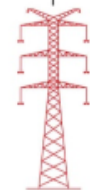
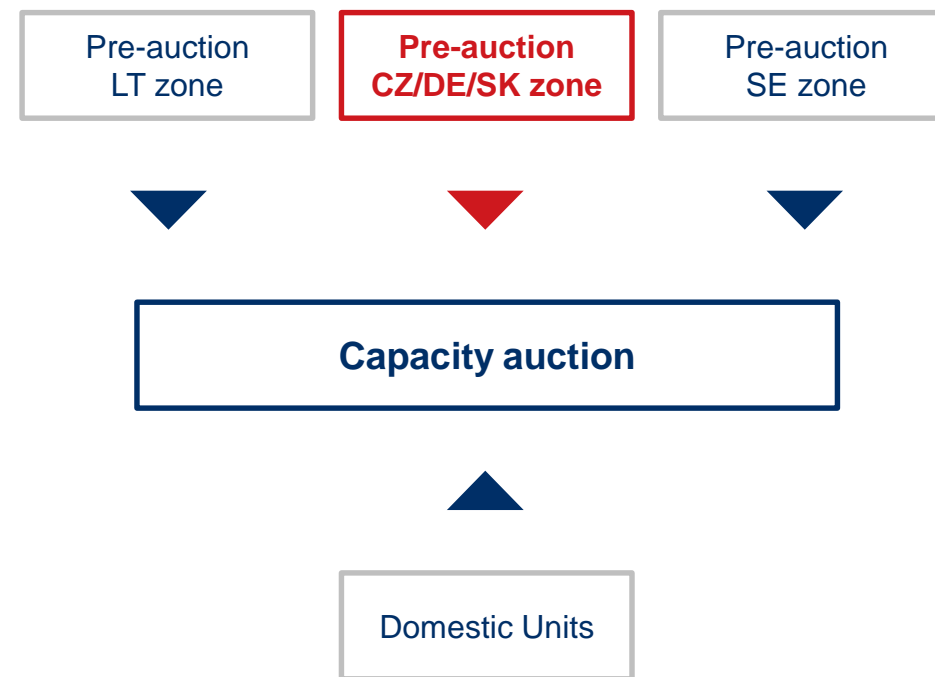




Pre-auction



- In order not to exceed the de-rated interconnection capacity intended for a given auction, a pre-auction was introduced
- Pre-auctions are organised separately for each capacity auction and for each of the three zones, not later than 2 weeks before the main certification begins
- Pre-auction date shall be published by PSE not later than 7 days in advance
- The offer includes offered price (PLN/MW), capacity obligation volume (at least 2 MW), unit's CO₂ emission factor and information on the divisibility of the offer
- Bids in the pre-auction shall be submitted in Polish language in electronic form using the Register and accompanied by a qualified electronic signature
- Submitted offers are arranged based on price criterion (starting from the lowest) and consecutively accepted until the volume of capacity for a given auction is reached





Main certification

Collaterals

Pre-auction

Main certification

Capacity auction

Delivery

Settlements

- The bids accepted in the pre-auction are to be replaced by Capacity Market Units composed of Physical Cross-Border Units. This replacement shall take place by submitting an application in the course of the relevant certification for the main or additional auctions
- A participant of the pre-auction shall **become the Capacity Provider** at the certification stage
- Single pre-auction **bid can be replaced only by single Capacity Market Unit**

	Foreign generating physical unit	Group of foreign generating physical units	Foreign DSR physical unit	Group of foreign DSR physical units
Capacity Market Unit (CMU) type	Existing generating CMU		Proven / Unproven DSR CMU	
Capacity agreement duration	1 Delivery Period			
Min. net capacity	2 MW			
Max. net capacity	n.a.	50 MW	n.a.	50 MW
Max. net capacity of a single unit	n.a.	10 MW	n.a.	





Application content

General information

- Physical Cross-Border Unit's and Capacity Provider's identification data
- Power of attorney (if necessary)

Capacity market unit details

- Net maximum capacity during the delivery period
- Volume of capacity obligation to be offered in the capacity auction (not exceeding the offer in the pre-auction)

Technical and economic parameters

- Emission factors (including CO₂)
- Fixed and operating costs

Confirmations

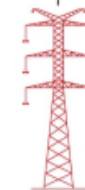
- **Confirmation, stating compliance with the technical parameters and location of all physical cross-border units forming part of the CMU, issued by the TSO**
- **Commitment to provide the PSE with metering/billing data and data regarding generation bids submitted by a physical cross-border unit, issued by the TSO**
- Information confirming the ability of individual physical cross-border generating units to provide net maximum capacity during the delivery period for a continuous period not shorter than 4 hours



**Appendix
7.4**



**Appendix
7.5**





Appendix 7.4.

Appendix 1 to the Agreement – Physical Cross-Border Unit Confirmation

Załącznik 7.4 do Regulaminu Rynku Mocy / Appendix 7.4 to the Capacity Market Rules

Wzór potwierdzenia parametrów technicznych i lokalizacji jednostki fizycznej zagranicznej
Template confirmation of technical parameters and location of a Physical Cross-Border Unit

Potwierdzenie parametrów technicznych i lokalizacji jednostki fizycznej zagranicznej

Confirmation of technical parameters and location of a Physical Cross-Border Unit

Dane operatora systemu przesyłowego właściwego ze względu na lokalizację jednostki fizycznej zagranicznej <i>Details of the transmission system operator within whose territory the Physical Cross-Border Unit is located</i>	
Forma prawna <i>Legal form</i>	
Nazwa / Imię i nazwisko <i>Name / first name and surname</i>	
Oznaczenie organu uprawnionego do reprezentacji <i>Designation of the authorised representation body</i>	
Dane identyfikacyjne <i>Identification data</i>	
Numer Identyfikacji Podatkowej <i>Tax identification number</i>	
REGON <i>REGON number</i>	N/A
KRS / PESEL / Numer paszportu ¹ <i>KRS / PESEL / Passport number</i>	
Numer wpisu do właściwego rejestru siedziby <i>Number of entry in the relevant registry for the TSO's registered office</i>	
Adres siedziby lub miejsca zamieszkania <i>Address of registered office or residence</i>	
Kraj <i>Country</i>	
Kod pocztowy <i>Postcode</i>	
Miejscowość <i>Place</i>	
Ulica <i>Street</i>	
Numer porządkowy <i>House number</i>	

¹ Należy wpisać nazwę właściwego rejestru.
Enter the name of the relevant registry.

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Confirmation of technical parameters and location of a Physical Cross-Border Unit contains:

- Identification data of the transmission system operator within whose territory the Physical Cross-Border Unit is located
- Identification data of the Physical Cross-Border Unit owner
- General data of the Physical Cross-Border Unit
- Location and technical parameters of the Physical Cross-Border Unit

Appendix 7.4 shall be signed by the TSO's representatives





Appendix 7.5.

Appendix 2 to the Agreement – Data Provision Commitment

Załącznik 7.5 do Regulaminu Rynku Mocy / Appendix 7.5 to the Capacity Market Rules

Zobowiązanie do przekazywania danych pomiarowo-rozliczeniowych oraz danych o składanych przez jednostkę fizyczną zagraniczną ofertach wytwarzania lub redukcji poboru energii elektrycznej
Commitment to provide metering/billing data and data regarding electricity generation or consumption reduction bids submitted by a Physical Cross-Border Unit

ZOBOWIĄZANIE COMMITMENT

operatora systemu przesyłowego właściwego ze względu na lokalizację jednostki fizycznej zagranicznej do przekazywania danych pomiarowo-rozliczeniowych oraz danych o składanych przez jednostkę fizyczną zagraniczną ofertach wytwarzania lub redukcji poboru energii elektrycznej

by the relevant transmission system operator within whose territory a Physical Cross-Border Unit is located to provide PSE with metering/billing data and data regarding electricity generation or consumption reduction bids submitted by the Physical Cross-Border Unit

Wskazany niżej Operator systemu przesyłowego, właściwy ze względu na lokalizację jednostki fizycznej zagranicznej, zwany dalej „Operatorem”:

The Transmission System Operator named below, within whose territory the Physical Cross-Border Unit is located, hereinafter referred to as “Operator”:

Dane Operatora Operator's details	
Nazwa Name	
Kraj Country	
Dane identyfikacyjne Identification data	
Forma prawna Legal form	
Numer Identyfikacji Podatkowej Tax identification number	
Nazwa właściwego rejestru Name of relevant registry	
Numer wpisu do właściwego rejestru Number of entry in the relevant registry	
Miejsce i data wpisu we właściwym rejestrze Place and date of entry in relevant registry	
Adres siedziby Registered office address	
Kraj Country	

¹ Pole opcjonalne.
Optional field.

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Strona (Page) 1 z 4

Commitment by the relevant transmission system operator within whose territory a Physical Cross-Border Unit is located to provide PSE with metering/billing data and data regarding electricity generation or consumption reduction bids submitted by the Physical Cross-Border Unit contains:

- Identification data of the transmission system operator within whose territory the Physical Cross-Border Unit is located
- Identification data of the Physical Cross-Border Unit owner
- General data of the Physical Cross-Border Unit
- Location of the Physical Cross-Border Unit

Appendix 7.5 shall be signed by the TSO's representatives

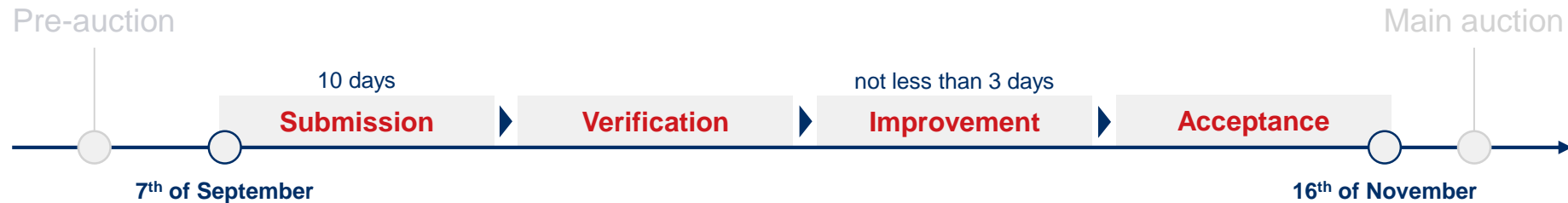




Main certification



- **Main certification for the main auction for delivery year 2025 will take place from 7th of September to 16th of November 2020**
- **Application for certification shall be submitted not later than on the 10th day of main certification**
- If an application is found to fail to meet all the requirements, PSE shall request the Capacity Provider, through the Register, to rectify formal defects or deficiencies of the application setting a time limit of not less than 3 working days
- If the Capacity Provider, while having been requested by the PSE to do so, has not rectified formal defects or deficiencies of the application for certification within the time limit, the PSE shall refuse to issue the certificate
- If the application has met all the requirements, **PSE shall issue a certificate** confirming the establishment of a CMU
- The certificate authorises that CMU to participate in the **upcoming auction and secondary market** during the delivery period
- Capacity Provider shall not be able to withdraw the CMU from the upcoming auction after the certificate has been issued





Collaterals



- **After the CMU has obtained a certificate, collateral established before the pre-auction shall be released:**
 - in full – if the volume of capacity to be offered in the capacity auction equals to the volume of capacity submitted in the replaced pre-auction offer
 - in amount corresponding the volume of capacity to be offered in the capacity auction - if the volume of capacity to be offered in the capacity auction is less than volume of capacity in the replaced pre-auction offer

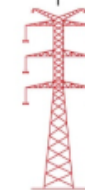
Example

Volume of capacity in the pre-auction offer – **50 MW**

Volume of capacity to be offered in the capacity auction by the CMU replacing the pre-auction offer – **40 MW**

Collateral retained by PSE:

$$(50\,000\text{ kW} - 40\,000\text{ kW}) \times 43\text{ PLN/kW} = 43\,000\text{ PLN (c.a 10\,000 EUR)}$$





Collaterals - Unproven DSR Capacity Market Units



- In regard to an unproven DSR Capacity Market Units, PSE issues a **conditional certificate** which authorises CMU to participate in the upcoming capacity auction after an appropriate collateral is established by the Capacity Provider

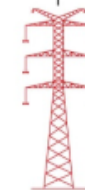
Collateral = Volume of offered capacity × 43 PLN/kW (c.a. 10 EUR)

Cash

**Insurance or bank
guarantee**

**A surety of another
company**

- The collateral may be provided in several forms simultaneously so that it is for an aggregate amount not less than the value required
- The collateral shall be established no later than 10 days before the capacity auction
- PSE releases the collateral if:
 - the unproven DSR CMU has completed the DSR Test or
 - the Capacity Provider submitted a request to expire the certificate after the CMU has not concluded a Capacity Agreement in the course of capacity auction





Capacity auction – basic information



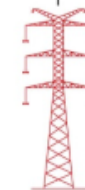
Main auction

- Carried out between 1st and 22nd December $n-5$ year
- Contracts of 1 year duration (for foreign capacity)
- Delivery period: 1 year
- Domestic and foreign units participating

