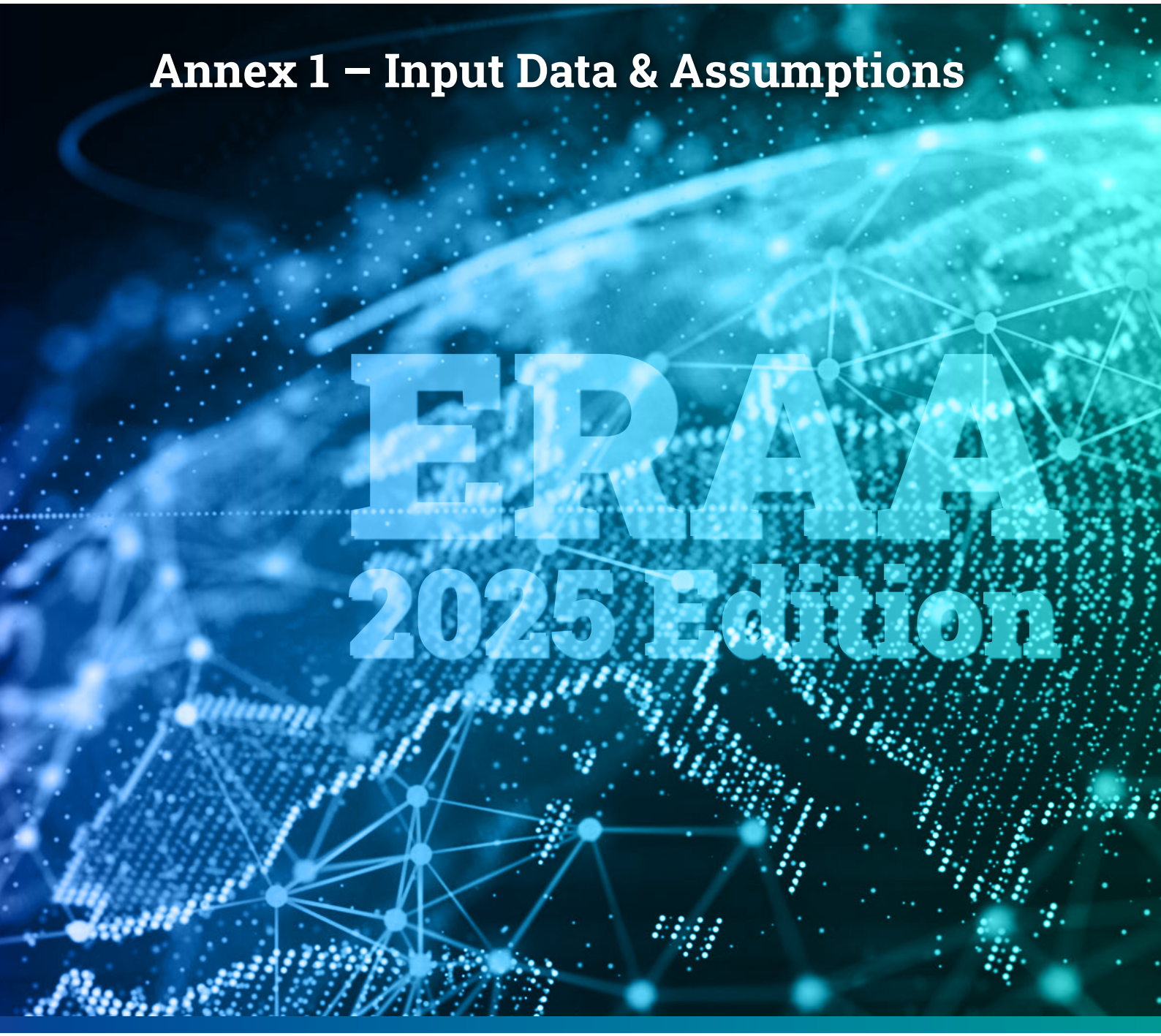
European Resource Adequacy Assessment

2025 Edition

ENTSO-E's proposal for ACER's approval



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1 ERAA 2025 Scenario

1.1 Scenario description

The European Resource Adequacy Assessment (ERAA) builds on the most up-to-date expectations for the selected target years (TYs), guided by policy frameworks and stakeholders' expert views. ENTSO-E conducts an extensive data collection exercise, during which transmission system operators (TSOs) provide their views and estimations of the trajectories of demand, resource capacities, and grid elements. The input data gathered from TSOs populate ENTSO-E's databases, including the Pan-European Market Modelling Database (PEMMDB). These bottom-up datasets comprise ENTSO-E's National Trends scenarios. The data collection for ERAA 2025 began in winter 2024 – 2025, with ENTSO-E providing guidance to TSOs on the assumptions for the scenario in addition to the data required to ensure a common understanding of all underlying assumptions, targeting a consistent dataset among all modelled study zones. Quality checks and reviews were continuously conducted throughout this process, with updates integrated into the assessment until the launch of the study's main simulations in summer 2025. Impacts of the latest country-specific updates that could not be accounted for are discussed, when relevant, in Annex 6.

A pan-European study naturally requires an extensive amount of input data, which are mostly calculated by the respective TSOs, but also centrally by ENTSO-E, based on national policies and trends. Data collection assumptions can be found in the published data collection guidelines. The National Trends scenarios of ERAA 2025 are mainly based on the National Energy and Climate Plans (NECPs) available at the time of the data collection and, wherever possible, reflect the ambitions of the Fit for 55 (FF55) package. For more information on the drivers of the National Trends scenarios, please see the detailed TSO survey in the next section.

The ERAA methodology defines the central reference scenario:

Central Reference Scenario: The National Trends scenario is basis of the central reference scenario of ERAA 2025. Note that this scenario also considers capacity mechanisms (CMs) that already hold a CM contract for a given year assessed in ERAA that was granted in any previous auction of any existing or approved CM at the time of the assessment. The National Trends scenario is refined through the economic viability assessment (EVA) to obtain a central reference scenario for the ERAA study. This document focuses on National Trends scenario data and EVA parameters. The EVA results can be found in Annex 3, which presents a range of EVA results emerging from the implementation of two different risk aversion modelling approaches: a) with the enhanced hurdle premium only and b) with the enhanced hurdle premium combined with a revenue cap. The parameters of these approaches are described in this document.

1.2 European power system projection change compared with the previous ERAA

TSOs' projections of their power systems for ERAA 2025, in comparison to ERAA 2024, indicate a generally slightly degrading adequacy outlook, driven by updated national plans and actual

developments. This shift reflects a more granular and, in some cases, more cautious assessment of future energy system developments across Europe, moving beyond broad trends to acknowledge country-specific challenges and opportunities. The comprehensive data collection exercise for both ERAA 2024 and ERAA 2025, guided by policy frameworks and stakeholder expert views, forms the bedrock of these projections, with TSOs providing their estimations of demand, resource capacities, and grid elements.

Specifically, while ERAA 2024 highlighted a broad increase in demand, often driven by factors such as electrification, power-to-X initiatives, and population/GDP growth, ERAA 2025 reveals more varied national demand trajectories. Some countries are still projecting substantial growth, often linked to ambitious electrification targets in transport (e.g., electric vehicles (EVs)) and industry (e.g., heat pumps, industrial process electrification). However, others anticipate minor to substantial decreases, which can be attributed to factors such as delayed electrification projects, more impactful energy efficiency measures stemming from the "Energy Efficiency First" principle, or revised economic growth forecasts impacting industrial consumption. This divergence underscores the increasing complexity and localised nature of demand evolution, where national policies and economic conditions play a more pronounced role. Renewable energy sources (RES) continue to expand overall, yet ERAA 2025 shows delayed developments. These delays are primarily due to project postponements, revised deployment rates influenced by permitting challenges, grid connection delays, supply chain issues, or changes in national support schemes, contrasting with the more consistent and widespread growth previously observed in ERAA 2024. This highlights the practical hurdles in translating ambitious RES targets, often driven by FF55 targets and national development plans, into operational capacity.

Thermal generation largely maintains its phase-out of coal and stable nuclear capacities, reflecting long-term decarbonisation commitments and existing operational lifespans. However, gas capacities exhibit more varied national changes in ERAA 2025, including both increases in some regions (potentially for ensuring system flexibility and security of supply during the energy transition, especially as intermittent renewables grow) and decreases in others (driven by further decarbonisation efforts, economic factors, or the retirement of older, less efficient plants). This indicates a dynamic re-evaluation of the role of dispatchable thermal generation in a rapidly changing energy mix, where drivers like NECPs, TSO network planning, and government decisions continue to shape projections. Battery storage, in contrast, consistently shows a strong and widespread increase across Europe, highlighting its growing role in providing flexibility, supporting grid stability, and facilitating the integration of intermittent renewables. This consistent growth underscores the increasing recognition of storage as a critical component for future system adequacy. Electrolyser capacity projections are also more diverse in ERAA 2025, with some nations forecasting significant growth in line with national hydrogen strategies and substantial investments, while others anticipate reductions due to economic viability concerns, infrastructure development challenges, or slower-than-expected market uptake for hydrogen applications. Interconnection capacities generally remain stable or show minor decreases, with a few exceptions where new projects are expected to come online. The challenges in securing permits, financing, and coordinating cross-border projects contribute to this more conservative outlook. These shifts are fundamentally attributed to updated NECPs, evolving market dynamics (including commodity prices and investment signals), and the practical realities of project implementation, which often involve unforeseen delays and adjustments. A qualitative understanding of key capacity and energy mix evolution drivers, such as updates to NECPs, other national climate action plans and targets, network development plans, and market-based developments (e.g. high fossil fuel and CO_2 prices), provided valuable insights for both ERAA 2024 and ERAA 2025 assessments, informing these year-on-year changes. Details on TSO responses can be found in Appendix 2.

1.3 TSO surveys on scenario drivers

Two surveys were sent out to the TSOs on scenario drivers. The first survey is about alignment with European and national policy targets and commitments. Responses can be found in Appendix 1. This appendix compiles TSO responses regarding their assumptions on data submissions for ERAA 2025, focusing on the alignment of national data with pivotal European energy policy objectives and planning frameworks. It meticulously addresses the validation processes undertaken by TSOs prior to submission, the compliance of submitted energy demand and capacity data with the EU's final energy consumption, renewable energy, and binding 2030 GHG reduction targets. Furthermore, the survey elucidates the consideration of the “Energy Efficiency First” principle and the “Recovery and Resilience Facility” within national frameworks. The survey also investigates the initiation of national market reforms and their integration into the ERAA 2025 dataset, alongside a comprehensive assessment of the integration and granularity of NECPs and European Commission’s scenarios. This includes the alignment of specific electricity generation capacities (renewable, thermal, demand-side response (DSR), electrolysers, and hydrogen production) with NECP targets, as well as compliance with Member States' non-binding offshore agreements and the consistency of submitted data between the ERAA and Ten-Year Network Development Plan (TYNDP) input.

The second survey is about year-on-year changes and other data assumptions, and can be found in Appendix 2. This appendix provides further granular insights from TSOs concerning the dynamic aspects of their ERAA 2025 data submissions. It specifically addresses the expected impact on system adequacy resulting from year-on-year data changes when compared to ERAA 2024, offering detailed elaborations for these anticipated impacts across various technology types, including thermal generation, RES, demand, DSR, batteries, electrolysers, and interconnection capacities, as covered in the previous section (Section 1.2). The survey also assesses the projected validity (as of the August perspective) of the submitted data, identifying key drivers for potential changes, such as policy shifts and market participant announcements. Additionally, it outlines specific details on out-of-market (OOM) measures available to TSOs for addressing potential supply shortfalls, quantifying their volumes and explaining their contribution to national system adequacy.

1.3.1 Compliance with EU targets

The TSO survey results indicate varying levels of alignment with key EU targets for 2030 and beyond:

- Regarding compliance with the EU’s final energy consumption targets, 11 of 35 TSOs reported alignment, eight TSOs indicated that data were adjusted based on their best estimates (citing such reasons as non-EU member status, NECP not aligned, or modelling differences), and 16 TSOs stated that this target was “Not assessed” (due to unavailable final NECPs, focus on electricity sector only, or non-EU member status).
- For the EU’s renewable energy target, 16 TSOs reported alignment, five TSOs indicated adjustments based on their best estimates, and 14 TSOs stated "Not assessed".
- Concerning the EU’s binding 2030 greenhouse gas (GHG) reduction target, 14 TSOs reported alignment, five indicated that data were adjusted based on their best estimates, and 16 TSOs stated "Not assessed".

Whereas the main majority of TSOs (30/33) reported that the input data for energy demand is aligned with the NECP or adjusted based on their best estimates for 2030, many TSOs (10/33) reported that the data is not specified in their NECP for 2035. This is consistent with the results presented in the previous section, and similar trends appear in TSO responses for the alignment of submitted data regarding electricity demand and the NECP.

1.3.2 Robustness of data submitted

ERAA 2025 focuses on four TYs for the adequacy assessment. Therefore, a qualitative understanding of the key capacity and energy mix evolution drivers (policy or otherwise) for the coming decade can provide valuable insights. Overall, the majority of TSOs' reported that the data submitted in Q4 of 2024 remains valid for final ERAA 2025 submission, albeit some with minute changes or minute impact on the results. However, new information is available in some countries, which is expected to have notable impact. These impacts will be assessed in following ERAA editions.

2 Demand dataset

The demand (or "load") dataset in ERAA 2025 represents the active power required by any end user installation/appliance connected to the grid, except for the major dispatchable consumption units, including hydro pumps in hydro storage facilities, as well as battery systems, electrolysers, and power-to-heat (P2H) facilities. The final demand in ERAA 2025 also considers the consumption of these major dispatchable consumption units, defined during the modelling stage when the dispatch of such units is optimised. However, in this annex, the consumption of such units is disregarded when we refer to demand.

Demand comprises several parts: demand that cannot be moved to another point in time by price incentives, demand that will only be consumed if electricity prices remain below a certain threshold (referred to as explicit DSR), and demand that would be consumed but could be shifted in time given sufficient price incentives (referred as implicit DSR, which generally represents the flexibility of some portion of the heat pumps, EVs charging and photovoltaic (PV) battery system operation). All the information below refers to demand before any decisions on demand reduction or time shift are made, and before the dispatch of major dispatchable consumption units.

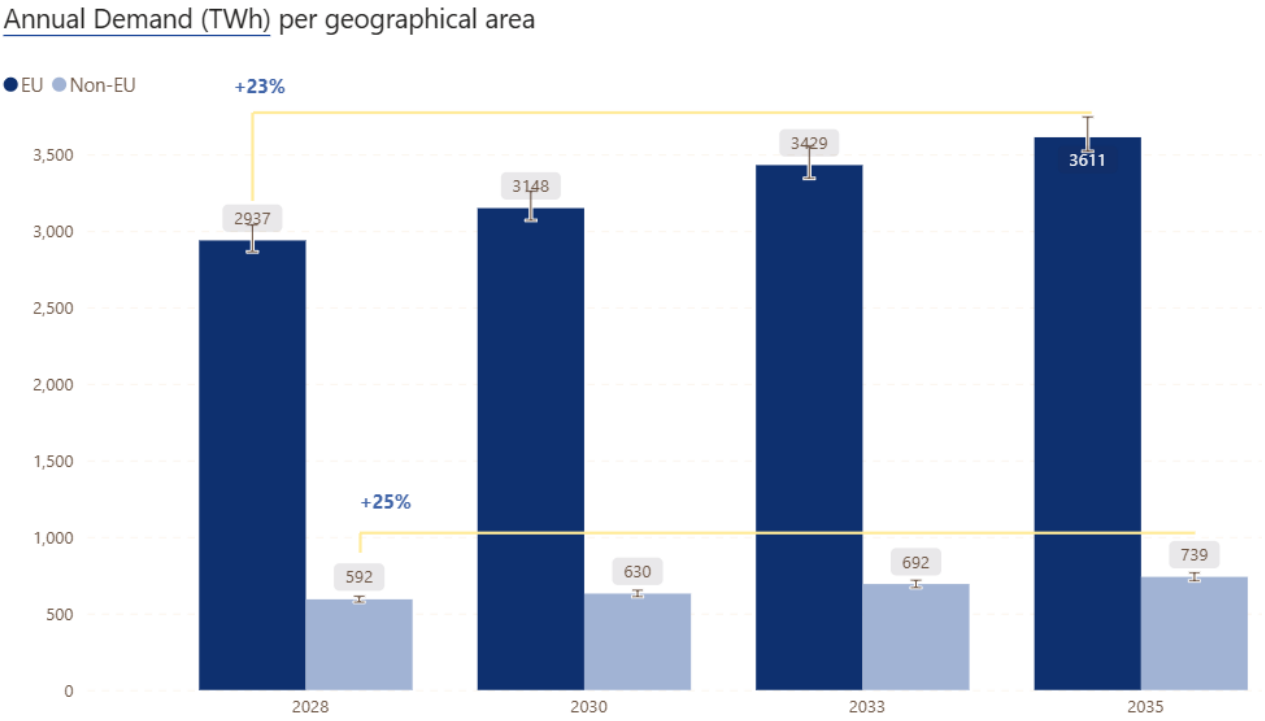
For details on how the demand dataset is created, please refer to the demand methodology[1] (published in the ERAA 2025 downloads section). Generally, demand is estimated for every hour of a considered year of the assessment, taking into account the expected evolution of consumers (e.g. the expected evolution of various electrical assets, such as EVs). It also considers a number of possible weather conditions for every hour, which plays a major role in electricity demand. Weather conditions are interlinked between every hour and spatially, which is ensured within the weather scenario (WS) dataset. Section 3 provides more information about the weather conditions[2] considered in ERAA 2025.

2.1 Overview of expected demand in the coming decade

A notable electrification is expected in Europe, with a 23% increase over seven years corresponding to a ~3% annual increase.

Figure 1 presents the evolution of expected annual consumption and average hourly demand values over the years assessed in ERAA 2025. For annual consumption, the bars represent average values, and the brackets represent the range of values, depending on weather conditions. For the average hourly demand values, i.e. the expected demand under average weather conditions, the bars represent the average values and the brackets the range of values depending on the hourly time period over the year. The upper (lower) bracket represents the maximum (minimum) hourly value of the average across weather conditions.

[1] https://www.entsoe.eu/outlooks/eraa/2025/eraa-downloads/
[2] A set of weather conditions representing the entire year is generally referred as weather scenario.



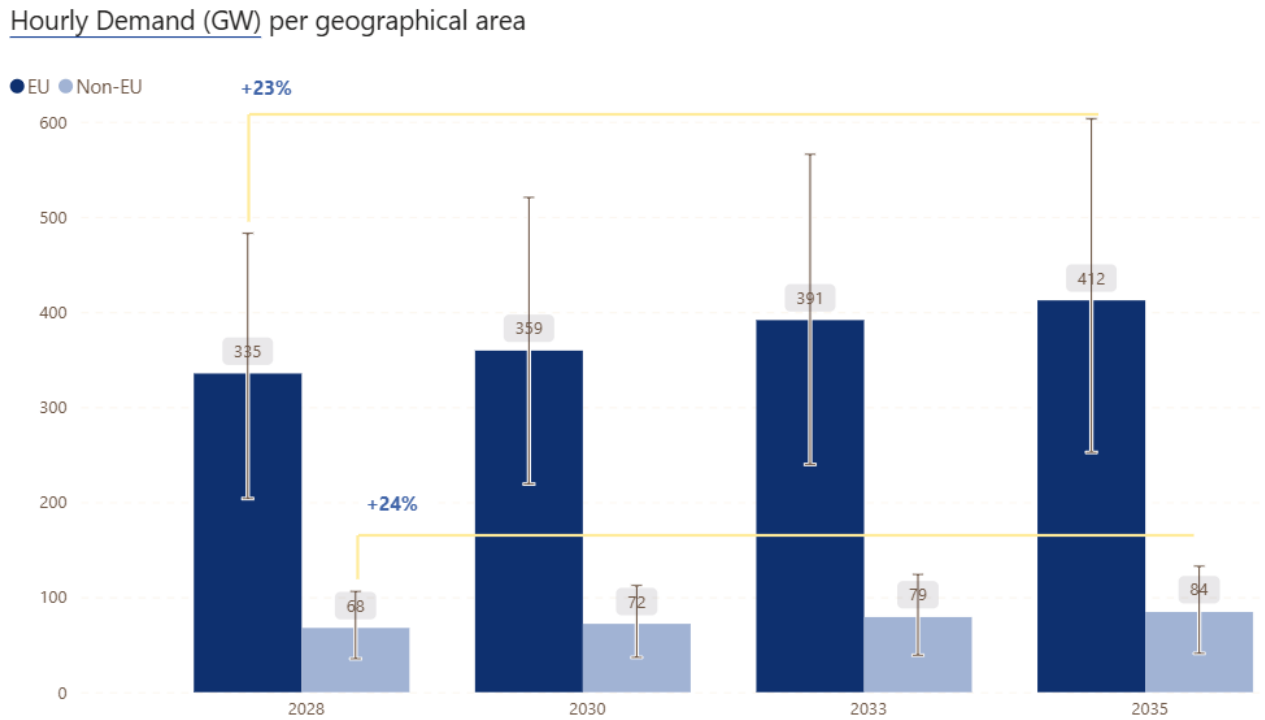


Figure 1: Yearly demand [TWh] and average hourly demand [GW]

3 Weather scenarios

Weather conditions[3] are a pivotal dataset for any power system assessment due to their impact on demand and supply. Demand is strongly influenced by weather conditions, especially during winter cold spells and summer heat waves. On the supply side, renewable generation potential (wind, solar and hydro) is strongly affected. While conventional generation availability is also affected, it can diminish under unfavourable conditions such as high cooling water temperatures or low river levels. All these weather conditions are described within Pan-European Climate Database (PECD).

ENTSO-E has co-developed and adopted version 4.2 of the PECD together with ECMWF and C3S in ERAA 2025 (along with other ENTSO-E products as seasonal outlooks). It also incorporates climate model outcomes, in which weather conditions and renewable generation potential are assessed based on assumptions about future climate evolution. In addition, compared to version 4.1 of the PECD, version 4.2 includes, among other things, an extended temporal coverage and scenario diversity data, improved bias adjustments for wind speed, enhanced energy conversion models, and new spatial aggregation zones. Details of the solution and technical documentation is accessible on the C3S website.[4] ENTSO-E has published the data package used in the study after any necessary processing, with more granular data available on the C3S website.

3.1 Requirements for the weather scenario dataset

It is necessary to have a comprehensive dataset describing possible simultaneous operational conditions across Europe at different hours of the year and in different areas. This is important because the European power system is highly interconnected, and the situation in one region can influence neighbouring regions.

This dataset must be sufficiently granular, both spatially (e.g. the pan-European average temperature is not suitable for all study zones individually) and temporally (e.g. the annual average temperature is not suitable for representing different seasons). Furthermore, climate data as a whole must represent a coherent set,[5] ensuring that it represents reasonable situations in space (e.g. the temperatures in neighbouring study zones in a given hour should be similar) and in time (e.g. the temperature does not drastically change from one hour to another). The PECD4 was developed to meet these requirements and PECD version 4.2 was used in ERAA 2025.

3.2 Representative weather scenarios for the EVA

Following the approach described in Annex 2 (Section 10.5), the full set of WSs is reduced for the cost-minimisation EVA to a subset of three representative WSs to keep the complexity of the model manageable. Table 1 shows the selected WSs, which are considered with equal weights. These are applied to all TYs.

[3] Referred to as *"climate data"* prior ERAA 2024.
[4] C3S Climate Data Store: https://cds.climate.copernicus.eu/datasets/sis-energy-pecd?tab=overview (Copyright ©2024 ECMWF/C3S/ENTSO-E).
[5] Often referred to as "spatial and temporal correlation".

