



Capacity market for review

Analysis of the results of three auctions

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Foreword

The implementation of the capacity market in 2018 was one of the largest changes in the Polish power sector in recent years. From 2021 onwards, those in Poland will pay not only for the electricity generated but also for the available capacity of the power system. This means, in simple terms, that power plants will be paid both for electricity production and standby capacity, i.e., full availability. However, not every power plant can count on this; each one must meet strict conditions, take part in a complicated auction, and win it. The energy market model based on payment for energy production and the continuous readiness to operate is costly. In the context of rising electricity prices and the need to limit emissions and replace generating units, it is necessary to analyse the results of auctions on an ongoing basis and pose the question of whether the capacity market is the optimal solution for Poland, especially with support for coal-fired power plants ending in 2025 because they emit much more than the agreed EU limit of 550 g CO₂/kWh.

Coal-fired power plants will, of course, still be able to operate. Poland is therefore facing a dilemma what to do next: give up the capacity market, and if so, how to construct its energy market, or, if the capacity market is here to stay, to what extent should gas capacity be subsidised?

This analysis is intended to encourage discussion on this issue.

Enjoy your read.

Dr. Joanna Maćkowiak-Pandera

President of Forum Energii

1. Analysis objectives and main conclusions

Since the entry into force in Poland of the Capacity Market Act¹ in 2018, three capacity auctions have been held for the delivery years 2021, 2022, and 2023. The purpose of this study is to analyse the results of these auctions and to assess the capacity market in terms of ensuring the availability of resources, encouraging new investment, and the costs of the capacity mechanism. Moreover, Forum Energii treats this analysis as a contribution to the discussion about the shape of this mechanism, especially in connection with the introduction of an EU-wide ban on public support of power plants emitting more than 550 g CO₂/kWh. This report is intended to evaluate the impact of the capacity market on the diversification of the electricity mix and to provide a voice in the debate about the impact of the capacity market on the energy market and its modernisation towards a low-carbon energy system.²

Main conclusions

- The capacity market in Poland was primarily intended to create financial incentives to remain in the domestic energy system and thus facilitate adequate capacity. The results of the three auctions show that this is exactly what happened: annual agreements and other agreements to modernise existing units account for 80% of the contracts concluded. New (coal) units will also receive support, but only those that have recently been completed or are at an advanced stage of construction.
- A consequence of this objective for the capacity market in Poland is the petrification of the current power mix: the maintenance of economically inefficient old units in the system and support for coal investments which, without the capacity market, would generate losses from the onset.
- The price at the auctions was set higher than expected, and at the first auction, it amounted to as much as 240 PLN/kW. This will translate into an improvement in the financial standing of the power generators and a strengthening of their position, but at the same time will be paid for by energy consumers.
- The cost of liabilities incurred within the capacity market amounts to PLN 35 billion, although the final amount must take into account the cost of mechanisms maintaining power reserves, which will be dissolved.
- The addition of a capacity fee to bills will coincide in time with the inevitable increases in electricity prices in the coming years, which are currently frozen by the government.
- Meanwhile, the capacity market in Poland is facing urgent reform. With EU rules restricting support for carbon-intensive sources after 1 July 2025, this year's (December) auction will be the last one under the existing rules.
- Maintaining the power market in Poland will require re-notification of this mechanism to the European Commission and confirmation that state support for generation units is still necessary to ensure energy security.
- The inability of coal-fired power plants to participate means, however, that next year, the volume of the capacity of units that can participate in the auctions will be drastically reduced. This implies a risk of insufficient competition and high costs. The beneficiaries of support may include gas units, storage, Demand Side Response (DSR), and possibly renewables and other technological solutions.
- So far, the capacity market has not encouraged new investment. The priority for the entities present on the domestic market was to obtain support for owned or emerging assets, not for the reconstruction of the production base.

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¹ Capacity Market Act of 8 December 2017.

² Analysis of the auction results requires the identification of specific blocks in the National Power System, which is a complex task. The individual units are only assigned a so-called 'capacity market unit code'. In information provided by the President of the Energy Regulatory Office on the final results of the auction, the name of the power supplier is also given. The identification of blocks in the system is additionally hampered by the difference between the installed power of the blocks and the obligation.

Main conclusions

- Poland needs diversification of its power mix, including new, flexible gas sources, but most of all it needs a discussion about the vision of the development of the national energy sector. While maintaining the capacity market, Poland needs to answer these important questions:
 - Does the capacity market make sense if coal-fired power stations cannot participate in it?
 - How much gas does Poland need in the energy sector, also in view of the EU's climate-neutrality objective and heating needs?
 - How to support flexibility and reliability in the system?
 - How does the capacity market affect the decentralisation of power generation and the development of local sources?
 - How to curb the rise in electricity prices?
- The question of how to reform the capacity market is therefore inextricably linked to the future of the Polish energy sector. The framework for change is set by the 'Clean energy for all Europeans' package. If Poland wants to maintain its capacity market, new regulations should be implemented immediately. Poland needs reform of the energy market adapted to its future energy model.
- The final assessment of the capacity market and its verification will take place in 2021 when it will become clear whether the entire volume of contracted capacity will actually be available to the transmission system operator. This will be a real test of the capacity market in Poland.

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2. Capacity market mechanism

In 2016, Poland started work on the introduction of a centralised capacity-market mechanism as a long-term, structural solution to the problem of insufficient generation capacity. The establishment of the two-commodity market and payments to generators for their readiness to produce additional power were justified by the insufficient revenues of energy companies from sales of electricity (*the 'missing money problem'*). The lower revenues, according to the energy companies, do not allow them to maintain adequate power reserves in the system and add electricity generation assets. This may affect the long-term stability and security of the electricity supply. The European Commission (EC) accepted the Polish arguments and in February 2018 approved the capacity market as a form of public aid compatible with the single market³. The EC approved its operation for 10 years, but in practice, the contracts already concluded will be in force until the end of 2037. Poland's Capacity Market Act came into force on 18 January 2018.

Guiding principles of the Polish capacity market:

- The system of remuneration for generation capacity is based on power auctions⁴ organised centrally by the transmission system operator: Polskie Sieci Elektroenergetyczne (PSE).
- The auctions are open to existing and new generators, demand side (DSR) entities, and energy-storage facilities certified before they enter the auction (i.e., meet formal criteria).

3 European Commission, State aid No. SA.46100 (2017/N) – Poland – Planned Polish capacity mechanism, C(2018) 601 final, Brussels, 7.2.2018.