Additional auctions

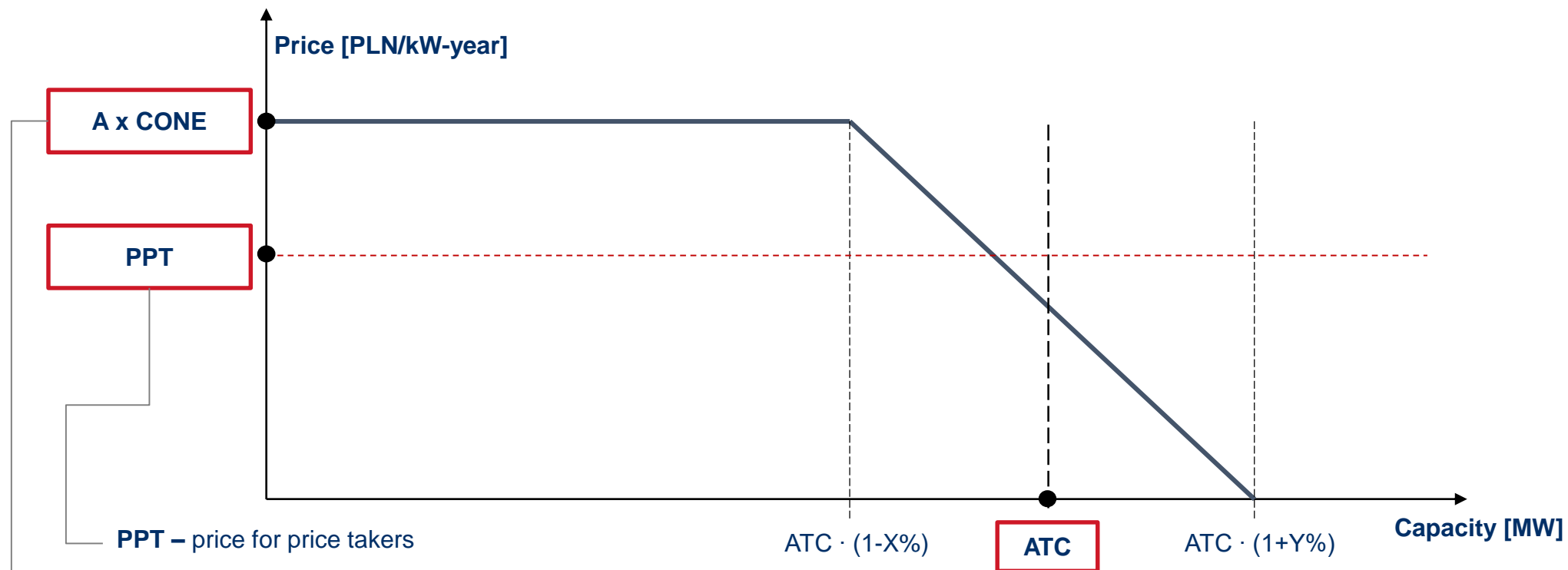
- Four simultaneous auctions (one per each quarter of the delivery year)
- Carried out during 1st quarter in $n-1$ year
- Possibility of concluding capacity agreements for individual quarters of the delivery year
- Domestic and foreign units participating

- The capacity auction is conducted in the form of a **Dutch auction**, with a **single clearing price** for all capacity market units that have won the auction (**pay-as-clear**)
- It consists of number of rounds during which participants can submit an exit bid
- Not submitting an exit bid in given auction round shall be treated as acceptance of the starting price of the next round
- Upon completion of the auction, the Capacity Providers whose units have won the auction, enter into Capacity Agreements with the PSE





Demand curve parameters

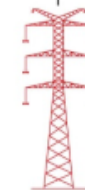


CONE – cost of new entry (price of technology with the lowest fixed costs)

A – multiplier increasing the CONE ($A > 1$)

Auction target capacity – forecasted peak demand in the power system + required level of reserve

X and Y – parameters determining the slope of the curve





Capacity auction parameters



- Parameters of the upcoming capacity auctions are published by the Polish Minister relevant for Energy no later than 18 weeks before the main auction.

Demand curve parameters

Parameters determining the auction demand curve

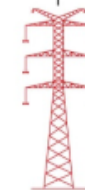
De-rating factors
for individual CMU technologies

De-rating factors reflect the averaged capacity availability for individual CMU technologies and set the maximum value of capacity a CMU representing specific type of technology may offer in the capacity market

**Volume of capacity to be procured
in capacity auction from each zone**

The volume of capacity that shall be made available to Capacity Providers during the pre-auction

- Parameters of main auction for delivery year 2025 shall be published no later than on the 10th of August 2020.
- After publication, auction parameters will be available [here](#)





Capacity auction – participation of foreign capacity

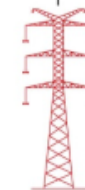
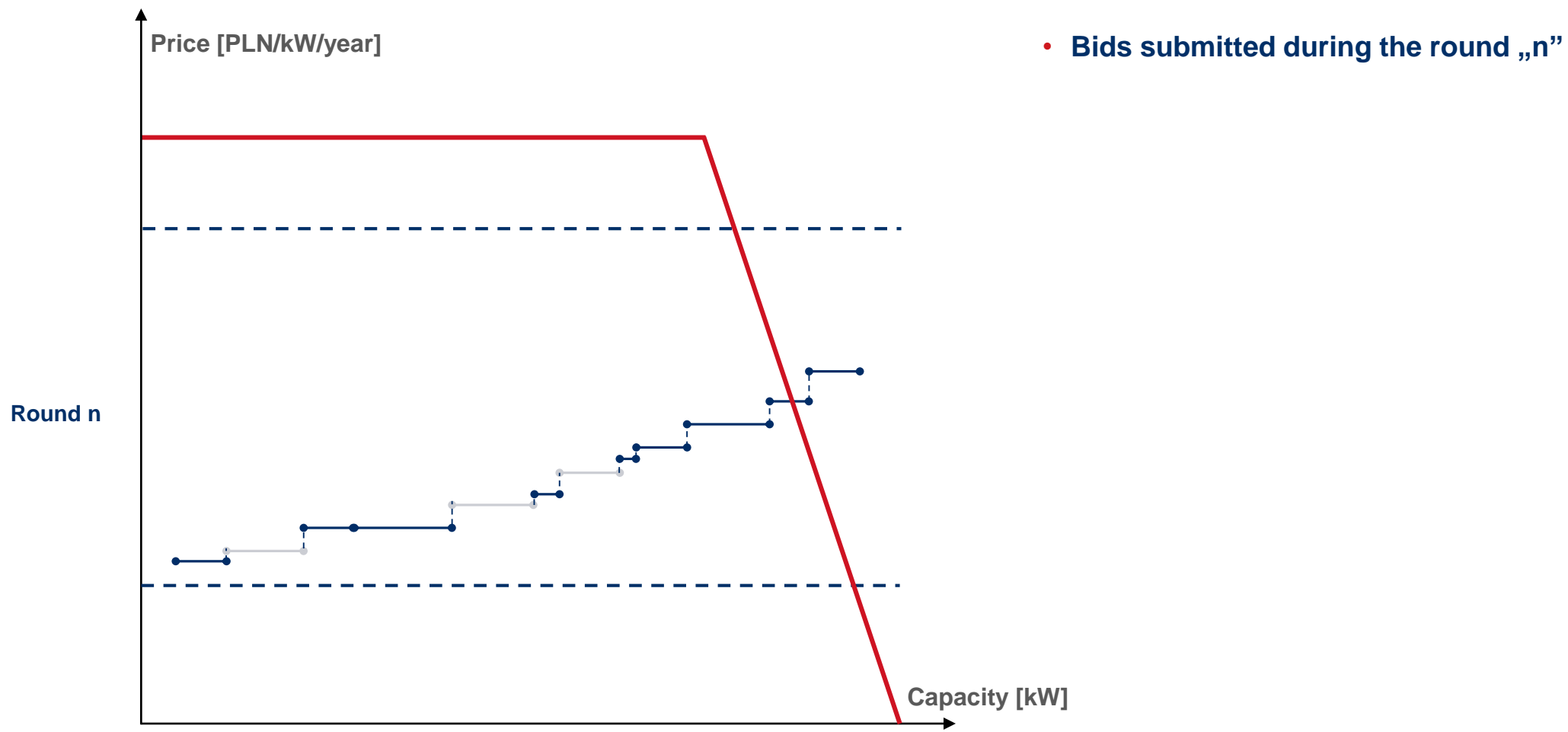


- Capacity auctions are held with the use of Register
- CMUs which were awarded a certificate authorising to participate in the capacity auction are automatically entered into it, there is no possibility to withdraw CMU from participating in the auction on this stage.
- **CMUs comprising Physical Cross-Border Units participate in the capacity auction in a passive way – their offer in the pre-auction is directly transferred into the capacity auction**
- **During the capacity auction, Capacity Provider is not obliged to take any action**
- If the auction clearing price is higher than the one offered by Capacity Provider during the pre-auction, given CMU wins the auction, if not, CMU does not win the auction and is not granted with the capacity agreement



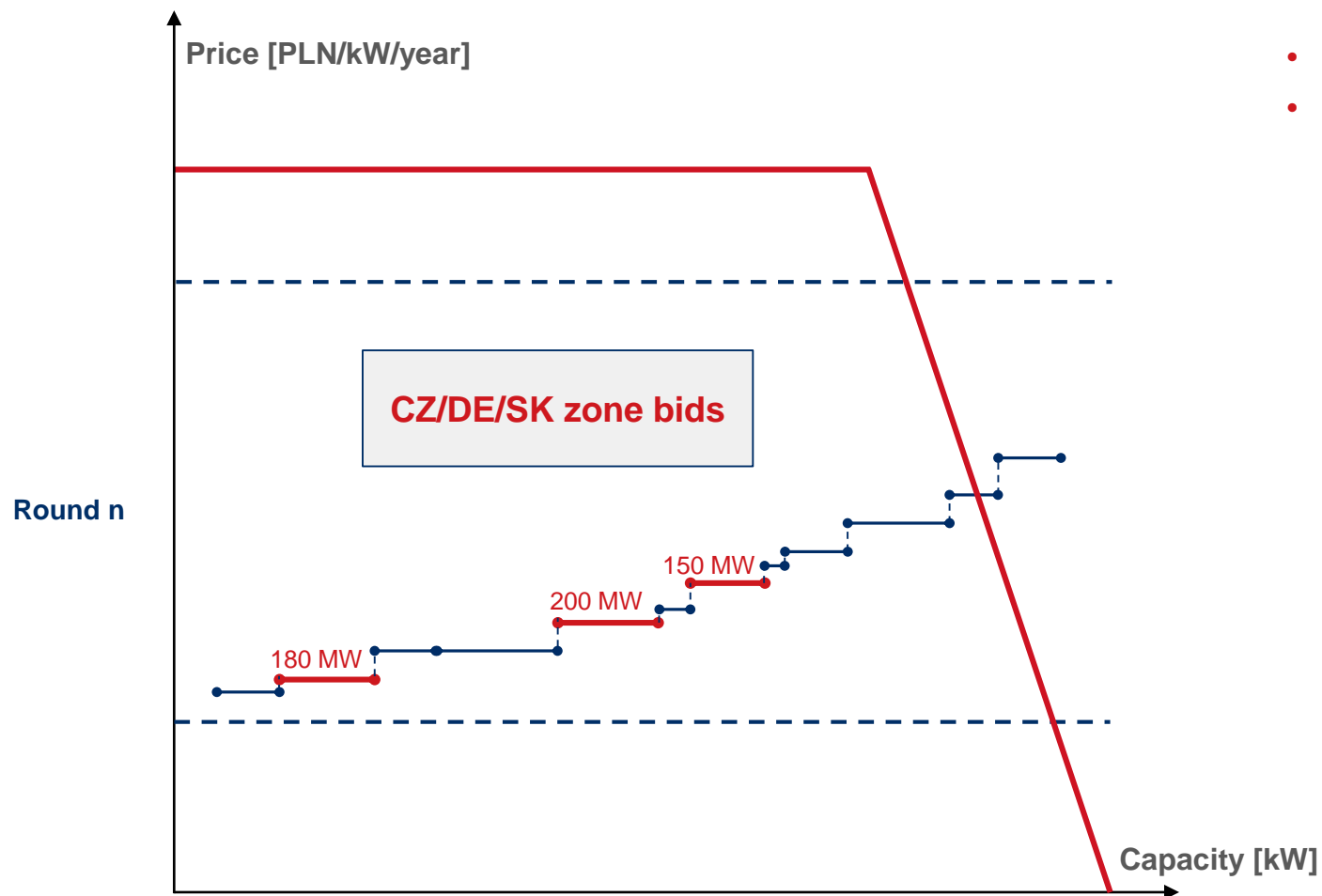


Capacity auction clearing - example

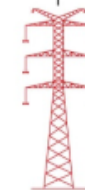




Capacity auction clearing - example

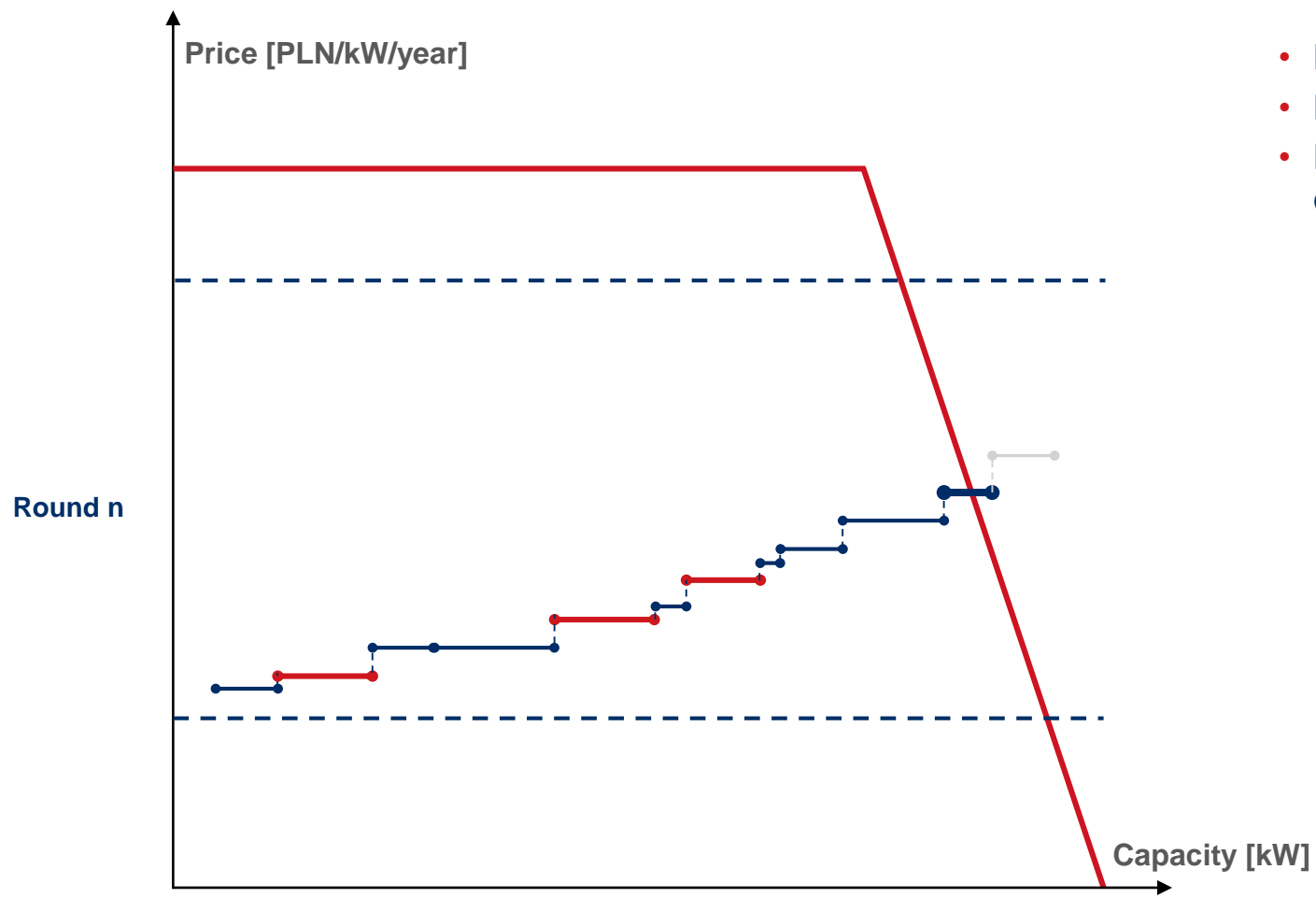


- Bids submitted during the round „n”
- **Bids directly entered from the pre-auction**