Table 1: Selected WSs for the cost-minimisation EVA

Selected WSs
WS23
WS27
WS35

In the revenue-based EVA approach, described in Annex 5, the same selection procedure was used to select a subset of six representative WSs. Table 2 lists them.

Table 2: Selected WSs for the revenue-based EVA

Selected WSs
WS01
WS04
WS13
WS16
WS27
WS36

3.3 Weather scenario selection representativeness

Subsets are selected to minimise the Wasserstein distance between the chosen WSs and the full 36 scenario revenue distribution (see Annex 2, Section 10.5). By selecting only three weather scenarios to be considered for the cost-minimisation EVA, the methodology, aiming to select the most representative sub-group of the whole revenue distribution, naturally tends to exclude the sporadic extreme WSs observed in the upper-tail of the distribution (WSs with very high revenues). It follows an analysis of observed yearly ED post-EVA revenue distribution for EVA technologies, comparing the 36 WSs with the original set of 3 WS selected based on ERAA 2024 ED revenues and finally the 3 “best representative” theoretical new subsets, representing the outcome of repeating the WSs selection process based on the ERAA 2025 final ED revenues post-EVA, as proposed benchmark. These new subsets represent the possible new WSs to be used for a second EVA iteration, followed by a second ED runs, which would even further improve the representativity. However, given the challenging yearly timeline of the ERAA, and the reasonable alignment reached between the final ED distribution, the original 3 WSs subset, and the new theoretical subsets, no second iteration of EVA was deemed necessary for ERAA 2025.

The median is chosen as a metric to assess WSs representativeness, as it is consistent with the WS methodology, i.e. better representative of the whole distribution compared to the simple average and less sensitive to extreme scenarios. Despite the limitations of selecting only 3 out of

the 36 WSs set, the median provides a suitable test of representativeness, showing reasonable consistency and proving that the WSs selection methodology is working as intended.

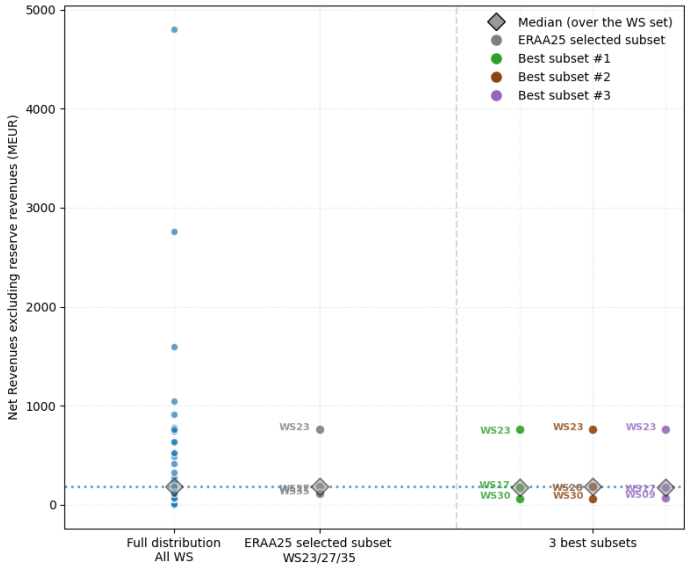


Figure 2: Post-EVA revenue distribution (TY and study zone's average) for the combined risk-aversion approach

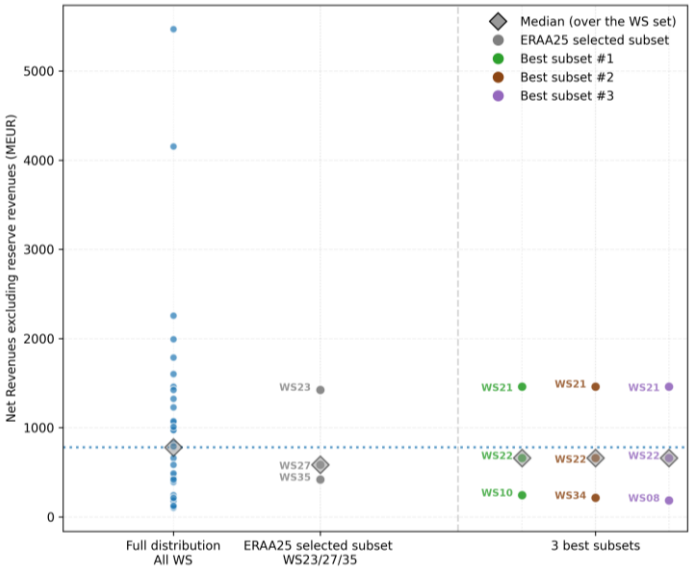


Figure 3: Post-EVA revenue distribution (TY and study zone's average) for the hurdle-premium only approach

Figure 2 and Figure 3 show, for the two risk-aversion modelling approaches adopted in the Central Reference Scenario, a comparison between (i) the full WSs revenue distribution from post-EVA ED results (sets of blue dots first from the left side), (ii) the revenues from the WS subset used in ERAA 2025 (set of grey dots, second from the left side), and (iii) the newly best-fitting subsets of 3 WSs, re-selected based on the same methodology, but leveraging the ED revenue distribution of the very same ED revenues depicted by the blue dots. The median of all (sub-)sets of WSs is also highlighted by the grey diamonds, with the horizontal dashed line representing the target median corresponding to the full 36 WSs set. The analysis and the benchmark of the median values indicate that the initial WS selection is reasonably aligned with the full WSs set and with the new theoretical best-fitting subsets.

4 Resource capacities of National Trends scenarios

As described in Section 1.1, the National Trends scenario is the starting point for the central reference scenario to which the EVA is applied. The EVA modifies the resource capacities, while the remaining assumptions under the National Trends scenario remain applicable.

In the context of ERAA 2025, a market resource (also called "resource" for simplicity) is a market-participating unit that can be scheduled to meet demand in time. Market resources include technologies that inject power into the grid and technologies that reduce or shift the demand to be met, such as DSR. DSR can be further categorised as explicit or implicit DSR: explicit DSR involves market-driven demand changes via accepted offers, including aggregated actions and foregone/time-shifted demand, while implicit DSR entails customer demand shifts in response to variable prices or incentives, with self-directed or provider-guided adjustments.

Table 3 details the technology aggregations used in the figures of this section.

Table 3: Technology aggregations and classification used in installed capacity figures

Technology aggregation	Underlying technologies
Hydro	Run of river (RoR) and pondage, traditional reservoir, open pump storage plants (PSP), closed PSP
Other RES	Geothermal, marine, small biomass, waste
Solar	PV (farm and rooftop), concentrated solar power (CSP)
Wind	Onshore wind, offshore wind
Coal	Hard coal, lignite
Gas	Conventional, open cycle gas turbines (OCGT), combined cycle gas turbines (CCGT)
Nuclear	N/A
Other non-RES	Heavy oil, light oil, shale oil, other
DSR	Explicit DSR
Battery	Large scale, and non-market batteries
Hydrogen	H_2 OCGT, H_2 CCGT

4.1 Resource capacities for National Trends scenario

Figure 4 shows the resource capacities (net generation capacity and DSR) by technology, aggregated for the ERAA explicit region for each TY. The figure accounts for capacities using 1 July as a threshold date, i.e. only units commissioned before 1 July and decommissioned after 1 July are included for each TY.

The figure shows that total resource capacities increase throughout the TYs, with solar and wind demonstrating the largest capacity increases.

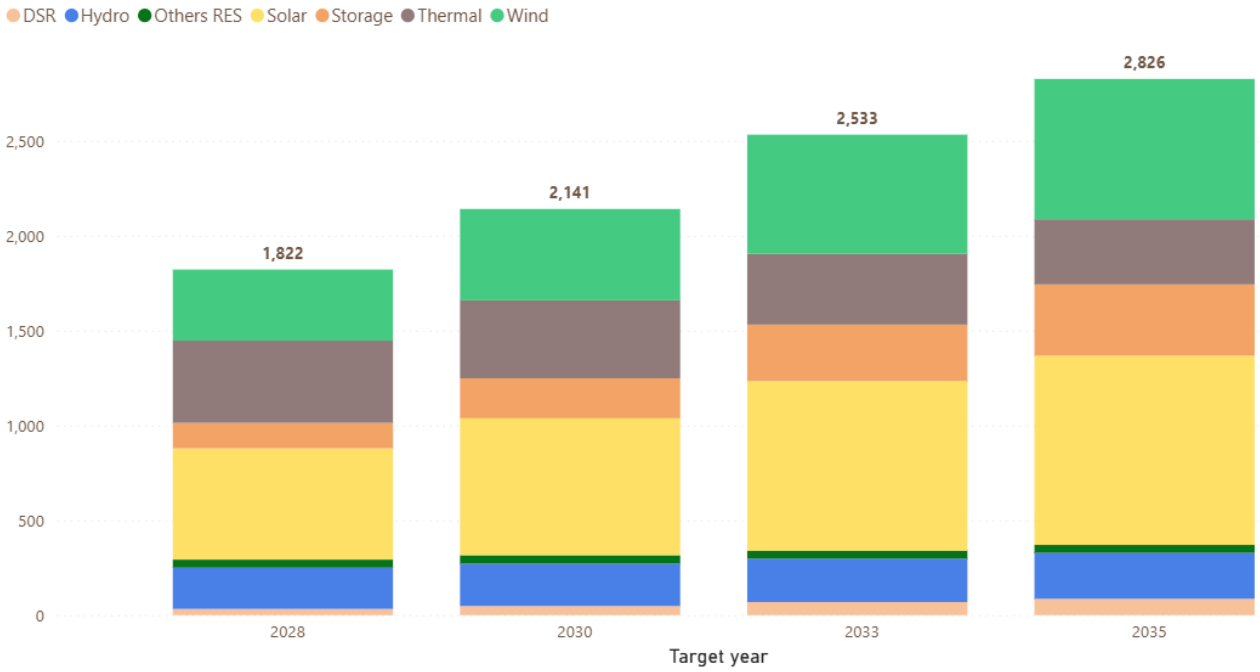


Figure 4: Resource capacity [GW]

Meanwhile some of the non-market resources dedicated for adequacy purposes, which are contracted, and therefore could be anticipated to be available, are given below.

Table 4: Non-market resources across Europe to be available for adequacy reasons

Study Zone	2028	2030	2033	2035	
MT00	175	175	175	175	-
PL00	981	-	-	-	Level of DSR from CM based on concluded auctions. Reduction tests have not been conducted yet, so effective level may be lower.

4.2 Storage capacities

Figure 5 shows the storage capacities by technology for each TY aggregated on the ERAA explicit region. The right side of the figure shows the evolution of hydro-based storage capacities (open and closed-loop pumping, pondage, and reservoir) across the TYs. The left side of the figure shows the evolution of battery-based storage (market based, i.e. large scale batteries and non-market, i.e. mostly household batteries) across the TYs. The figure accounts for capacities available in the market, using 1 July as the threshold date for each TY.

The vast majority of the total storage capacity in the ERAA's explicit scope comprises hydro technologies and, more precisely, traditional reservoirs and open PSPs, whereas closed PSPs, pondage, and batteries represent only a minor proportion of the overall storage capacity.

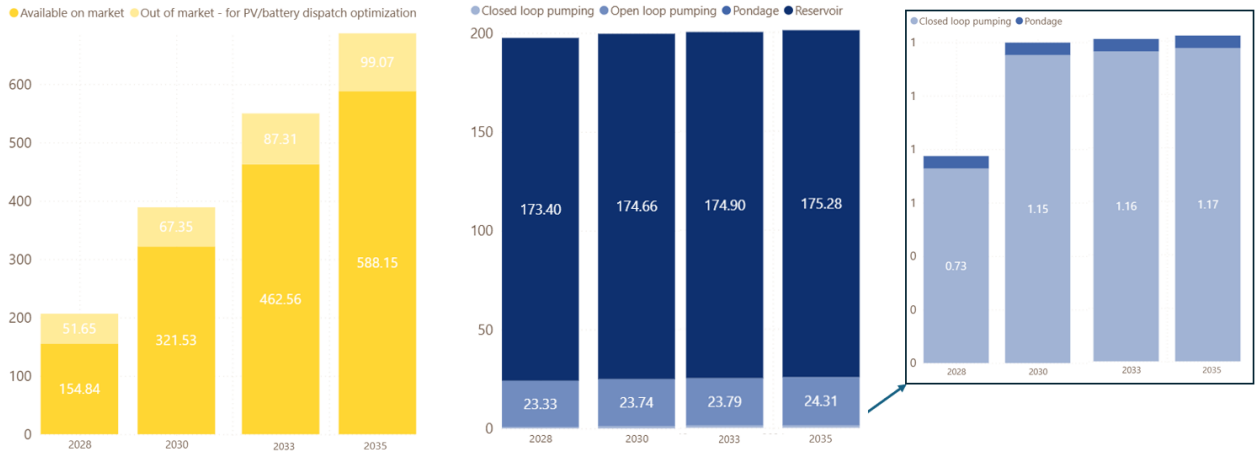


Figure 5: Battery storage capacity [GWh], hydro storage capacity [TWh]

4.3 Reserve requirements in all scenarios

Some frequency containment reserve (FCR) and frequency restoration reserve (FRR) contracts have already been awarded, while others will be awarded in future auctions to satisfy Member State reserve requirements. Awarded/known capacities are deducted from the net generating capacities (NGCs) of thermal generation units or DSR units, as reported by TSOs. The remaining capacity must be accounted for by withholding thermal or renewable capacities from the wholesale market, reducing available hydro turbining capacity and/or derating available battery and DSR capacities (see Annex 2).

Figure 6 illustrates the FRR and FCR requirements of the entire system for all TYs, in addition to the amount of the requirement accounted for by each method.

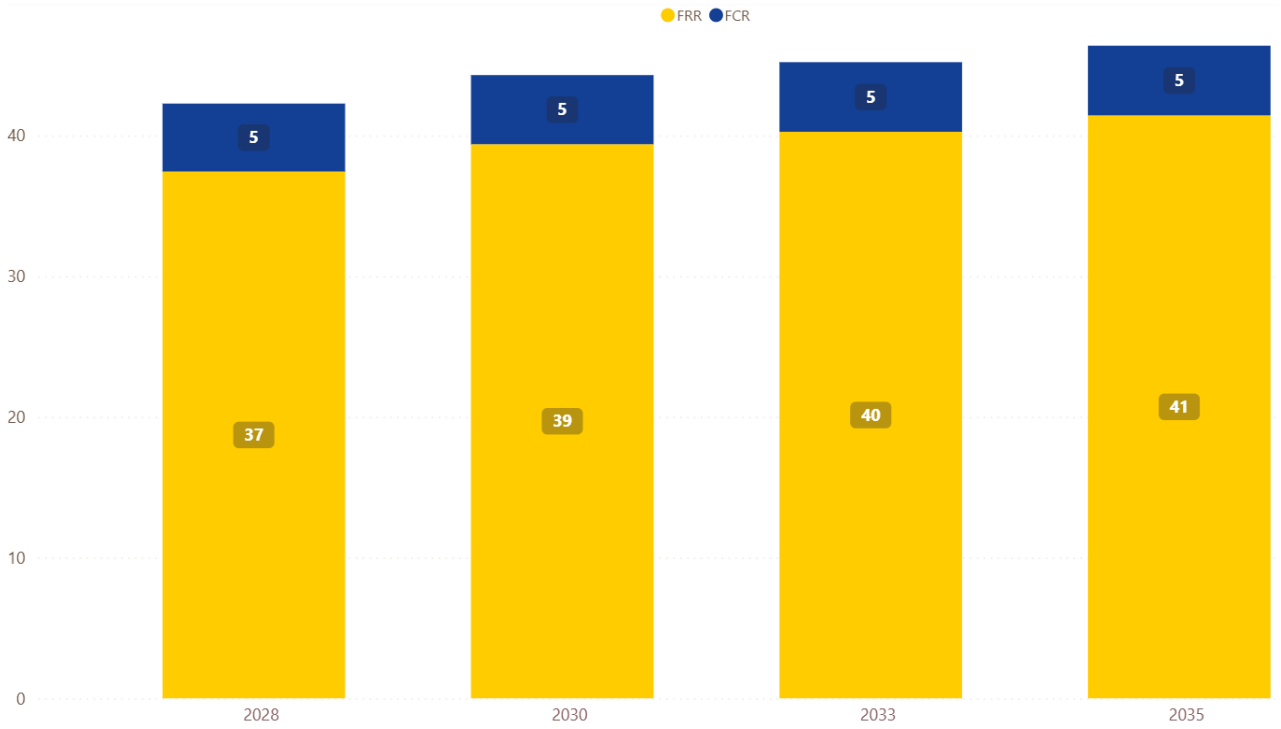


Figure 6: Reserve requirements [GW]

The figure shows that FRR (the larger portion) and FCR either increase or remain steady throughout the TYs. An increase in the share of reserves provided by batteries, DSR, hydro, and RES can be observed, whereas a slight decrease in the share of reserves provided by thermal is evident. Figure 6 also indicates that the awarded capacity is higher for later TYs.

4.4 Planned maintenance

Planned maintenance of thermal assets is either calculated centrally or provided directly by TSOs to be incorporated in the models. The calculation methodology is presented in Annex 2 of ERAA 2025. Figure 7 shows the thermal capacity in maintenance in the ERAA explicit region per TY. For all TYs, the maintenance window is mainly during the European late spring/early summer season.

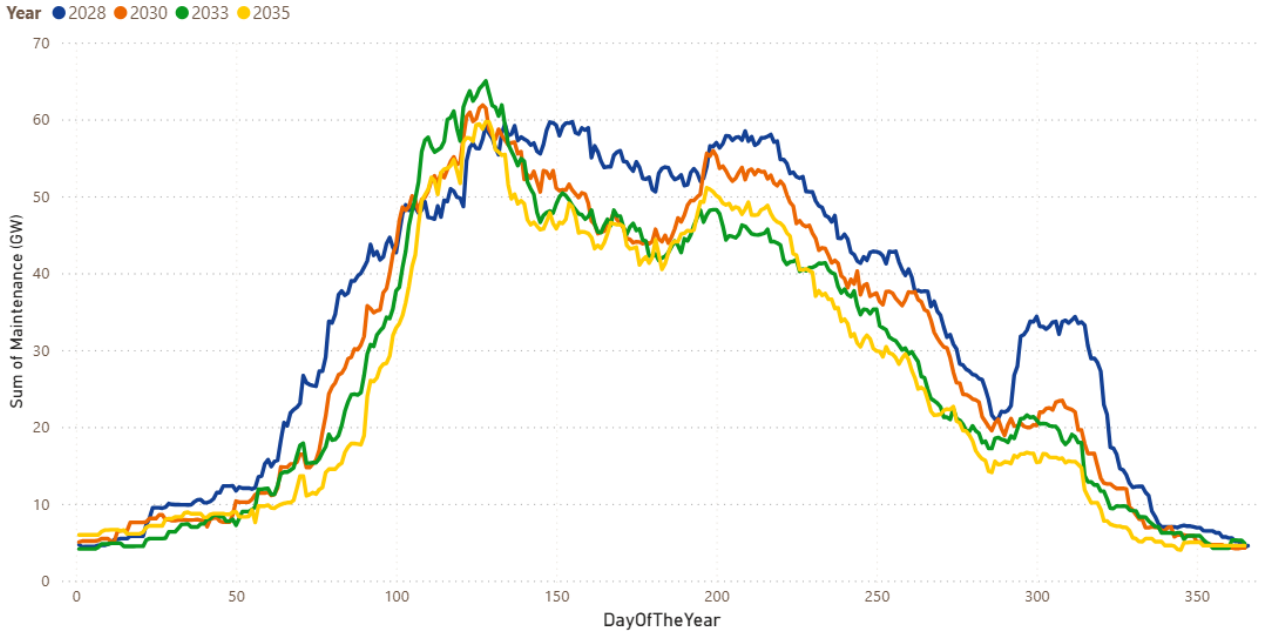


Figure 7: Pan-EU thermal capacity in maintenance

4.5 Forced outage rates

As described in Annex 2, ERAA 2025 only models random forced outages (FOs) for thermal assets and not for all resources, as RES generation profiles are considered to already account for outages. By nature, outages are random and can take units out of the market at any moment. Table 5 illustrates that the ratios are very specific to the fuel types, and their distribution remains fairly similar across TYs. Nuclear technologies show the lowest ratios on average, at around 5%. Gas and other non-RES technologies are slightly more subject to FOs on average, with ratios ranging from around 6% to 7%. Coal and lignite – the technologies with the highest forced outage (FO) ratios – range from 7.3% to 9.9%. Aggregation is done based on input data, with possible variations based on age and technology type.

Table 5: 10th and 90th percentiles and average of FO ratios (%) per TY and generation technology aggregation type

TY	Coal			Gas			Nuclear			Lignite			Other non-RES		
	10th	90th	Avg	10th	90th	Avg	10th	90th	Avg	10th	90th	Avg	10th	90th	Avg
2028	4.0	10.0	**8.8**	4.7	8	**6.2**	1.4	5	**4.7**	2.1	10	**7.4**	4.7	8	**7.0**
2030	4.0	13.1	**8.7**	4.7	8	**6.2**	1.5	5	**4.7**	2.1	10	**7.3**	4.7	8	**7.1**
2033	4.0	17.4	**9.2**	4.7	8	**6.3**	1.6	5	**4.7**	2.1	10	**7.7**	4.7	8	**7.0**
2035	4.0	17.4	**9.9**	4.7	8	**6.3**	1.3	5	**4.7**	2.9	10	**7.7**	4.7	8	7.1

5 Network inputs

5.1 Net import/export capacities

Net transfer capacity (NTC) values represent the theoretical maximum commercial flows between two study zones in one of the two directions and under specific conditions. **Error! Reference source not found.** illustrates the average import and export NTCs per country and TY in the ERAA explicit region, with these values collected from the TSOs. In the economic dispatch (ED) and EVA, NTC values were replaced by the corresponding flow-based (FB) constraints, where relevant.

Figure 9Figure 8 shows the maximum net import and export capacities averaged among all hours of the year, showing that the values increase in most countries throughout the TYs.

