

# Divergence between national and European resource adequacy assessments

Appendix to

**National resource adequacy  
assessment  
2025 - 2040**



November 2024

## 1 Introduction

The analysis presented below aims to highlight the differences between the national resource adequacy assessment for Poland for the years 2025-2040<sup>1</sup> and the European resource adequacy assessment report –2023 edition<sup>2</sup>.

The main results of the resource adequacy assessment are the LOLE and EENS indicators. The values of these indicators for the respective target years for both reports are presented in Tab. 1-1 and Tab. 1-2, with the red colour indicating results exceeding the reliability standard for Poland i.e. 3h/year.

*Tab. 1-1 The results of the LOLE indicator for the base scenario and the scenario with the capacity mechanism in the NRAA report, as well as Scenario A and Scenario B in the ERAA 2023 report*

Year				2025	2028	2030	2033
NRAA	base scenario	LOLE	h/a	7,6	33,3	9,6	15,0
NRAA	scenario with capacity mechanism	LOLE	h/a	2,9	2,3	2,2	2,0
ERAA	scenario A	LOLE	h/a	0,1	1,7	2,5	8,5
ERAA	scenario B	LOLE	h/a	0,3	4,7	4,4	12,3

*Tab. 1-2 The results of the EENS indicator for the base scenario and the scenario with the capacity mechanism in the NRAA report, as well as Scenario A and Scenario B in the ERAA 2023 report*

Year				2025	2028	2030	2033
NRAA	base scenario	EENS	GWh/a	5,8	52,1	13,8	24,3
NRAA	scenario with capacity mechanism	EENS	GWh/a	1,8	2,4	2,2	2,1
ERAA	scenario A	EENS	GWh/a	0,0	1,2	0,9	6,1
ERAA	scenario B	EENS	GWh/a	0,0	3,0	2,6	13,5

The values of the LOLE and EENS indicators for the respective target years differ significantly. These differences are mainly due to the applied calculation method (more detailed in NRAA) and partly due to most up to date assumptions regarding various elements of the power system.

The comparison is focused on the differences between the NRAA base scenario and the scenario A in the ERAA 2023. The NRAA also presents results for the scenario with the capacity mechanism, which was not included in the ERAA 2023 report, so the results from this scenario cannot be compared.

Additionally, the ERAA 2023 report covers four calculation (target) years, while the NRAA encompasses the entire period from 2025 to 2040. To illustrate the differences, comparisons are presented only for the target years covered in the ERAA 2023. Although this should not overlook the adequacy issues identified in the NRAA that occur in years not included in the ERAA 2023.

<sup>1</sup>

<https://www.pse.pl/documents/20182/32109/Ocena+wystarczalno%C5%9Bci+zasob%C3%B3w+na+poziomie+krajowym+2025+%E2%80%93+2040/2d5d0ec2-2fba-4687-81d5-9a575f22655e?safeargs=76657273696f6e3d312e30>

<sup>2</sup> <https://www.entsoe.eu/outlooks/eraa/2023/>

## 2 Elements of the analyses affecting the differences in results

### 2.1 Economic Viability of generation units

Both reports, i.e., the NRAA and ERAA, should include an economic viability of generation units, the result of which is the available capacity in the system during the analysed period.

In the ERAA, the assessment of economic viability is conducted using a long-term system cost minimization model, which covers 4 target years and 3 climate scenarios. This model does not analyse the economic viability of each generation unit. It identifies a cost-minimal solution from the perspective of the entire power system, but within the selected solution, it also allows for the operation of generation units that do not generate profit at the operational level, and therefore are realistically at risk of being decommissioned for economic reasons.

In the NRAA, for the development of the base scenario, which should be compared with the scenarios presented in the ERAA 2023, the profitability analysis was conducted using two analytical models: a long-term system cost minimization model (covering the entire period from 2025 to 2050 and 3 climate scenarios), and a full market model (covering the period from 2025 to 2040 and the same climate scenarios). This approach allowed for the analysis of the revenues and costs of each generation units (both existing and new) up to 2040, while also considering the climate scenarios.