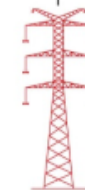




Capacity auction clearing - example



- Bids submitted during the round „n”
- Bids directly entered from the pre-auction
- **Bids winning the auction - the bid crossing the curve has been accepted**





Capacity auction clearing - example

Collaterals

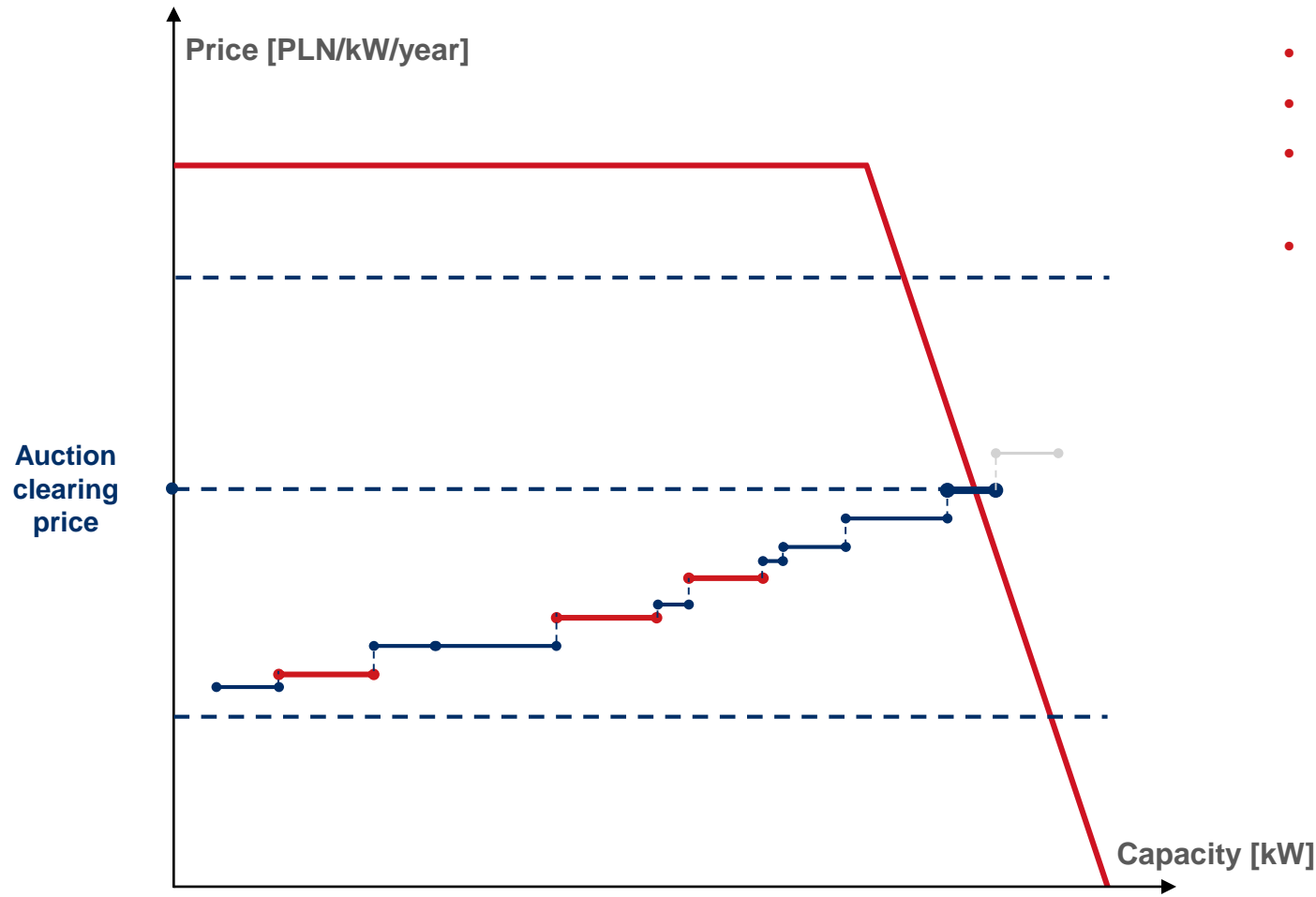
Pre-auction

Main certification

Capacity auction

Delivery

Settlements



- Bids submitted during the round „n”
- Bids directly entered from the pre-auction
- Bids winning the auction - the bid crossing the curve has been accepted
- **The auction clearing price is the price of the last accepted exit bid**





Capacity auction clearing - example

Collaterals

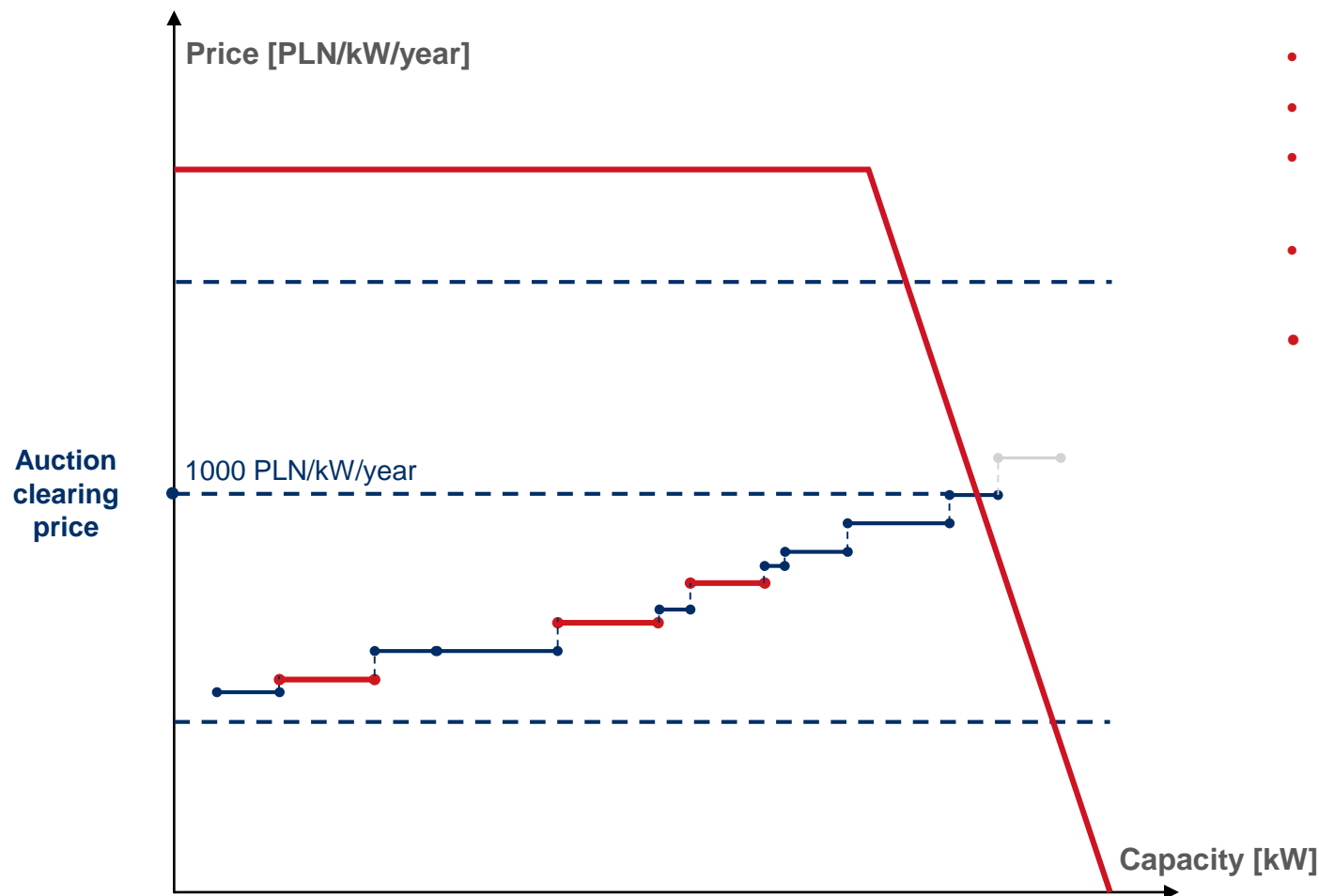
Pre-auction

Main certification

Capacity auction

Delivery

Settlements



- Bids submitted during the round „n”
- Bids directly entered from the pre-auction
- Bids winning the auction - the bid crossing the curve has been accepted
- The auction clearing price is the price of the last accepted exit bid
- Capacity auction results in different clearing prices:
 - **Price paid to domestic CMUs (auction clearing price)**





Capacity auction clearing - example

Collaterals

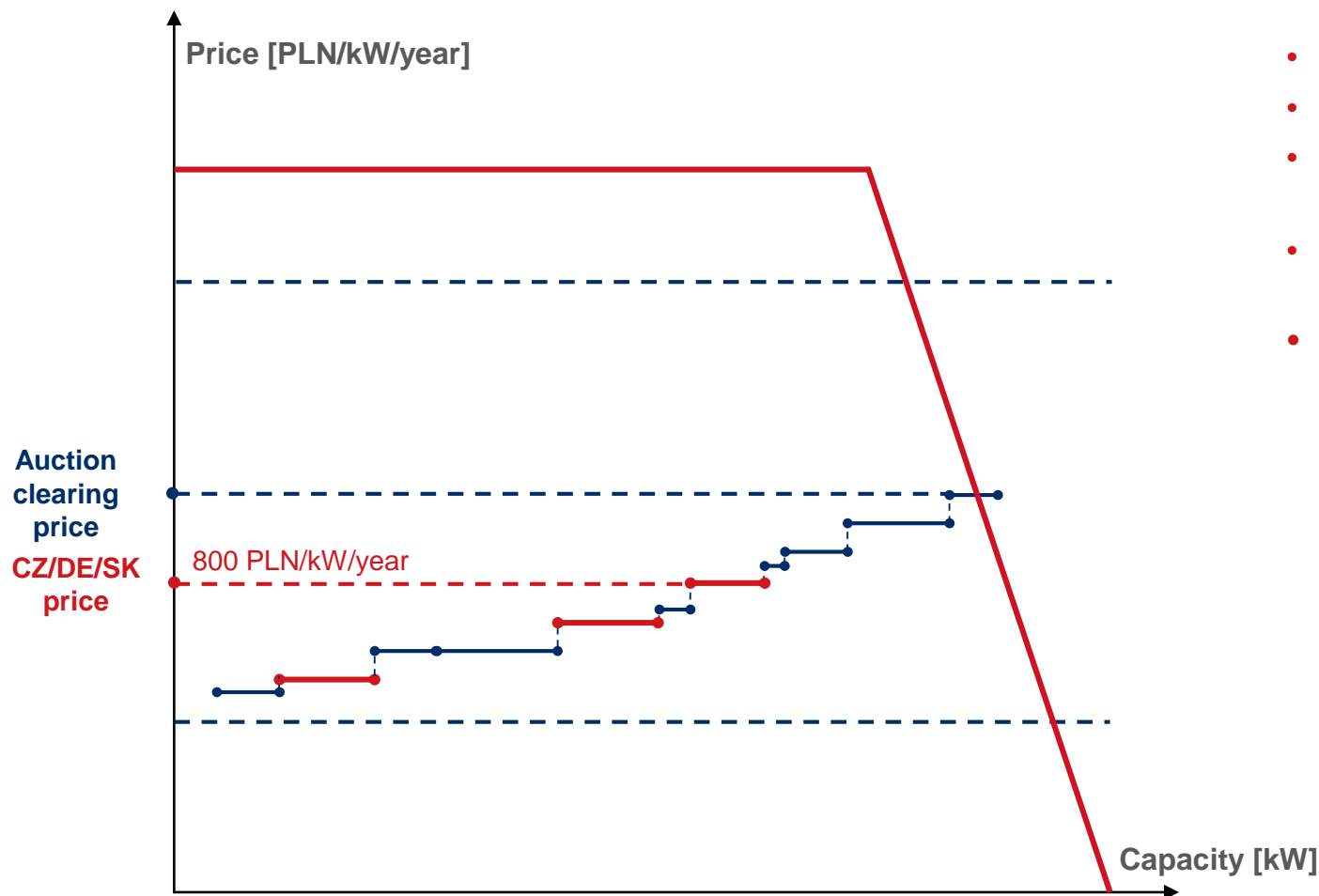
Pre-auction

Main certification

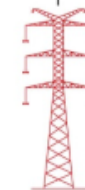
Capacity auction

Delivery

Settlements



- Bids submitted during the round „n”
- Bids directly entered from the pre-auction
- Bids winning the auction - the bid crossing the curve has been accepted
- The auction clearing price is the price of the last accepted exit bid
- Capacity auction results in different clearing prices:
 - Price paid to domestic CMUs (auction clearing price)
 - Price paid to foreign CMUs from the CZ/DE/SK zone (the highest price of all winning bids from the CZ/DE/SK zone)