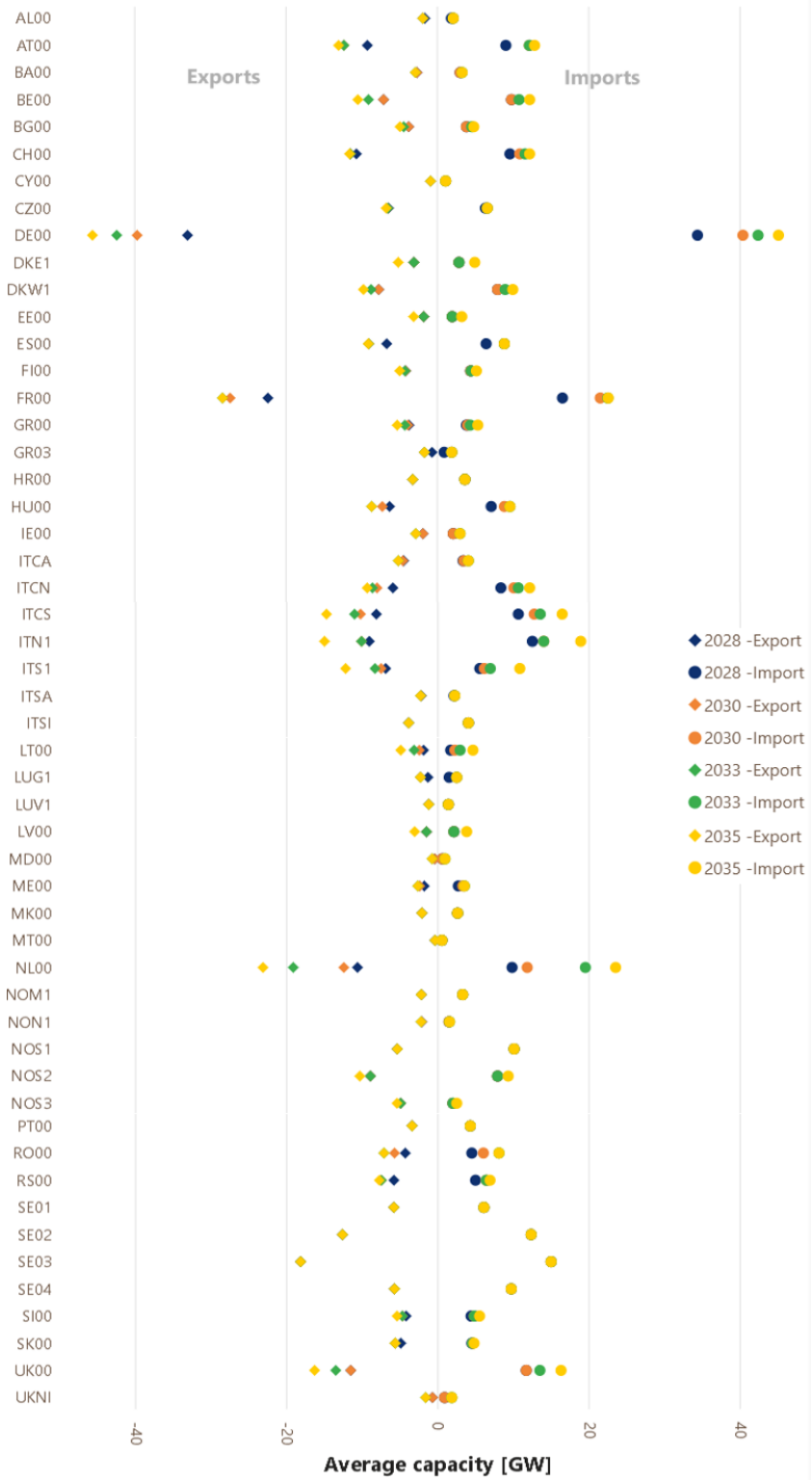


Figure 8: Average maximum net import and export capacity [GW] by country for each TY (ordered by 2035 import capacity)

5.2 Flow-based domains

5.2.1 Core flow-based

Table 6 displays six typical FB domains per TY for ED and two typical FB domains per TY for EVA. They were identified using the clustering process (Porygon) described in Annex 2. Three clusters were identified for each of the summer and winter seasons for ED, while one domain is used per season for EVA due to complexity. A classification model also determined when each typical domain should be selected in ED simulations according to the operational conditions (demand, RES, etc.) in each WS of the ERAA model. As described in Annex 2, the six timestamps for ED and two timestamps for EVA for which the representative FB domains were calculated are shown in Table 6.

Table 6: Initial market model timestamps for all TYs

Study	2028	2030	2033	2035
EVA	17-11-2028 09:00, WS14_FOR1 – Winter	2030-10-09 00:00, WS14_FOR2 – Winter	09-10-2033 00:00, WS14_FOR2 – Winter	18-11-2035 06:00, WS28_FOR1 – Winter
EVA	25-08-2028 07:00, WS25_FOR1 – Summer	2030-09-22 07:00, WS28_FOR1 – Summer	22-09-2033 07:00, WS28_FOR1 – Summer	28-08-2035 08:00, WS14_FOR1 – Summer
ED	23-02-2028 00:00, WS14_FOR2 – Winter 1	2030-11-08 15:00, WS25_FOR1 – Winter 1	08-11-2033 15:00, WS25_FOR1 – Winter 1	07-11-2035 01:00, WS14_FOR2 – Winter 1
ED	27-11-2028 01:00, WS28_FOR1 – Winter 2	2030-02-01 01:00, WS14_FOR1 – Winter 2	18-10-2033 22:00, WS14_FOR2 – Winter 2	01-12-2035 14:00, WS28_FOR1 – Winter 2
ED	24-01-2028 07:00, WS25_FOR1 – Winter 3	2030-02-10 01:00, WS14_FOR2 – Winter 3	17-01-2033 01:00, WS14_FOR1 – Winter 3	07-02-2035 15:00, WS28_FOR1 – Winter 3
ED	09-08-2028 00:00, WS14_FOR2 – Summer 1	2030-08-09 10:00, WS14_FOR1 – Summer 1	09-08-2033 10:00, WS14_FOR1 – Summer 1	30-08-2035 16:00, WS14_FOR2 – Summer 1
ED	28-06-2028 13:00, WS28_FOR1 – Summer 2	2030-08-09 01:00, WS14_FOR2 – Summer 2	09-08-2033 03:00, WS14_FOR2 – Summer 2	22-04-2035 07:00, WS25_FOR1 – Summer 2
ED	14-04-2028 01:00, WS14_FOR1 – Summer 3	2030-07-31 01:00, WS14_FOR2 – Summer 3	31-07-2033 01:00, WS14_FOR2 – Summer 3	08-06-2035 00:00, WS28_FOR1 – Summer 3

In ERAA 2025, all borders between Core and non-Core study zones are modelled as advanced hybrid coupling (AHC). There are two evolved flow-based (EvFB) elements, namely the Alegro DC link between Belgium and Germany and the Piedmont-Savoie high voltage direct current (HVDC) link between France and Italy. With 13 Core study zones, two EvFB links, and up to 36 AHC links, the FB domain holds a total of 51 dimensions in TY 2035.

The maximum theoretical import and export net position of study zones quantifies the increased level of exchanges enabled by FB domains, as shown in Figure 9. These values are calculated by finding the maximum Core net position per study zone in both the import and export direction, respectively, subject to FB constraints. It should be noted that these values are theoretical as exports or imports from all other zones can be chosen without restriction for calculating these metrics for a given study zone, therefore may be not achievable in practice. A second point is that the AHC borders were included in these calculations, so these maximum import and export capacities consider the additional capacity that optimising these elements could add. These

minimum and maximum net positions enable an easy comparison between different FB domains but cannot be used as a metric to draw any conclusions regarding what could actually be feasible for specific power systems to import or export.

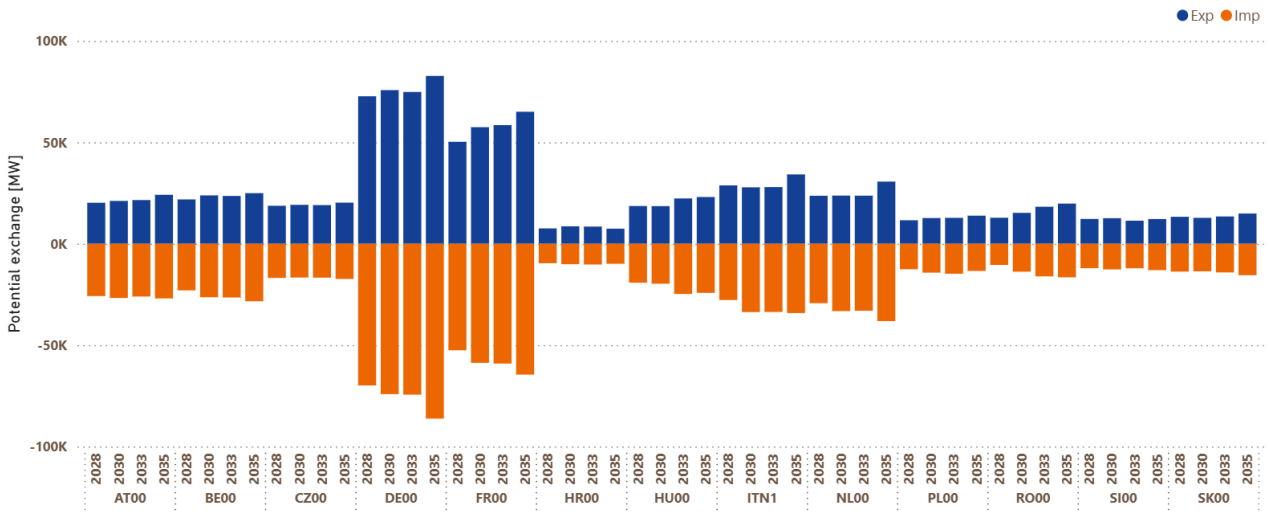


Figure 9: Illustrative theoretical maximum export and import capacities for all TYs[6]

5.2.2 Nordic flow-based

The market-grid model Samnett used to calculate the Nordic FB domains has a three-hour time resolution. Results are computed for each three-hour time step throughout the TY. The power transfer distribution factors (PTDF) computed are constant over the TY, reflecting the static properties of the grid model.

The Nordic FB domain calculation was originally computed for 29 historical WSs (historical climate years from 1988 to 2016). This captures the variation of inflow in the many hydro reservoirs in the Nordics, and variations in temperature-dependent consumption. These WSs have a considerable impact on the resulting flow, prices, and remaining available margin (RAM) values, but add complexity with a large amount of data. With a unique set of RAM values computed for every three-hour time step of each 29 CY, this resulted in an initial 84448 unique FB domains for each TY for the Nordics.

Measures were taken to reduce the complexity of the initial domains. The original 84,448 domains were reduced using k-means clustering, where each cluster represents a unique RAM domain. Based on the clustering, it was decided that a set of seven domains per TY was representative of the total set.

ERAA climate year data (onshore wind, offshore wind, solar) is used to calculate hourly capacity factors.
After computing these seven final domains per TY, a nearest-neighbour algorithm assigns each hour of every ERAA WS to the cluster that best matches the calculated capacity factors.

For ERAA 2025, PTDF values are calculated for all HVDC interconnectors in the Nordic region and within the Nordic synchronous area. With 11 study zones within the synchronous area and a total

[6] A positive value shows the maximum export value, while a negative value shows the maximum import value.

of 15 HVDC links, the PTDF matrix comprises 26 columns. For TYs 2026 and 2028, 134 Nordic critical network elements with contingency (CNECs) were included in the calculation, mainly Norwegian and Swedish CNECs. For TY 2030, 86 CNECs were included, and for 2035, the domain was calculated based on 92 CNECs.

5.3 Forced outage rates

Table 7 shows the forced outage ratios (FORs) used per TY and technology type. For HVDC power lines, the average FOR is between 6% and 7%. For HVAC lines, the average remains around 1.7% for all TYs. The default ratio for the HVAC lines is 0%, as capacities delivered by TSOs are expected to respect the N-1 principle. If this is not respected, TSOs overwrite the default FOR by a non-zero value.

Table 7: 10th and 90th percentiles, average, and default values of FORs (%) per TY and technology type

TY	HVDC				HVAC			
	10th	90th	Avg	Def	10th	90th	Avg	Def
2028	1.2	11	7	6	0	5.9	1.7	0
2030	1	8.9	6.2	6	0	5.6	1.7	0
2033	1	8.9	5.9	6	0	5.6	1.6	0
2035	0	8.9	5.6	6	0	5.6	1.6	0

5.4 Exchanges with implicit regions

The regions modelled implicitly are accounted for via fixed exchanges with countries within the ERAA explicit region. Spain (ES00) is connected to Morocco (MA00), Ceuta (ESCE) and the Balearic Islands (ESIB), Greece (GR00) is connected to Egypt (EG00), and Italy (ITSI) is connected to Tunisia (TN00). Detailed data can be consulted among published datasets.

6 Economic assumptions

6.1 Fuel and CO2 prices

Fuel and CO_2 prices are key inputs for the EVA, as they determine the marginal cost of the thermal units and thus their hierarchy in the merit order, which is the key factor driving their optimal dispatch and ultimately affecting the revenue they are capable of generating. This section explains the references and assumptions considered to estimate fuel and CO_2 prices. Table 8 summarises the specific price values used in ERAA 2025, reported in 2024€. When necessary, factors of 1.091 have been applied to convert prices from 2022€ to 2024€ and 1.026 to convert prices from 2023€ to 2024€. Furthermore, a 0.925 exchange rate has been applied to convert 2023$ to 2023€.

- *Nuclear:* The reference for nuclear fuel prices is EIA 2023,[7] aligned with current TYNDP estimates for 2030. The prices are considered constant over the horizon.
- *Gas blend:* A blend of natural gas, biomethane, and synthetic methane is considered as fuel for gas-fired thermal units. Average shares of biomethane and synthetic methane are based on internal assumptions derived from different sources (100% natural gas until 2028, 8% biomethane in 2030, 25% biomethane and 1% synthetic methane in 2040). Regarding natural gas prices, the reference used is the EC recommended parameters for reporting on GHG projections in 2025 for 2030 and 2040, interpolating between 2030 and 2040 for other target years. Regarding biomethane prices, the reference is the Danish Technology catalogue for 2030 and 2040, interpolating between these values for the intermediate years. Regarding synthetic methane prices, the reference is IEA WEO 2022 (APS) for 2030 and 2040. “Natural gas”, “biomethane” and “synthetic methane” fuels are only used for calculating the fuel cost of “gas blend”, which is used for simulations.
- *Shale oil:* The reference for price values is TYNDP[8] 2022 for 2025, 2030, and 2040, interpolating between these values for the intermediate years.
- *Light oil and heavy oil:* The price values of light oil and heavy oil are calculated by upscaling the crude oil price with a price premium. Price premium factors are 28% for light oil and 5% for heavy oil. The references for crude oil prices is the EC recommended parameters for reporting on GHG projections in 2025 for 2030 and 2040. Prices for other years are interpolated from 2030 and 2040.. ”Crude oil” fuel is only used for calculating the fuel cost of “light oil” and “heavy oil”, which are used for simulations.
- *Hard coal:* The reference for hard coal prices is the EC recommended parameters for reporting on GHG projections in 2025 for 2030 and 2040. Prices for 2028, 2033, and 2035 are interpolated from 2030 and 2040.
- *Lignite:* Lignite prices are reported for four different sub-groups, reflecting the prices specific to one or more regions. The reference for all is Booz & Company, and constant prices are considered over the horizon.

[7] EIA (2023): https://www.eia.gov/electricity/annual/html/epa_08_04.html
[8] TYNDP 2022: https://2022.entsos-tyndp-scenarios.eu

— *Hydrogen:* The method of producing hydrogen considered is steam methane reforming with carbon capture utilisation. For Table 8, the hydrogen production cost has been obtained and calculated based on internal assumptions.
— *CO_2:* The references for CO2 prices are parameters recommended by the EC for reporting on GHG projections in 2025 for 2030 and 2040. Prices for other target years are interpolated from 2030 and 2040.

Table 8: Fuel prices [€2024/net GJ] and CO_2 price [€2024/tonne] per TY

Fuel Type	2028	2030	2033	2035	2040
Nuclear	0.61	0.61	0.61	0.61	-
Natural Gas	9.01	9.23	9.57	9.80	10.36
Biomethane	13.82	13.87	13.95	13.99	14.11
Synthetic methane	33.44	32.83	31.91	31.30	29.78
Gas Blend	9.01	9.62	10.21	10.60	11.59
Shale oil	2.07	2.28	2.59	2.80	3.32
Crude oil	13.87	14.26	14.85	15.24	16.21
Light oil	17.76	18.25	19.00	19.50	20.75
Heavy oil	14.57	14.97	15.59	16.00	17.02
Hard coal	4.15	4.10	4.04	4.00	3.90
Lignite 1[9]	1.86	1.86	1.86	1.86	-
Lignite 2[10]	2.39	2.39	2.39	2.39	-
Lignite 3[11]	3.15	3.15	3.15	3.15	-
Lignite 4[12]	4.12	4.12	4.12	4.12	-
Hydrogen	14.67	15.82	17.05	17.84	19.69
CO_2	57.46	97.47	157.49	197.51	297.54

[9] Group 1 applicable to: BG, MK, CZ
[10] Group 2 applicable to: SK, DE, RS, PL, ME, UKNI, BA, IE
[11] Group 3 applicable to: SL, RO, HU
[12] Group 4 applicable to: GR

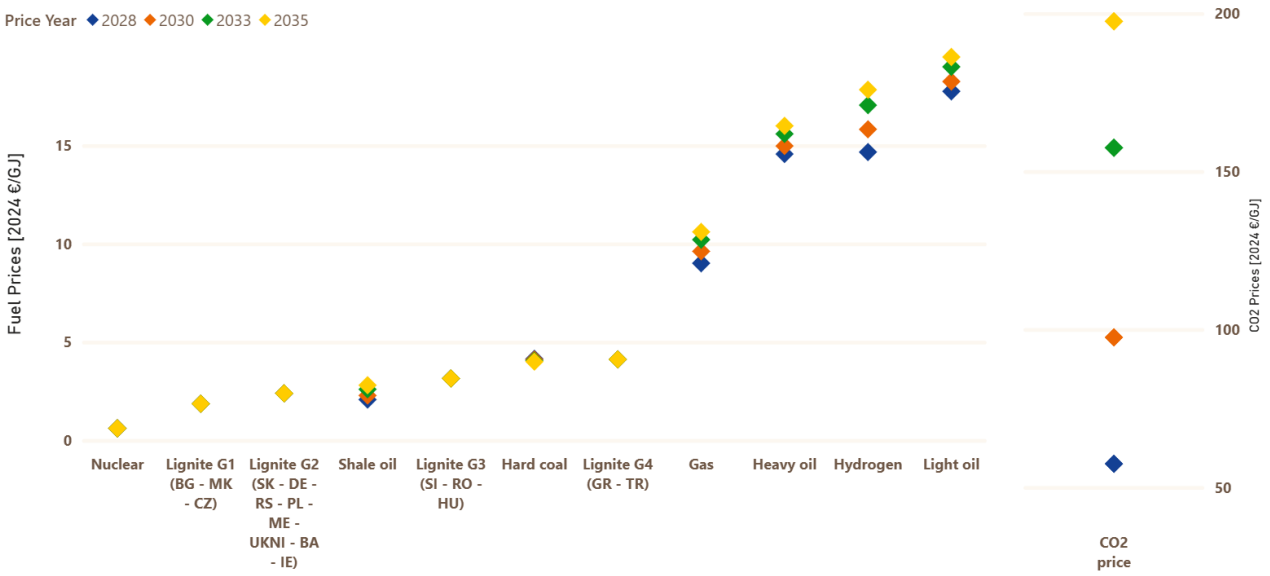


Figure 10: Evolution of fuel and CO_2 prices.

6.2 Technologies and capacities subject to the EVA

As described in Annex 2, the EVA's objective is to identify and decommission non-economically viable capacity from the system and add additional economically viable capacities. As presented in Annex 2 (Section 10.3), the technologies and capacities considered eligible for retirement by the model are limited to thermal hard coal and lignite, natural gas, and oil. The capacity of nuclear and RES is based on the National Trends scenario provided by individual TSOs (see Annex 2, Section 2) based on specific Member State policies. For this reason, nuclear and RES capacity are not subject to the EVA. Other considerations in the EVA are (i) (de-)mothballing of unviable capacity, as an alternative to permanent retirement[13]; (ii) consideration of heat and steam revenue stream for combined heat and P units; (iii) lifetime extension; and (iv) DSR and battery storage expansion.

Figure 11 illustrates the installed capacity subject to the EVA in addition to the capacity excluded from it. As described in Annex 2 (Section 10.4), the units with the new CM contract in place are not subject to the EVA, nor are the units subject to a must-run commitment or the policy units. Overall, in 2028, 120 GW of gas-fired units (54% of the total gas capacity) are assessed during the EVA, 43 GW of coal units (70% of the total coal capacity), and 6 GW of oil (74% of the total oil capacity), whereas nuclear and other non-RES are not subject to the EVA.

[13] Mothballing options could not be considered in the EVA of ERAA 2024, although the impact is expected to be minor.

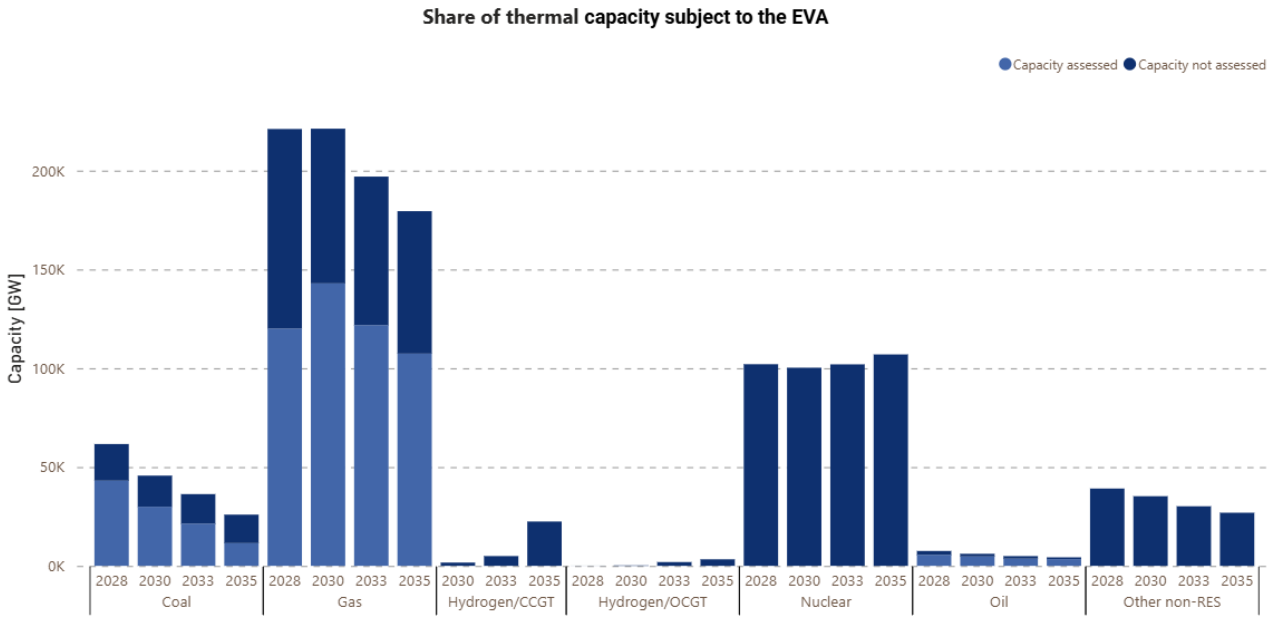


Figure 11: Share of thermal capacity subject to the EVA

6.3 Cost of new entry

According to Regulation (EU) 2019/943, having a reliability standard (RS) in place is a necessary condition for implementing CMs in any given Member State. This RS shall be based on the value of lost load (VoLL), cost of new entry (CONE), and the RS methodology proposed by ENTSO-E and approved by ACER in October 2020. In ERAA 2025, the reference scenario is based on harmonised CONE assumptions (using default CONE only) for gas-fired power plant and battery investments across Europe. The default CONE was defined as the average of country-specific CONE values except for battery investments where NREL's assumption (link) for average 4h utility-scale batteries were used.

The actual values are shown in the next section. An update of the values considered in ERAA 2024 has been included when national data has been updated. Table 9 lists countries with the corresponding CONE studies:

Table 9: References to national CONE studies

Country	Reference	Year of publication
Belgium	SPF Economie (VOLL)	2022
	SPF Economie (CONE)	
Belgium[14]	Elia NRAA	2025
Czech Republic	MPO	2022
Denmark	Energstyrelsen	2025
Germany, Luxembourg	BMWK	2021
Finland	Energiavirasto	2023

[14] In addition to the data from the Belgium VoLL CONE study, some data were obtained from the adequacy and flexibility study for Belgium. It should be noted that the values in the national CONE study is four years old.

France	RTE	2022
Greece	RAE	2021
Italy	Terna	2020
Netherlands	ACM	2022
Slovenia	Eles	2022
Spain	CNMC (CONE)	2024
	DGPEM (VOLL, RS)	2025
Sweden	EI	2024
Poland	URE	2023
Ireland	SEM committee	2023

6.4 Techno-economic assumptions

This section describes the techno-economic values used in the EVA for commissioning, decommissioning, mothballing, and lifetime extension candidates.