4 Dutch auctions, where the starting price is gradually lowered.

- The auctions may be observed by domestic and foreign participants located in the control area of operators from EU countries neighbouring Poland.
- The entities that win the auctions—capacity suppliers—receive a fixed payment (in PLN/kW per year) in exchange for a capacity obligation, i.e., ability to supply capacity throughout the delivery period and its actual delivery to the system in the event of a risk of an imbalance in supply.
- Capacity is contracted primarily at what are called ‘main auctions’ covering subsequent calendar years, starting from 2021. Three such auctions covering the years 2021-2023 took place in 2018. The next ones will be held five years in advance, for example, the capacity auction for 2024 will be contracted in December 2019.
- There will be one main auction each year for all capacity market units that may apply for:
 - one-year contracts (existing units),
 - 5-year contracts (modernised units),
 - 15-year contracts (new units). Additionally, units whose emissions will be below 450 g CO₂/kWh, will receive a bonus in the form of a two-year extension of a contract (i.e., a total of 17 years).
- Demand Side Response (DSR) units may apply for annual or 5-year contracts, but only if they incur capital expenditures.
- Additional auctions for a capacity obligation for individual quarters of the year will take place in the year preceding the delivery periods. These allow the participants to fill in missing capacity in relation to the main auction. These also allow capacity to be offered by units with seasonally variable electricity production characteristics.
- The capacity market is financed by the final electricity consumers and its cost will be added to the distribution fee in 2021.

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3. Which units are supported by the capacity market? Auction results in 2018

Three capacity market auctions with delivery dates between 2021 and 2023 were held in November and December 2018.

Table 1: Results of the three capacity auctions

Auctions	Year of delivery	Offered capacity	Capacity contracted at auction	Capacity contracted per year of delivery (cumulative)	Auction price
First auction (15.11.2018)	2021	26 000 MW	22 427,066 MW	22 427,066 MW	240.32 PLN/kW/year
Second auction (05.12.2018)	2022	13 000 MW	10 580,056 MW	23 038,875 MW	198.00 PLN/kW/year
Third auction (21.12.2018)	2023	13 000 MW	10 631,191 MW	23 215,010 MW	202.99 PLN/kW/year

Source: Communications from the President of the Energy Regulatory Office (ERO), (available in Polish only).

3.1. Old vs. new

In theory, the capacity market is a technologically neutral mechanism. At the auctions, both producers and demand-side actors are treated equally. The main element differentiating the rights of individual units in the capacity market is the length of the capacity contract. The agreement may be concluded for a period longer than one year in the event of the necessity to incur modernisation expenditures (for 5 years) or investment expenditures (for 15 years). Longer contracts were supposed to stimulate investments in the power sector.

- Analysis of the auction results shows that yearly contracts have the highest market share in the capacity market. They constitute 40% of each year's deliveries, on average about 10 GW⁵. In addition to the contracts concluded with DSR service providers (Figure 5), this is part of the support to maintain conventional power-plant capacity. It is worth remembering that this is a quite diverse group of generators for which different auction 'baskets' were originally planned. These include coal-fired and gas-fired power plants and hydropower stations. There are also inefficient and old units that would not be able to stay in the market without support.
- More than 30% of the capacity (8.3 GW) was contracted in 5- and 7-year contracts, which are related to the obligation to modernise the units. These agreements were concluded after the first auction⁶ with the highest price of 240 PLN/kW. These are mainly old 200 MW units, for which support means continued existence. The aid will be used to adapt to the requirements of the BAT⁷ conclusions, which will be in force from the beginning of August 2021. The 7-year agreements were also signed by investors of two units that do not exist yet:
 - a small unit (8 MW) - Tameh Polska Spółka z o.o.,
 - gas-fired CHP plant in Stalowa Wola (386 MW) - joint investment of PGNiG and Tauron SA.
- The last group, long-term contracts (15 or 17 years), covering 5 GW of capacity, are dedicated to new units. Most of them were concluded at the first auction, i.e., similarly as in the case of the modernised units, hence at the highest price. Contracts provide funding for projects that are already completed or will be completed in the near future. This applies primarily to the coal-fired power plant in Kozienice, which was commissioned in December 2017. The Fortum CHP plant in Zabrze has recently been commissioned. Other new units are currently under construction: Jaworzno, Opole⁸, Turów, and the PGNiG Termika gas-fired CHP Plant in Warsaw, Żerań. In each year of delivery, their share is about 20%.
- The only investment still being planned and which has received support from the capacity market is the Ostrołęka power plant (852.6 MW). Due to the expected date of its implementation, it could participate only in the third auction, so it obtained a lower price (202.99 PLN/kW) than the already built units. Even if this power plant is built (which is not yet certain), it will still not provide the capacity obligation from the very beginning of the contract period, i.e., from 1 January 2023. The construction contract stipulates that the power plant will be ready later that year, in August⁹. This still ambitious deadline may not be met due to problems with the financing of the investment.
- The longest 17-year contracts (executed until the end of 2037) concern the construction of a CCGT unit for the Żerań PGNiG CHP Plant (433 MW) and the small Tauron CHP Plant (4.66 MW).

⁵ Based on the results of the auction; these data do not equal the installed capacity of the units concerned. This applies to all data based on the auction results.

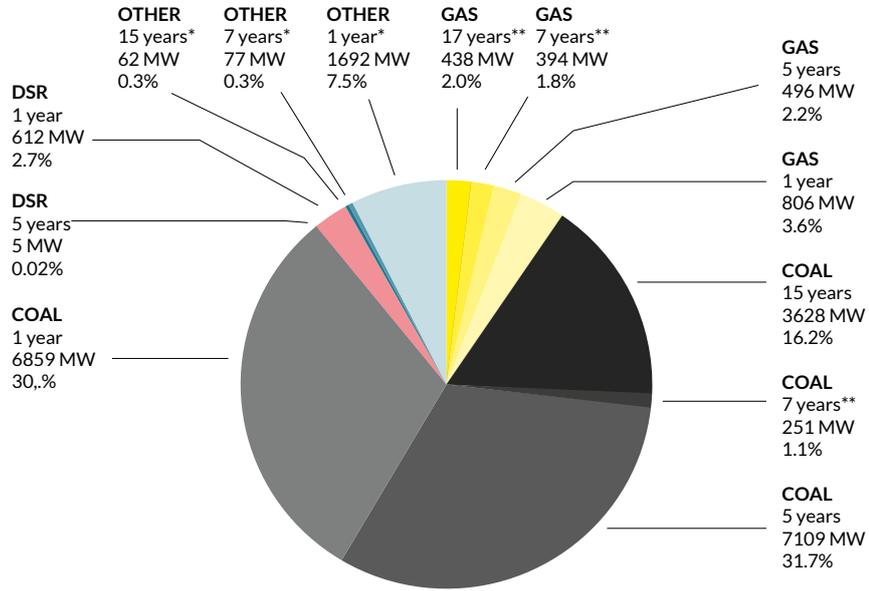
⁶ With the exception of two contracts concluded in the second auction—5 MW for DSR and 120 MW for coal.