In both reports (ERAA and NRAA), after determining the available capacity in the system using adequacy models, the LOLE and EENS indicators were calculated for the analysis calculation years.

#### Evaluation of the difference

The use of a comprehensive economic viability for individual generation units has a significant impact on the results, namely the LOLE and EENS indicators for the respective calculation years. Due to the specific characteristics of the Polish generation sector, the absence of such an analysis may lead to a substantial underestimation of the results, i.e., the LOLE and EENS values could be estimated at an overly low level.

### 2.2 Assumptions - power and energy demand

The demand curves for power and electricity used for ERAA 2023 were prepared based on the most up-to-date strategic documents available at the time of preparation the assumptions (Q1 2023). The assumptions being developed during that period for the Development plan for meeting the current and future electricity demand for the years 2023-2032 were also considered, as well as the assumptions used to determine the capacity market parameters for the main auction conducted in 2023 and the additional auctions conducted in 2024.

For the purposes of the NRAA, work on which began in Q2 2024, the demand curves for power and electricity were developed considering forecasts of final energy consumption, GDP growth forecasts, and anticipated changes in the structure of final energy consumption resulting from the ongoing energy transition. These data were prepared in Q1 2024 and were also used for the draft of latest edition of the *Development plan for meeting the current and future electricity demand for the years 2025 - 2034*.

Both input data sets, i.e., for ERAA and NRAA, consider changes in the shape of hourly profiles resulting from the ongoing energy transition (including the widespread use of heat pumps and the popularization of electric vehicles) and energy efficiency increase. Both data sets also consider the use of climate scenarios.

Tab. 2-1 The forecast of annual net electricity demand in NRAA and ERAA 2023 (average from climatic years)

Year			2025	2028	2030	2033
NRAA	Demand	TWh	162	174	181	191
ERAA	Demand	TWh	169	181	189	199

### Evaluation of the difference

The forecast of power and energy demand impacts the system adequacy results and the economic viability of generation units. Accurately determining the effect of using a different forecast in the NRAA on the discrepancy in results between the ERAA and NRAA is difficult to estimate due to differences in the applied methodology (chapter 2.1) and the fact that ERAA 2023 does not include intermediate years.

## 2.3 Assumptions – centrally dispatched system units

The data presented for ERAA 2023 has been updated and used for analyses within the NRAA.

The data collection process for ERAA 2023 took place at the end of 2022, and therefore, ERAA 2023 considered the most up-to-date information available at that time, obtained from resources owners through a survey process conducted by PSE at the turn of 2021 and 2022. The new generation units planned for commissioning were determined based on the results of the capacity market auctions conducted by the end of 2022. Primarily, in the ERAA 2023 models, the technical and economic parameters of the units were assumed to be unified for each category of generation source.

The parameterization of centrally dispatched generation units in the NRAA was carried out individually for each unit, using technical and economic data as well as planned decommissioning schedules obtained, among other sources, from the survey results of June 2024. The survey data are marked with a trade secret clause. The parameters for new, determined generation units were defined based on the results of the capacity market auctions conducted by the end of 2023.

Tab. 2-2 presents the capacity of centrally dispatched generating units applied in NRAA and ERAA 2023 for economic optimization (for the system cost minimization model).

Tab. 2-2 The capacity of centrally dispatched coal and gas generating units used in NRAA and ERAA 2023

Year			2025	2028	2030	2033
NRAA	Coal	GW	20,9	20,4	20,0	17,7
ERAA	Coal	GW	20,8	19,3	18,8	13,7
NRAA	Gas	GW	3,5	6,4	6,4	6,4
ERAA	Gas	GW	5,1	5,8	5,8	5,8

In both analyses, i.e., ERAA 2023 and NRAA, the units in this group are subject to economic optimization.

### Evaluation of the difference

The assumed available capacity of system units is an initial value that undergoes changes (optimization) during economic viability analysis. The difference in the initial value itself has a marginal impact on the results of ERAA and NRAA. The main factor influencing the discrepancy between ERAA and NRAA is the difference in the applied method of economic viability of generation units (chapter 2.1) and the fact that ERAA 2023 does not include intermediate years.