6.4.1 Economic commissioning candidates

The capital expenditure (CAPEX), fixed operation and maintenance (FOM), economic life, and weighted cost of capital (WACC) values used in ERAA 2025 are taken from the aforementioned MS CONE studies. When such values were unavailable, ENTSO-E calculated and applied default values.

For most studies, the values were given for a specific forecasted year and are subsequently assumed to represent the entire horizon. Figure 12 to Figure 17 illustrate the CAPEX, FOM, economic life, and WACC changes from TY 2028 to TY 2035 (the values for the rest of the target and non-TYs are not shown). Only the default value and the information provided in the available CONE study are shown. To consider a future decrease in utility-scale battery costs, CAPEX and FOM costs are reduced by 3% each year on average.[15] Default values are calculated using all possible data points coming from national CONE studies, using the average function.

[15] Batteries costs assumption from the NREL website for average 4h utility-scale batteries

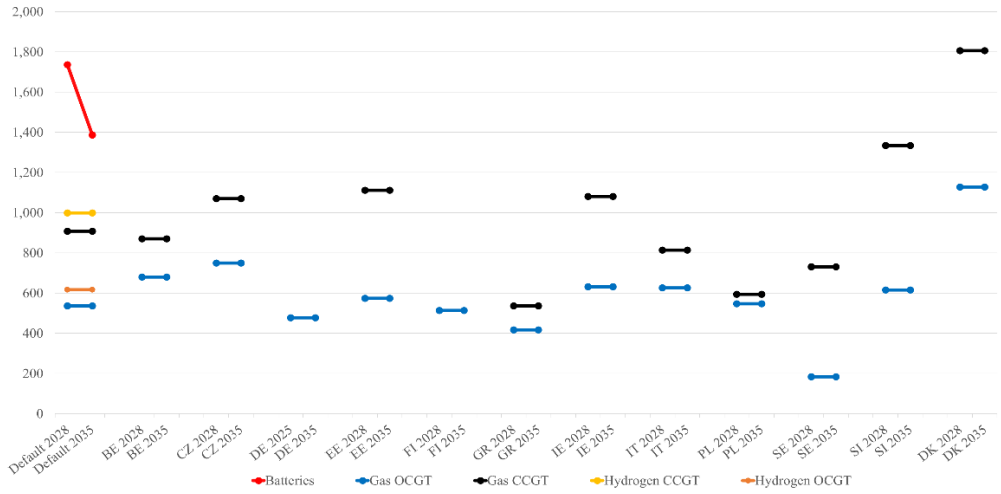


Figure 12: National CONE and derived default values for CAPEX (thermal units and batteries)

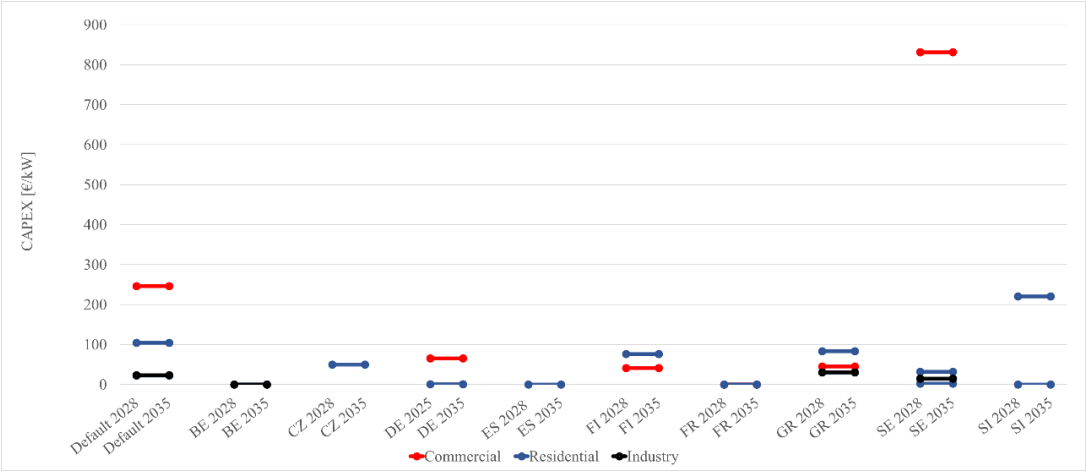


Figure 13: National CONE and derived default values for CAPEX (DSR)

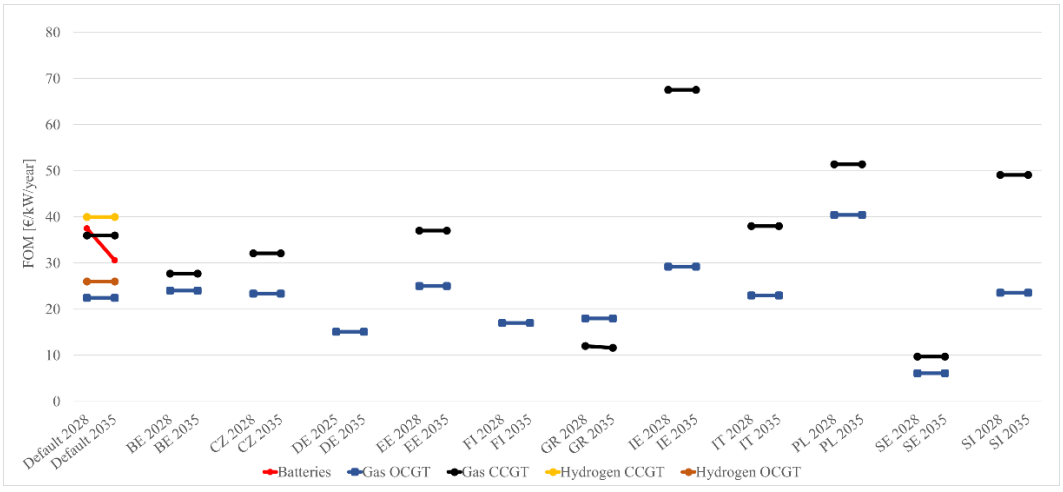


Figure 14: National CONE and derived default values for FOM (thermal units and batteries)

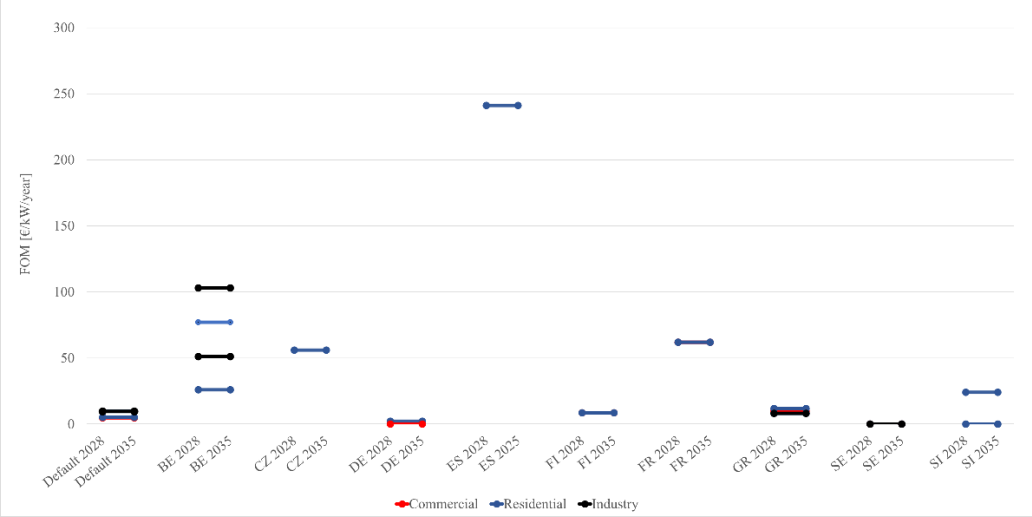


Figure 15: National CONE and derived default values for FOM (DSR)

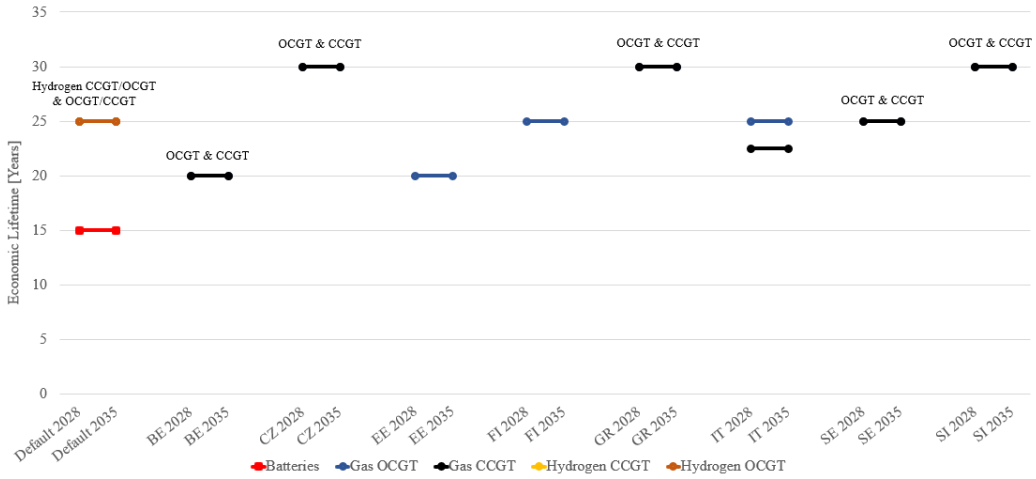


Figure 16: National CONE and derived default values for economic life extension costs

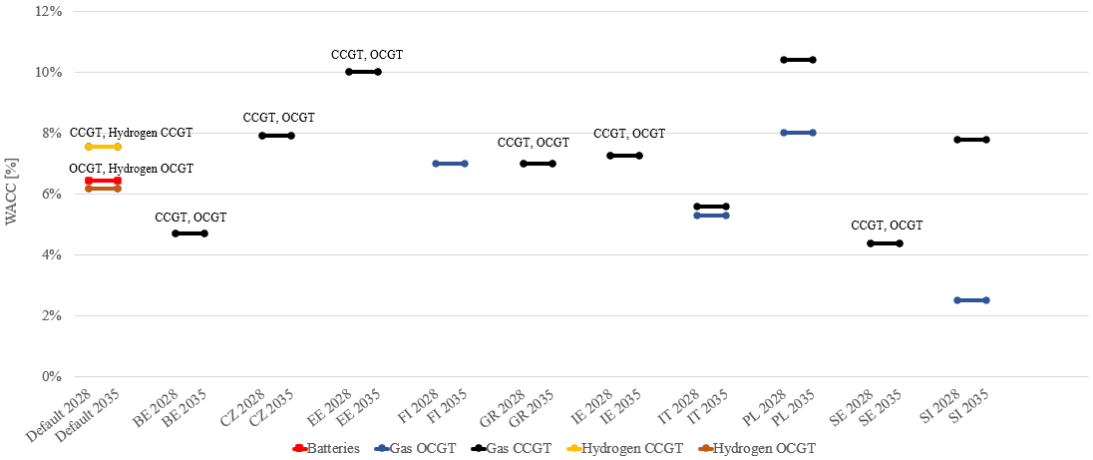


Figure 17: National CONE and derived default values for WACC

The hurdle premium values used to compute the hurdle rate together with the WACC differ by technology, as shown in Table 10 (see also Annex 2, Section 10.11).

Table 10: Default values for the hurdle premium [%]

Battery	CCGT	OCGT
3	**6.9**	**9.9**

Construction period of commissioning candidates

Due to the construction period of thermal units, the commissioning of CCGT and OCGT units is not considered feasible before TY 2028. Meanwhile, batteries and DSR are available for commissioning before 2028, which is the first year of ERAA 2025's assessment. Table 11 summarises the first TY when a commissioning technology is available for a new entry.

Table 11: First TY when the new entry of capacity is available, according to harmonised construction period (CONE studies)

TY for new entry	
OCGT new	**2028**
CCGT new	**2028**
Grid-scale batteries	**2027**
Explicit DSR	**2027**

Additionally, the EVA's commissioning decisions are constrained for individual countries. Table 12 provides an overview of the limitations applied in the optimisation and whether constraints stem from VoLL CONE studies or TSO estimations (e.g. due to technical constraints such as a lack of grid connection points). Capacities represent additional capacity that can be installed on top of the National Trends scenario capacity.

Section 6.5 elaborates on constraints for DSR capacities.

Table 12: Overview of constraints in optimisation and sources

Study zone	Technology	2028	2030	2033	2035	Source
BE00	Batteries	1,449	2,677	3,573	4,021	TSO expansion constraint
CH00	Hydrogen CCGT new	0	0	0	0	TSO expansion constraint
CH00	Hydrogen OCGT new	0	0	0	0	TSO expansion constraint
CH00	Gas CCGT new	0	0	0	0	TSO expansion constraint
CH00	Gas OCGT new	0	260	1,027	1,795	TSO expansion constraint
FI00	Gas OCGT new	10,000	10,000	10,000	10,000	CONE
FI00	Gas CCGT new	0	0	0	0	CONE

FR00	Gas CCGT new	0	0	0	0	TSO expansion constraint
FR00	Gas OCGT new	0	0	0	0	TSO expansion constraint
FR00	Hydrogen CCGT new	0	150	475	800	TSO expansion constraint
FR00	Hydrogen OCGT new	0	700	1,600	2500	TSO expansion constraint
GR00	Gas CCGT new	0	2,652	2,652	2,652	CONE
GR00	Gas OCGT new	0	0	0	0	CONE
ES00	Hydrogen CCGT new	0	0	0	0	CONE
ES00	Hydrogen OCGT new	0	0	0	0	CONE
ES00	Gas CCGT new	0	0	0	0	CONE
ES00	Gas OCGT new	0	0	0	0	CONE
ES00	Batteries	3,920	3,688	3,519	3,402	CONE
IT00	Batteries	0	500	500	500	CONE with TSO revision[16]
ITN1	Gas CCGT new	0	2,800	2,800	2,800	CONE with TSO revision
ITN1	Gas OCGT new	0	2,800	2,800	2,800	CONE with TSO revision
ITCN	Gas CCGT new	0	1,000	1,000	1,000	CONE with TSO revision
ITCN	Gas OCGT new	0	1,000	1,000	1,000	CONE with TSO revision
ITCS	Gas CCGT new	0	1,000	1,000	1,000	CONE with TSO revision
ITCS	Gas OCGT new	0	1,000	1,000	1,000	CONE with TSO revision
ITCA	Gas CCGT new	0	800	800	800	CONE with TSO revision
ITCA	Gas OCGT new	0	800	800	800	CONE with TSO revision

[16] CONE data potential for batteries was divided equally between different study zones.

ITSA	Gas CCGT new	0	0	0	0	CONE with TSO revision
ITSA	Gas OCGT new	0	0	0	0	CONE with TSO revision
ITSI	Gas CCGT new	0	800	800	800	CONE with TSO revision
ITSI	Gas OCGT new	0	800	800	800	CONE with TSO revision
PL00	Gas CCGT new	1	2,000	8,000	12,000	TSO expansion constraint
PL00	Gas OCGT new	1	2,500	10,000	15,000	TSO expansion constraint
SI00	Gas CCGT new	0	120	120	120	CONE
SI00	Gas OCGT new	56	56	56	56	CONE
UK00	Gas CCGT new	0	33,800	25,057	23,405	TSO expansion constraint
UK00	Gas OCGT new	3,673	3,673	3,054	3,054	TSO expansion constraint
UA	Gas CCGT new	0	1,000	300	500	TSO expansion constraint

6.4.2 Economic decommissioning candidates

A resource unit is considered not viable when its net revenues are lower than its FOM costs, which are independent of the unit's usage. The net revenues depend on random events and are subject to risks considered by the hurdle rate.

Table 13 lists the techno-economic parameters specifically used to assess the viability of existing and planned thermal units, stating the source of the FOM cost. WACC values come from CONE for gas-powered technologies and are assumed to be the same for the other technologies. The value used for hurdle premium comes from the Elia study.[17]

Table 13: Default economic parameters for thermal economic units in the EVA

Resource Unit Category	FOM cost [€/kW/y]	WACC [%]	Hurdle Premium [%]	Source of Fixed Cost Value
Hard coal	26 – 39	6.2	3.5	EU reference scenario 2020
Lignite	33	6.2	3.5	EU reference scenario 2020

[17] https://www.elia.be/-/media/project/elia/shared/documents/elia-group/publications/studies-and-reports/20210701_adequacy-flexibility-study-2021_en_v2.pdf

CCGT	36	7.5	6.9	Average of CONE studies
OCGT	22	6.2	9.9	Average of CONE studies
Light oil	21	6.2	3.5	EU reference scenario 2020/ASSET 2018
Heavy oil	21	6.2	3.5	EU reference scenario 2020/ASSET 2018
Oil shale	21	6.2	3.5	EU reference scenario 2020/ASSET 2018

6.4.3 Lifetime extension of thermal units

Units approaching their decommissioning date can be refurbished to remain operational for an extended period, which requires additional investment. A single CAPEX, lifetime extension duration, hurdle premium, and WACC value are assumed for each technology across all TYs. The values were extrapolated from the Elia adequacy and flexibility study,[17] the EU Reference Scenario[18], and the ASSET study.[14] Data are available in Table 14.

Table 14: Default economic parameters for lifetime extension in the EVA

Resource Unit Category	CAPEX [€/kW]	Life Extension [years]	Hurdle Premium [%]	WACC [%]	Source of Fixed Cost Value
CCGT	106	10	4 – 5	6.2 – 7.5	Elia
OCGT	84				Elia
Lignite	290				Extrapolation
Hard Coal	254				Extrapolation
Oil	198				Extrapolation

The modelling specificity of the lifetime extension is that it can only be triggered the year following the decommissioning year of the unit, as provided by the TSOs.

6.4.4 Mothballing of thermal units

Thermal units can be mothballed for brief or extended periods (up to several years) before being decommissioned. The costs involved arise from the necessary preparations to put the unit out of operation for a long period of time, as the preparations to put the unit back into operation (e.g. water, grid, new staff). The cost of de-mothballing is significantly higher than the cost of mothballing. For the mothballing duration, fixed costs are significantly reduced. These decisions are influenced by risks considered through the hurdle rate. The values are extrapolated from the TenneT *Monitoring Leveringszekerheid 2021* study[19] following the same approach used for the lifetime extension. Among the different types of mothballing introduced in the study – mainly defined by the duration of mothballing – the *Dry* modus has been used. Under this assumption, the

[18] European Commission: Directorate-General for Mobility and Transport, Directorate-General for Climate Action and Directorate-General for Energy, *EU reference scenario 2020 – Energy, transport and GHG emissions – Trends to 2050*, Publications Office, 2021, **https://data.europa.eu/doi/10.2833/35750**

[19] https://tennet-drupal.s3.eu-central-1.amazonaws.com/default/202207/TenneT_Rapport_Monitoring_Leveringszekerheid_2021.pdf

duration of mothballing is assumed to be at least one year. Any mothballing situation that would last less than a year is not considered, with the capacity change being assessed at a yearly level of granularity. Table 15 shows the values for each technology across all TYs assumed in ERAA 2025.

Table 15: Default economic parameters for (de-)mothballing in the EVA

Resource Unit Category	Mothballing CAPEX [€/kW]	De-mothballing CAPEX [€/kW]	Fixed cost [€/kW/y]	Hurdle Premium [%]	WACC [%]	Source
CCGT	1.1 – 3.2	3.2 – 23.7	0.4	3	7.5	TenneT
OCGT	1.0 – 2.9	2.9 – 21.8	0.3 – 1.1	3.5	6.2	Extrapolation
Lignite	3.1 – 8.7	8.7 – 65.0	1.0 – 3.4	3.5	6.2	Extrapolation
Hard Coal	2.7 – 7.6	7.6 – 56.9	0.9 – 3	3.5	6.2	Extrapolation
Oil	2.1 – 6.0	6.0 – 44.3	0.7 – 2.3	3.5	6.2	Extrapolation

6.4.5 Short-run marginal cost of thermal units

The short-run marginal cost (SRMC) is the cost for a unit to generate electricity derived from three main components:

- variable operation and maintenance (VOM) cost;
- costs related to CO_2 emissions; and
- costs related to fuel prices.

These costs are then linked to the operation of the unit with its efficiency and CO_2 emission factor. The SRMC is then described as presented in the equation below:

$$\begin{aligned}\text{SRMC} = {} & \text{VOM}\ [\text{EUR/MWh}] \\ & + \left(\frac{\text{CO}_2\ \text{emission factor}\ [\text{tCO}_2/\text{GJ}] \times 3.6\ [\text{GJ/MWh}]}{\text{efficiency}\ [\%]} \times \text{CO}_2\ \text{price}\ \left[\frac{\text{EUR}}{\text{tCO}_2}\right] \right. \\ & \left. + \frac{\text{fuel price}\ \left[\frac{\text{EUR}}{\text{GJ}}\right] \times 3.6\ \left[\frac{\text{GJ}}{\text{MWh}}\right]}{\text{efficiency}\ [\%]} \right) \times \text{usage of primary fuel}\ [\%] \\ & + \left(\frac{\text{CO}_2\ \text{emission factor}\ [\text{tCO}_2/\text{GJ}] \times 3.6\ [\text{GJ/MWh}]}{\text{efficiency}\ [\%]} \times \text{CO}_2\ \text{price}\ [\text{EUR/tCO}_2] \right. \\ & \left. + \frac{\text{fuel price}\ [\text{EUR/GJ}] \times 3.6\ [\text{GJ/MWh}]}{\text{efficiency}\ [\%]} \right) \times \text{usage of secondary fuel}\ [\%]\end{aligned}$$

The VOM, unit efficiency, and CO_2 emission factor values below are applicable for all units. The VOM is the operation cost of a unit (excluding fuel costs, CO_2 emission costs, and fixed costs). The

assumptions used in ERAA 2025 come from the EU reference scenario[18] and the ASSET report.[14] Table 16 reports the values.

Table 16: VOM [EUR/MWh]

Generation Unit Category	2028	2030	2033	2035
CCGT	1.6			
CCGT with CCS	3.2			
OCGT	1.6			
Lignite	3.3			
Lignite with CCS	6.6			
Hard Coal	3.3			
Hard Coal with CCS	6.6			
Oil	1.1 – 3.3			
Nuclear	9			
Hydrogen	1.6			

The efficiency of the generators drives the impact of CO_2 and fuel costs, whereby the values are computed internally by ENTSO-E. Table 17 summarises the values.

Table 17: Efficiency [%]

Generation Unit Category	Efficiency
CCGT	40 – 60
OCGT	35 – 42
Lignite	35 – 46
Hard Coal	35 – 46
Oil	29 – 40
Nuclear	33
Hydrogen	42-60

The CO_2 emission factor represents the rate of CO_2 emission when the fuel is burnt to power the unit. The values are computed internally by ENTSO-E. Table 18 summarises the values.

Table 18: CO_2 emission factor [CO_2kg/GJ]

Generation Unit Category	CO2 emission factor
Gas (OCGT&CCGT)	57
Gas with CCS	5.7
Lignite	101
Lignite with CCS	10.1
Hard Coal	94
Hard Coal with CCS	9.4

Oil	78-100
Nuclear	0
Hydrogen	0

6.5 Explicit DSR commissioning potential

A stepwise approach is used to determine the additional DSR potential beyond the assumptions of the National Trends scenario, depending on the availability of country-specific data, in the following order:

- a **published VoLL/CONE study** conducted according to the ACER methodology[20] that includes DSR as a reference technology with additional potential;
- another **national study** of DSR potential provided by TSOs or ACER; and
- a **centralised bottom-up methodology** described in Annex 2.