⁷ BAT conclusions introduce restrictive limits on NO_x, SO_x, dust, mercury emissions, etc. Commission Implementing Decision (EU) 2017/1442 of 31 July 2017 laying down BAT conclusions for large combustion plants under Directive 2010/75/EU of the European Parliament and of the Council, OJ L 175, 30.7.2010, p. 1. L 212/1 of 17 August 2017. Installations must comply with the BAT conclusions within four years of publication of that Decision.

⁸ Unit 5 in Opole started operation in the Polish Power System on 31 May 2019, and Unit 6 was to be commissioned on 30 September 2019.

⁹ Attachment No. 1 to Current Report No. 22/2019: Answers to the questions of the Shareholders submitted during the Ordinary General Meeting of Shareholders of ENERGA S.A. on 25 June 2019 (available in Polish only).

Figure 1: Capacity auction results for 2021

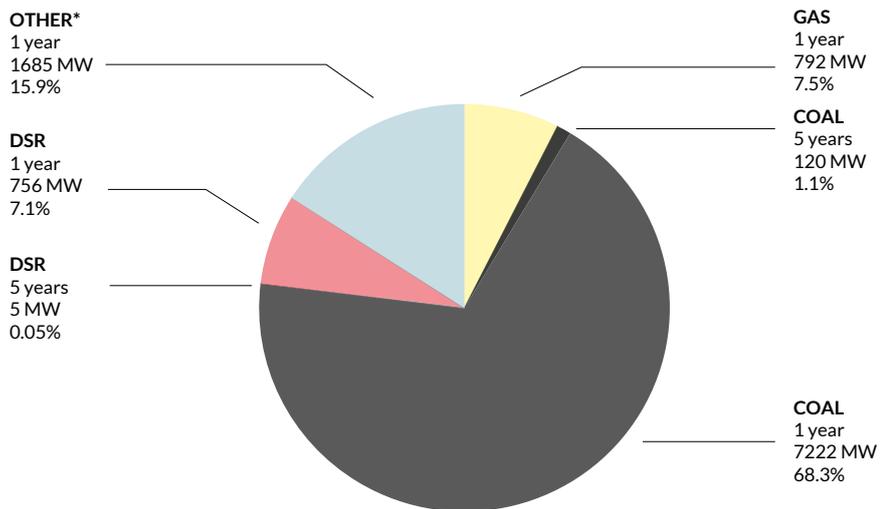


* 'other' includes, among others, hydro, multi-fuel, and biomass power plants.

** contract includes the so-called green bonus, a 2-year extension of the contract granted to units with CO₂ emissions lower than 450 g/kWh and CHP plants transferring more than 50% of the produced heat to district heating.

Source: own calculations.

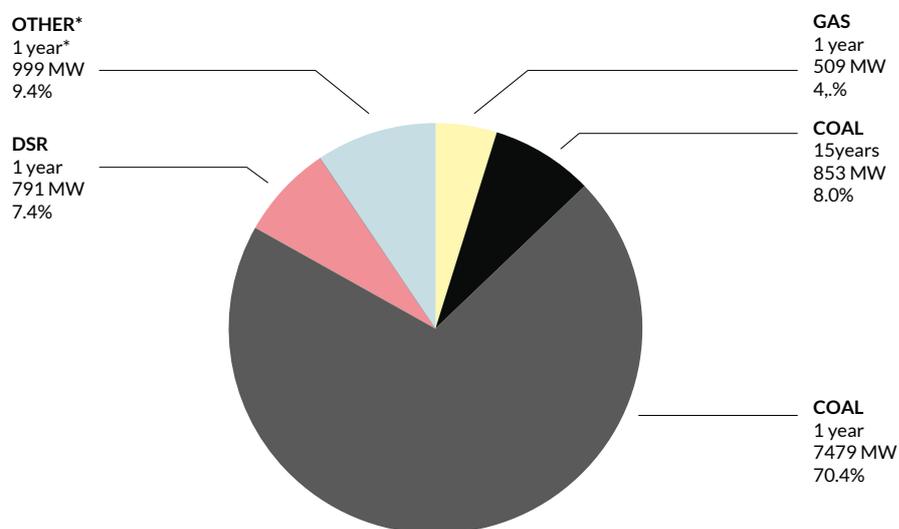
Figure 2: Capacity auction results for 2022



* 'other' includes, among others, hydro, multi-fuel and biomass power plants.

Source: own calculations.

Figure 3: Capacity auction results for 2023



* 'other' includes, among others, hydro, multi-fuel, and biomass power plants.

Source: own calculations.

3.2. Contracted capacity by fuel type

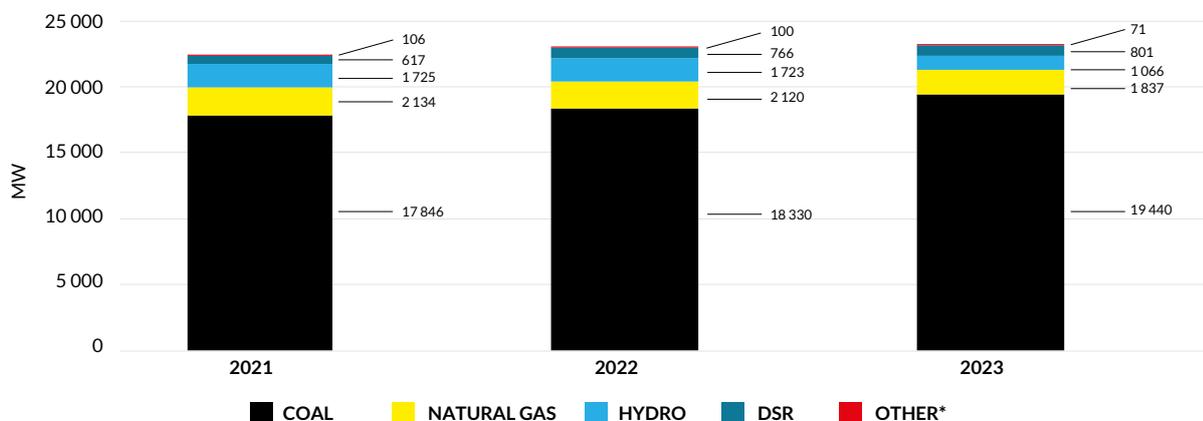
The Polish energy sector, although slow to change, is still dominated by coal. In 2018, coal-fired power units using hard coal and lignite accounted for 70.3% of the installed capacity¹⁰. As a result, coal units also dominate in capacity contracts. The share of coal-fired power units in the contracted capacity in 2023 is nearly 84%. The remainder is gas (8.1%), hydro (4.7%), DSR (3.6%), and other fuels (0.3%).