## 2.4 Energy storage and hydro pumped storage power plants

The data presented for ERAA 2023 has been updated and used for analyses within the NRAA.

The net capacities of pumped storage power plants (PSPP) remained unchanged and were used identically for NRAA and ERAA 2023. In both assessments there is no development of new PSPP units.

For NRAA, energy storage systems (other than PSPP) that signed capacity contracts through capacity market auctions held by the end of 2023 were considered. In the optimization process, from 2030, it is possible to additionally install up to 2.5 GW of capacity in battery energy storage systems annually.

In ERAA 2023, at the time of data collection, there was no information on initiated investments in energy storage systems (other than PSPP), and up to that point, units of this type had not signed capacity contracts.

Tab. 2-3 Energy storage and PSPP capacity used in NRAA and ERAA 2023

Year			2025	2028	2030	2033
NRAA	PSPP	GW	1,3	1,3	1,3	1,3
ERAA	PSPP	GW	1,3	1,3	1,3	1,3
NRAA	Electrochemical storage	GW	0	2,1	2,1	2,1
ERAA	Electrochemical storage	GW	0	0	0	0

### Evaluation of the difference

The assumed available capacity of energy storage systems and PSPP is a starting value. Additionally, within the optimization process in the profitability analysis, there is the possibility of developing storage units.

The difference in the initial installed capacity might have the impact on the results of ERAA and NRAA. However, due to the discrepancy between ERAA and NRAA in the applied method of economic viability of generation units (chapter 2.1) it is difficult to determine the level of impact of this difference on the results.

## 2.5 Assumptions – RES units

The data presented for ERAA 2023 has been updated and used for analyses within the NRAA.

The data collection process for ERAA 2023 took place at the end of 2022, and therefore, the most up-to-date information available at that time was considered. The renewable energy development forecasts in NRAA have been updated compared to the forecasts in ERAA 2023, reflecting the status of projects, signed connection agreements, and issued connection conditions.

Tab. 2-4 presents the installed capacity of RES units, which were used for NRAA and ERAA 2023.

Tab. 2-4 The capacity of RES used in NRAA and ERAA 2023

Year			2025	2028	2030	2033
NRAA	Photovoltaic	MW	19 631	23 898	26 443	33 611
ERAA	Photovoltaic	MW	16 049	20 613	21 663	22 929
NRAA	Onshore wind farms	MW	10 883	11 630	13 155	15 807
ERAA	Onshore wind farms	MW	10 930	12 418	13 768	13 768
NRAA	Offshore wind farms	MW	0	4 138	7 594	10 376
ERAA	Offshore wind farms	MW	0	5 932	9 644	10 900
NRAA	Run-of-the-river power plants	MW	1 008	1 041	1 101	1 134
ERAA	Run-of-the-river power plants	MW	1 011	1 011	1 011	1 011
NRAA	Biomass	MW	928	898	944	950
ERAA	Biomass	MW	895	1 312	1 338	1 338
NRAA	Biogas	MW	277	302	367	408
ERAA	Biogas	MW	313	481	585	613
<b>NRAA</b>	<b>Total</b>	<b>MW</b>	<b>32 727</b>	<b>41 907</b>	<b>49 604</b>	<b>62 286</b>
<b>ERAA</b>	<b>Total</b>	<b>MW</b>	<b>29 198</b>	<b>41 767</b>	<b>48 009</b>	<b>50 559</b>

### Evaluation of the difference

The available capacity in RES units impacts the profitability of other generation sources. A larger amount of electricity generated by RES at very low prices leads to a reduction in the clearing price during certain hours, which affects the system adequacy results and the profitability analysis of generating units. Accurately determining the impact of using a different RES development forecast in the NRAA on the discrepancies in results between ERAA and NRAA is difficult to estimate due to the discrepancy between ERAA and NRAA in the applied method of economic viability of generation units (chapter 2.1) and the fact that ERAA 2023 does not include intermediate years.