Capacity auction clearing - example

Collaterals

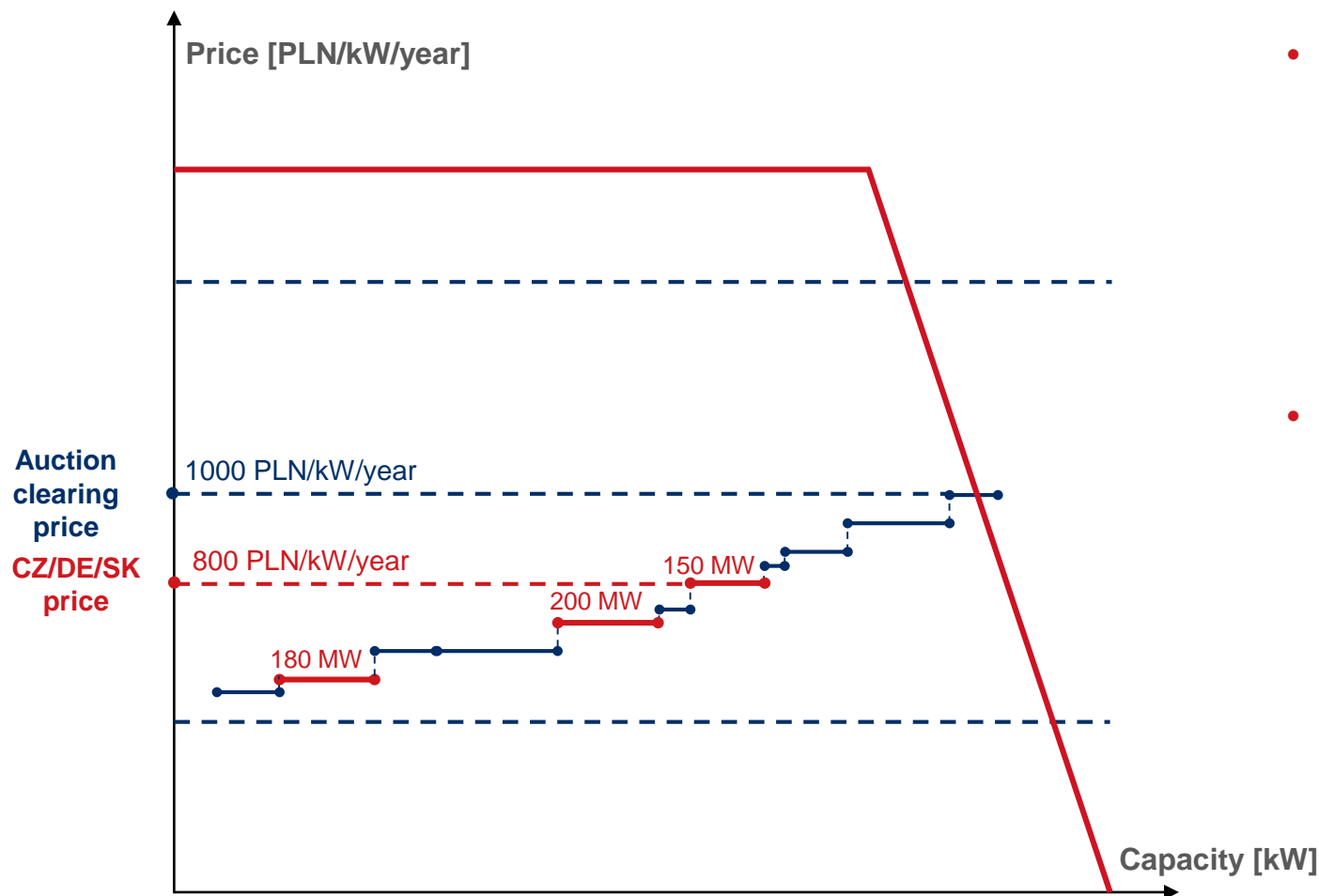
Pre-auction

Main certification

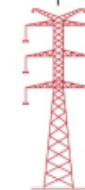
Capacity auction

Delivery

Settlements

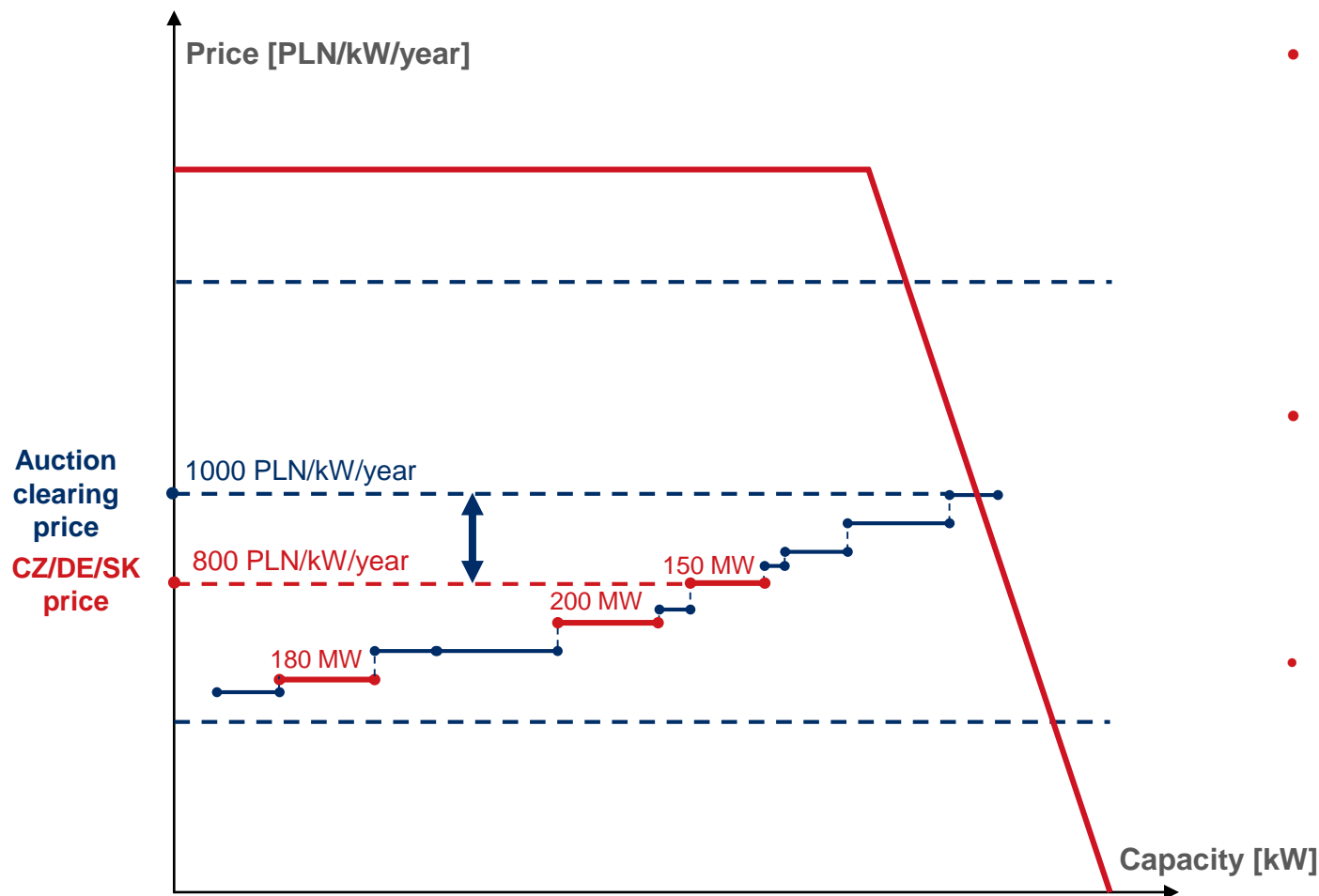


- Capacity auction results in different clearing prices:
 - Price paid to domestic CMUs (auction clearing price)
 - Price paid to foreign CMUs from the CZ/DE/SK zone (the highest price of all winning bids from the CZ/DE/SK zone)
- Remuneration for foreign CMUs from the CZ/DE/SK zone:
 - CMU1 150 000 kW × 800 PLN/kW/year
 - CMU2 200 000 kW × 800 PLN/kW/year
 - CMU3 180 000 kW × 800 PLN/kW/year

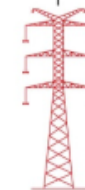




Capacity auction clearing - example



- Capacity auction results in different clearing prices:
 - Price paid to domestic CMUs (auction clearing price)
 - Price paid to foreign CMUs from the CZ/DE/SK zone (the highest price of all winning bids from the CZ/DE/SK zone)
- Remuneration for foreign CMUs from the CZ/DE/SK zone:
 - CMU1 150 000 kW × 800 PLN/kW/year
 - CMU2 200 000 kW × 800 PLN/kW/year
 - CMU3 180 000 kW × 800 PLN/kW/year
- The difference between auction clearing price and clearing price for foreign CMUs from the CZ/DE/SK zone constitute the remuneration due to PSE all TSOs involved





Capacity auction results

- **Provisional capacity auction results** are published by PSE on our website within 3 working days from the conclusion of the capacity auction
- The capacity agreement shall be deemed concluded at the time at which the provision results are announced, under the condition precedent that announcement of the final results of the auction has been made
- The Polish President of ERO shall announce the **final results of the capacity auction** on its website, on the first working day following the 21st day from the completion of the capacity auction



- After winning the capacity auction, an unproven DSR Capacity Market Unit must pass a demand-side response test (DSR Test)

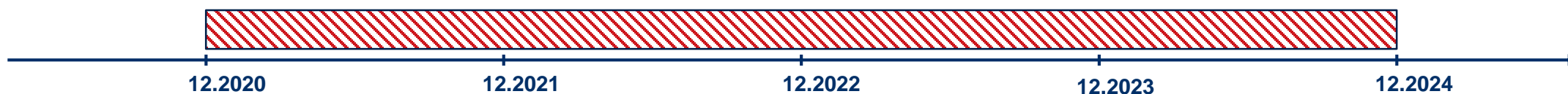




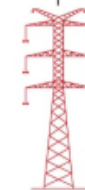
Demand-side response test



- The DSR Test shall be carried out for:
 - a single Physical Cross-Border DSR Unit that independently forms an unproven DSR Capacity Market Unit or
 - a group of Physical Cross-Border DSR Units that jointly form an unproven DSR Capacity Market Unit
- **DSR Test shall be performed no later than one month before the start of the delivery period**

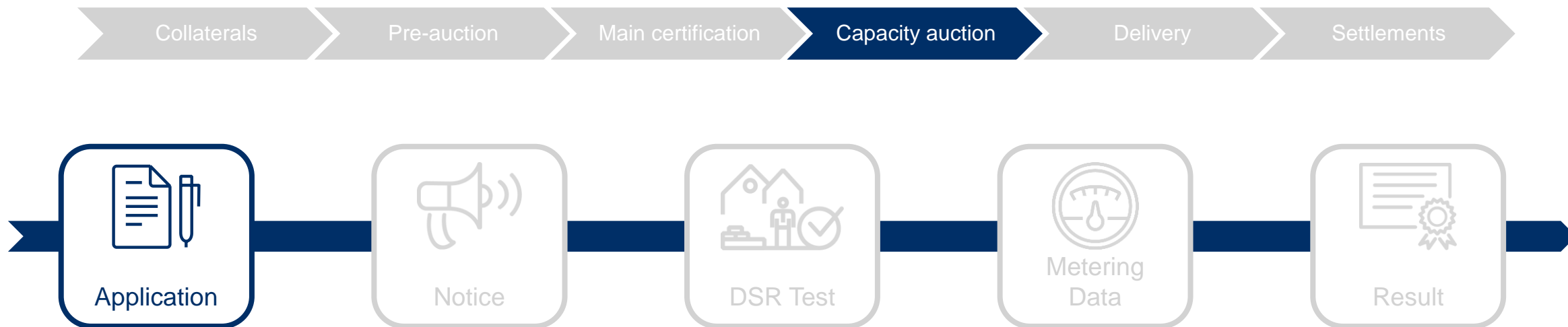


- PSE shall not refund any costs of the DSR Test
- Confirmation of completion of the DSR Test shall be issued in electronic form with the use of the register and **valid for 5 years**

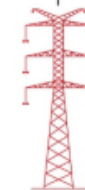




Demand-side response test

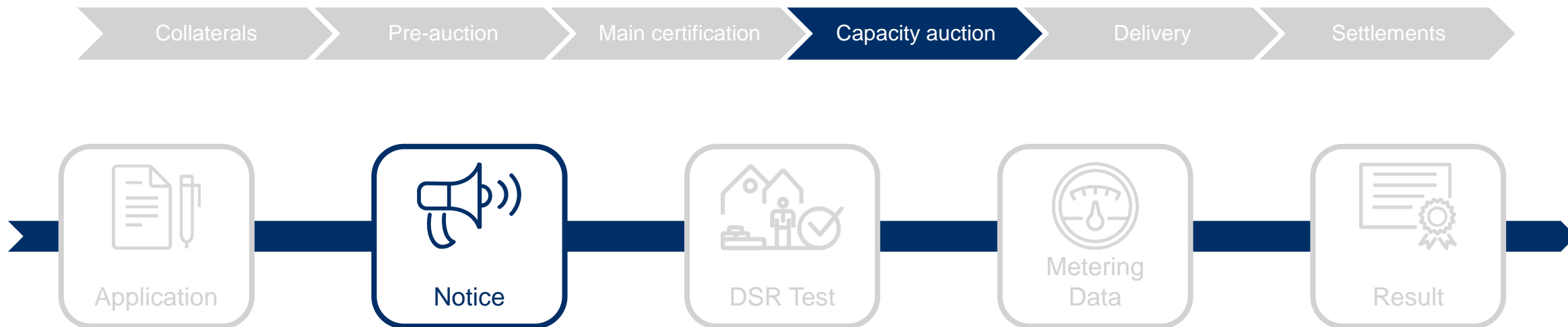


- DSR Test shall be performed following an application submitted by Capacity Provider to PSE
- Application shall be submitted through the Register and contain i.e. identification data of the party submitting the application, the CMU code, designation of the method of calculating the volume of capacity delivered
- Application shall be verified within 7 calendar days upon it's submission