- So far, the Polish capacity market has not delivered diversification of generation capacity. This can change, though, for deliveries after 1 July 2025, when the emissions limit of 550 g CO₂/kWh becomes applicable, which will, in principle, exclude coal-fired power units from the mechanism¹¹.
- No new gas projects appeared in the first auctions. The winners were projects already in progress (CHP Żerań, CHP Stalowa Wola) or existing ones. Although gas-fired power plants are being built relatively quickly and investors can benefit from green bonuses, they have not decided (at least for the time being) to participate in the auctions. This may change in 2019 (deliveries for 2024), as gas units are planned by several companies (PGE in Dolna Odra and Rybnik, Energa in Grudziądz).

¹⁰ R. Macuk, Energy transition in Poland. Edition 2019, Forum Energii, Warsaw 2019.

¹¹ Meeting the decarbonisation criterion would be possible in the case of cogeneration or units in which, in addition to coal, other, less emission-intensive fuels would be used.

Figure 4: Contracted capacity by fuel type



*'other' includes multi-fuel and biomass power plants.

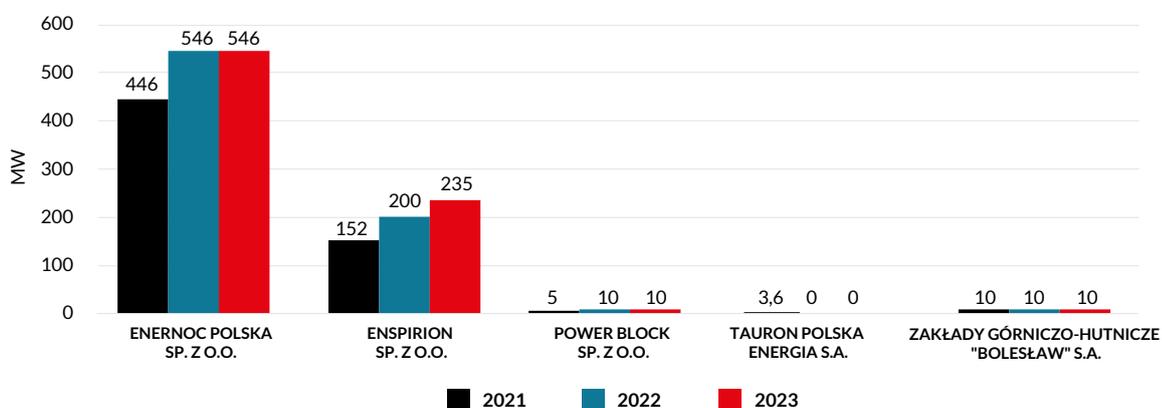
Source: own calculations.

3.3. DSR (Demand Side Response) involvement

In the Polish capacity market, active consumers may participate in auctions on the same terms and conditions as generators. The demand side (DSR) may include annual or 5-year contracts when the project requires capital expenditure.

- The share of demand entities (DSR) in contracted capacity was, respectively:
 - 2.7% (616.6 MW) for the year 2021,
 - 7.2% (766 MW) for the year 2022,
 - 8.1% (801 MW) for the year 2023.
- The demand side is represented by just five entities, but two of them—ENERNOC (currently Enel X) and Enspirion—are large, important players (with volume exceeding 100 MW).
- The presence of demand entities (DSR) in the capacity market is visible, but below their estimated potential for Poland¹². Although they were able to obtain longer contracts in practice, their share in such contracts is marginal—both at 5 MW in 2021 and 2022.

Figure 5: DSR volume per auction and per enterprise



Source: own calculations.

4. How much does the capacity market cost?

The capacity auction mechanism is based on submitting offers at a declining price, i.e., in subsequent rounds it is lowered. Price-makers, i.e., new or modernised units, DSRs and foreign entities, may submit bids with a price not higher than the maximum price of a given auction. This parameter is defined by the Ministry of Energy (Table 2).

For price-takers, which are existing generators, the maximum price is different and a limit is set on their offers. The more new entities in a given auction, i.e., price-makers, the higher the final auction price. This is confirmed by the results of the three auctions (see Table 1).

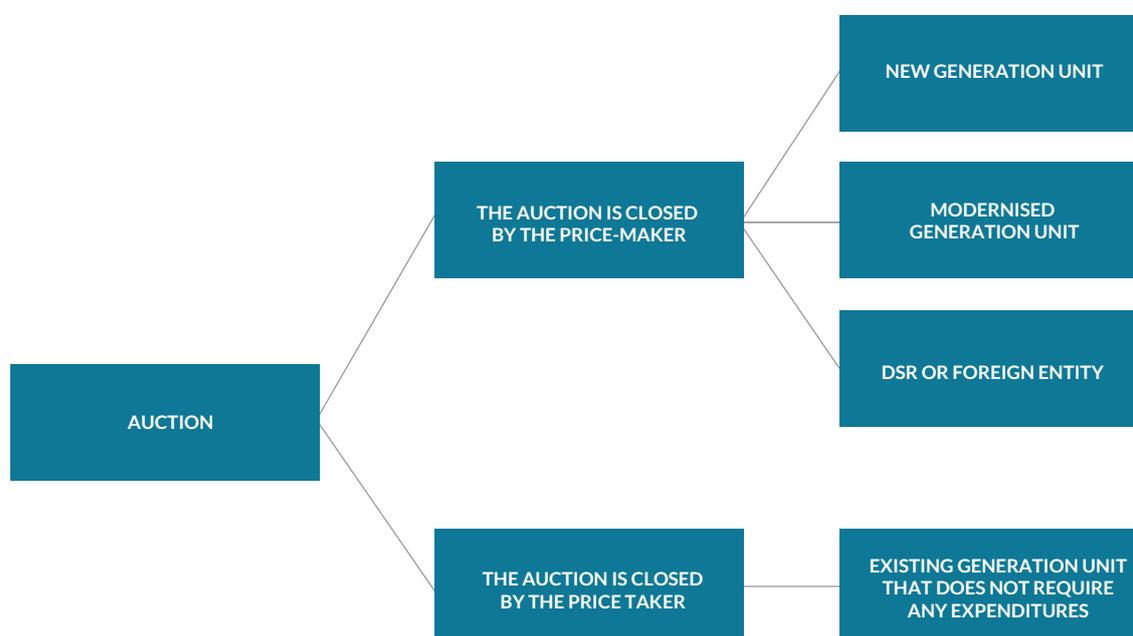
Table 2: Price parameters of the main auctions for the years 2021-2023