## 2.6 Assumptions – other nCDGU

The data presented for ERAA 2023 has been updated and used for analyses within the NRAA.

The data collection process for ERAA 2023 took place at the end of 2022, and therefore, the most up-to-date information available at that time was considered. The available capacity of generation units not participating in the central dispatch mechanism for NRAA was based on the latest information obtained from their owners, provided through the cyclical survey process of the generation sector conducted at the turn of 2023 and 2024. For ERAA 2023, the available capacity of generation units not participating in the central dispatch mechanism was based on information obtained through the survey process of the generation sector conducted at the turn of 2021 and 2022.

Tab. 2-5 presents the installed capacity of generation units not participating in the central dispatch mechanism applied in NRAA and ERAA 2023.

Tab. 2-5 The installed capacity of generation units not participating in the central dispatch mechanism used in NRAA and ERAA 2023

Year			2025	2028	2030	2033
NRAA	Gas	MW	2 123	2 191	2 155	2 147
ERAA	Gas	MW	1 896	1 798	1 793	1 654
NRAA	Hard coal	MW	3 875	3 663	2 902	1 887
ERAA	Hard coal	MW	4 590	4 391	3 821	3 024
NRAA	Other non-RES	MW	1 061	1 068	874	860
ERAA	Other non-RES	MW	123	232	232	232
<b>NRAA</b>	<b>Total</b>	<b>MW</b>	<b>7 059</b>	<b>6 922</b>	<b>5 931</b>	<b>4 894</b>
<b>ERAA</b>	<b>Total</b>	<b>MW</b>	<b>6 609</b>	<b>6 421</b>	<b>5 846</b>	<b>4 910</b>

### Evaluation of the difference

The assumed available capacities in various technologies are at a similar level in both ERAA and NRAA. The identified difference in installed capacity has a marginal impact on the results, even despite the differences in the applied method of economic viability of generation units (chapter 2.1).

## 2.7 Assumptions – other units

For the NRAA, the construction of nuclear units has been assumed in accordance with the data indicated in the Polish Nuclear Power Programme, considering current information on the commissioning dates of subsequent nuclear units. The commissioning of the first unit was assumed for 2036, with the subsequent units expected to start operations in 2038 and 2040, respectively. These units are not subject to economic optimization.

In ERAA 2023, the construction of nuclear units was assumed in accordance with the data and timelines indicated in the Polish Nuclear Power Programme. The commissioning of the first unit is planned for 2033, with subsequent units expected to start operations every two years.

Tab. 2-6 presents the capacity of nuclear power plants (NPP) used in NRAA and ERAA 2023

Tab. 2-6 The capacity of nuclear power plants used in NRAA and ERAA 2023

Year			2025	2028	2030	2033
NRAA	NPP	MW	-	-	-	-
ERAA	NPP	MW	-	-	-	1 100

### Evaluation of the difference

The available capacity of NPP impacts the profitability of other generating sources. The electricity they generate, like that from RES, is produced at a relatively low price (modelled as variable marginal cost), which leads to a reduction in the clearing price during certain hours. This, in turn, affects the system adequacy results and the profitability analysis of generating units.

Accurately determining the impact of using a different nuclear energy development forecast in NRAA on the difference in results between ERAA and NRAA is impossible due to the discrepancies in the applied method of economic viability of generation units (chapter 2.1) and the fact that ERAA 2023 does not include intermediate years.

## 2.8 Cost of new entry (CONE)

Both the NRAA and ERAA 2023 reports used information on the cost of new entry for new generation units or demand response, i.e., CONE.

In the NRAA report, the values of CONE were used according to the Information of the President of the Energy Regulatory Office No. 12/2023 *on the cost of entry of new capacities and demand response*. The CONE value were developed by the NRA office as specified in Article 25 point 2 of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity and based on the ACER's methodology presented in Annex I „Methodology for calculating the value of lost load, the cost of new entry and the reliability standard” to the Decision no 23/2020 of the European Union Agency for the Cooperation of Energy Regulators of 2 October 2020 *on the methodology for calculating the value of lost load, the cost of new entry, and the reliability standard*.