Demand-side response test

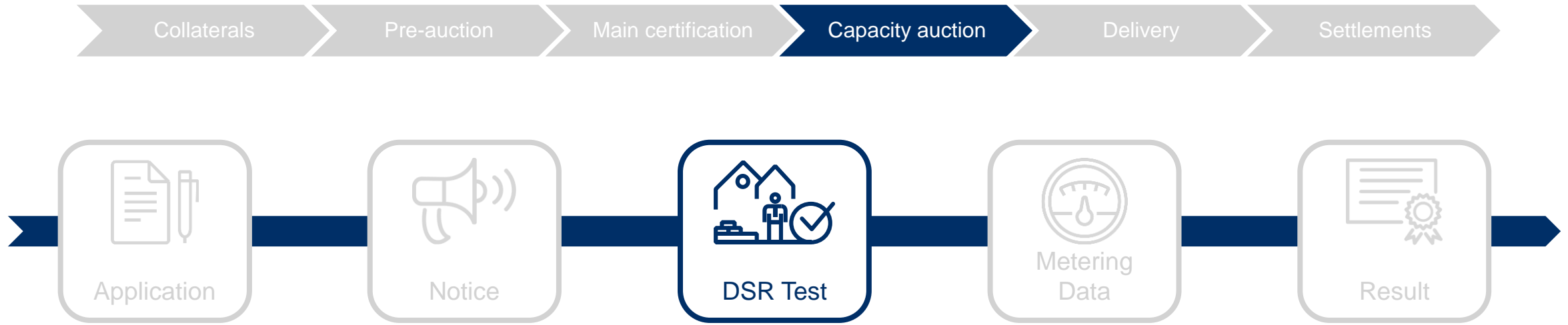


- PSE shall issue a notice to carry out the DSR Test, no later than 14 working days after the DSR Test application is verified positively
- If the method of calculating the volume of capacity delivered as a result of temporary reduction of capacity demand from the grid requires plans of electricity supply to physical demand side response units covered by the application to be submitted to the PSE, the time limit mentioned above shall be extended by a time period necessary
- The notice to carry out the DSR Test shall be communicated to the **telephone number** and **e-mail address** stated in the application, not later than **8 hours before its commencement**





Demand-side response test

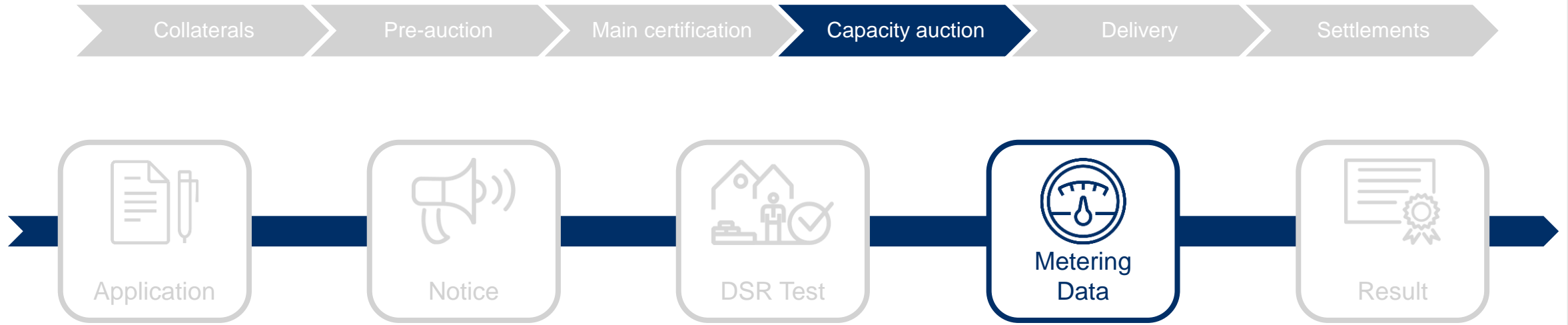


- DSR Test shall be carried out for a continuous period of 1 hour
- DSR Test shall be carried out only between 7 a.m. and 10 p.m. on Working Days





Demand-side response test

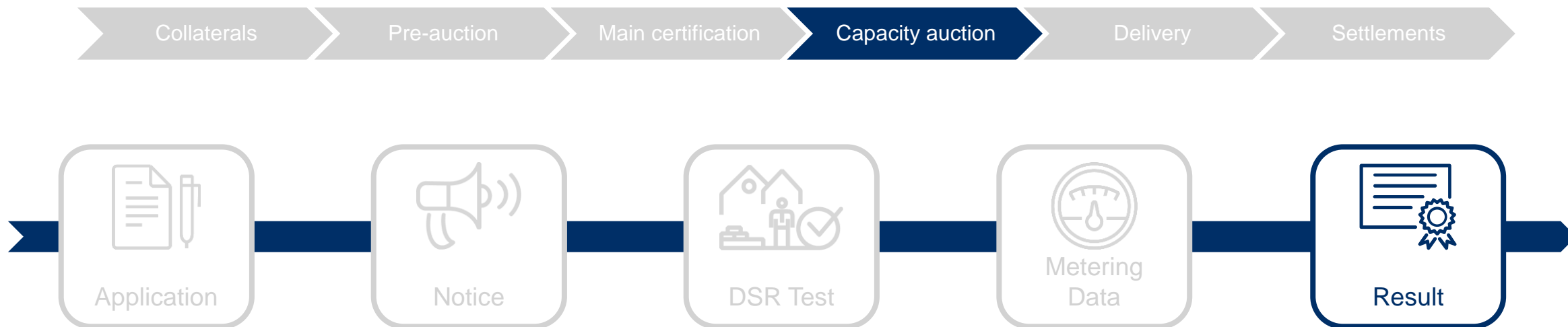


- TSO shall provide PSE with the metering data necessary to verify the DSR Test performance





Demand-side response test



- PSE shall communicate the result no later than **14 calendar days after the DSR test date**, stating the volume of capacity delivered to the system during the DSR Test
- **Confirmation of completion of the DSR Test** shall be issued electronically and delivered to the Capacity Provider through the Register
- **Confirmation of completion of the DSR Test shall be valid for 5 years**
- The 5 year validity period shall begin to run from delivering the capacity obligation volume at least equal to the adjusted capacity obligation of the CMU concerned during the system stress event, test system stress event or demonstration

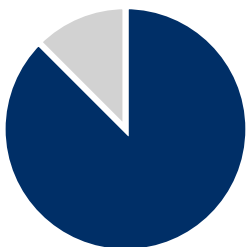




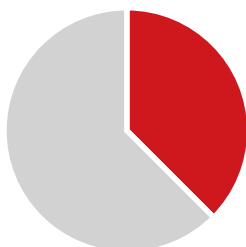
Demand-side response test



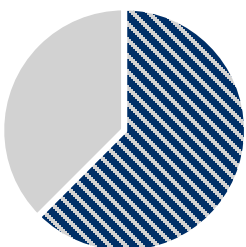
DSR Test result:



- **positive – capacity delivery of volume not lower than 80% of the product of the attainable capacity and the de-rating factor:**
 - Confirmation of completion of the DSR Test
 - Collateral release



- **negative – capacity delivery of volume lower than 80% of the product of the attainable capacity and the de-rating factor:**
 - PSE retains the collateral
 - Capacity Agreement shall be terminated



- **capacity delivery of volume not lower than 50% of the product of the attainable capacity and the de-rating factor:**
 - Confirmation of completion of the DSR Test (upon the Capacity Provider's request)
 - Capacity Obligation, remuneration and CMU's attainable capacity shall be decreased
 - Collateral relating to the delivered capacity shall be released, the remaining part is retained by PSE





System stress event

Collaterals

Pre-auction

Main certification

Capacity auction

Delivery

Settlements



A system stress event is an hour in which the available dispatchable capacity reserve is lower than the required level of capacity reserve margin



Mon. – Fri.
7 a.m. – 10 p.m.

System stress event may be announced in reference to hours between 7 a.m. and 10 p.m. during Working Days

15

Maximum number of system stress events per day

www.pse.pl
www.purm.pse.pl

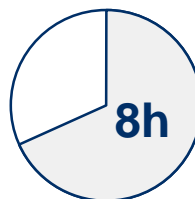


SMS



e-mail

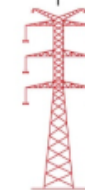
PSE announces the system stress event on their website and in the Register (capacity providers receive e-mail notification and SMS as well)



The system stress event is announced at least 8 hours in advance

$DACO \geq ACO$

Capacity Market Units are requested to deliver capacity in amount not less than the adjusted capacity obligation of a given unit





Adjusted Capacity Obligation



- Along with the system stress event announcement, PSE provides data required to determine the ACO (Adjusted Capacity Obligation) that given capacity market unit shall deliver

$$ACO = \min \left(1, \frac{P_{OZ} - W_{NJRM}}{\sum_n CO_{JRM} - UR_{JRM}} \right) \times CO$$

where:

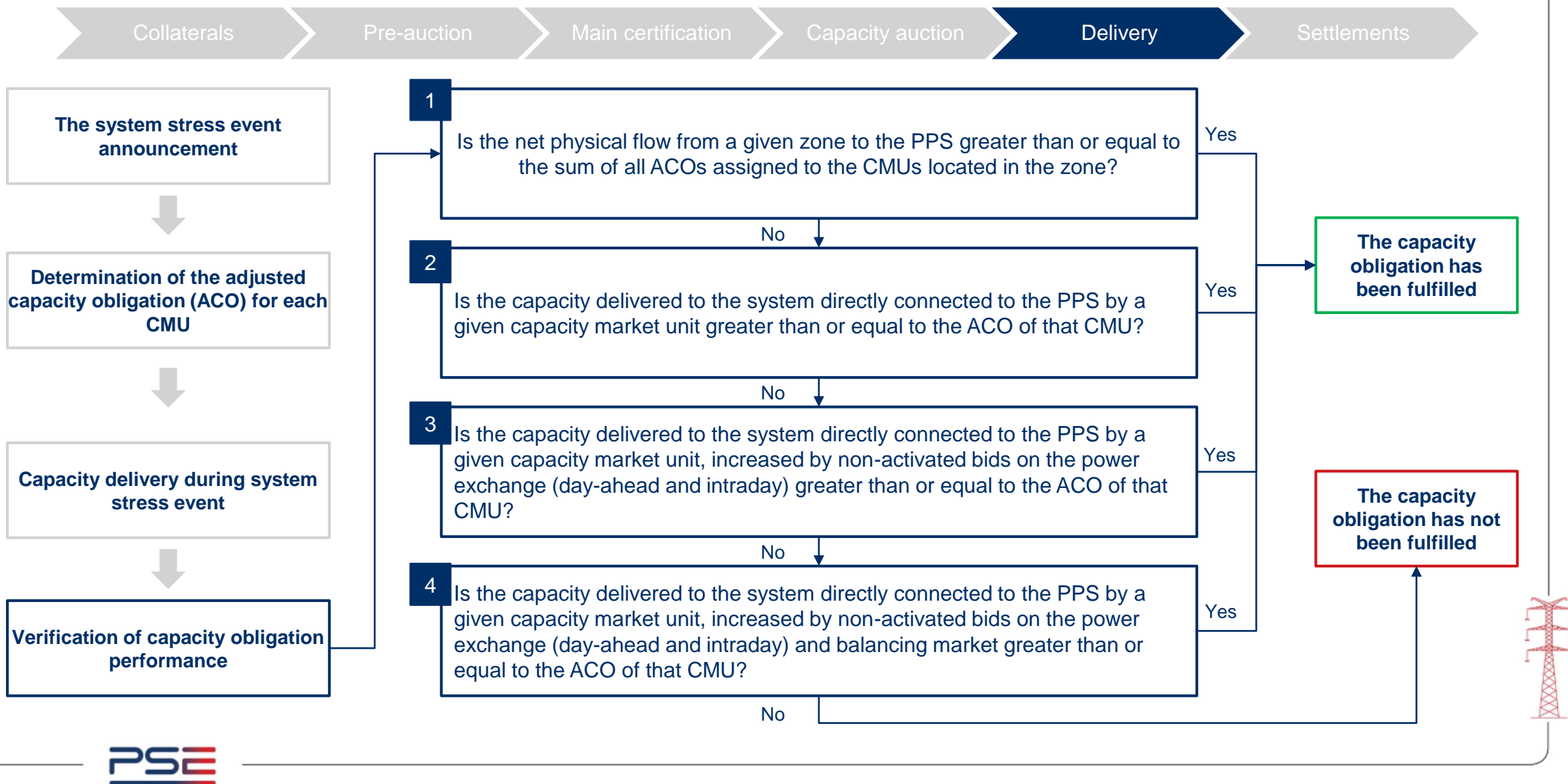
- ACO – means the adjusted capacity obligation of given capacity market unit in a given system stress event,
- CO – means the capacity obligation of given capacity market unit in a given system stress event,
- P_{OZ} – means the average forecasted grid demand in PPS in a given system stress event,
- W_{NJRM} – means the average forecasted capacity delivered to the grid by generating assets not covered by capacity obligations,
- CO_{JRM} – means the capacity obligation of the n-th capacity market unit in a given system stress event, covered by capacity obligations,
- UR_{JRM} – means the sum of unavailable capacities of capacity market units in a given system stress event

- After the System Stress Event announcement, PSE cannot cancel the System Stress Event or change the data used to determine ACO