Year	Market entry price of a new generating unit	Maximum price specified for the price-taker
2021	298 PLN/kW	193 PLN/kW
2022	305 PLN/kW	198 PLN/kW
2023	313 PLN/kW	203 PLN/kW

Source: Regulation of the Minister of Energy of 22 August 2018 on the parameters of main auctions for delivery periods in the years 2021-2023, Dz.U. 2018, item 1632.

Figure 6: Price formation mechanism in the Polish capacity market

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Source: own elaboration.

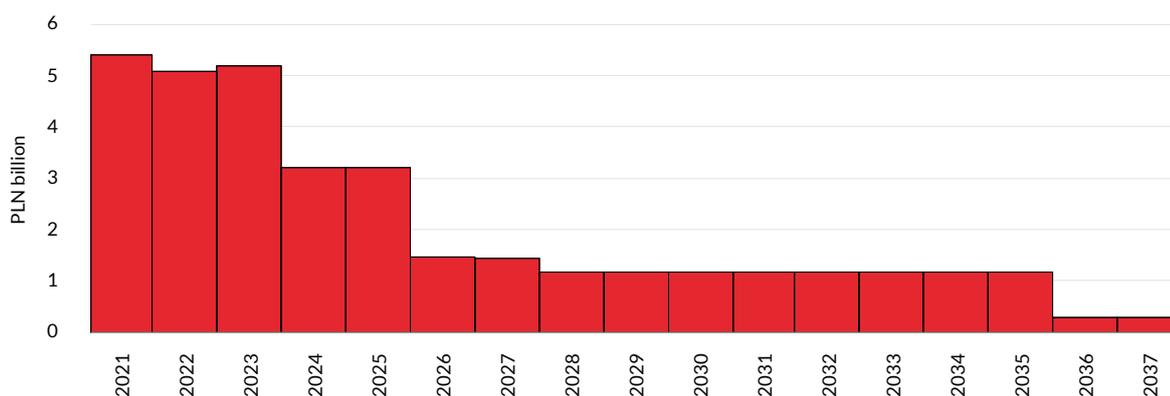
- The price of the capacity market was higher than expected. The Ministry of Energy estimated that it should be around 180 PLN/kW/year¹³. Eventually, at the first auction, it was 30% higher, at 240.22 PLN/kW/year. This is the only auction in which many price-makers competed. The second and third auctions were dominated by price-takers. The final settlement prices of 198 PLN/kW and 202.99 PLN/kW, respectively, reflect the level of the maximum price set for the price-takers.

- The high price on the Polish capacity market results from the adoption of a single auction formula for all categories of units, i.e., existing, modernised, and new units, and the abandonment of so-called 'auction baskets' (in the course of the Act's proceedings). This means that the clearing price is the same both for units whose investment needs are higher and for old, fully depreciated blocks.
- The price level is higher than in the UK market on which the Polish support mechanism was modelled. At the T4 auction in the UK (for delivery years 2021/2022), £8.4/kW was achieved (equivalent to only 42 PLN/kW), and in the previous year it was £22.5/kW (112.5 PLN/kW). There may be several reasons for this: the high share of interconnectors¹⁴, lower modernisation needs of British power plants, and greater competition on the British market.

4.1. Remuneration for contracted capacity

The remuneration for capacity supplies contracted for the years 2021-2023 amounts to more than PLN 5 billion annually. This is quite a lot, considering that the value of the market in one year amounts to about PLN 65 billion.¹⁵ On the other hand, the total cost of the capacity market resulting from all the contracts already concluded (the longest ones are valid until the end of 2037) is, so far, almost PLN 35 billion (Figure 6)¹⁶. These values do not include additional auctions (probably they will increase the costs by about PLN 350 million annually¹⁷).

Figure 6: Total remuneration for contracted capacity in the years 2021-2037



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Source: own calculations.

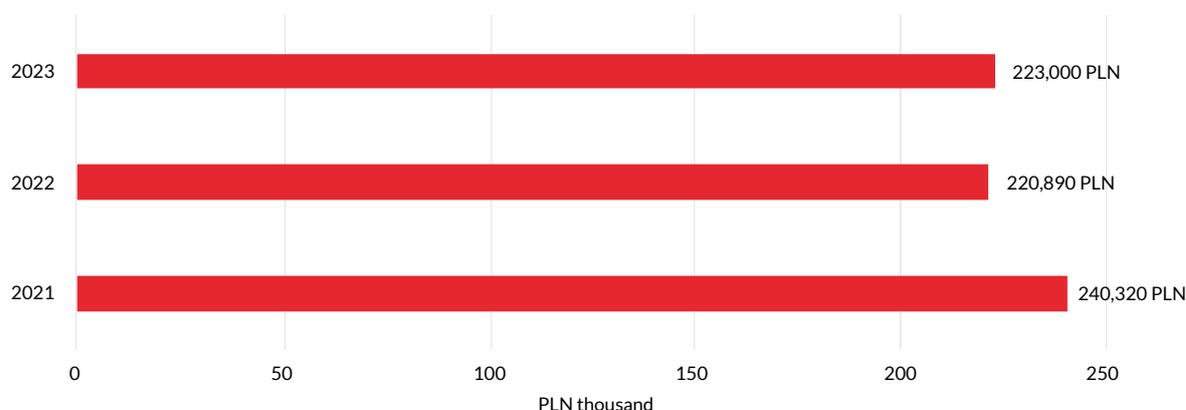
¹⁴ In the T-4 auction for the years 2021/2022, three existing and three newly built interconnectors were awarded contracts. See: https://www.ofgem.gov.uk/system/files/docs/2018/08/20180802_annual_report_on_the_operation_of_cm_2017-18_final.pdf.

¹⁵ How to make the consumer improve the security of the energy system and at the same time benefit from it? Transparency and economic efficiency of the retail market, Forum Energii, Warsaw 2016.

¹⁶ At current prices.

¹⁷ Own calculations.

Figure 7: Cost of keeping 1 MW of standby capacity



Source: own calculations.