For ERAA 2023, the CONE values published for certain countries were used. In these countries, national CONE values were applied. However, in countries where the CONE value was not calculated, including Poland, an average of the national CONE values was used.

Tab. 2-7 presents the parameter for CONE used in the NRAA and ERAA 2023.

Tab. 2-7 The technical-economic parameters of new units by technology used for NRAA (real prices 2023) and ERAA 2023 (real prices 2021), exchange rate EUR/PLN = 4,203

			OCGT	CCGT	Electrochemical storage
NRAA	Capital expenditures	kPLN/MW	3 349	3 638	5 035 – 4 544*
ERAA	Capital expenditures	kPLN/MW	2 095	3 031	4 394
NRAA	WACC	%	8%	10,39%	10,39
ERAA	WACC	%	6,4%	5,9%	5,8%
NRAA	Technical lifetime	years	25	25	15
ERAA	Technical lifetime	years	25	25	15
NRAA	Variable cost	PLN/MWh	20	20	-
ERAA	Variable cost	PLN/MWh	10	9	-
NRAA	Fixed operating costs	PLN/kW/year	248	315	96
ERAA	Fixed operating costs	PLN/kW/year	71	80	87

\* Capital expenditures for the period 2030 - 2040

### Evaluation of the difference

The technical-economic data used to determine CONE significantly impacts the profitability analysis results of generation units, affecting both new and existing units.

Estimating the impact of differences in this data on the discrepancies between ERAA and NRAA results is impossible due to the differences in the applied method of economic viability of generation units (chapter 2.1) and the fact that ERAA 2023 does not include intermediate years.

## 2.9 Prices

The forecasts for the prices of fuels and CO<sub>2</sub> emission allowances in the NRAA were applied in accordance with the forecasts used for the preparation of ERAA 2024 (currently developed by ENTSO-E).

Tab. 2-8 Fuel costs and CO<sub>2</sub> emission allowances in NRAA (real prices 2023) and ERAA 2023 (real prices 2021), exchange rate EUR/PLN = 4,203

			2025	2028	2030	2033
NRAA	natural gas	PLN/GJ	34,5	30,8	28,3	27,6
ERAA	natural gas	PLN/GJ	52,7	37,0	26,5	25,6
NRAA	hard coal	PLN/GJ	16,5	11,8	10,7	10,3
ERAA	hard coal	PLN/GJ	14,2	10,2	7,5	7,3
NRAA	lignite*	PLN/GJ	3,7	3,7	3,7	3,7
ERAA	lignite	PLN/GJ	7,6	7,6	7,6	7,6
NRAA	CO <sub>2</sub> emission allowances	PLN/t	257,9	474,9	619,6	674,6
ERAA	CO <sub>2</sub> emission allowances	PLN/t	369,5	433,8	476,6	519,0
NRAA	H <sub>2</sub> (green)	PLN/GJ	261,4	261,4	261,4	245,7
ERAA	H <sub>2</sub> (blue)	PLN/GJ	79,4	76,3	74,1	71,0
NRAA	oil	PLN/GJ	67,4	71,5	74,2	72,1
ERAA	oil	PLN/GJ	55,5	51,8	49,4	48,9

\* - The prices of lignite were determined individually for each power plant based on data from unit owners. The table shows average values for all sources. Additionally, in NRAA, the fixed costs of maintaining the lignite mining sites were also included

### Evaluation of the difference

Price assumptions in power system models impacts the market merit order. These assumptions also have a significant impact on the results of economic analysis. Despite differences in individual values, it can be stated that the price assumptions used in NRAA and ERAA should result in the same merit order, and the resulting distribution of loads between technologies in individual years should not differ significantly. However, estimating the full impact of discrepancies between ERAA and NRAA results is impossible due to the differences in the applied method of economic viability of generation units (chapter 2.1) and the fact that ERAA 2023 does not include intermediate years.