Capacity Obligation performance

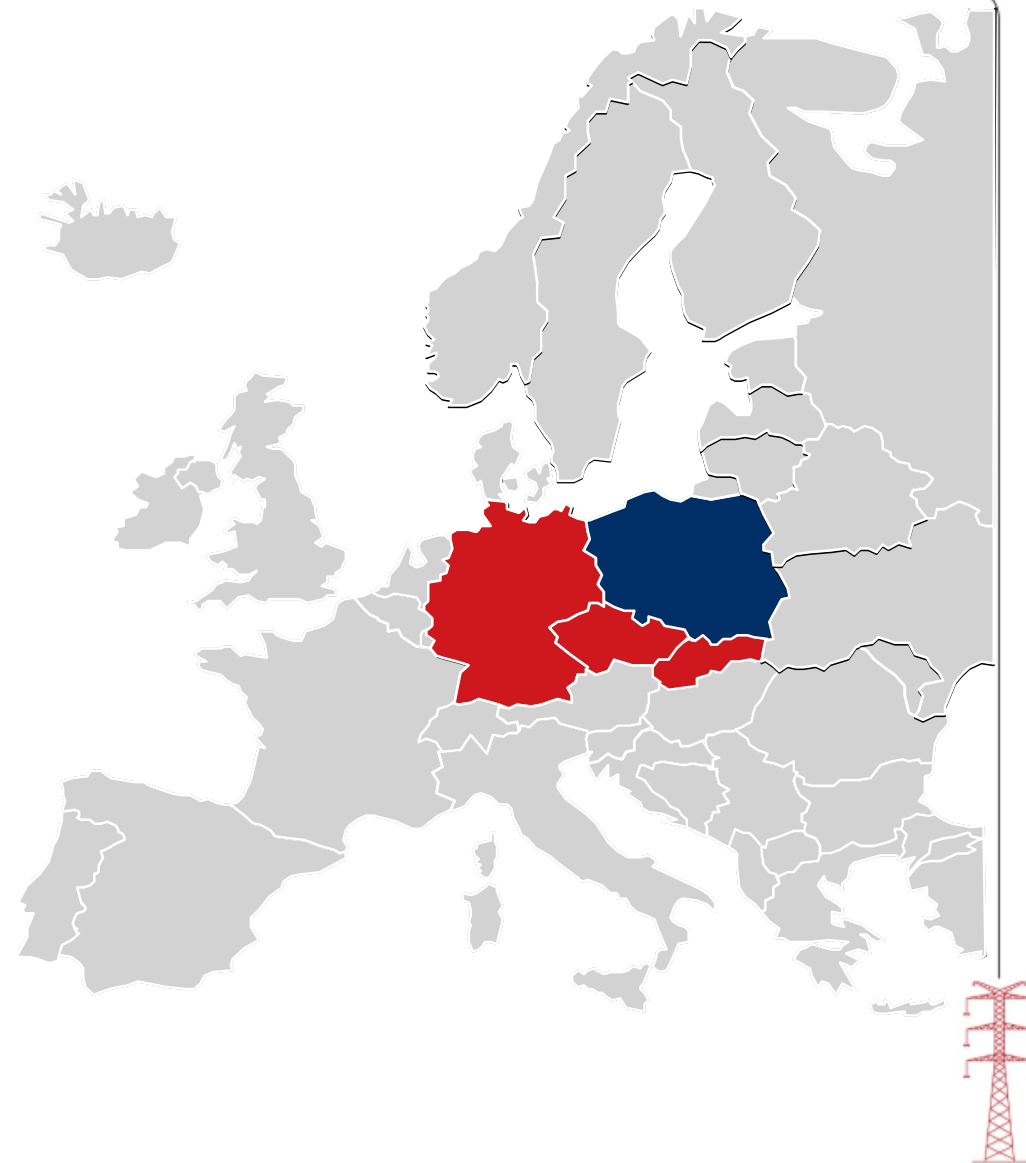




Net physical flow

- The first step of the verification of the capacity obligation performance by CMUs located within the CZ/DE/SK zone shall be carried out based on the **net physical flow from the CZ/DE/SK zone to the Polish Power System (PPS)**
- The net physical flow will be verified based on the metering data from measuring points located on the CZ/DE/SK borders
- Capacity flowing in the PPS increases the value of the net physical flow and the one flowing out of the PPS, decreases it
- There are no obligations on TSOs to provide extra transmission capacity on the CZ/DE/SK borders in order to meet the needs of capacity market. Capacity market works parallel to the Energy market and shall not influence its results

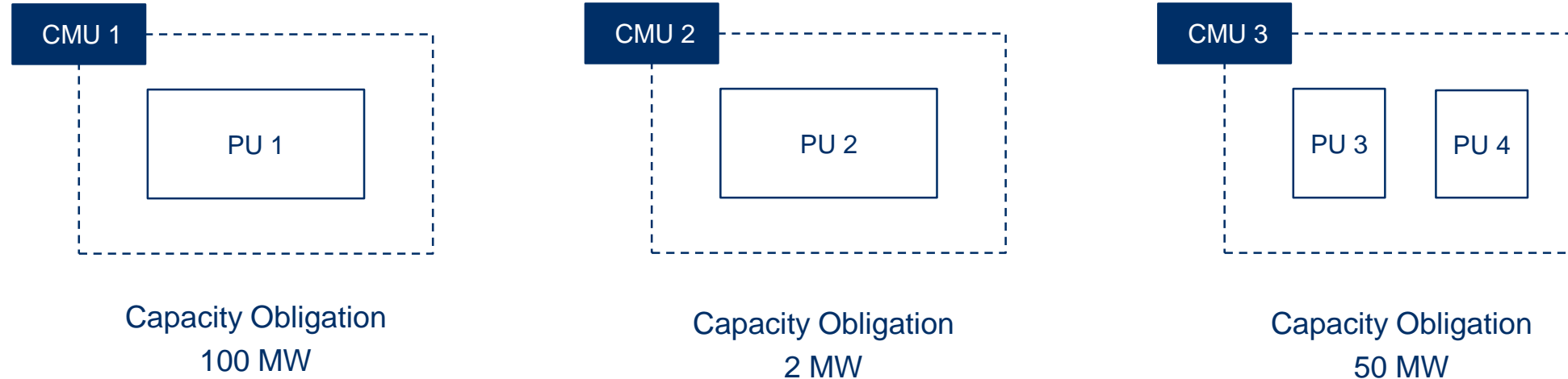
If the net physical flow from the CZ/DE/SK zone to the PPS during the system stress event exceeded the sum of ACOs assigned to CMUs located within it in that system stress event, it is assumed that all CMUs had performed their capacity obligation in full





Examples – basic assumptions

- In the course of capacity auction, three CMUs comprising physical cross-border units (PU) located within the CZ/DE/SK zone are covered by capacity obligation



Presentation includes examples of possible results of capacity obligation performance verification depending on capacity provider's actions during the system stress event





System stress event - assumptions

The system stress event announcement

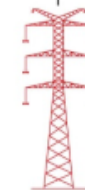


Determination of the adjusted capacity obligation (ACO) for each CMU

- PSE announces a **system stress event** between 18:00 and 19:00
- System stress event announcement shall be sent no later than 8 hours before it's commencement
- PSE has notified capacity providers at 10:00 (8 hours in advance)
- Along with the system stress event announcement, PSE provides data required to determine the ACO (volume of that given CMU shall deliver). Volume of ACO cannot exceed CMU's capacity obligation
- ACO was set as **80% of CMU's capacity obligation**

	Capacity Obligation	Sum of Capacity Obligations assigned to CMUs located within the CZ/DE/SK zone	ACO	Sum of ACOs assigned to CMUs located within the CZ/DE/SK zone
CMU 1	100 MW	152 MW	$0,8 \times 100 \text{ MW} = 80 \text{ MW}$	121,6 MW
CMU 2	2 MW		$0,8 \times 2 \text{ MW} = 1,6 \text{ MW}$	
CMU 3	50 MW		$0,8 \times 50 \text{ MW} = 40 \text{ MW}$	

- Each CMU is obliged to deliver its ACO during the system stress event
- After the system stress event has ended, PSE proceeds to verify the adjusted capacity obligation performance of each CMU





Examples description

Example 1

- During the system stress event, **net physical flow** from the CZ/DE/SK zone to the PPS was **greater than sum of ACOs** assigned to CMUs located within it

Example 2

- During the system stress event, net physical flow from the CZ/DE/SK zone to the PPS was lower than sum of ACOs assigned to CMUs located within it
- CMU 1 delivered capacity to the system in volume greater than its ACO
- CMU 2 and CMU 3 delivered capacity to the system in volume less than their ACOs
- Both CMU 2 and CMU 3 participate in power exchange and balancing market

Example 3

- During the system stress event, net physical flow from the CZ/DE/SK zone to the PPS was greater than sum of ACOs assigned to CMUs located within it
- CMU 1 delivered capacity to the system in volume greater than its ACO
- CMU 2 and CMU 3 delivered capacity to the system in volume less than their ACOs
- CMU 2 participates in power exchange and balancing market
- CMU 3 participates only in power exchange





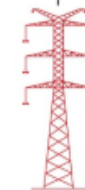
Verification of the capacity obligation performance – example 1

Step 1 – PSE verifies if the **net physical flow from the CZ/DE/SK zone to the PPS** during the system stress event was not lower than the sum of ACOs assigned to CMUs located within it

	Capacity Obligation [MW]	ACO [MW]	Sum of ACOs assigned to CMUs [MW]	Net physical flow to PPS [MW]	Capacity delivered to the CZ or DE or SK power system [MW]	Non-activated bids on the power exchange [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange [MW]	Non-activated bids on the balancing market [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange and balancing market [MW]	Penalty
CMU 1	100	80	121,6	240	n/a	n/a	n/a	n/a	n/a	No
CMU 2	2	1,6			n/a	n/a	n/a	n/a	n/a	No
CMU 3	50	40			n/a	n/a	n/a	n/a	n/a	No

- Net physical flow from the CZ/DE/SK zone to the PPS during the system stress event was greater to the sum of ACOs assigned to CMUs located within it
- No further verification is needed

**All CMUs had performed their capacity obligation
No one shall be penalized**





Examples description

Example 1

- During the system stress event, net physical flow from the CZ/DE/SK zone to the PPS was greater than sum of ACOs assigned to CMUs located within it

Example 2

- During the system stress event, **net physical flow** from the CZ/DE/SK zone to the PPS was **lower than sum of ACOs** assigned to CMUs located within it
- CMU 1 delivered capacity to the system in volume greater than its ACO
- CMU 2 and CMU 3 delivered capacity to the system in volume lower than their ACOs
- Both CMU 2 and CMU 3 participate in power exchange and balancing market

Example 3

- During the system stress event, net physical flow from the CZ/DE/SK zone to the PPS was greater than sum of ACOs assigned to CMUs located within it
- CMU 1 delivered capacity to the system in volume greater than its ACO
- CMU 2 and CMU 3 delivered capacity to the system in volume less than their ACOs
- CMU 2 participates in power exchange and balancing market
- CMU 3 participates only in power exchange.





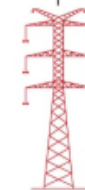
Verification of the capacity obligation performance – example 2

Step 1 – PSE verifies if the **net physical flow from the CZ/DE/SK zone to the PPS** during the system stress event was not lower than the sum of ACOs assigned to CMUs located within it

	Capacity Obligation [MW]	ACO [MW]	Sum of ACOs assigned to CMUs [MW]	Net physical flow to PPS [MW]	Capacity delivered to the CZ or DE or SK power system [MW]	Non-activated bids on the power exchange [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange [MW]	Non-activated bids on the balancing market [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange and balancing market [MW]	Penalty
CMU 1	100	80	121,6	100						
CMU 2	2	1,6								
CMU 3	50	40								

- Net physical flow from the CZ/DE/SK zone to the PPS during the system stress event was lower than the sum of ACOs assigned to CMUs located within it
- Result of step 1 defines that capacity obligation had not been fulfilled.
- Verification proceeds to the next step - to check which CMUs had not performed its capacity obligation

Step 2 of the verification





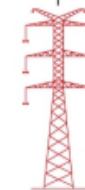
Verification of the capacity obligation performance – example 2

Step 2 – PSE verifies if each CMU had **delivered capacity to the CZ or DE or SK power system** in volume not lower than its ACO

	Capacity Obligation [MW]	ACO [MW]	Sum of ACOs assigned to CMUs [MW]	Net physical flow to PPS [MW]	Capacity delivered to the CZ or DE or SK power system [MW]	Non-activated bids on the power exchange [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange [MW]	Non-activated bids on the balancing market [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange and balancing market [MW]	Penalty
CMU 1	100	80	121,6	100	90	n/a	n/a	n/a	n/a	No
CMU 2	2	1,6								
CMU 3	50	40								

- Step 2 is being held independently in relation to each CMU
- CMU 1 had delivered 90 MW to the CZ or DE or SK power system during the system stress event, which is greater than its ACO (80 MW)

CMU 1 had performed its capacity obligation, no further verification is conducted in relation to that CMU





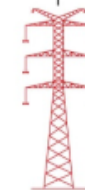
Verification of the capacity obligation performance – example 2

Step 2 – PSE verifies if each CMU had **delivered capacity to the CZ or DE or SK power system** in volume not lower than its ACO

	Capacity Obligation [MW]	ACO [MW]	Sum of ACOs assigned to CMUs [MW]	Net physical flow to PPS [MW]	Capacity delivered to the CZ or DE or SK power system [MW]	Non-activated bids on the power exchange [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange [MW]	Non-activated bids on the balancing market [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange and balancing market [MW]	Penalty
CMU 1	100	80	121,6	100	90	n/a	n/a	n/a	n/a	No
CMU 2	2	1,6			1					
CMU 3	50	40			20					

- CMU 2 had delivered only 1 MW to the CZ or DE or SK power system during the system stress event, which is less than its ACO (1,6 MW)
- CMU 3 had delivered only 20 MW to the CZ or DE or SK power system during the system stress event, which is less than its ACO (40 MW)