Table 19 shows which approach is used per country, in addition to the net additional DSR potential that the EVA can invest in for selected TYs above what is considered in the National Trends scenario. Note that these are total non-cumulative potentials covering the full horizon until 2035 (e.g. capacity invested in 2028 reduces the potential for 2035). For the countries of AL, BA, CH, IE, ME, MK, RS, TR, UA, and UK, no additional DSR investments are considered because the centralised approach could not be applied due to insufficient data. Note that the retirement of DSR capacity is not considered; this is due to the assumption that investments intended to make processes more flexible and responsive to market prices would not be decommissioned.

Table 19: Net additional explicit DSR potential (GW) assumed per target year per zone

Zone	Approach	2028	2030	2033	2035
AT00	Centralised approach	0.30	0.30	0.30	0.30
BE00	National study / TSO estimate	0.60	0.90	1.35	1.65
BG00	Centralised approach	0.40	0.40	0.40	0.40
CY00	Centralised approach	0.06	0.06	0.06	0.06
CZ00	National study / TSO estimate	0	0.10	0.37	0.55
DE00	National VoLL/CONE study	0.83	0.83	0.83	0.83
DKE1	Centralised approach	0.17	0.17	0.17	0.17
DKW1	Centralised approach	0.32	0.32	0.32	0.32
EE00	Centralised approach	0	0	0	0
ES00	National study / TSO estimate	1.45	1.45	1.45	1.45
FI00	National VoLL/CONE study	2.00	2.00	2.00	2.00
FR00	National study / TSO estimate	0.8	1.6	2.10	2.70
GR00	National VoLL/CONE study	1.60	1.78	1.80	1.80
HR00	Centralised approach	0.12	0.12	0.12	0.12

[20] ACER Decision of 2 October 2020 on the methodology for calculating the value of lost load, the cost of new entry, and the reliability standard in accordance with Article 23(6) of Regulation (EU) 2019/943 on the internal market for electricity.

HU00	National study / TSO estimate	0.06	0.06	0.06	0.06
IE00	National study / TSO estimate	0	0	0	0
IT00	National VoLL/CONE study	0	0	0	0
LT00	Centralised approach	0.15	0.15	0.15	0.15
LV00	Centralised approach	0	0	0	0
MT00	National study / TSO estimate	0	0	0	0
NL00	National study / TSO estimate	2.93	3.12	3.12	3.12
NOM1	Centralised approach	0.42	0.42	0.42	0.42
NON1	Centralised approach	0.30	0.30	0.30	0.30
NOS1	Centralised approach	0.56	0.56	0.56	0.56
NOS2	Centralised approach	0.58	0.58	0.58	0.58
NOS3	Centralised approach	0.27	0.27	0.27	0.27
PL00	National study / TSO estimate	1.02	1.41	2.5	2.5
PT00	Centralised approach	0.86	0.86	0.86	0.86
RO00	Centralised approach	0.78	0.78	0.78	0.78
SE00	National VoLL/CONE study	5.40	5.40	5.40	5.40
SI00	National VoLL/CONE study	0.13	0.13	0.13	0.13
SK00	Centralised approach	0.41	0.41	0.41	0.41

6.6 Wholesale market price cap

In ERAA 2025, the wholesale market price cap (i.e. the highest bid/offer that market players can submit) is a single value used across all study zones for each TY. The maximum price cap (also referred to as the "maximum technical bidding limit") for the wholesale single day-ahead coupling (SDAC) market is set to 4,000 €/MWh at the time of writing.[21] The methodology for adjusting the harmonised maximum market clearing price (HMMCP) to future years is based on the evolution of prices as seen in ERAA 2024, with a triggering mechanism calculated as described by the updated guidelines as of 11 January 2023.[22]

Following the approach proposed in Annex 2, the price cap evolutions over all the TYs are estimated (Table 20).

Table 20: Price cap [€/MWh] per TY

2028	2030	2033	2035
5,500	6,500	7,000	7,500

[21] https://eepublicdownloads.entsoe.eu/clean-documents/Network%20codes%20documents/NC%20CACM/SDAC%202022/SDAC_Comm._Note__HMMP_-_4000_clean.pdf

[22] https://www.acer.europa.eu/sites/default/files/documents/Individual%20Decisions/ACER%20Decision%2002-2023%20on%20HMMCP%20SIDC.pdf

7 Additional assumptions

7.1 Reliability standards across Europe

To identify potential shortcomings in the future adequacy and reliability of the power system, the ERAA relies on available national RSs that define acceptable levels of supply security in each EU Member State. These standards set quantitative benchmarks, most commonly expressed through indicators such as the loss of load expectation (LOLE), which measures the probabilistic number of hours per year when electricity demand might not be supplied. National RSs, as outlined in Table 21, typically target a LOLE value to remain below several hours. By comparing projected system performance against these benchmarks, the ERAA identifies potential shortcomings (periods or conditions under which the system may fail to meet the agreed reliability criteria) thus highlighting areas where corrective action or investment may be needed to ensure future security of supply.

Table 21: Reliability Standard

Member state	LOLE Reliability Standard (h/year)	Complementary Reliability Standard
Belgium[23]	3.00	
Czech Republic	6.7	
Cyprus	15	EENS < 0.010% of annual electricity demand
Denmark[24]	[24]	5 “outage minutes” (OM) per year
Estonia[25][26]	8.00	Expected energy not served (EENS) < 4.5 GWh/year
Finland[27]	2.10	EENS of 1,100 MWh/y with the LOLE being the primary.
France[28]	3.00	2h of load-shedding (after OOM measure activation such as voltage reduction, contractual interruptibility for large consumers, ...)
Germany[29]	2.77	
Greece[30]	3	

[23] The reference to the Belgian Law can be found here: http://www.ejustice.just.fgov.be/eli/arrete/2021/08/31/2021021813/justel

[24] In Denmark a 5 “outage minutes” (OM) per year metric is used, estimated based on the demand and expected unserved energy (EUE) as OM = 8760 * 60 _* EUE/Demand. Meanwhile the Danish Utility Regulator published its proposal for a Danish RS (1.49 hours/year) at the end of May 2025, which is subject to approval for legislative adoption.

[25] https://www.riigiteataja.ee/akt/112052021002?leiaKehtiv

[26] https://www.konkurentsiamet.ee/media/753/download

[27] https://energiavirasto.fi/documents/11120570/13026619/Energiaviraston+p%C3%A4ivitetty+ehdotus+valtioneuvostolle+luotettavuusstandardista.PDF/35ac4bfd-11de-74f7-eff9-3a66be9bdcc5/Energiaviraston+p%C3%A4ivitetty+ehdotus+valtioneuvostolle+luotettavuusstandardista.pdf?t=1647937046571

[28] https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000044622322

[29] https://www.bundeswirtschaftsministerium.de/Redaktion/DE/Downloads/V/vorschlag-der-regulierungsbehoerden-zum-zuverlaessigkeitsstandard.pdf?__blob=publicationFile&v=4

[30] https://www.raaey.gr/energeia/wp-content/uploads/2022/04/gnomatodotisi_12.pdf

Member state	LOLE Reliability Standard (h/year)	Complementary Reliability Standard
Ireland[31]	3.00	
Italy[32]	3.00	
Luxembourg[33]	2.77	
Netherlands[34]	4	
Northern Ireland[35]	4.90	
Poland	3.00	
Portugal[36]	5.00	
Sweden[37]	1	
Spain[38]	1.5	

7.2 Electrolyser and power-to-heat data

Figure 18 shows the electrolyser and P2H capacities aggregated for the ERAA explicit region for each TY (left part). The right side of the figure shows the countries with the highest shares of resource capacities averaged across all TYs. Figure 18 accounts for capacities using 1 July as a threshold date, i.e. only units commissioned before 1 July and decommissioned after 1 July are included for each TY.

The electrolyser and P2H capacity increases from around 33.5 GW in 2028 to around 140 GW in 2035, with the most significant capacity in Germany and Spain.

Hydrogen production efficiency was adopted based on data provided by the TSO and ranged between 50% and 85% (if not specified by the TSO, the default value of 68% is used). Table 8 in Section 6.1 presents the hydrogen price assumptions for each TY assumption. The approach used to compute these prices is described in Annex 2 (Section 7).

[31] https://www.semcommittee.com/files/semcommittee/2024-07/SEM%20-%2024%20-%20051%202027-28%20T-4%20Volumes%20Information%20Note.pdf
[32] The Italian RS was defined by Ministry (Ministerial decree n 180 on 09-05-2024 https://www.mase.gov.it/portale/documents/d/guest/dm_180_09-05-2024-pdf) based on Authority Resolution 370-2021 (https://www.arera.it/fileadmin/allegati/docs/21/370-21studio.pdf)
[33] In accordance with Regulation (EU) 2019/943, the governments of Luxembourg and Germany, being part of the common DE/LU study zone, agreed in 2021 on the RS applicable to that study zone. This agreement was established for the purpose of ensuring compliance with Luxembourg's obligations within the joint DE/LU study zone.
[34] https://tennet-drupal.s3.eu-central-1.amazonaws.com/default/2025-05/20250515%20TenneT%20Monitor%20Leveringszekerheid%202025%20final.pdf
[35] https://cms.soni.ltd.uk/sites/default/files/publications/All-Island%20Resource%20Adequacy%20Assessment%202025-2034%20Main%20Report.pdf
[36] https://acer.europa.eu/sites/default/files/documents/Publications/Security_of_EU_electricity_supply_2023.pdf
[37] https://ei.se/om-oss/publikationer/publikationer/rapporter-och-pm/2024/arlig-uppdatering-av-tillforlitlighetsnormen-for-sverige-ei-r202415
[38] https://www.boe.es/diario_boe/txt.php?id=BOE-A-2025-14438

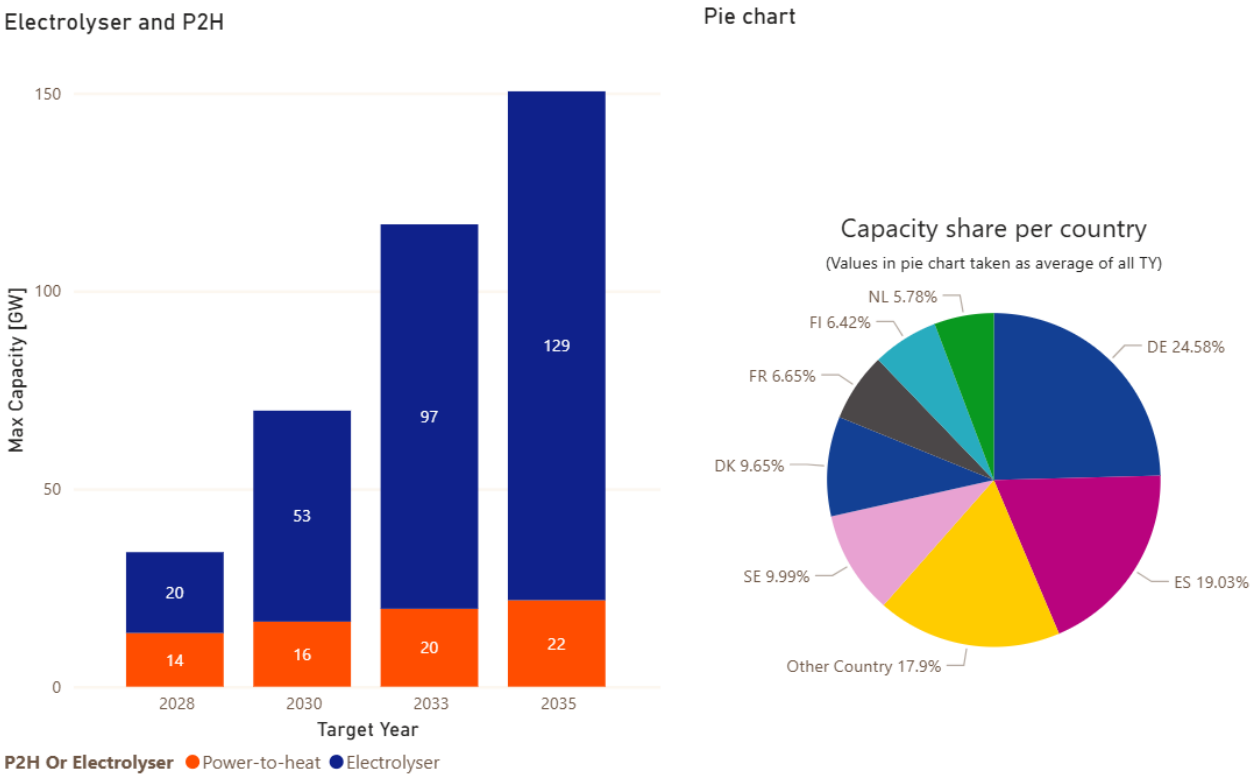


Figure 18: Electrolyser and P2H capacities and distribution across countries

Appendix 1: Survey on alignment with key European requirements

Complete TSO feedback

Validation of data before submission to ENTSO-E

Yes	23
No	12

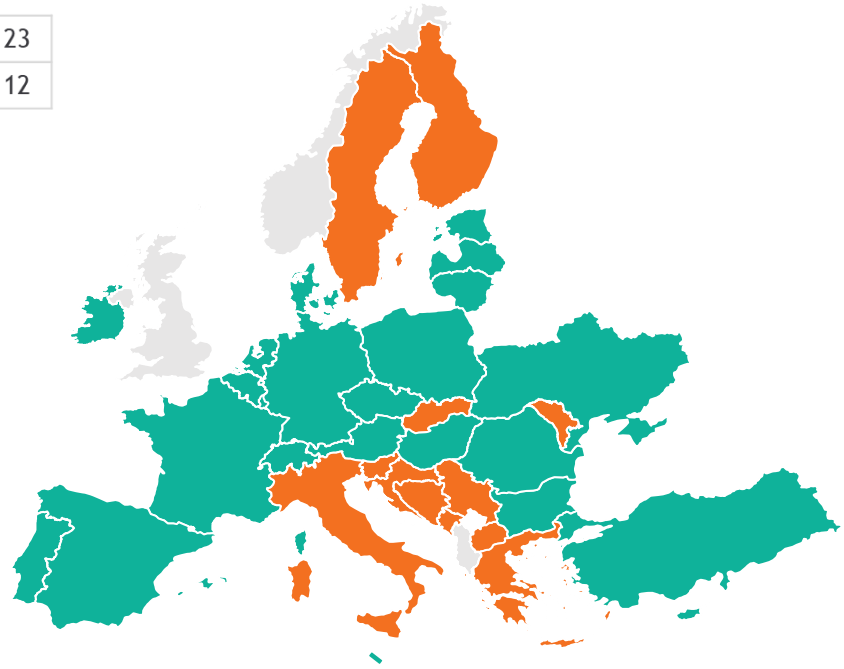


Figure 19: Have you validated data before submission for the studies?

Country	Have you validated data before submission for the studies? If yes, with whom?

	Validated?	NRA	Ministries	DSOs	Other authorities	Other stakeholders	Others
AT	Yes						
BA	No						
BE	Yes		X			X	The assumptions of ERAA2025 were based on the data for the NRAA "Adequacy and Flexibility for Belgium 2026-2036" which was publicly consulted with national stakeholders.
BG	Yes		X				
CH	Yes	X					Part of the data (mostly generation data) had been agreed with the NRA as common input data for an internal adequacy study. This applies to target years until 2035 included.
CY	Yes		X				
CZ	Yes		X			X	We receive the power generation data from large resource operators, associations and relevant government officials for NECP assessment (Ministry of Industry and Trade and Ministry of Environment).
DE	Yes	X	X			X	
DK	Yes				X		The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported for ERAA 2025. The modified version and reasoning for this modification can be found here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version.
EE	Yes					X	Market participants who submitted information about the future plans regarding their generation units
ES	Yes	X	X				Assumptions agreed at national level in the coordination framework established among TSO, Ministry and NRA and aligned with the NRAA.
FI	No						
FR	Yes		X			X	
GR	No						
HR	No						
HU	Yes					X	Each year, significant effort is made to align the target years' data with both the NECP (currently: final NECP submitted in October, 2024 with target years 2030, 2040, 2050) and the latest annual Hungarian NDP (currently with target years 2030, 2035) as best

							as possible. Through formal surveys, the Energy Ministry, the NRA and other leading stakeholders of the industry are involved in the scenario-building process of the NDP. Besides that, the practical scenario-building is done by an expert group consisting of representatives of the NRA, the TSO and all the DSOs.
IE	Yes						ERAA25 data is taken from the All-Island Resource Adequacy Assessment 2025-2034 (AIRAA). The National Regulatory Authority does not formally approve ERAA data but reviews the data for the AIRAA.
IT	No						
LT	Yes		X	X			
LU	Yes		X				
LV	Yes	X					
MD	No						
ME	No						
MK	No						
MT	Yes		X		X		The Energy and Water Agency validated data for renewables and final energy demand.
NL	Yes	X	X	X	X	X	All of the above. The data submitted for NT+ has been extensively validated in the course of the national scenarios development process and are consulted with external stakeholders (sector representatives, experts, energy companies, industrial customers, regional authorities, etc.) and the relevant ministry (KGG). The national regulatory authority (ACM) has also been informed about the national scenario development process, assumptions and datasets. These consultations / alignments take place on different levels, e.g. stakeholder workshops, bilateral meetings, etc.
PL	Yes		X			X	Data validation is understood as data made available for the purposes of the process by individual entities (ministry and power sector entities).
PT	Yes				X		Portuguese Directorate for Energy and Geology - DGEG
RO	Yes		X				
RS	No						/
SE	No						The input data is based on the national short-term electricity market analysis and the long-term scenario EP.
SI	No						The data is not validated by other entities, however, all the data is aligned with national development plans, NECP and other relevant documents.
SK	No						
TR	Yes						
UA	Yes		X		X	X	- Ministry of Energy, Ministry of Economy, Ministry of Environment Protection - National Bank of Ukraine - Reform Support Team at the Ukrainian Ministry of Energy - private companies - owners of various types of generation incl. Nuclear, Hydro, Coal,

	Gas, Renewables, Municipal cogeneration, industrial works cogeneration, battery energy storages, professional associations

Compliance with EU targets (2030 & 2050)

EU final energy consumption target

Aligned	11
Not aligned	9
Not assessed	15
Non-EU Member States	8

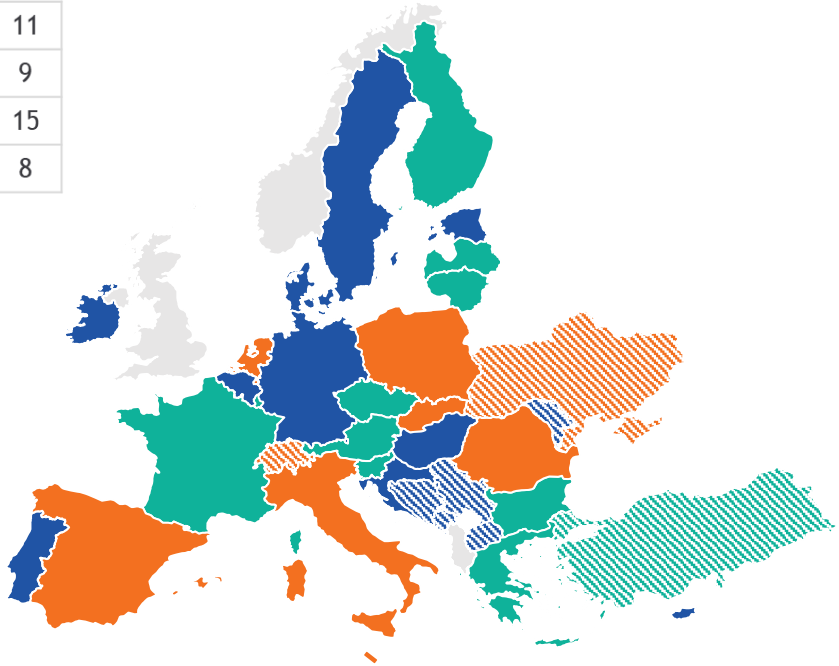


Figure 20: Please confirm if submitted energy demand data is compliant with indicative national contributions towards EU's final energy consumption targets sent to the Member States.

Country	Compliance with EU's final energy consumption targets	If not aligned, please justify
AT	Aligned	
BA	Not assessed	
BE	Not assessed	At the time of the data collection in December '24, no final NECP was available for Belgium.

Country	Compliance with EU's final energy consumption targets	If not aligned, please justify
		The submitted data was aligned as best as possible with existing draft NECP together with available national and regional policies
BG	Aligned	
CH	Not aligned	Not applicable to CH as a non-EU member. Data based on Swiss National Framework for Grid Planning, aiming at net zero by 2050.
CY	Not assessed	We used the data from the NECP submitted in December 2024. For years beyond those covered by the NECP, we were provided data through the ministry's underlying (unpublished) studies behind the NECP. As a TSO, we don't assess the NECP's compliance with EU targets.
CZ	Aligned	ERAA 2025 demand is aligned with NECP, but the NECP does not consider e.g. the behind-the-meter consumption of prosumers.
DE	Not assessed	The ERAA does not include data on the final energy consumption, as only the electricity sector is modeled, therefore the alignment with the final energy consumption cannot be assessed.
DK	Not assessed	For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. It has not been possible to assess this specific section as the Analysis Assumptions for Energinet 2024 do not include the entire Danish energy consumption.
EE	Not assessed	A final updated NECP was unavailable during data submission, but preliminary information is aligned.
ES	Not aligned	Aligned with final NECP, which is not aligned with the indicative target
FI	Aligned	
FR	Aligned	
GR	Aligned	
HR	Not assessed	Data is aligned with last NECP and National energy strategy
HU	Not assessed	We used final NECP submitted in October, 2024, but as TSO we have not assessed the exact alignment of the figures with the indicative national contributions.
IE	Not assessed	EirGrid's ERAA25 demand data submission is based on the Total Electricity Requirement (inclusive of embedded generation and network losses). Final energy consumption is not explicitly modelled and so cannot be directly assessed for alignment. However, EirGrid's demand forecast does account for Government targets for the electrification of heat and transport as set out in the Climate Action Plan 2024 and is broadly consistent with the electricity demand projections set out in the NECP.
IT	Not aligned	NECP is not aligned
LT	Aligned	
LU	Aligned	
LV	Aligned	

Country	Compliance with EU's final energy consumption targets	If not aligned, please justify
MD	Not assessed	Moldova is not an EU member state. Our NECP sets a target of Energy Efficiency contribution in the final energy consumption must keep total consumption at 2.8 Mtoe in 2030 compared with 2.55 Mtoe in 2020, i.e. to result in 151.3 ktoe of energy savings.
ME	Not assessed	Montenegro is still not a part of the EU. The projections were based on previously available data and communication with the relevant institutions. The draft NECP was published only at the stage of the public consultation at the end of June 2025, therefore there are minor differences between the NECP projections and the submitted data. These differences are not expected to have a significant impact on the results or the relevant assessments.
MK	Not assessed	MK is not EU Member
MT	Not aligned	Final energy demand data is aligned with figures submitted in final NECP 2021 - 2030
NL	Not aligned	The latest analysis of the current, proposed and envisions energy policies (KEV 2024) reveals that it is highly unlikely that the EED targets for energy efficiency will be met in the Netherlands. See for more information: https://www.pbl.nl/publicaties/klimaat-en-energieverkenning-2024 Note: The KEV study is conducted on a yearly basis by Planbureau voor de Leefomgeving (PBL) on behalf of the Dutch Government. KEV edition 2024 is an update of the analysis used in the latest NECP, which is based on the KEV 2022.
PL	Not aligned	The data PSE relied on is based on the latest version of the NECP project*, which was available at the time of data collection process. The values concerning energy demand data are not fully compliant with the indicative national contributions target. * https://www.gov.pl/web/klimat/projekt-krajowego-planu-w-dziedzinie-energii-i-klimatu-do-2030-r--wersja-do-konsultacji-publicznych-z-102024-r
PT	Not assessed	PT demand data is aligned with NECP but it was not assessed if it is aligned with indicative national contributions towards EU's final energy consumption targets
RO	Not aligned	We used the most recent national information on consumption evolution. The expected moderate growth in demand is mainly driven by the expected economic growth and energy efficiency increase. Also, the assumptions about electromobility are reflected in the electricity demand forecast and load profile
RS	Not assessed	Serbia is not EU member.
SE	Not assessed	The submitted data is based on a combination of our short-term electricity market analysis and the long-term scenario EP. In the short-term analysis, the years 2025–2029 are explicitly modelled, while in the long-term scenario, 2035 is the first target year. As a result, 2030 is not explicitly represented in our scenarios.
SI	Aligned	

Country	Compliance with EU's final energy consumption targets	If not aligned, please justify
SK	Not aligned	By the time of data collection for ERAA, approved updated SK NECP was not available. In case the TSOs did not dispose with the requested data, default solutions for such case was applied.
TR	Aligned	
UA	Not aligned	The situation in Ukraine is changing from week to week; we based on the data from National bank of Ukraine, Ministry of Economy

Compliance with EU's renewable energy target

Aligned	16
Not aligned	5
Not assessed	14
Non-EU Member States	8

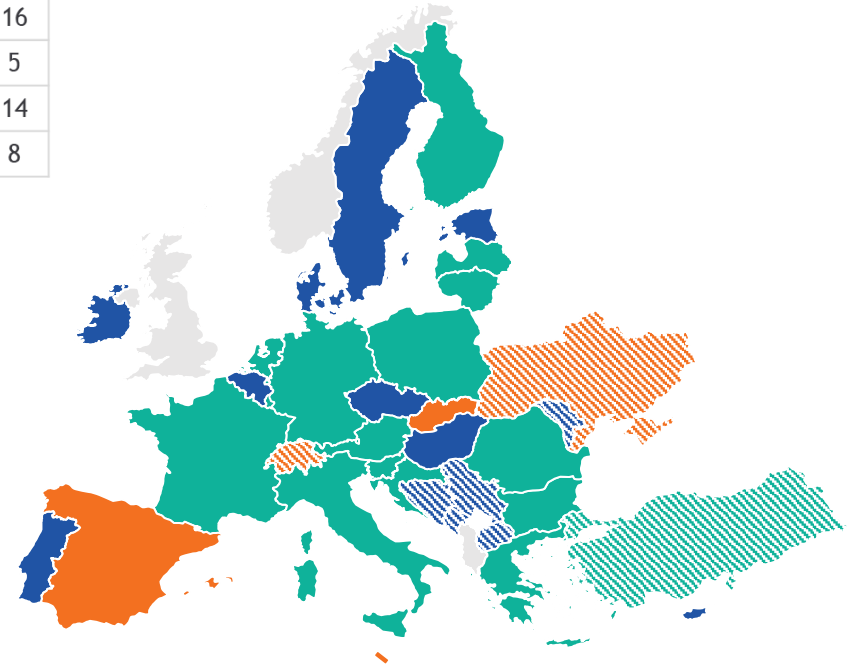


Figure 21: Please confirm if submitted data is compliant with indicative national contributions towards EU's renewable energy target

Country	Compliance with EU's RES target	If not aligned, please justify
AT	Aligned	
BA	Not assessed	
BE	Not assessed	At the time of the data collection in December '24, no final NECP was available for Belgium. The submitted data was aligned as best as possible with existing draft NECP together with available national and regional policies (incl. known RES targets of the regions)
BG	Aligned	
CH	Not aligned	Not applicable to CH as a non-EU member. Data based on Swiss National Framework for Grid Planning, aiming at net zero by 2050.