## 2.10 Climate years scenarios

The climate year scenarios in both the NRAA and ERAA 2023 reports were developed based on the PECD 3.1 database, which covers the years 1982 - 2019. For the ERAA 2023 report, the range of climate years was narrowed to the period 1982 - 2016 due to the lack of data for hydro power plants for the years 2017 - 2019. In the case of the NRAA report, due to the modelling of hydro power generation based on PSE measurement data rather than data from the PECD database, it was possible to use the full set of climate years, i.e., 1982 - 2019. Additionally, the PECD database for the NRAA process was modified to reflect the development of technologies (photovoltaics, onshore and offshore wind farms), which contributes to an increase in the average annual capacity factor.

Tab. 2-9 Average value of the capacity factor for the entire set of climate years for Poland

Year		2025	2028	2030	2033
NRAA	Available number of climate years scenarios	38 (1982 – 2019)			
ERAA	Available number of climate years scenarios	35 (1982 – 2016)			
NRAA	Photovoltaic	% 10,9	11,1	11,2	11,6
ERAA	Photovoltaic	% 12,0	12,0	12,0	12,0
NRAA	Onshore wind farms	% 32,0	32,5	32,9	33,7
ERAA	Onshore wind farms	% 34,9	35,2	35,4	35,4
NRAA	Offshore wind farms	% -	45,1	45,2	45,3
ERAA	Offshore wind farms	% -	48,6	48,6	48,6

### Evaluation of the difference

The selection of climate scenarios mainly impacts the available power and energy in RES units, which in turn affects the profitability of other generating sources. The lower amount of electricity generated by RES at very low prices, assumed in NRAA (compared to ERAA), leads to the increase in the clearing price in some hours, which should impact the system adequacy results and the profitability analysis of generating units. Accurately determining the influence of using modified climate scenarios in NRAA on the discrepancies in results between ERAA and NRAA is impossible to estimate due to the differences in the applied method of economic viability of generation units (chapter 2.1) and the fact that ERAA 2023 does not include intermediate years.

### 2.11 Demand Side Response - DSR

The NRAA report was prepared using current data on demand reduction, i.e., DSR. Both demand-side capabilities, where consumers voluntarily adjust their energy consumption in response to market price signals (implicit DSR), and DSR resulting from contracts to reduce consumption based on TSO requests (explicit DSR) were considered. Demand flexibility includes loads such as electrode boilers, industrial heat pumps, green hydrogen production installations, and electric vehicles. This way, greater flexibility of the power system was modelled by shifting part of the demand to more favourable moments, allowing cost minimization and reducing peak power demand. The results of the ERAA included explicit DSR resulting from contracts to reduce consumption, which depended on ENS, its value, the time of occurrence, and duration. The ERAA 2023 did not consider implicit DSR.

Tab. 2.10 Available capacity of explicit DSR in NRAA and ERAA 2023

Rok			2025	2028	2030	2033
NRAA	explicit DSR	MW	1 300	1 539	1 600	1 600
ERAA	explicit DSR	MW	1 017	1 017	1 017	-

### Evaluation of the difference

In the NRAA, a significantly greater potential for demand response through changes in power and energy demand by both individual and industrial consumers is included. This improves system adequacy indicators, i.e., the LOLE and EENS results should be lower. Accurately determining the impact of using different available capacity of explicit DSR and inclusion of implicit DSR in the NRAA on the difference in results between the ERAA and NRAA is impossible to estimate due to differences in the applied method of profitability analysis of generating units (chapter 2.1) and the fact that ERAA 2023 does not include intermediate years.

## 2.12 Contribution of neighbouring bidding zones

The ERAA 2023 report applied two methods for modelling cross-border exchange constraints between zones. The first is the NTC method, which involves determining the maximum possible energy exchange between zones without considering its impact on other connections in the system. In this method, each border is analysed separately, and exchange limits are fixed and based on estimates of available network capacity for a given period. The second is the FBMC (flow-based market coupling) method, which has the advantage of considering interdependencies in the system, allowing export and import between zones if individual network elements are not overloaded. This better reflects the physical constraints of the network and enables more optimal use of available transmission resources.