- The cost of keeping 1 MW of capacity in 2021 will amount to more than 240,000 PLN/MW, 221,000 PLN/MW in 2022 and 223,000 PLN/MW in 2023.
- Costs of the capacity market will be borne by consumers through a capacity fee, which will be added to energy bills as early as 2021.
- The capacity market costs much more than the Ministry of Energy had estimated. In just 2021, expenditures will be more than PLN 1.3 billion higher than assumed.
- However, the capacity market mechanism replaces several other mechanisms aimed at improving the balance of power in Poland, and for which consumers pay today. These are:
 - cold contingency reserve,
 - interventional operation,
 - guaranteed DSR programme,
 - operational capacity reserve.
- In 2018, the costs of their operation amounted, according to our estimates, to PLN 800 million in total¹⁸. These mechanisms will be terminated as of 1 January 2021, so their costs will have to be deducted from the total cost of the capacity market.
- In accordance with the decision of the European Commission and the rules of EU public aid, payments for beneficiaries of the capacity market are reduced by the amount of investment aid obtained for the construction or modernisation of a given unit. Additionally, the amount of remuneration of units receiving certificates of origin for RES or support for cogeneration will also be adjusted downwards. It should also be remembered that the final auction price in contracts longer than one year will be indexed to inflation. Therefore, the exact operating cost of the capacity market will only be known *ex post*.

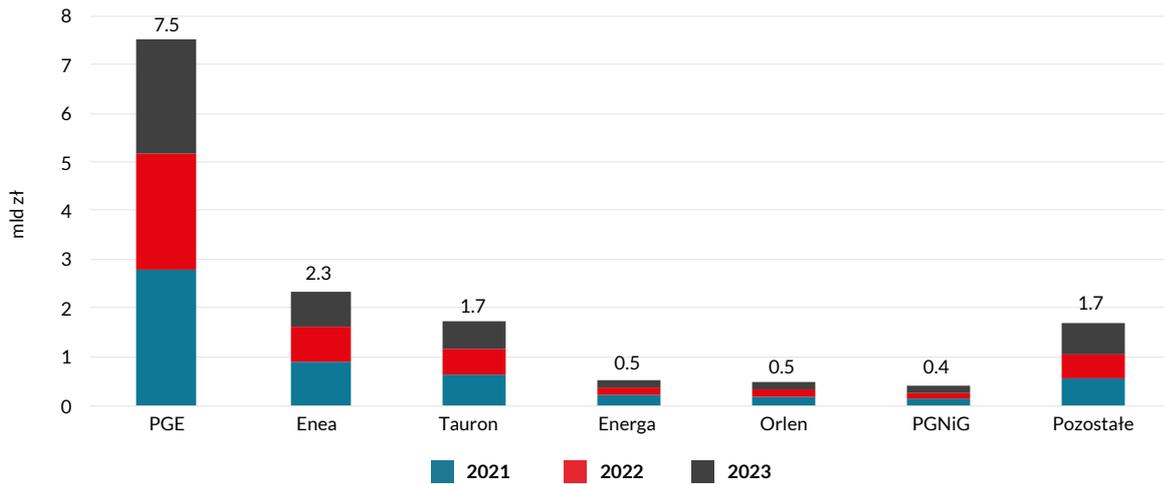
4.2. Beneficiaries of the capacity market

The analysis of the contracted capacity broken down by enterprise indicates significant domination by PGE, which won half (in terms of capacity) of the contracts in each year of the deliveries and which will consequently receive the highest support from the capacity market in each year of the deliveries. Following it, in order, is ENEA, with 16% of the contracts, and Tauron, with 11%.

18 Excluding costs of intervention work.

- The beneficiaries of the capacity market are state-owned companies. These large energy concerns strengthened their position on the market, gaining a new source of revenue.
- Some of the revenue from the capacity market will go to non-energy companies. They develop their own sources of electricity.

Figure 8: Remuneration for capacity contracted by a company



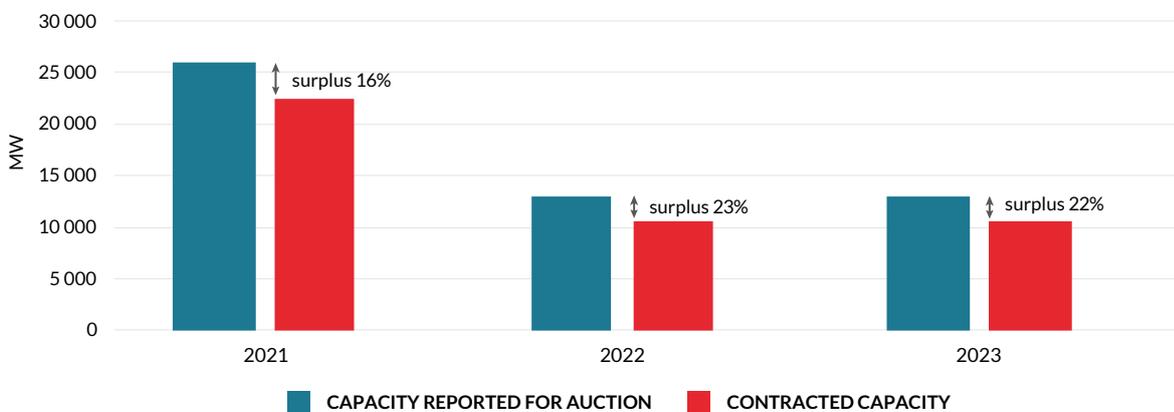
Source: own calculations.

4.3 How much capacity is available?

For the first year of supply in the capacity market, 2021, 22.4 GW were contracted, for 2022, 23 GW, and for 2023, 23.2 GW.

These figures do not take into account the results of any additional auctions that may be held one year before the delivery period.

Figure 9: Reported and contracted capacity volume for 2021-2023



Source: own calculations.

- The capacity auctions offered verification of the disposable power potential in the National Power System (NPS). The reported surplus was no more than 23%. This is less than in the UK, where the surplus was 32.1% at the 2021-2022 capacity auction.
- This rather low surplus of offered capacity shows that there are relatively few available energy resources in the NPS. The capacity market is composed of not only payments for capacity but also a number of obligations, as well as high penalties in the event of unavailability.
- Taking into account the volume of capacity submitted for the first auction on both the supply and demand side (26 GW) and the currently available cross-border interconnection capacity (1.5 GW), it can be estimated that the network operator PSE has no more than 28 GW of real capacity at its disposal. This is not much if we compare it to the maximum capacity demand of 26.5 GW in 2018.