Country	Compliance with EU's RES target	If not aligned, please justify
CY	Not assessed	We used the data from the NECP submitted in December 2024. For years beyond those covered by the NECP, we were provided data through the ministry's underlying (unpublished) studies behind the NECP. As a TSO, we don't assess the NECP's compliance with EU targets.
CZ	Not assessed	RES target is expressed as the share of RES in the gross final energy consumption. Submitted data include installed capacities only, while the actual share of RES in the gross final energy consumption will only be available after the market simulation. We expect not alignment with target proposed by EC (30,1 % as NECP target vs. 33 % proposed by EC), as RES installed capacities in the submitted data are aligned with the amount of the installed capacities in the CZ NECP.
DE	Aligned	
DK	Not assessed	For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. It has not been possible to assess this specific section as the Analysis Assumptions for Energinet 2024 is not the same analytical foundation as submitted in the NECP section B.
EE	Not assessed	A final updated NECP was unavailable during data submission, but preliminary information is aligned.
ES	Not aligned	Differences due to modelling requirements, in line with the assumptions agreed at national level in the coordination framework established among TSO, Ministry and NRA and aligned with the NRAA
FI	Aligned	
FR	Aligned	Data submitted to ERAA25 and TYNDP26 is compatible with the FitFor55 targets. Data is compliant with indicative national contributions towards EU's renewable energy target when considering nuclear and renewable energy sources.
GR	Aligned	
HR	Aligned	
HU	Not assessed	We used final NECP submitted in October, 2024, but as TSO we have not assessed the exact alignment of the figures with the indicative national contributions. Nevertheless, the submitted renewable energy capacities are equal to/higher than the NECP targets.
IE	Not assessed	EirGrid's studies account for increased decarbonization through the electrification of heat and transport in line with the Climate Action Plan 2024 along with efficiency gains informed by the Energy Efficiency Directive and projected high RES growth from SEAI's latest projections. However, the share of RES across energy sector is not explicitly assessed as part of national studies on electricity generation.
IT	Aligned	
LT	Aligned	
LU	Aligned	
LV	Aligned	
MD	Not assessed	Moldova is not an EU member state. Our NECP sets a target of at least a 27% share of renewable energy in final energy consumption in 2030

Country	Compliance with EU's RES target	If not aligned, please justify
ME	Not assessed	In Table 3, only EU member states are listed, while Montenegro is not included since it is not an EU member. Therefore, the table does not contain an indicative RES target for Montenegro. The RES targets for Montenegro are defined through the National Energy and Climate Plan (NECP) and the obligations within the Energy Community. Montenegro already produces more than 60% of its electricity from renewable energy sources.
MK	Not assessed	MK is not EU Member
MT	Not aligned	Figures provided are aligned with Final NECP published on 7th January 2025.
NL	Aligned	In principle the RES capacities submitted as part of the data collection should be sufficient to comply with this target (at least when considering import & export in the calculations). However, ultimately this depends on the supply modelling performed by the ENTSOs.
PL	Aligned	
PT	Not assessed	PT renewable data is aligned with NECP but it was not assessed if it is aligned with indicative national contributions towards EU's renewable energy target
RO	Aligned	
RS	Not assessed	Serbia is not EU member.
SE	Not assessed	The submitted data is based on a combination of our short-term electricity market analysis and the long-term scenario EP. In the short-term analysis, the years 2025–2029 are explicitly modelled, while in the long-term scenario, 2035 is the first target year. As a result, 2030 is not explicitly represented in our scenarios.
SI	Aligned	
SK	Not aligned	By the time of data collection for ERAA, approved updated SK NECP was not available. In case the TSOs did not dispose with the requested data, default solutions for such case was applied. Most of the RES data (such as solar and wind) is based on the NECP up to 2030. Data for the mid and long term is based on relevant prognoses and comes from internal studies.
TR	Aligned	
UA	Not aligned	The NECP of Ukraine is used as a general roadmap, and National Renewables Development Action Plan until 2030 - as a direct plan

Compliance with EU's binding 2030 GHG reduction target

	Yes	14
	No	5
	Other	16
	Non-EU Member States	8

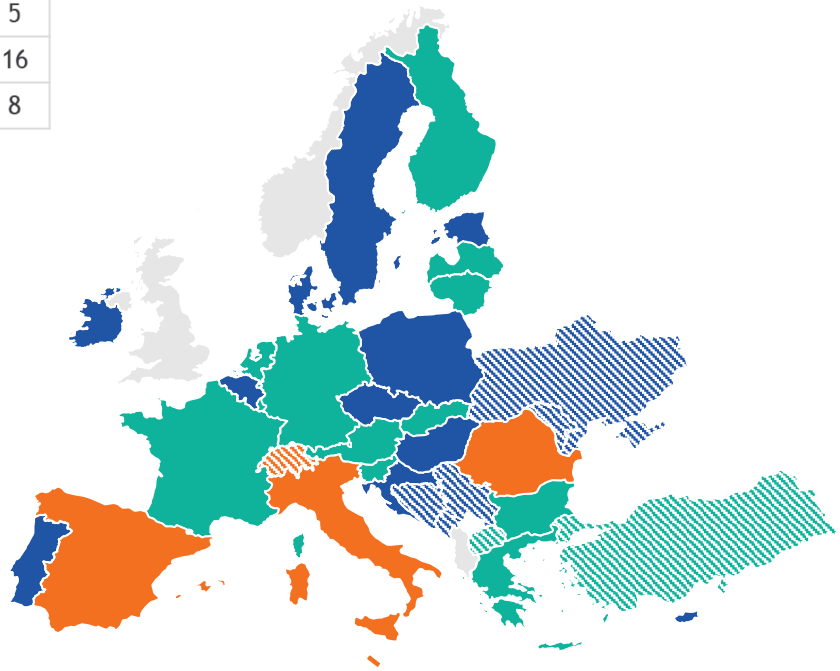


Figure 22: Please confirm if the delivered datasets are compliant with national references to comply with EU's binding 2030 GHG reduction target.

Country	Compliance with EU's binding 2030 GHG reduction target	If not aligned, please justify
AT	Aligned	
BA	Not assessed	
BE	Not assessed	At the time of the data collection in December '24, no final NECP was available for Belgium. The submitted data was aligned as best as possible with existing draft NECP together with available national and regional policies.
BG	Aligned	
CH	Not aligned	Not applicable to CH as a non-EU member. Data based on Swiss National Framework for Grid Planning, aiming at net zero by 2050.

Country	Compliance with EU's binding 2030 GHG reduction target	If not aligned, please justify
CY	Not assessed	We used the data from the NECP submitted in December 2024. For years beyond those covered by the NECP, we were provided data through the ministry's underlying (unpublished) studies behind the NECP. As a TSO, we don't assess the NECP's compliance with EU targets.
CZ	Not assessed	Not Assessed, for power generation very likely not aligned because we submitted generation data according to the latest information from operators.
DE	Aligned	
DK	Not assessed	For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. It has not been possible to assess this specific section as the Analysis Assumptions for Energinet 2024 do not include the entire Danish energy consumption and production, and not all sectors with greenhouse gas emissions.
EE	Not assessed	A final updated NECP was unavailable during data submission, but preliminary information is aligned.
ES	Not aligned	Differences due to modelling requirements, in line with the assumptions agreed at national level in the coordination framework established among TSO, Ministry and NRA and aligned with the NRAA
FI	Aligned	
FR	Aligned	
GR	Aligned	
HR	Not assessed	Data is aligned with last NECP and National energy strategy
HU	Not assessed	We used final NECP submitted in October, 2024, but as TSO we have not assessed the exact alignment of the figures with the indicative national contributions.
IE	Not assessed	GHG targets are not assessed in the All-Island Resource Adequacy Assessment, and therefore not included within the ERAA data submission.
IT	Not aligned	NECP is not aligned
LT	Aligned	
LU	Aligned	
LV	Aligned	
MD	Not assessed	Moldova is not a EU member state. However, our NECP sets a target to reduce GHG emissions by 70% below 1990 levels by 2030. According to the latest National Inventory Report "1990–2022: Greenhouse Gases and Sinks in the Republic of Moldova", GHG emissions in 2020 were 71.5% lower than in 1990.
ME	Not assessed	Montenegro is not an EU Member State and therefore does not have binding EU 2030 GHG reduction targets. The country's commitments are defined through the Energy Community framework and the National Energy and Climate Plan (NECP). For this reason, the compliance with EU binding 2030 GHG targets has not been assessed.
MK	Aligned	In line with Macedonian NECP
MT	Not aligned	Used data is aligned with Final NECP published on 7th January 2025.

Country	Compliance with EU's binding 2030 GHG reduction target	If not aligned, please justify
NL	Aligned	In principle the RES and CCS capacities submitted as part of the data collection should be sufficient to comply with this target (at least with the climate target benchmark methodology we applied). However, ultimately this depends on the supply modelling performed by the ENTSOs.
PL	Not assessed	Poland did not submit a final updated NECP but provided preliminary information for "EU wide assessment of the final updated national energy and climate plans". Data used for ERAA 2025 is primary based on the latest NECP project which was available at the time of data collection process.
PT	Not assessed	PT data is aligned with NECP but it was not assessed if it is aligned with national references to comply with EU's binding GHG reduction target
RO	Not aligned	Due to the delay in the commissioning of gas-fired combined cycle power plants, the full decarbonization is expected to take place in 2030 (delayed from 2026)
RS	Not assessed	Serbia is not EU member.
SE	Not assessed	The submitted data is based on a combination of our short-term electricity market analysis and the long-term scenario EP. In the short-term analysis, the years 2025–2029 are explicitly modelled, while in the long-term scenario, 2035 is the first target year. As a result, 2030 is not explicitly represented in our scenarios.
SI	Aligned	
SK	Aligned	The datasets, mainly the final electricity demand in the individual sectors of the national economy and as well as the total electricity demand is based on the WAM scenario of the NECP. The WAM scenario is in line with national references relating to the target of GHG reduction by 2030.
TR	Aligned	
UA	Not assessed	The NECP of Ukraine is used as a general roadmap, and the direct target for electricity generation mix for (25% from hydro + renewables) 2030 is stated in the National Economy Development Strategy until 2030

Consideration of EU principles and adoption in national frameworks

Consideration of the Energy efficiency first (EE1st) principle and the Recovery and Resilience Facility (RRF)

Yes	13
No	11
Other	9
Non-EU Member States	8

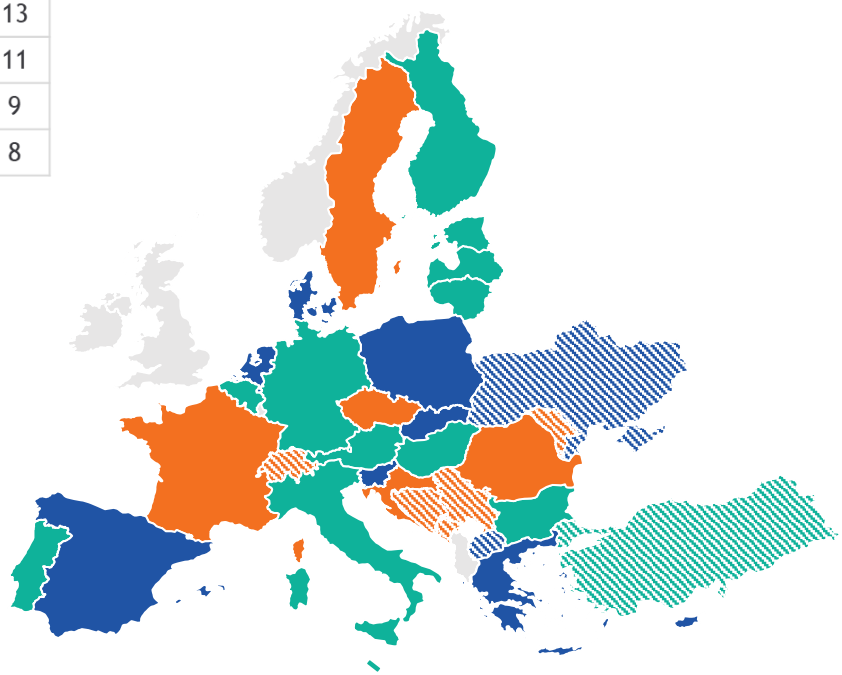


Figure 23: Did your country consider the Recovery and Resiliency Facility in the completion of the dataset for ERAA 2025?

Country	Please describe how specific assumptions are included in the datasets you provided for the National Trends Scenario for each time horizon (2030, 2035, 2040, 2050), for the inclusion of the EE1st principle on the supply side and on the demand side.	Consideration of RRF	If other, please specify
AT		Yes	
BA		No	
BE	Electrification of Heating, Transport and Industrial Demand (including flexibility of demand). Increased renovation rates , therefore increasing insulation of buildings Modal shift of transport	Yes	
BG		Yes	

Country	Please describe how specific assumptions are included in the datasets you provided for the National Trends Scenario for each time horizon (2030, 2035, 2040, 2050), for the inclusion of the EE1st principle on the supply side and on the demand side.	Consideration of RRF	If other, please specify
CH	Not applicable to CH as a non-EU member. Data based on Swiss National Framework for Grid Planning, aiming at net zero by 2050.	No	
CY	We used the data from the NECP submitted in December 2024. For years beyond those covered by the NECP, we were provided data through the ministry's underlying (unpublished) studies behind the NECP.	Other	We used the data from the NECP submitted in December 2024. We understand that the government has considered EU policies and funding mechanisms.
CZ	RES capacities follow NECP assumptions for solar and wind. Electrolysers capacities for 2030 follow NECP assumptions.	No	
DE	The EE1st principle is included in the NECP and therefore also in the submitted Data. It is mainly considered by switching from less efficient technologies to more efficient technologies.	Yes	
DK	The modified Analysis Assumptions for Energinet 2024, has been utilized as the main scenario reported, which do not explicitly included or assess the EE1st principle.	No	
EE	Demand forecasting objectives incorporate energy efficiency targets, with particular emphasis on the renovation of residential buildings and the decarbonization of the transport and industrial sectors	Yes	
ES	The aim has been to align with the NECP, which outlines how the Energy Efficiency First principle is embedded across sectors: • Buildings: Through long-term renovation strategies and efficiency targets for public buildings. • Transport: Via the 2030 Sustainable Mobility Strategy. • Industry and Households: By promoting behavioral change, digitalization, and energy services. • Infrastructure Planning: The plan prioritizes demand-side measures before considering new infrastructure, ensuring that energy savings are evaluated as the first option. For time horizons beyond 2030, where the NECP does not provide detailed guidance, TSOs have sought to follow the same trend.	Other	The data presented draws directly from the core content of the NECP, with any modifications in line with the assumptions agreed at national level in the coordination framework established among TSO, Ministry and NRA and aligned with the NRAA -
FI		Yes	
FR	NA	No	
GR	updated NECP data used	Other	implicitly yes. Data submission based on updated NECP

Country	Please describe how specific assumptions are included in the datasets you provided for the National Trends Scenario for each time horizon (2030, 2035, 2040, 2050), for the inclusion of the EE1st principle on the supply side and on the demand side.	Consideration of RRF	If other, please specify
HR	Data is taken from NECP and national energy strategy forecast	No	
HU	Demand side: heat pumps combined with PV panels (state aids, development programs), decreasing energy intensity assumptions (i.e. moderate electricity demand growth) due to insulation (e.g. state aid programs for improving energy efficiency of buildings) Supply side: penetration of new, more energy-efficient renewable technologies (e.g. innovative wind turbines, solar panels with tracking)	Yes	
IE			
IT	Datasets have been provided according to what is indicated in the NECP	Yes	
LT	Baseload electricity demand forecast includes a specific underlying efficiency assumption for demand reduction for all time horizons.	Yes	
LU	our data sets are aligned with NECP		
LV	During preparation of the consumption this principle was not considered, due to low consumption and enough generating capacity + interconnections with neighboring countries consumption management measures are not necessary yet.	Yes	
MD		No	
ME	The National Trends Scenario reflects the EE1st principle by integrating efficiency measures that keep demand in a moderate range (≈3.0–3.4 TWh by 2050). On the demand side, this includes building renovations, efficient heating, and transport electrification. On the supply side, reduced demand lowers the need for new fossil capacity, enabling a gradual coal phase-out with the Pljevlja TPP closing by 2040 and its replacement by RES expansion (solar, wind, hydro).	No	Montenegro is not an EU Member State and therefore did not consider the Recovery and Resilience Facility in the completion of the dataset for ERAA 2025.
MK	In the data provided for the National Trends Scenario, the assumptions for North Macedonia are based on the NECP (2021), which transposes the Energy Efficiency First (EE1st) principle in line with EU targets under the Energy Community framework. On the demand side, the NECP adopts the EU methodology for reducing primary and final energy consumption by 2030, ensuring that demand growth is moderated through efficiency measures in buildings, appliances, transport, and industry. These reductions are consistent with the EU-wide 2030 efficiency target set in the Energy Efficiency Directive. On the supply side, the NECP applies EE1st by prioritizing efficiency and flexibility measures over costly new generation or grid reinforcements, in line with the EU principle that system needs should first be addressed through demand reduction and system optimization. This ensures that North	Other	Macedonia, as a Contracting Party of the Energy Community and not an EU Member State, did not consider the EU Recovery and Resilience Facility (RRF) in the preparation of the National Trends dataset submitted

Country	Please describe how specific assumptions are included in the datasets you provided for the National Trends Scenario for each time horizon (2030, 2035, 2040, 2050), for the inclusion of the EE1st principle on the supply side and on the demand side.	Consideration of RRF	If other, please specify
	Macedonia's scenario development remains consistent with EU long-term objectives for 2040–2050, where efficiency, flexibility, and decentralization are considered before central supply expansion.		
MT	Although NECP time horizon is up to 2030, the policies and measures included are designed to comply with the EU's 2050 net Zero Target.	Yes	
NL	Energy efficiency is considered in various ways, for example: The scenario assumes the uptake of electrification in various sectors (i.e. heat pumps, EV's etc.), which are more efficient than the technologies they replace. On the supply side, renewable energy sources provide an increasing share in the production mix, replacing less efficient forms of electricity production (i.e. coal fired power plants). Increased insulation of residential and tertiary sectors brings down the energy demand in these sectors. Increasing use of residual heat production from industry in the build environment.	Other	Not explicitly considered, direct impact on scenario assumptions unclear to us.
PL	Data used for ERAA 2025 is primary based on the latest NECP project which was available at the time of data collection process. This project takes into account the implementation of planned policies and regulations aimed at improving energy efficiency.	Other	No information
PT	2030 and 2035 PT datasets assume energy efficiency principles according to NECP	Yes	
RO	N/A	No	
RS	Serbia is not EU member.	No	Serbia is not EU member.
SE		No	
SI	All the data provided is aligned with NECP.	Other	All the data provided is aligned with NECP.
SK	In general, both the supply and demand sides are based on the NECP, not only up to 2030, but also up to 2035. Energy efficiency is a key consideration in all areas of energy policy (NECP). It means that applying the energy efficiency first principle is one of the NECP's most important priorities. It follows from the above, that submitted datasets automatically include assumptions related to applying the energy efficiency first principle. On the supply side, the main assumptions relating to the energy efficiency are primarily based on the decarbonization. On the demand side, the main assumptions relating to the energy efficiency are based primarily on decarbonization, electrification, as well as decrease in PEC	Other	The NECP is the basis for most of the data, particularly in terms of demand in relation to the ERAA2025. The NECP implements measures set out in the Slovak Republic's Recovery and Resilience Plan, which is financed by the Recovery and Resilience Facility. It can be said that the Recovery and Resiliency Facility was taken into account to a certain extent when completing the dataset.