In the adequacy model in ERAA 2023, the FBMC method is used in the CORE area (AT, BE, HR, CZ, FR, DE, HU, LU, NL, PL, RO, SK, and SI), while the rest of Europe is modelled using the NTC method. In the economic viability assessment (EVA) model, the NTC method is applied for the whole of Europe.

For determining the capacity of foreign units contributing to the NPS in the NRAA, the methodology used for determining the volumes of foreign capacity participating in capacity mechanisms was used. The method is consistent with the ACER decision, which is presented in the annex to this decision titled: "ACER Decision on technical specifications for cross-border participation in capacity mechanisms: Annex I". Essentially, in this method, the contribution of foreign capacities to the balance of the zone where the capacity market is located is determined based on the analysis of cross-border flows during hours when there is unserved energy in that zone, i.e., during scarcity periods.

The aim of the NRAA is particularly to assess the level of operational security of the NPS, and therefore the lack of full modelling of cross-border exchange during periods not characterized by a tight balance situation does not affect the adequacy analysis result.

The analysis was based on forecasted values due to the changing power structure in European power systems, and consequently, price differentiation in individual zones, as well as structural changes in the transmission capacities of cross-border connections. The analyses used the results of the European generation adequacy assessment, i.e., the ERAA 2023 report (in the version approved by ACER in May 2024).

### Evaluation of the difference

The level of contribution neighbouring zones to the NPS balance has a significant impact on the final NRAA result. The assumed contribution value is the average value of all analysed samples. However, data analysis show that the contribution can be significantly below the average (zero or even negative values – negative values indicate export due to simultaneous scarcity in the region and the apply of the curtailment sharing mechanism) as well as significantly above the average. Such large deviations in the analysed data set cause the contribution of foreign units to be an element introducing significant uncertainty into the NRAA analyses, requiring appropriate consideration during the result processing and conclusion drawing stages.

The assumed contribution of neighbouring zones was determined based on the ERAA 2023 report, which should translate to a marginal impact on the results, i.e., it should not significantly affect the differences between ERAA and NRAA.

### 3 Summary

In contrast to ERAA 2023, the analyses presented in NRAA showed that the defined reliability standard is not met in the analysed period. This comparison focused on the differences between the NRAA base scenario and the ERAA 2023 scenarios. The NRAA also presented results for a scenario with a capacity mechanism, which was not included in the ERAA 2023 report, so the results from this scenario cannot be compared. Additionally, the ERAA 2023 report covers four calculation years, while the NRAA covers the entire period from 2025 to 2040. To illustrate the differences, comparisons were presented only for the target years from ERAA 2023.

Tab. 3-1 presents a comparison of the base scenarios in the ERAA 2023 and NRAA reports, with the red colour indicating results exceeding the reliability standard for Poland i.e. 3h/year.

Tab. 3-1 Comparison of the base scenarios in the ERAA 2023 and NRAA reports

Target year			2025	2028	2030	2033
NRAA	base scenario	LOLE h/a	7,6	33,3	9,6	15,0
ERAA	scenario A	LOLE h/a	0,1	1,7	2,5	8,5
ERAA	scenario B	LOLE h/a	0,3	4,7	4,4	12,3

The most significant impact on the differences between the two assessments is the implementation of a full economic viability of generating units in the NRAA. The complete profitability analysis of units in the NRAA significantly affects the adequacy results, i.e., the final LOLE and EENS indicators for individual calculation years. Due to the specifics of the Polish power sector, the lack of such an analysis may cause significant underestimation of the results, i.e., the LOLE and EENS values may be estimated at too low a level.

Other elements of the assessments that differ between the ERAA and NRAA reports has also impact the final LOLE and EENS results. However, due to the discrepancy between ERAA and NRAA in the applied method of economic viability of generating units (chapter 2.1), it is impossible to determine the level of impact of these differences on the results.