5. Changes, changes, changes

Following the conclusion of the EU negotiations on the 'Clean Energy for All Europeans' package, the capacity market should be modified. The changes are a consequence of the two most important provisions on emissions reductions in the support mechanisms and an in-depth analysis of whether the capacity market is necessary from a security perspective. The regulations are aimed at protecting consumers against unnecessary costs and limiting support from public funds for investments harmful to the environment.

5.1. Description of the changes. Limit of 550 g CO₂/kWh

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In July 2019, the Internal Electricity Market Regulation¹⁹ entered into force and set new requirements for generation-capacity mechanisms, including CO₂ emissions limits of 550 g CO₂/kWh²⁰. If the capacity market is already functioning, as it is in Poland, the emissions performance standard will apply to new units from 1 January 2020 and to existing ones from 1 July 2025. The commitments resulting from the existing auctions and those to be held by the end of 2019 will be valid for the entire duration of the contracts.

Table 2: Functioning of CO₂ emission limits within the Polish capacity market

		GENERATION UNITS (started commercial production before 4.07.2019)	NEW GENERATION UNITS (started commercial production after 4.07.2019)
CAPACITY MARKET IN POLAND (as a mechanism functioning on the date of entry into force of the Regulation, i.e. 4.07.2019)	Obligations and agreements concluded before 31.12.2019	Without EPS for the whole period of validity of the agreements	Without EPS for the whole period of validity of the agreements
	Obligations and agreements concluded from 1.01.2020 to 1.07.2025	Without EPS for the duration of contracts and commitments up to 1.07.2025	EPS 550 from 1.1.2020
	Obligations and agreements concluded from 1.07.2025	EPS 550 and EPS 350	EPS 550

Source: P. Wróbel, *Small steps to big changes. Impact of the 'Clean Energy for All Europeans' package on energy*, Forum Energii, Warsaw 2019.

¹⁹ Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal electricity market, OJ L 158/54, 14.6.2019. The Regulation, with regard to CO₂ emissions limits, applies from the date of its entry into force.

²⁰ More in the analysis by: P. Wróbel, op. cit.

5.2. European resource adequacy assessment

From 1 January 2020, Poland (and all other countries using capacity mechanisms) will have to carry out a European-level capacity adequacy assessment. Based on PSE data, the European Network of Transmission System Operators (ENTSO-E) will assess whether there is a power adequacy problem. If not, no new contracts can be concluded. Acceptance of the capacity market means that a timetable must be set for the implementation of remedies to remove regulatory distortions in the market²¹. The capacity market is treated by the Commission as a public support mechanism and therefore must be temporary. The EC wants to force European countries to cooperate more in solving energy problems. The aim is to prevent new peak capacity (and costs to consumers) in a situation where Europe still has large overcapacity and network congestion is a barrier to its use.

It is also worth remembering that the provisions of the 'Clean Energy for All Europeans' package introduce the need to deregulate prices for individual consumers, which is also a condition for the functioning of capacity markets.

6. What next for the capacity market?

As of 1 July 2025, all entities whose contracts expire after that date and which do not meet the emissions limits will be excluded from the capacity market. The consequences of these provisions will affect, first of all, units that receive annual contracts, and from 1 January 2026, also units being modernised—almost all of them signed contracts at the first auction, so their 5-year support will end then. Selected high-emission blocks will receive support under contracts up to 15 years long. This will apply to agreements with a total available power of 3690 MW (4542 MW if Ostrołęka C is built). This means that in Poland, due to the CO₂ emissions limit, there will be coal-fired units in operation that will benefit from support within the capacity market but which will be deprived of it in time.

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This year's (2019) December auction will be the last one conducted under the old rules. Most capacity suppliers will compete for one-year contracts, and the advantage of existing units will result in the price being determined mainly by the price-makers²². The results of the general certification predict this: on 8 September, PSE completed the process, but the summary is still missing²³. The final results of the 2019 auction will depend on whether new capacity will be launched. This, in turn, will be the result of many factors—political ones, fuel prices, electricity prices, and CO₂ emissions allowances. In the case of cogeneration units, it is also necessary to assess which support system they will choose—capacity auctions or cogeneration auctions.

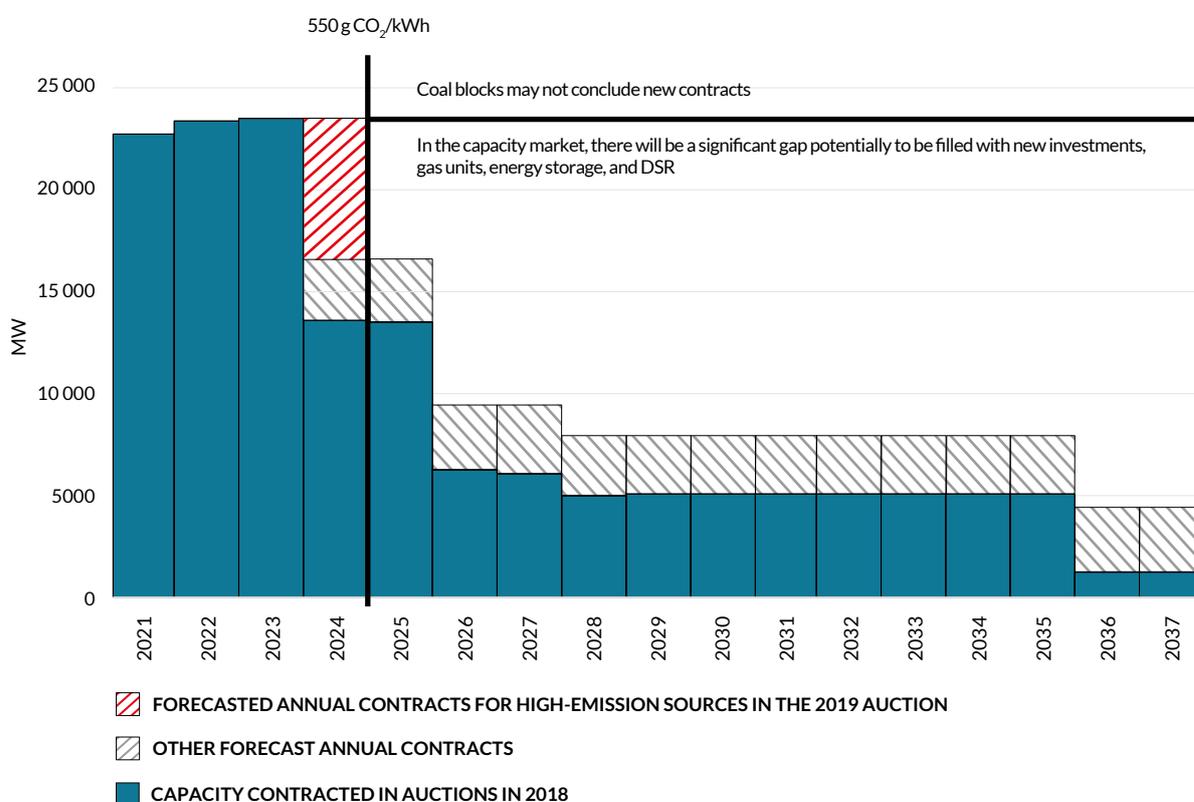
Despite the loss of revenue from the capacity market, coal-fired power units will not disappear from the power system overnight. Formally, they will be able to continue to be exploited, receiving payment only from the energy market. However, much will depend on the level of wholesale prices, as well as CO₂ and fuel costs. It is worth noting that the capacity market was introduced in the period when wholesale energy prices were low, at the level of 160 PLN/MWh. Currently, they reach 250 PLN/MWh, but at the same time, the operating costs of CO₂ and coal purchase have also increased.