Country	Please describe how specific assumptions are included in the datasets you provided for the National Trends Scenario for each time horizon (2030, 2035, 2040, 2050), for the inclusion of the EE1st principle on the supply side and on the demand side.	Consideration of RRF	If other, please specify
	and FEC. All assumptions related to applying the energy efficiency first principle are included in the NECP. (link, https://www.mhsr.sk/uploads/files/A65vdZlY.pdf?csrt=9414390188373845476 #page=39&zoom=100,90,164)		
TR		Yes	
UA	Implicitly included in the demand for electric energy	Other	The Ukraine facility plan is affecting the country at all, incl. energy

Initiation of national market reforms

Yes, currently	15
Yes, in the future	7
Neither currently, nor in the future	11
Non-EU Member States	7

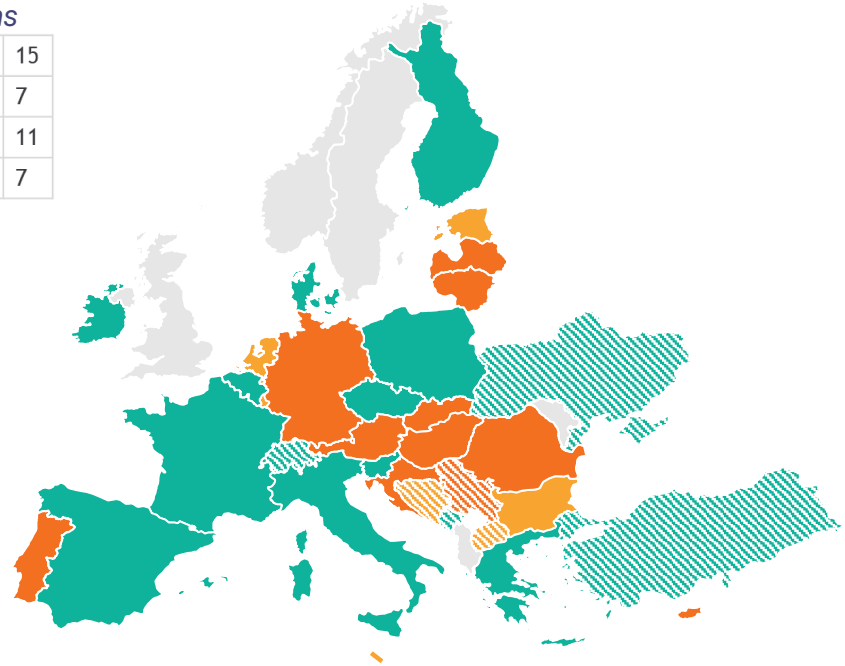


Figure 24: Has your country initiated national market reforms?

Country	Has your country initiated national market reforms?		How were the reforms considered when providing ERAA 2025 data for PEMMDB?
AT	Neither currently nor in the future		
BA	Yes, in the future		
BE	Yes, currently	We consider the mechanism of price cap increase in the EVA module	The assumptions of PEMMDB were based on the data from the NRAA "Adequacy and Flexibility for Belgium 2026-2036" which were publicly consulted with national stakeholders and further aligned with previous studies performed by Elia considering e.g. scenarios that comply with objective and national policies /objectives and consider the Belgian implementation plan.
BG	Yes, in the future		
CH	Yes, currently	Switzerland has introduced measures similar to the ones mentioned in Art. 20 (3) c, d, e and f according to Swiss national law.	
CY	Neither currently nor in the future	Cyprus is an isolated island, and is thus exempt from Articles 20 and 23 of Regulation (EU) 2019/943.	
CZ	Yes, currently	CZ has implemented several market reforms specified in Q17. CZ is currently considering initiating capacity mechanisms, but they were not considered in ERAA 2025.	There is explicit DSR, improvement of NTC and increase in battery storage and power in the dataset.
DE	Neither currently nor in the future	The previous federal government had concrete plans to implement a “power plant strategy” that would promote the construction of 12.5 GW of gas-fired power plant capacity. At the same time, the introduction of a capacity mechanism in Germany was to be pushed forward. After the federal elections in February 2025, the current German federal government announced a plan to tender for 20 GW of gas-fired power plant capacity. More detailed information on implementation, including the introduction of a capacity mechanism, is not yet available.	
DK	Yes, currently	The Analysis Assumptions for Energinet 2024 does not internalize new market reforms, when made by the Danish Energy Agency. Modelling of the electricity system is based on current market structures and is a target fulfilment scenario, compatible with achieving the political objectives in the climate and energy sectors. It is the task of Energinet to, subsequently, develop physical and	Many potential changes to the market are considered in an ongoing process of political, technical and economic analyses, estimations and market consultations. This is done to ensure the best possible view on what could be done to enhance market performance and overall system performance. If major changes are adopted, such as

Country	Has your country initiated national market reforms?		How were the reforms considered when providing ERAA 2025 data for PEMMDB?
		market-based solutions, which are to accommodate challenges regarding security of supply based on the implementation of The Analysis Assumptions for Energinet 2024 and the analysis and conclusions that the utilization of these lead to. Consequently, such measures have not been implemented in the PEMMDB app reporting as the analysis outcome of the utilization of this scenario is, amongst other things, supposed to identify such measures and the need for them. Additionally, there's an ongoing work to enhance market efficiency through changes in market regulation. These types of adjustments, however, are not included explicitly in the project assumptions and /or the data collection for ERAA 2024. Adjustments could be full implementation of aggregators or application of implicit rather than explicit grid loss on interconnectors and changes to the balancing markets, which follows form the common European balancing market regulation (integration to PICASSO etc.). Lastly, The National Resource Adequacy Assessment 2023 of Denmark, performed by Energinet, proposed, in cooperation with the Danish Energy Agency, an investigation of the possibility of and impact of establishing a capacity mechanism in Denmark. The result of this analysis is not yet finalized.	increased interconnector capacity, it will be incorporated into the Analysis Assumptions. More market narrow changes might not be incorporated into The Analysis Assumptions for Energinet.
EE	Yes, in the future	As a result of the previous ERAA iteration, resource adequacy issues were identified, and the process of market reform, introducing a capacity mechanism by 2027, has been initiated	
ES	Yes, currently		The updated values reflecting interconnection reinforcements have been implemented in accordance with technical assessments and governmental commitments. Explicit DSR is associated to current Spanish SRAD (Active Demand Response Service).
FI	Yes, currently	Significant market reforms include an EU-wide harmonized balancing market, imbalance settlement and	The direct effect of the market reforms cannot be precisely quantified; however, e.g. balancing market

Country	Has your country initiated national market reforms?		How were the reforms considered when providing ERAA 2025 data for PEMMDB?
		requirements for the procurement of reactive power. In addition, price cap of balancing market has been increased to the technical price limit and independent aggregation is allowed in most of the reserve market products. A working group initiated by the Ministry of Economic Affairs and Employment has examined support scheme for non-fossil flexibility in the energy system.	reforms are expected to support price signals that incentivize DSR development in the balancing timeframe. The market reforms were considered to the extent possible when providing the data. The impact of a possible CM or other similar measures was not considered. TSO's investment plan which includes significant network investments in both the internal network and interconnectors has been considered in the data. As weather-dependent electricity production increases, the electricity system needs more flexibility, and part of it is assumed to be different storages, which have been considered in the data collection. TSO's connection enquires also support the development in which storage capacity would increase in the power system.
FR	Yes, currently		
GR	Yes, currently	Cross-border interconnections, demand side response and electricity storage are currently being encouraged through regulatory and legislative actions.	By submitting the respective data...
HR	Neither currently nor in the future	Neither currently nor in the future	
HU			
IE	Yes, currently	National market reform is currently ongoing through multiple workstreams in Eirgrid. These include, but are not limited to, the Scheduling and Dispatch Project, the Day-Ahead System Services Auction, the Future Arrangements of System Services, the Strategic Markets Programme, and the Celtic Readiness programme.	
IT	Yes, currently		
LT	Neither currently nor in the future		
LU	Yes, in the future		
LV	Neither currently nor in the future	Capacity mechanism isn't implemented in Latvia as in other countries. For similar purposes recently Balancing market was established in all Baltic countries, so CM isn't priority.	

Country	Has your country initiated national market reforms?		How were the reforms considered when providing ERAA 2025 data for PEMMDB?
MD			
ME	Yes, currently	Montenegro has initiated market reforms in line with Energy Community obligations, but the process is still ongoing.	For the mentioned study, interconnection reinforcements are planned, as well as storage systems in the form of reservoir hydropower plants.
MK	Yes, in the future	Macedonia has not yet initiated full national market reforms in accordance with the EU Electricity Regulation, as the country is still in the process of transposing the Clean Energy Package into national law under the Energy Community framework.	
MT	Yes, in the future		Commissioning of a second interconnection with Sicily and battery energy storage facilities were included in data submitted for TYNDP 2026 and ERAA 2025
NL	Yes, in the future	Currently not, but potentially in the future. No concrete measures yet towards bigger (electricity) market reforms announced. However, recent national adequacy studies (see Monitor Leveringszekerheid, TenneT 2025) hint at possible adequacy risks beyond 2030, therefore policy measures become more likely. See here for more background: https://www.tennet.eu/nl/over-tennet/publicaties/rapport-monitoring-leveringszekerheid	No market reforms explicitly considered. However, we see developments in the market leading to built-out of resources that can provide flexibility to the system, like battery storages and electrical interconnection which we do consider in our scenarios.
PL	Yes, currently		
PT	Neither currently nor in the future		
RO	Neither currently nor in the future		
RS	Neither currently nor in the future	Serbia is not EU member.	Interconnection reinforcements have been implemented by providing increased NTCs starting from the year of the commissioning of expected new interconnections (all submitted within the TYNDP). Storage facilities have been included in line with the official submissions for connection studies.
SE			
SI	Yes, currently	Slovenia fulfils EU regulations, so effort is made to be aligned with every new reform.	All of the provided data is aligned with NECP scenarios.

Country	Has your country initiated national market reforms?		How were the reforms considered when providing ERAA 2025 data for PEMMDB?
SK	Neither currently nor in the future	So far, the results of the adequacy calculations at the European level (as well as Slovakia's own calculations at the national level) do not point to issues with the adequacy of resources in Slovakia. For this reason, it has not been necessary to initiate national market reforms in terms of Article 20(3).	
TR	Yes, currently		
UA	Yes, currently	Ukraine is implementing Energy Package IV - we are reforming our legislation and practices simultaneously	Price cap - has not been explicitly reflected, but assumed that no shocks with electricity demand and import/export volumes will be in the future; interconnection - growth of the NTC with neighboring systems; storages - growth of installed capacities

	Which market reforms have been implemented or considered in the ERAA 2025 dataset?						
Country	No market reforms in data	Price cap rules in data	Scarcity pricing in data	Explicit DSR in data	Implicit DSR in data	Interconnection reinforcement in data	Storage facilities in data
AT				X			
BA	X						
BE		X		X	X	X	X
BG						X	X
CH					X		X
CY	X						
CZ			X	X		X	X
DE	X						
DK				X	X	X	X
EE							
ES				X		X	
FI					X	X	X
FR		X	X	X	X	X	X
GR				X	X	X	X
HR				X		X	X
HU	X						
IE							
IT						X	X
LT	X						

LU							
LV	X						
MD	X						
ME						X	X
MK	X						
MT						X	X
NL	X						
PL	X						
PT	X						
RO	X						
RS						X	X
SE							
SI				X	X	X	X
SK							X
TR						X	
UA		X				X	X

Integration of NECPs and EC scenarios

Time horizon of NECPs

	2030	18
	2040	2
	2050	9
	Other	5

Figure 25: What is the time horizon covered by your country's NECP?

Country	Time horizon of NECPs	Other NECP time horizon
AT	Other	Last update of the NECP covers period 2021-2030 (acc. to 2018/1999); some trajectories cover until 2040 and 2050.
BA	2030	
BE	2030	
BG	2050	
CH	Other	Switzerland does not have a NECP. The Swiss National Framework for Grid Planning covers until 2040.
CY	2030	
CZ	2050	
DE	2050	
DK	2050	Parts of section A covers until 2050, however section B mostly covers until 2040. The time horizon for The Analysis Assumptions for Energinet 2024 covers up until 2050.
EE	2030	
ES	2030	

Country	Time horizon of NECPs	Other NECP time horizon
FI	2030	
FR		2030-2035
GR	2050	
HR	2030	
HU	2050	
IE	2030	
IT	2030	
LT	2030	
LU	2030	
LV	2030	
MD	2030	
ME	2030	
MK	2030	
MT	Other	Time horizon of data provided in NECP varies. Renewables - 2030, Final Energy Demand - 2040, Electricity Supply - 2030
NL	Other	The main focus of the Dutch NECP is the time horizon until 2030. However, it partly contains an outlook until 2050 (also see attachment to the NECP).
PL	2040	
PT	2030	
RO	2050	
RS	2050	/
SE		
SI	2030	
SK	2030	Some parts of the NECP includes projections beyond 2030, extending to 2035, 2040, 2045 and 2050.
TR	2040	
UA	2050	N.B. There is no info for Ukraine at the links provided

Data drivers for data beyond the time horizon of NECPs

Country	How is data derived for years beyond the NECP horizon?							
	TSO/DSO studies and plans	Political targets	National (government) energy strategies	Connection requests	Studies from independent research institutions	NECP covers all years	Other drivers	If other, please specify

AT	X	X	X	X			X	Last update of the NECP covers period 2021-2030 (acc. to 2018/1999); some trajectories cover until 2040 and 2050.
BA	X							
BE	X	X	X	X	X			Stakeholder inputs from national consultation processes from the "Adequacy and Flexibility study 2026-2036"
BG						X		
CH						X		The Swiss National Framework for Grid Planning was here considered as an equivalent of the EU's NECP.
CY							X	Data provided by the ministry, through their underlying studies for the NECP.
CZ						X		
DE						X		
DK	X		X			X		For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are mainly concerning data after target year 2030 primo. The details of the modified version and reasoning for this modification can be found here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. The modifications are postponing windfarms, Energy islands and electrolyser capacities, compared to the original dataset. The modified version is considered a more accurate projection for offshore wind capacity, PtX, and energy island development—particularly in the short/mid-term scope and hence within the ten-year horizon of ERAA. Overall, the data is in line with the long-term NECP/offshore goals, but adjusted in the short term to reflect recent developments.. The risk of not adjusting the ERAA submission to align with the modified version is that Denmark's adequacy assessment may be rated higher than expected, hence wrong conclusions will be made. Additionally the data collection guideline allowed for more freedom in terms of compliance with NECP for the ERAA submission, than for the TYNDP/SB.

								TYNDP/SB has a longer time horizon (main years of interest are 2040 and 2050) than ERAA, which provides greater opportunity to initiate political initiatives aimed at achieving the political objectives reflected in the NECP section A and the Member States' non-binding offshore targets. Hence why the original version of The Analysis Assumptions for Energinet 2024 has been submitted for the TYNDP/SB.
EE	X	X	X	X	X			
ES	X	X	X	X	X		X	Spanish Economic Forecasting Centre Association National documents and plans: Long-term strategy 2050 (2020: https://ec.europa.eu/clima/sites/lts/lts_es_es.pdf), National Hydrogen Roadmap (2020: https://www.miteco.gob.es/content/dam/miteco/es/ministerio/planes-estrategias/hidrogeno/hojarutahidrogenorenovable_tcm30-525000.PDF), National Network Development Plan (https://www.planificacionelectrica.es/sites/default/files/2025-07/REE_PLAN_DESARROLLO_MAPs_ingles.pdf) 7th GENERAL RADIOACTIVE WASTE PLAN (2024: https://www.enresa.es/documentos/EN_7-plan-general-residuos-radiactivos.pdf)
FI	X			X				
FR	X	X	X	X				
GR						X		
HR			X					
HU						X		
IE	X							ERAA 2025 data post NECP target year 2030 derived from All-Island Resource Adequacy Assessment 2025-2034 published in March 2025.
IT	X		X	X				
LT	X		X					
LU			X		X			
LV	X			X				
MD	X							
ME	X			X				

MK			X					For longer-term projections (e.g., 2035, 2040, 2050), assumptions are typically extrapolated from NECP 2030 targets and in line with National Energy Strategy
MT							X	No data for solar PV capacity provided beyond 2030. Information on offshore projects aligned with MS' non-binding agreements. Internal assumptions used for Final energy demand - 2050
NL	X	X	X	X	X			The NECP for the Netherlands only partly contains quantitative information which we require to build scenarios. Furthermore, most of the figures (for example in annex 4 of the NECP) are outdated. As a result, the NECP is not suitable as direct input to our scenarios. However, the underlying national climate and energy policies which are reflected in the NECP are of course considered in our national scenarios.
PL						X		
PT			X					Years beyond NECP horizon were based on PT National Resource Adequacy Assessment studies
RO						X		
RS				X		X		Data for Serbia has been aligned with the connection requests for all of the time horizons.
SE	X			X				
SI						X		
SK					X		X	- studies by an independent consultancy company as well as from the internal forecasts and action plans (e.g. - https://www.minv.sk/?ros_ministerstvo-hospodarstva-slovenskej-republiky&sprava=gov-akcny-plan-rozvoja-elektromobility-v-sr - https://www.mhsr.sk/nvs)
TR	X							
UA	X					X		NECP of Ukraine is treated as a general roadmap, TSO provide own results based on consultations with Ministries and stakeholders

Compliance of submitted energy demand and capacity data with NECPs

Explicit in NECP	14

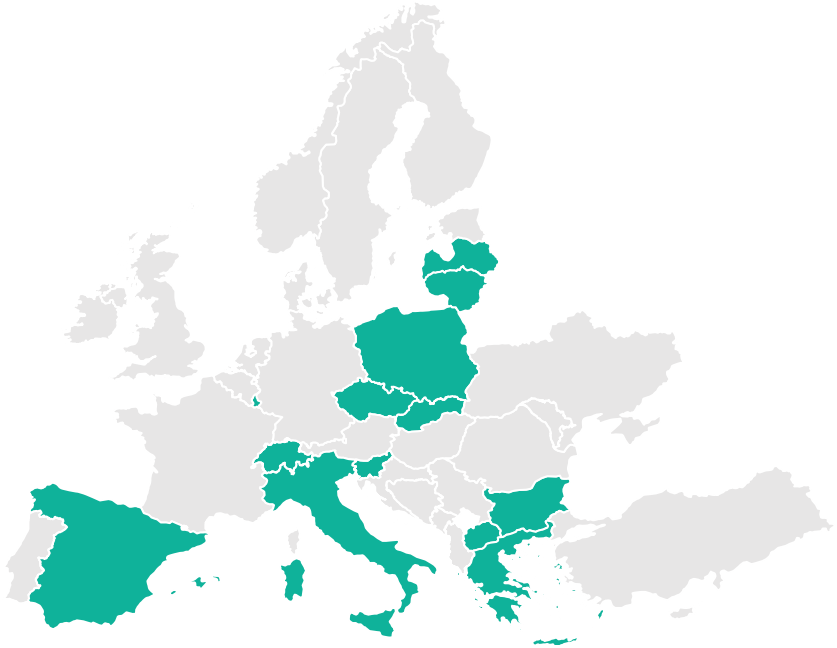


Figure 26: Please explain how you ensured the submitted energy demand and capacity data is compliant with NECP

Country	Demand and capacity compliant with DECP	Contact with Ministry for compliance with NECP	Using published plans for compliance with NECP	Please explain how you ensured the submitted energy demand and capacity data is compliant with NECP
AT			X	https://www.bmluk.gv.at/themen/klima-und-umwelt/klima/nationale-klimapolitik/energie_klimaplan.html Please also refer to question 9
BA			X	Indicative Development Generation Plan, www.nosbih.ba
BE			X	Electricity Demand and Capacity is compliant with latest "Adequacy and Flexibility for Belgium 2026-2036"study of Elia

Country	Demand and capacity compliant with DECP	Contact with Ministry for compliance with NECP	Using published plans for compliance with NECP	Please explain how you ensured the submitted energy demand and capacity data is compliant with NECP
BG	X			
CH	X			
CY		X		Explicit projections from the underlying NECP studies were provided, via the ministry, from their consultants that carried out the studies.
CZ	X		X	Thermal resources from operators. Other resources and demand explicitly from NECP
DE			X	As the NECP provides only a high level overview, the technical report behind the NECP has been used as a source ('Technischer Anhang der Treibhausgas-Projektionen 2024 für Deutschland | https://www.umweltbundesamt.de/sites/default/files/medien/11850/publikationen/projektionen_technischer_anhang_0.pdf').
DK			X	For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are mainly concerning data after target year 2030 primo. The details of the modified version and reasoning for this modification can be found here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. The modifications are postponing windfarms, Energy islands and electrolyser capacities, compared to the original dataset. The modified version is considered a more accurate projection for offshore wind capacity, PtX, and energy island development—particularly in the short/mid-term scope and hence within the ten-year horizon of ERAA. Overall, the data is in line with the long-term NECP/offshore goals, but adjusted in the short term to reflect recent developments.. The risk of not adjusting the ERAA submission to align with the modified version is that Denmark's adequacy assessment may be rated higher than expected, hence wrong conclusions will be made. Additionally the data collection guideline allowed for more freedom in terms of compliance with NECP for the ERAA submission, than for the TYNDP/SB. TYNDP/SB has a longer time horizon (main years of interest are 2040 and 2050) than ERAA, which provides greater opportunity to initiate political initiatives aimed at achieving the political objectives reflected in the NECP section A and the Member States' non-binding

Country	Demand and capacity compliant with DECP	Contact with Ministry for compliance with NECP	Using published plans for compliance with NECP	Please explain how you ensured the submitted energy demand and capacity data is compliant with NECP
				offshore targets. Hence why the original version of The Analysis Assumptions for Energinet 2024 has been submitted for the TYNDP/SB.
EE		X		
ES	X	X		Data submitted has been shared, in line with the assumptions agreed at national level in the coordination framework established among TSO, Ministry and NRA and aligned with the NRAA
FI				
FR			X	ERAA25 hypotheses are derived from France last published NRAA, central reference scenario “A-Référence” of the RTE Bilan Prévisionnel 2023.
GR	X			
HR				Contact with NECP and energy strategy producer
HU			X	Main sources: the NECP, official plans of power plants (regular consultation), official network connection plans/requests.
IE			X	ERAA25 electricity demand forecast is taken from the All-Island Resource Adequacy Assessment 2025-2034 which incorporates the Irish government's Climate Action Plan targets 2024 for the electrification of heat and transport.
IT	X			Some fugures were derived by published data
LT	X	X		
LU	X			
LV	X			
MD			X	NECP Moldova Draft Draft of Moldova’s TYNDP 2025–2034
ME				As the draft NECP was published for public consultation at the end of June 2025, and the data from it were not available at the time of data submission. The data were provided using the method of extrapolating previously available information and were adjusted in line with the communication carried out with the institutions concerned by this type of data.
MK	X			
MT	X			
NL			X	We use one of our own grid operator scenarios for the TYNDP. We submitted the data from the scenario “Koersvaste Middenweg”, which closely follows the national energy policies, ambitions and national strategies (i.e. National Plan Energysystem, NPE). This scenario had been jointly developed and published by both national TSOs (TenneT, Gasunie) and the

Country	Demand and capacity compliant with DECP	Contact with Ministry for compliance with NECP	Using published plans for compliance with NECP	Please explain how you ensured the submitted energy demand and capacity data is compliant with NECP
				regional distribution companies. See for more information: https://www.netbeheernederland.nl/artikelen/nieuws/netbeheer-nederland-scenarios-editie-2025.
PL	X	X		Demand: data from WAM scenario of NECP project . Capacity: data used for ERAA 2025 is primary based on the latest NECP project (WAM scenario) which was available at the time of data collection process and on up-to-date information available for TSO from producers.
PT		X	X	Demand and capacity submitted data were based on both PT National Resource Adequacy Assessment studies and on data provided by Portuguese Directorate for Energy and Geology
RO		X	X	Thermal capacity are updated based of the most recent information from generators and discussed with Ministry.
RS			X	Submitted demand is aligned with the forecasts done within the National Development Plan.
SE				
SI	X			Additionally TSOs are in contact with all the relevant institutions and discuss the needs and projections that could change and differ from published documents.
SK	X			The final energy demand in individual sectors of the national economy, as well as the total energy demand are based on the WAM scenario of the NECP. https://www.mhsr.sk/uploads/files/A65vdZIY.pdf?csrt=9414390188373845476#page=39&zoom=100,90,164
TR		X		
UA		X		The access to the energy information is restricted in Ukraine, only consultations with Ministries and stakeholders are available

Granularity of NECP data

Yes	7
Partially	13
No	15

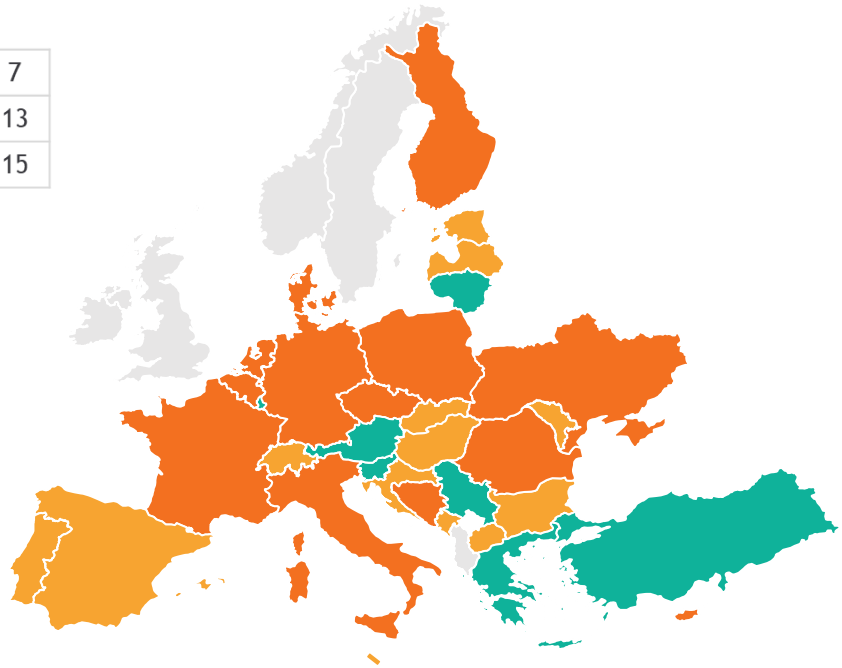


Figure 27: Does the NECP provide sufficient granularity for the TYNDP and ERAA datasets?