Capacity obligation performance by CMU 2 and CMU 3 shall be further verified





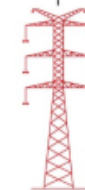
Verification of the capacity obligation performance – example 2

Step 3 – PSE verifies if capacity delivered to the to the CZ or DE or SK power system by a given CMU, increased by **submitted, non-activated bids on the power exchange (day-ahead and intraday)** was greater than or equal to its ACO

	Capacity Obligation [MW]	ACO [MW]	Sum of ACOs assigned to CMUs [MW]	Net physical flow to PPS [MW]	Capacity delivered to the CZ or DE or SK power system [MW]	Non-activated bids on the power exchange [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange [MW]	Non-activated bids on the balancing market [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange and balancing market [MW]	Penalty
CMU 1	100	80	121,6	100	90	n/a	n/a	n/a	n/a	No
CMU 2	2	1,6			1	1	2	n/a	n/a	No
CMU 3	50	40			20					

- CMU 2 had submitted a volume of 1 MW in bids on the power exchange which had not been activated during given system stress event
- Capacity delivered to the system by CMU 2, increased by its submitted, non-activated bids on the power exchange equals 2 MW which is greater than its ACO (1,6 MW)

CMU 2 had performed its capacity obligation





Verification of the capacity obligation performance – example 2

Step 3 – PSE verifies if capacity delivered to the to the CZ or DE or SK power system by a given CMU, increased by **submitted, non-activated bids on the power exchange (day-ahead and intraday)** was greater than or equal to its ACO

	Capacity Obligation [MW]	ACO [MW]	Sum of ACOs assigned to CMUs [MW]	Net physical flow to PPS [MW]	Capacity delivered to the CZ or DE or SK power system [MW]	Non-activated bids on the power exchange [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange [MW]	Non-activated bids on the balancing market [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange and balancing market [MW]	Penalty
CMU 1	100	80	121,6	100	90	n/a	n/a	n/a	n/a	No
CMU 2	2	1,6			1	1	2	n/a	n/a	No
CMU 3	50	40			20	10	30			

- CMU 3 had submitted a volume of 10 MW in bids on the power exchange which had not been activated during given system stress event
- Capacity delivered to the system by CMU 3, increased by its submitted, non-activated bids on the power exchange equals 30 MW which is less than its ACO (40 MW)

Capacity obligation performance by CMU 3 shall be further verified





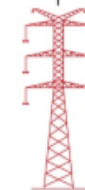
Verification of the capacity obligation performance – example 2

Step 4 – PSE verifies if capacity delivered to the CZ or DE or SK power system by a given CMU, increased by submitted, non-activated bids on the power exchange (day-ahead and intraday) **and balancing market** was greater than or equal to its ACO

	Capacity Obligation [MW]	ACO [MW]	Sum of ACOs assigned to CMUs [MW]	Net physical flow to PPS [MW]	Capacity delivered to the CZ or DE or SK power system [MW]	Non-activated bids on the power exchange [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange [MW]	Non-activated bids on the balancing market [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange and balancing market [MW]	Penalty
CMU 1	100	80	121,6	100	90	n/a	n/a	n/a	n/a	No
CMU 2	2	1,6			1	1	2	n/a	n/a	No
CMU 3	50	40			20	10	30	15	45	No

- CMU 3 had submitted a volume of 15 MW in bids on the balancing market which had not been activated during given system stress event
- Capacity delivered to the system by CMU 3, increased by its submitted, non-activated bids on the power exchange and balancing market equals 45 MW which is greater than its ACO (40 MW)

CMU 3 had performed its capacity obligation





Examples description

Example 1

- During the system stress event, net physical flow from the CZ/DE/SK zone to the PPS was greater than sum of ACOs assigned to CMUs located within it

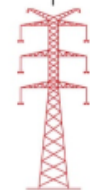
Example 2

- During the system stress event, net physical flow from the CZ/DE/SK zone to the PPS was lower than sum of ACOs assigned to CMUs located within it
- CMU 1 delivered capacity to the system in volume greater than its ACO
- CMU 2 and CMU 3 delivered capacity to the system in volume less than their ACOs
- Both CMU 2 and CMU 3 participate in power exchange and balancing market

Example 3

- During the system stress event, **net physical flow** from the CZ/DE/SK zone to the PPS was **lower than sum of ACOs** assigned to CMUs located within it
- CMU 1 delivered capacity to the system in volume greater than its ACO
- CMU 2 and CMU 3 delivered capacity to the system in volume lower than their ACOs
- CMU 2 participates in power exchange and balancing market
- CMU 3 participates only in power exchange

Steps 1, 2 and 3 are the same as in example 2



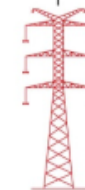


Verification of the capacity obligation performance – example 3

Step 4 – PSE verifies if capacity delivered to the CZ or DE or SK power system by a given CMU, increased by submitted, non-activated bids on the power exchange (day-ahead and intraday) **and balancing market** was greater than or equal to its ACO

	Capacity Obligation [MW]	ACO [MW]	Sum of ACOs assigned to CMUs [MW]	Net physical flow to PPS [MW]	Capacity delivered to the CZ or DE or SK power system [MW]	Non-activated bids on the power exchange [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange [MW]	Non-activated bids on the balancing market [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange and balancing market [MW]	Penalty
CMU 1	100	80	121,6	100	90	n/a	n/a	n/a	n/a	No
CMU 2	2	1,6			1	1	2	n/a	n/a	No
CMU 3	50	40			20	10	30	0	30	Yes

- In this example, CMU 3 does not participate in the balancing market
- Capacity delivered to the system by CMU 3, increased by its submitted, non-activated bids on the power exchange and balancing market equals 30 MW which is less than its ACO (40 MW)
- **CMU 3 had not performed its capacity obligation. A penalty shall be imposed**





Penalties for failure to perform the capacity obligation

- In case of failure to perform the capacity obligation in a given system stress event, PSE shall impose a penalty on the Capacity Provider which shall be equal to the product of the penalty unit rate set out in the Regulation and the volume of undelivered capacity in kW:

$$PEN = (ACO - P_{DEL}) \times PR$$

where:

- | | |
|------------------|------------------------------------------------------------------------------------------------------------------------------|
| ACO | – means the adjusted capacity obligation of given capacity market unit in a given system stress event [kW], |
| P _{DEL} | – means the capacity delivered to the system increased by non-activated bids on the power exchange and balancing market [MW] |
| PR | – means the penalty unit rate [PLN/kW] |

- Penalty unit rate shall be calculated for every delivery year separately and equal c.a. 4000 PLN/kW (c.a. 900 EUR/kW)
- Settlement period for penalties shall be calendar month
- PSE shall issue an accounting note with total amount of penalty in a given settlement month





Penalty – example 3

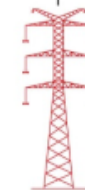
Step 4 – PSE verifies if capacity delivered to the CZ or DE or SK power system by a given CMU, increased by submitted, non-activated bids on the power exchange (day-ahead and intraday) **and balancing market** was greater than or equal to its ACO

	Capacity Obligation [MW]	ACO [MW]	Sum of ACOs assigned to CMUs [MW]	Net physical flow to PPS [MW]	Capacity delivered to the CZ or DE or SK power system [MW]	Non-activated bids on the power exchange [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange [MW]	Non-activated bids on the balancing market [MW]	Capacity delivered to the system increased by non-activated bids on the power exchange and balancing market [MW]	Penalty
CMU 1	100	80	121,6	100	90	n/a	n/a	n/a	n/a	No
CMU 2	2	1,6			1	1	2	n/a	n/a	No
CMU 3	50	40			20	10	30	0	30	Yes

Example

Penalty imposed on CMU 3 for the non-performance of the capacity obligation shall be calculated as:

$$PEN_{CMU\ 3} = (40\ MW - 30\ MW) \times 4000\ \frac{PLN}{kW} = 10\ MW \times 4000\ \frac{PLN}{kW} = 40\ 000\ PLN\ (c.a.\ 9\ 000\ EUR)$$





Capacity Obligation performance

Collaterals

Pre-auction

Main certification

Capacity auction

Delivery

Settlements

Test system stress event

- PSE, not more frequently than once per quarter of a year, may announce a **test system stress event** with respect to selected Capacity Market Units covered by the capacity obligation
- The duration of the test system stress event shall be **1 hour** between 7:00 a.m. and 10:00 p.m. on working days
- The result of the test system stress event is:
 - **positive** - if the amount of capacity delivered is not less than the full capacity obligation during the test system stress event
 - **negative** – in any other case - the penalty for failure to fulfil the capacity obligation shall be paid each time
- PSE shall refund any justified costs arising from the test system stress event performance (only if the result was positive)

Demonstration

- After the end of each delivery quarter, the Capacity Provider who was a party to the Capacity Agreement is obliged to demonstrate to PSE **at least one hour** during which the CMU delivered capacity to the PPS in an amount not less than the highest capacity obligation of that CMU in a given quarter of a year
- If Capacity Provider has failed to perform the demonstration, the remuneration for the performance of the capacity obligation shall be **refunded** to PSE
- The obligation to refund the remuneration shall cover remuneration due for the entire quarter for which no demonstration has been performed





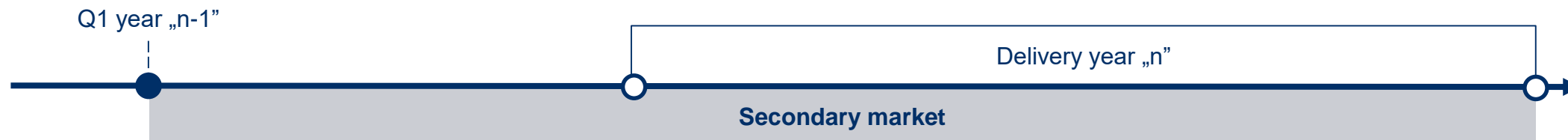
Secondary market



- The secondary market allows the Capacity Providers to mitigate their risk of not being able to fulfil their capacity obligations and takes place after conclusion of additional auctions for a given delivery year
- Transactions must be reported to the Register at the latest 24 hours prior to the commencement of the period they relate to

- Minimum volume of traded capacity obligation: **0,001 MW**
- Minimum delivery period part of traded capacity obligation: **1 h**
- Secondary market transactions may regard to hours between 7 a.m. to 10 p.m. during working days

Additional auctions
regarding delivery year „n”

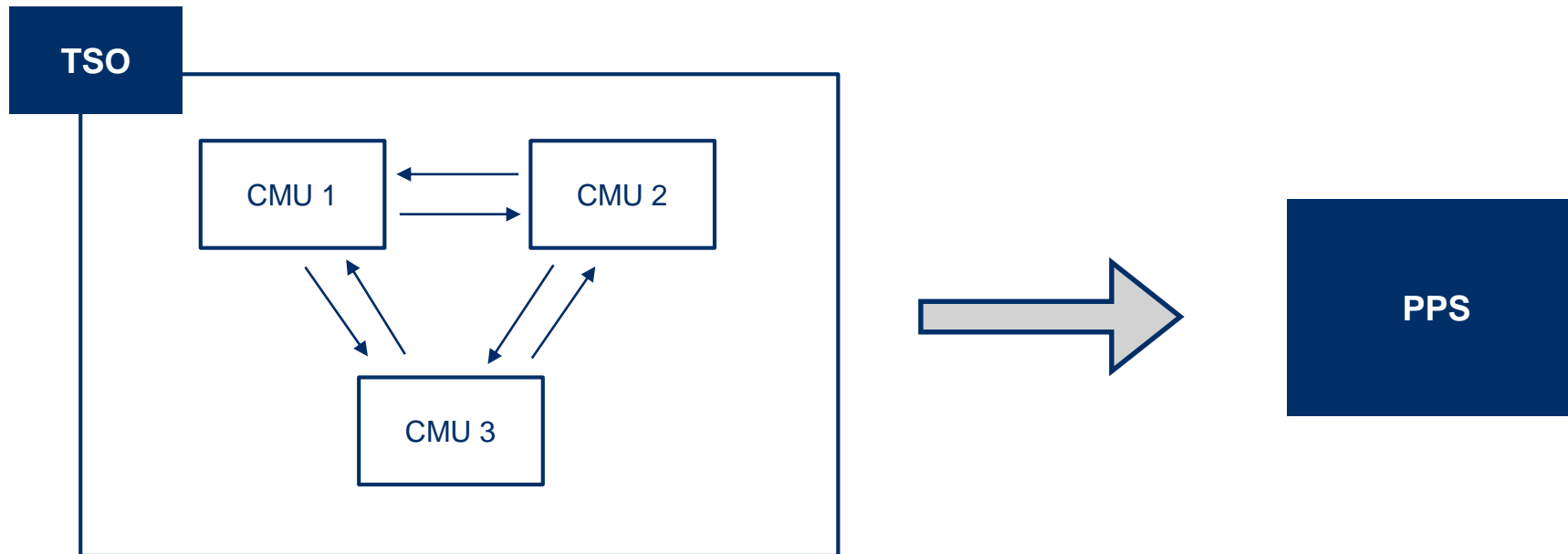




Secondary market

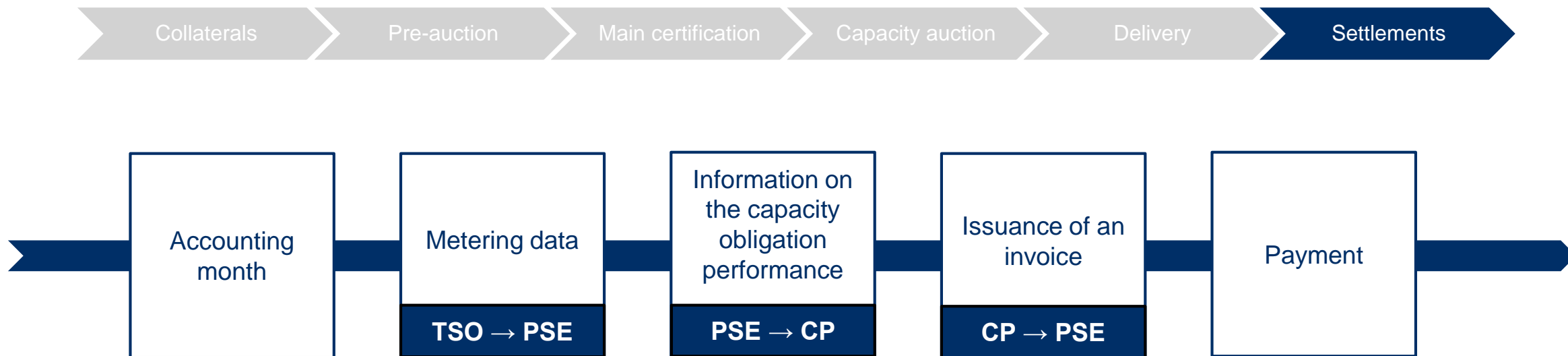


- CMUs consisting of Physical Cross-Border Units **are allowed to trade** capacity obligations with other CMUs comprising Physical Cross-Border Units located **in the same transmission system**
- CMUs consisting of Physical Cross-Border Units **are allowed to transfer** capacity obligations on CMUs **located in the PPS**