The turning point for generating units, however, will be the end of the 2030s, when another revision of the BAT conclusions is planned, i.e., tightening environmental standards. After this date, the majority of coal-fired capacity not receiving revenues from the capacity market will be withdrawn because it will not be profitable to adapt it to the stricter technical requirements. This will be truer for hard coal-fired units, as they have a low margin on electricity generation. The decision on lignite units will additionally depend on the supply of resources. And the existing lignite deposits will soon be exhausted.

²¹ See: P. Wróbel, *op. cit.* Warsaw 2019.

²² The maximum price specified for the price-taker will be 183 PLN/kWh.

²³ See: <https://www.pse.pl/aktualnosci-rynku-mocy>.

Figure 10: Impact of CO₂ emissions limits on capacity availability in future auctions

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Source: own calculations.

A thorough revision of the capacity market is necessary. The Ministry of Energy should analyse what the costs and sense of functioning of the capacity market can be without the possibility of participation of conventional coal-fired unit capacity. Is it acceptable, firstly, to limit the volume of capacity for which auctions are organised and, secondly, to have a capacity market for new capacity of gas units, DSR, storage facilities, and RES?

Maintaining the capacity market also raises a number of challenges that need to be addressed, as it will have consequences for the entire energy sector and for all consumers.

- From next year, fewer participants will take part in the auctions and price-makers (new units on the capacity market, if any) are likely to dominate. This entails the risk of insufficient competition and, as a result, very high costs for consumers over the next 15 to 17 years. There may also be over-compensation of existing units that will not need as much support as new units (as was the case at the first auction in 2018).
- The conduct of the auction must be preceded by a reliable analysis of the demand, which, however, ignores capacity ineligible due to emissivity from joining the capacity market.
- The situation in the electricity market has changed significantly compared to the capacity market design period. The average selling price of energy on the competitive market in 2016 was 163.70 PLN/MWh²⁴, and in 2018, 194.30 PLN/MWh²⁵. At present, futures contracts for 2020 are

24 See: <https://www.ure.gov.pl/pl/urzed/informacje-ogolne/aktualnosci/7480,Srednie-ceny-sprzedazy-energii-elektrycznej-na-rynku-konkurencyjnym-za-IV-kwarta.html> (available in Polish only).

25 See: <https://www.ure.gov.pl/pl/urzed/informacje-ogolne/aktualnosci/8161,Srednie-ceny-sprzedazy-energii-elektrycznej-na-rynku-konkurencyjnym-kwartalna-i.html> (available in Polish only).

above 270 PLN/MWh. Therefore, revenues from the electricity market will be higher than in the period when the capacity market was launched. Additional support will no longer be needed.

- Maintaining the capacity market means that in the case of generators, Poland will mainly support gas capacity. Their share in Poland is low so far—2.6 GW, i.e., 6% of the installed capacity²⁶. Flexible gas units are needed in the energy system, but it should be remembered that two-thirds of the gas is imported and this volume matters. At the same time, gas, although less emitting than coal, is at most a transitional fuel, and its prospects should be assessed in the context of the EU's climate neutrality objectives. Therefore, the continuation of the capacity market also means that it is necessary to discuss the future and optimal role of gas in the Polish power mix. Moderate development is desirable, but the increase in the share of this fuel must be viewed comprehensively, not only in electricity generation but also in heating. If Poland wants to maintain gas and thus give impetus to the development of new gas infrastructure, it must consider how to support the development of what is known as 'renewable gas'.
- The urgency of the reform before general certification and by the end of the first quarter of 2020 is also a challenge. So far, however, no detailed EU guidelines (e.g., on how to calculate the emissions performance standard) have been released, which means that the Polish government, which must also take into account the notification process, will operate under time pressure. Uncertainty is also exacerbated by Tempus Energy's complaint against the European Commission's decision approving the Polish capacity mechanism.

7. Conclusions

The introduction of the capacity market is a powerful intervention in the energy sector that has changed the architecture of the market. Poland has moved from a single-commodity market to a dual-commodity market. The assessment of this reform is not unequivocal, especially based on the results of the three auctions that have been held.

PPROS AND CONS OF THE CAPACITY MARKET



- Securing capacity in the system until 2025, although verification of their actual availability for the needs of the transmission system operator will take place only in 2021.
- Development of DSR services and, potentially, storage.
- Greater transparency and market orientation in the acquisition of power reserve services.



- Imposing a large, additional cost on customers.
- Postponement of the diversification of the energy mix.
- Lack of action to improve the flexibility of the power system.
- Lack of action reducing CO₂ emissions.

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The discussion about maintaining the capacity market or possibly other support mechanisms (e.g., differential contracts, feed-in premium, etc.) is, in fact, a discussion about the future strategy for the Polish power sector. And the Polish power system is currently facing major challenges, which are:

- The reconstruction and decarbonisation of the energy mix resulting from the ageing of generation units and the inevitable end of lignite extraction in Poland and decreasing production of electricity from hard coal;
- increased distributed generation;
- increased dispersion and volatility of demand.

And these are the challenges that must be faced.

Therefore, the electricity market in Poland needs urgent, in-depth reform, and that includes a change in the capacity market. If the capacity market is to remain in Poland, it must be an instrument that will solve problems other than just reliability, and improve flexibility and promote diversification of the energy mix.

Capacity market for review.

Analysis of the results of three auctions.



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