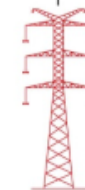




Remuneration



- Capacity Provider (CP) shall be remunerated after the end of each month of the delivery period in an amount equal to the sum of the products of the capacity obligations and their prices
- Capacity Provider issues an invoice to PSE for the capacity obligation performance
- The remuneration shall be paid after the TSO, competent for the given Physical Cross-Border Unit, presents metering data which allows for settlements to be made





Penalties for failure to perform the capacity obligation



- The Capacity Market Act introduces penalty limits applied in regard to every Capacity Market Unit:
 - **Yearly limit** - the total value of penalties imposed on the CMU during the delivery year must not exceed twice the product of the CMU's highest capacity obligation and the highest auction clearing price for the relevant delivery year

$$Y = 2 \times CO \times AC$$

where:

- | | |
|-----|-------------------------------------------------------------------------------------------------------------|
| CO | – means the capacity obligation of given capacity market unit [kW], |
| ACO | – means the adjusted capacity obligation of given capacity market unit in a given system stress event [kW], |
| PUR | – means the penalty unit rate [PLN/kW] |

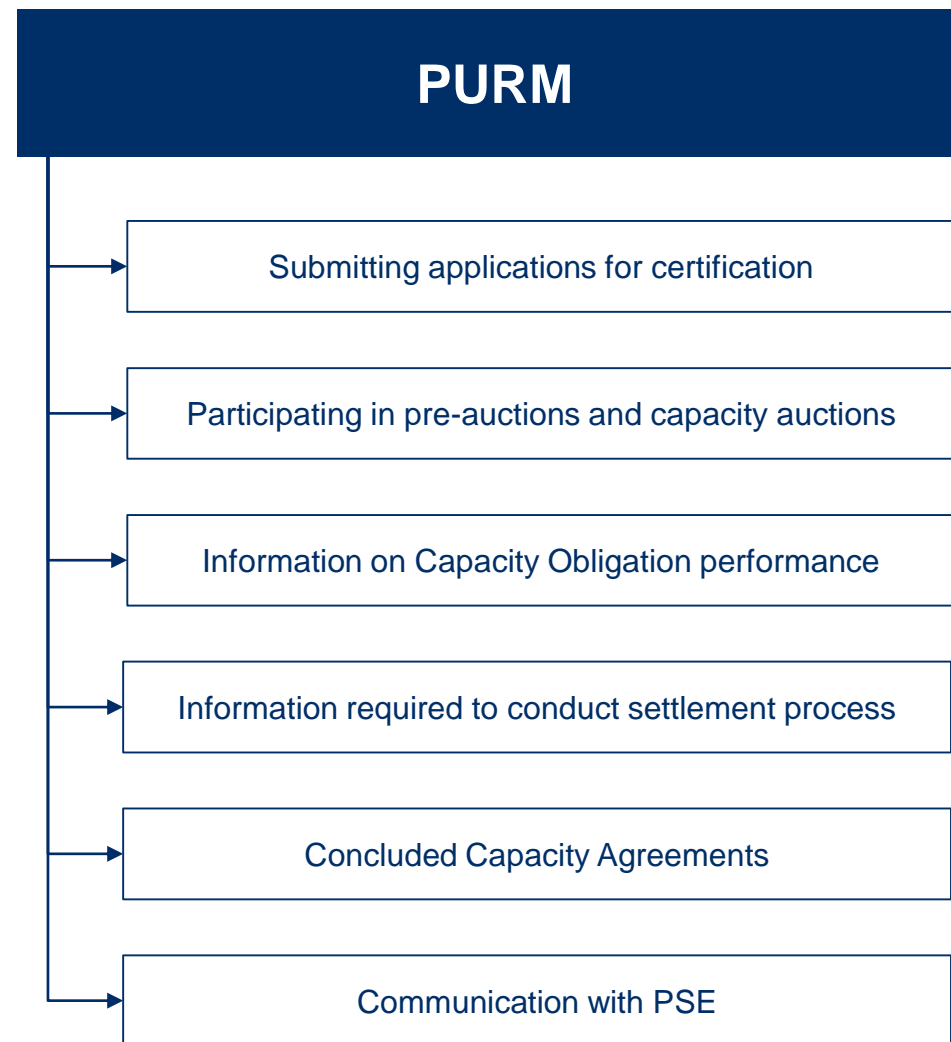
- **Monthly limit** - the total value of penalties imposed on the CMU in a month must not exceed 20% of the yearly limit

$$M = \frac{1}{5} \times Y$$



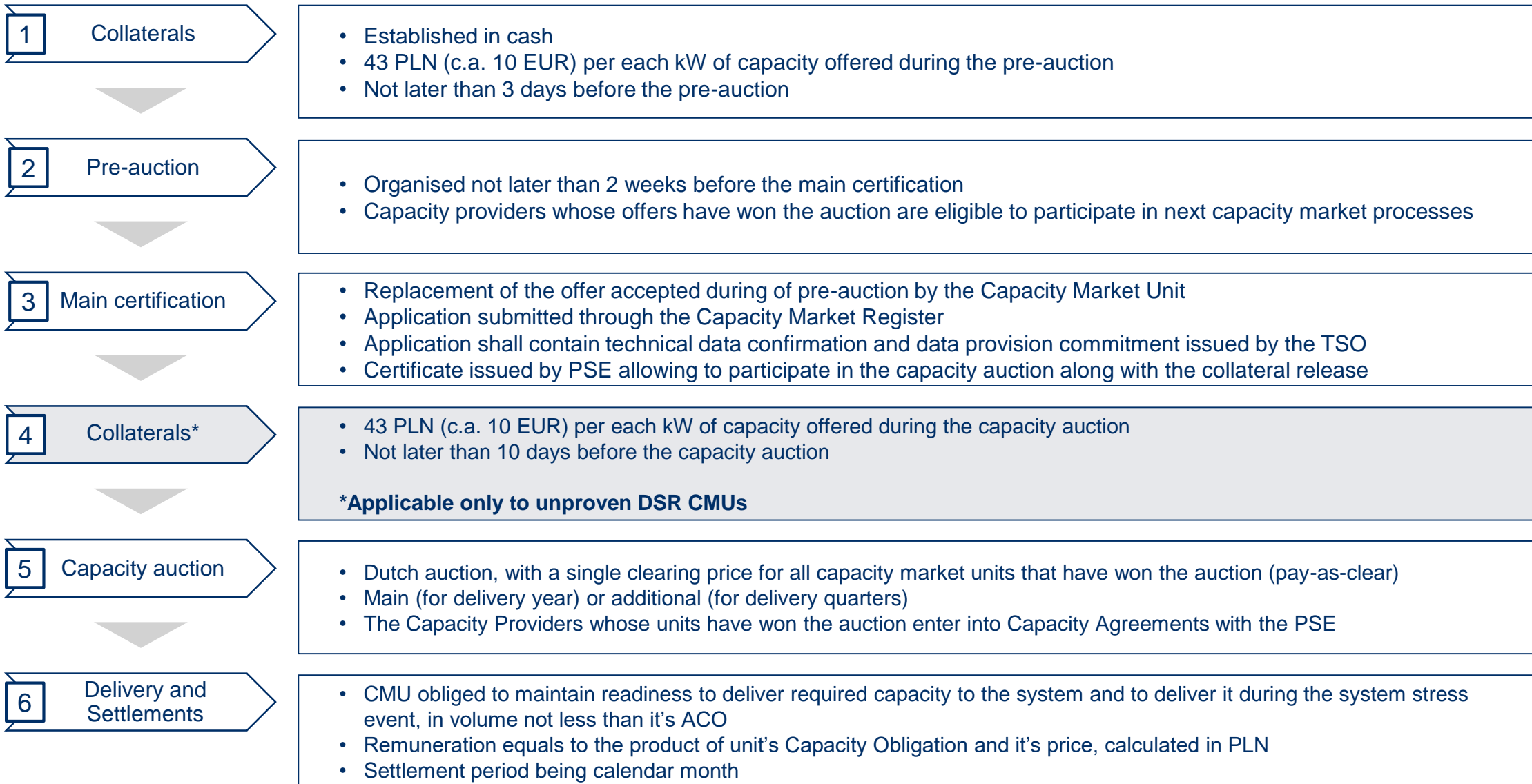


- Capacity Market Register is an essential tool for communication between capacity market participants
- **PURM** is a part of Capacity Market Register, designed for Capacity market participants
- In order to access PURM, a personal account shall be established
- Establishing an account requires:
 - E-mail address
 - Telephone number
 - **Qualified electronic signature**
- All documents submitted to PSE through PURM shall be signed using a **qualified electronic signature**



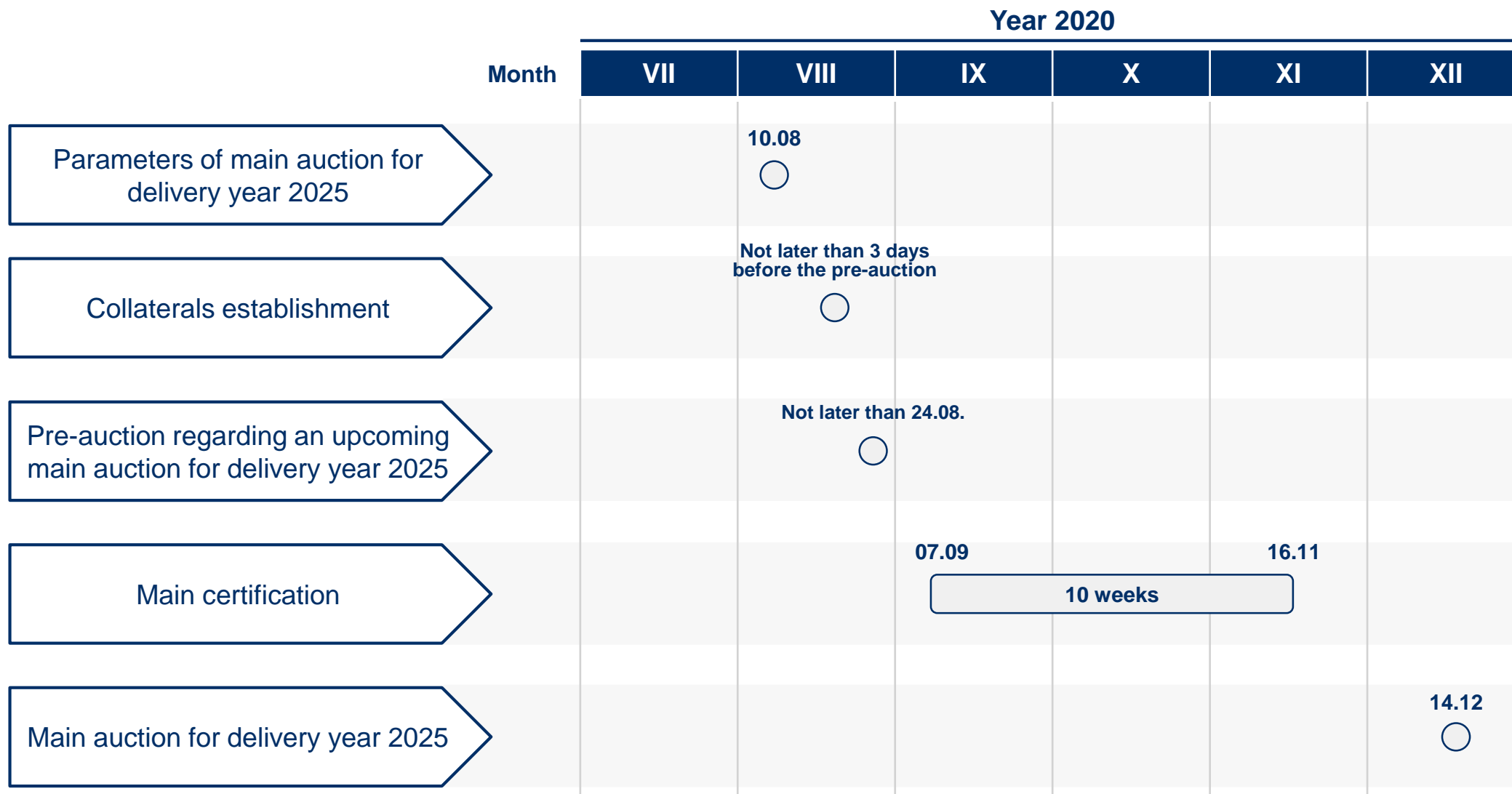


Required capacity market processes





Schedule of capacity market processes in 2020





Contact details



Website

www.rynekmocy.pl

On our website you can find the information regarding polish capacity market such as:

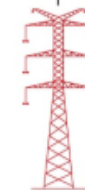
- Legal basis
- Schedule
- Instructions regarding the IT system
- Capacity auction results
- Frequently Asked Question

If you are not able to find necessary information on our website, please do not hesitate to contact us via e-mail



E-mail

rynek.mocy@pse.pl





Polskie Sieci Elektroenergetyczne S.A.

Thank you for your attention