Country	Is the NECP sufficiently granular?	Please specify missing datasets	How did you obtain the missing data?					
			Responsible entity for NECP	Other entity	By reverse-engineering	TSO's own internal scenarios	Other source	Please specify further
AT	Yes							
BA	No					X		
BE	No		X					See previous answers above
BG	Partially	For some specific ERAA years we have interpolated data from the NECP because NECP only takes into account multiple of 5 years ex.:2025, 2030, 2035 etc.	X					

CH	Partially	Higher granularity in some sectors would be useful. This includes the demand from big consumers and data centers, behaviour of e-mobility, heat pumps and decentralized and utility scale batteries or development of DSR. On the generation side, disaggregated targets for different PV installation types and explicit reservoir sizes per hydro technology (particularly for reservoir plants). More detail on sector coupling would also be helpful, especially for hydrogen and power-to-gas modelling.				X		The internal scenarios used are the ones from the published Strategic Grid 2040. They were used mostly for the demand modelling (EV profiles, additional load).
CY	No	The published NECP data only goes until 2030. However, the ministry was able to provide projections for all years to 2050, based on their underlying studies.	X					
CZ	No	NECP does not provide data for 2028 and 2033.					X	Linear interpolation from available years.
DE	No	As the NECP provides only a high level overview, the technical report behind the NECP has been used as a source ('Technischer Anhang der Treibhausgas-Projektionen 2024 für Deutschland | https://www.umweltbundesamt.de/sites/default/files/medien/11850/publikationen/projektionen_technischer_anhang_0.pdf').				X		
DK	No	The NECP is not in itself detailed enough for the use of submitting data to ERAA 2025. Additionally Energinet is not directly using the NECP in its planning, but instead The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, with some modifications made by Energinet, has been utilized as the main scenario reported for ERAA 2025.	X		X	X	X	For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are mainly concerning data after target year 2030 primo. The details of the modified

								version and reasoning for this modification can be found here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. The modifications are postponing windfarms, Energy islands and electrolyser capacities, compared to the original dataset. The modified version is considered a more accurate projection for offshore wind capacity, PtX, and energy island development—particularly in the short/mid-term scope and hence within the ten-year horizon of ERAA. Overall, the data is in line with the long-term NECP/offshore goals, but adjusted in the short term to reflect recent developments.. The risk of not adjusting the ERAA submission to align with the modified version is that Denmark's adequacy assessment may be rated higher than expected, hence wrong conclusions will be made. Additionally the data collection guideline allowed for more freedom in terms of

								compliance with NECP for the ERAA submission, than for the TYNDP/SB. TYNDP/SB has a longer time horizon (main years of interest are 2040 and 2050) than ERAA, which provides greater opportunity to initiate political initiatives aimed at achieving the political objectives reflected in the NECP section A and the Member States' non-binding offshore targets. Hence why the original version of The Analysis Assumptions for Energinet 2024 has been submitted for the TYNDP/SB.
EE	Partially	Certain values had to be derived from targets that remained unchanged between the preliminary NECP and the updated NECP	X		X	X		
ES	Partially	For certain figures up to 2030, data is available at five-year intervals. To complete the dataset, additional assumptions have been made, including demand forecasts and the commissioning or decommissioning dates of infrastructure.				X	X	Data obtained from national strategies, planning or studies
FI	No	All target years are not include in NECP time horizon, and the data collected for ERAA and TYNDP is more detailed and complex.				X		
FR	No					X		
GR	Yes							
HR	Partially	Public NECP and energy strategy does not provide additional granularity. Detailed data obtained from NECP and strategy produce does.		X				
HU	Partially	Certain capacities (e.g. biogas, biomethane), demand input figures. Import H2 demand.					X	Official plans of power plants (regular consultation), official

								network connection plans/requests,
IE						X		Using the All-Island Resource Adequacy Assessment 2025-2034 which incorporates multiple data points from different sources. These include but are not limited to, the Irish Government's Climate Action Plan 2024, the renewable energy capacity forecast from SEAI's latest report entitled "Forecasts of plausible rates of generation technology deployment 2024 - 2040", economic projection from ESRI, and the EU Energy Efficiency Directive.
IT	No	Market nodes details, demand input fugures, etc.			X	X		
LT	Yes	The NECP covers the period 2021-2030. Data for 2035 is missing and TSO forecasts are used.				X		
LU	Yes		X			X		
LV	Partially	Data is prepared in several scenarios with low granularity, so it isn't possible to implement data properly into dataset.				X		
MD	Partially					X		
ME	Partially	As the draft NECP was published for public consultation at the end of June 2025, and the data from it were not available at the time of data submission..The NECP does not provide a sufficient level of detail by years and across all categories defined in the forms for data submission, particularly with quantifications for all years.			X			
MK	Partially	The NECP (2021) of North Macedonia provides high-level targets for energy efficiency, renewable deployment, and sectoral demand reduction up to 2030. However, it lacks detailed	X		X	X		

		granularity required for ERAA , such as hourly load profiles and unit-level generation data. MEPSO supplements the NECP with historical system data, planned projects, cross-border capacities, and flexibility assumptions to ensure the datasets accurately represent the Macedonian power system.						
MT	Partially	NECP datasets supplemented with internal assumptions and modelling.		X				
NL	No	We use our national energy system scenario quantification since the NECP does not provide the required level of detail. For example, the NEPC only provides limited (and outdated) information on energy volume, while scenarios require more detailed information on the underlying assumptions (e.g. market shares of different technologies).				X		
PL	No	No TY2028 and TY2033		X	X			
PT	Partially	Demand and capacity data from NECP don't provide sufficient granularity (e.g. hourly data) for ERAA, which had to be based on input data used in National Resourse Adequacy Assessment studies					X	
RO	No	Demand input figures Unit by unit evolution for thermal capacity. Information about DRS, Electrolysers				X	X	Thermal capacity are updated based of the most recent information from generators and Ministry.
RS	Yes	Data delivered for the TYNDP and ERAA is aligned with the official data available to the TSO.				X		/
SE								
SI	Yes	Sometimes there could be dome inconsistencies that need some clarification. In these cases we coordinate with NECP consortium, as we as TSO are a member of.						We are in contact with all the relevant institutions and discuss the needs and projections that could change and differ from published documents. If we find some inconsistencies or there are data missing, we

								coordinate with all the relevant stakeholders. We are also in NECP consortium so the coordination is quick and effective.
SK	Partially	Although the NECP contains a large amount of relevant data, some of this data originates from other sources. For instance, it includes information from studies by an independent consultancy company as well as from the internal forecasts (batteries, heat pumps, electrolyzers) and action plans (e.g. policies on the utilisation of hydrogen).				X	X	- Heat pumps - Batteries - Electrolysers - some data relating to the generation side with the higher required level of the granularity (solar, wind), i.e. mainly data beyond 2030 TSO's internal prognoses are based on the outcomes of studies by an independent external consultancy company. These relevant prognoses are used e.g. in the TSO's ten-year development plan as well as in the assessment of the adequacy resource of the Power system of the Slovak Republic for the Ministry of Economy purposes. - https://www.sepsas.sk/legislativa/plany-rozvoja/desatrocny-plan-rozvoja-prenosovej-sustavy/ - https://www.economy.gov.sk/energetika/energeticka-politika/posudenie-primeranosti-zdrojov-elektrizacnej-sustavy-sr
TR	Yes		X					

UA	No	The Ukrainian NECP was adopted in 2024, due to uncertain situation in Ukraine it should be time to time reviewed		X		X		

Integration of NECPs and EC scenarios (2030 & 2035)

Alignment of energy demand figures with NECP

2030	
Aligned	20
Adjusted based on TSOs best estimates	10
Not specified in NECP	3

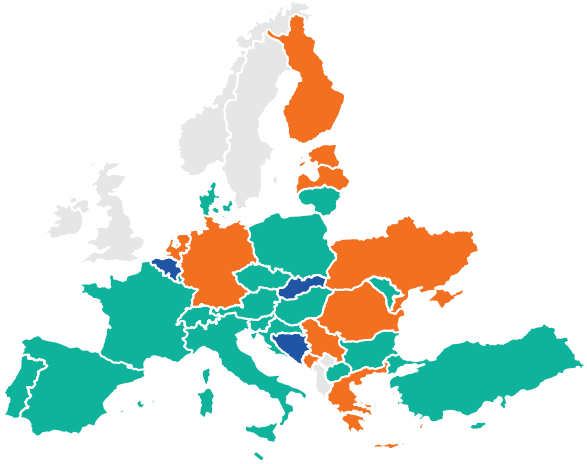


Figure 29: Please confirm alignment of submitted energy demand figures with the NECP for 2030

2035	
Aligned	15
Adjusted based on TSOs best estimates	8
Not specified in NECP	10

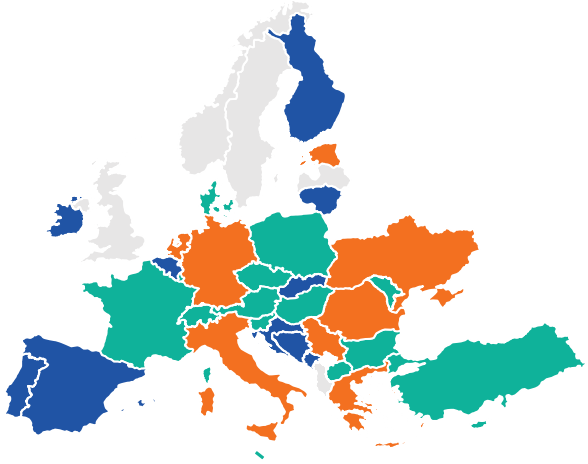


Figure 28: Please confirm alignment of submitted energy demand figures with the NECP for 2035

Country	Energy demand aligned with NECP for 2030	If energy demand is not aligned with the NECP for 2030, please justify	Energy demand aligned with NECP for 2035	If energy demand is not aligned with the NECP for 2035, please justify
AT	Aligned		Aligned	

Country	Energy demand aligned with NECP for 2030	If energy demand is not aligned with the NECP for 2030, please justify	Energy demand aligned with NECP for 2035	If energy demand is not aligned with the NECP for 2035, please justify
BA	Not specified in NECP	Indicative Development Generation Plan, www.nosbih.ba	Not specified in NECP	Indicative Generation Development Plan, www.nosbih.ba
BE	Not specified in NECP	At the time of the data collection in December '24, no final NECP was available for Belgium. The submitted data was aligned as best as possible with existing draft NECP together with available national and regional policies.		See answers for 2030
BG	Aligned		Aligned	
CH	Aligned		Aligned	
CY	Aligned		Aligned	
CZ	Aligned	Since electricity demand was taken from NECP, I assume the correct answer is "Aligned". However, not sure if this question is applicable for ERAA 2025 data collection, only electricity demand is submitted.	Aligned	
DE	Adjusted based on TSOs best estimates	For ERAA there is only an electricity demand submitted, therefore no overall energy demand can be aligned with the NECP. The electricity demand for ERAA is based on the draft scenario framework of the NEP (https://www.netzentwicklungsplan.de/en/nep-aktuell/netzentwicklungsplan-20372045-2025) and the system analysis (https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Versorgungssicherheit/Netzreserve/start.html) and its underlying research. This data has been considered more adequate to fill the DFT (Demand Forecast Tool) than the data available in the NECP. With 2.5% deviation on the overall demand the difference is very small.	Adjusted based on TSOs best estimates	In ERAA there is only an electricity demand submitted, therefore no overall energy demand can be aligned with the NECP. The electricity demand for ERAA is based on the draft scenario framework of the NEP (https://www.netzentwicklungsplan.de/en/nep-aktuell/netzentwicklungsplan-20372045-2025) and the system analysis (https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Versorgungssicherheit/Netzreserve/start.html) and its underlying research. This data has been considered more adequate to fill the DFT than the data available in the NECP. With 2.5% deviation on the overall demand the difference is very small.

Country	Energy demand aligned with NECP for 2030	If energy demand is not aligned with the NECP for 2030, please justify	Energy demand aligned with NECP for 2035	If energy demand is not aligned with the NECP for 2035, please justify
DK	Aligned		Aligned	
EE	Adjusted based on TSOs best estimates	The Strategic Sector Development Plan was used as a source instead, as the final NECP data was not available at the time of submission	Adjusted based on TSOs best estimates	
ES	Aligned		Not specified in NECP	Internal scenarios were used for those years that are not specified or insufficiently specified in national publications for 2030 and 2050, namely 2035 and 2040. Special attention was paid to preserving consistency of data for these intermediate years with national publications e-demand: NDP, eTSO projections, Spanish Economic Forecasting Centre Association
FI	Adjusted based on TSOs best estimates	The forecast horizon and granularity of NECP data are not sufficient for study, and the available data does not reflect the TSOs' latest view and analysis for the future developments.	Not specified in NECP	
FR	Aligned		Aligned	
GR	Adjusted based on TSOs best estimates	Electricity and Gas (incl Hydrogen, Methane, etc.) Sectors are aligned with NECP	Adjusted based on TSOs best estimates	Electricity and Gas (incl Hydrogen, Methane, etc.) Sectors are aligned with NECP
HR	Aligned		Not specified in NECP	
HU	Aligned		Aligned	
IE		EirGrid's ERAA25 demand data submission is based on the Total Electricity Requirement (inclusive of embedded generation and network losses). It accounts for Government targets for the electrification of heat and transport as set out in the Climate Action Plan and is broadly consistent with the electricity demand projections set out in the NECP in 2030.	Not specified in NECP	NECP only goes as far as 2030. Data extrapolated from All-Island Resource Adequacy Assessment 2025-2034.

Country	Energy demand aligned with NECP for 2030	If energy demand is not aligned with the NECP for 2030, please justify	Energy demand aligned with NECP for 2035	If energy demand is not aligned with the NECP for 2035, please justify
IT	Aligned		Adjusted based on TSOs best estimates	Target year not covered by NECP
LT	Aligned		Not specified in NECP	Lithuanian Energy Transformation Study to 2050.
LU	Aligned		Aligned	
LV	Adjusted based on TSOs best estimates	Demand data are coming from TSO best estimate and compared with NECP, but not identically aligned.		
MD	Aligned		Aligned	
ME	Adjusted based on TSOs best estimates	At the time of submitting the data, the draft NECP was not available. The draft NECP was published at the end of June 2025 as part of the public consultation process. The data were submitted on the basis of several materials, including data provided for previous plans, as well as data obtained through communication with institutions dealing with specific issues related to the type of data requested.	Not specified in NECP	The current draft NECP covers only the period up to 2030, with certain indicative projections up to 2050.
MK	Aligned		Aligned	
MT	Aligned		Aligned	
NL	Adjusted based on TSOs best estimates	The NECP for the Netherlands only partly contains quantitative information which we require to build scenarios. Furthermore, most of the figures (for example in annex 4) are outdated. The data provided for NT+ stems for our national policy scenario, which has been consulted with external stakeholders (sector representatives, experts, energy companies, industrial customers, regional authorities, etc.) and the relevant ministry (KGG). See scenario report publication here: https://www.netbeheernederland.nl/artikelen/nieuws/netbeheer-nederland-scenarios-editie-2025	Adjusted based on TSOs best estimates	See response to same question on 2030 assumptions.
PL	Aligned		Aligned	
PT	Aligned		Not specified in NECP	Whenever necessary, datasets used for both ERAA and TYNDP were complemented by input data used in PT National Resource Adequacy

Country	Energy demand aligned with NECP for 2030	If energy demand is not aligned with the NECP for 2030, please justify	Energy demand aligned with NECP for 2035	If energy demand is not aligned with the NECP for 2035, please justify
				Assessment and/or on data provided by the Portuguese Directorate for Energy and Geology - DGEG.
RO	Adjusted based on TSOs best estimates	Assumptions based on different sources for the evolution of both macroeconomic and energy indicators.	Adjusted based on TSOs best estimates	Assumptions based on different sources for the evolution of both macroeconomic and energy indicators.
RS	Adjusted based on TSOs best estimates	Data delivered for the TYNDP and ERAA is aligned with the official data available to the TSO.	Adjusted based on TSOs best estimates	Data delivered for the TYNDP and ERAA is aligned with the official data available to the TSO.
SE				
SI	Aligned		Aligned	
SK	Not specified in NECP	- cooling profiles, heating profiles, water heating profiles, addtional load profiles. - The data source is pre-filled ENTSO-E default data	Not specified in NECP	- cooling profiles, heating profiles, water heating profiles, addtional load profiles. - The data source is pre-filled ENTSO-E default data
TR	Aligned		Aligned	
UA	Adjusted based on TSOs best estimates	Due to the fast change of situation in Ukraine the electricity demand is lower than in any NECP scenario	Adjusted based on TSOs best estimates	The demand for 2035 is projected based on the consultations with Ministries and other stakeholders

Alignment of electricity demand figures with NECP

2030	
Aligned	21
Adjusted based on TSOs best estimates	11
Not specified in NECP	2

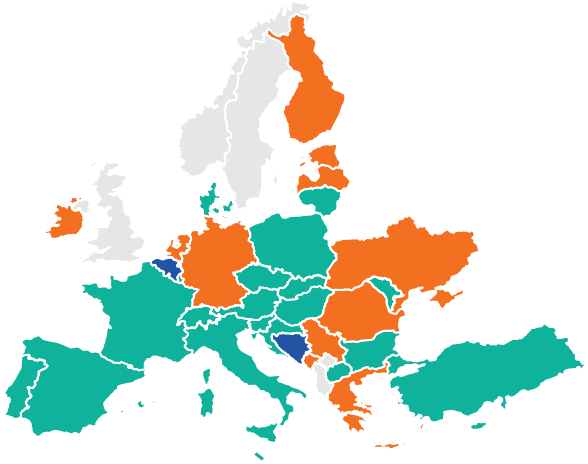


Figure 31: Please confirm alignment of submitted annual electricity demand figures with the NECP for 2030

2035	
Aligned	16
Adjusted based on TSOs best estimates	7
Not specified in NECP	9

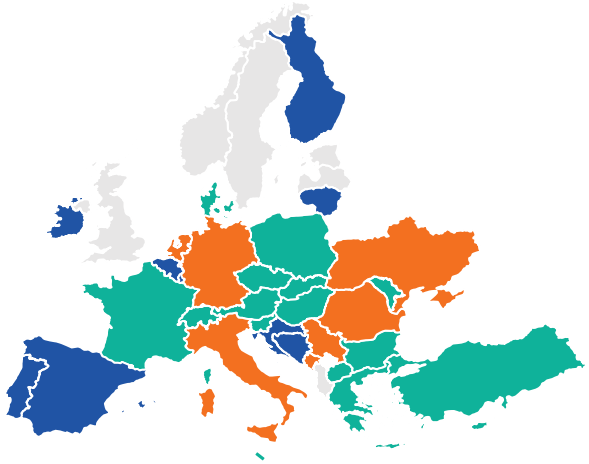


Figure 30: Please confirm alignment of submitted annual electricity demand figures with the NECP for 2035

Country	Electricity demand aligned with NECP for 2030	If annual electricity demand is not aligned with the NECP for 2030, please justify	Electricity demand aligned with NECP for 2035	If annual electricity demand is not aligned with the NECP for 2035, please justify
AT	Aligned		Aligned	
BA	Not specified in NECP	Indicative Development Generation Plan, www.nosbih.ba	Not specified in NECP	Indicative Generation Development Plan, www.nosbih.ba
BE	Not specified in NECP	No final NECP for BE was submitted in December 2024. The submitted data was aligned as best as possible	Not specified in NECP	See answers for 2030

Country	Electricity demand aligned with NECP for 2030	If annual electricity demand is not aligned with the NECP for 2030, please justify	Electricity demand aligned with NECP for 2035	If annual electricity demand is not aligned with the NECP for 2035, please justify
		with existing draft NECP together with available national and regional policies. For electricity the demand is aligned with the latest "Adequacy and Flexibility study for Belgium 2026-2036"		
BG	Aligned		Aligned	
CH	Aligned		Aligned	
CY	Aligned		Aligned	
CZ	Aligned		Aligned	
DE	Adjusted based on TSOs best estimates	The electricity demand for ERAA is based on the draft scenario framework of the NEP (https://www.netzentwicklungsplan.de/en/nep-aktuell/netzentwicklungsplan-20372045-2025) and the system analysis (https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Versorgungssicherheit/Netzreserve/start.html) and its underlying research. This data has been considered more adequate to fill the DFT than the data available in the NECP. With 2.5% deviation on the overall demand the difference is very small.	Adjusted based on TSOs best estimates	The electricity demand for ERAA is based on the draft scenario framework of the NEP (https://www.netzentwicklungsplan.de/en/nep-aktuell/netzentwicklungsplan-20372045-2025) and the system analysis (https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Versorgungssicherheit/Netzreserve/start.html) and its underlying research. This data has been considered more adequate to fill the DFT than the data available in the NECP. With 2.5% deviation on the overall demand the difference is very small.
DK	Aligned		Aligned	
EE	Adjusted based on TSOs best estimates	The Strategic Sector Development Plan was used as a source instead, as the final NECP data was not available at the time of submission		
ES	Aligned		Not specified in NECP	NDP, e-TSO projections, Spanish Economic Forecasting Centre Association
FI	Adjusted based on TSOs best estimates	The forecast horizon and granularity of NECP data are not sufficient for study, and the available data does not reflect the TSOs' latest view and analysis for the future developments.	Not specified in NECP	

Country	Electricity demand aligned with NECP for 2030	If annual electricity demand is not aligned with the NECP for 2030, please justify	Electricity demand aligned with NECP for 2035	If annual electricity demand is not aligned with the NECP for 2035, please justify
FR	Aligned		Aligned	
GR	Adjusted based on TSOs best estimates	Small reduction in electricity demand for Electric Vehicles.	Aligned	
HR	Aligned		Not specified in NECP	
HU	Aligned		Aligned	
IE	Adjusted based on TSOs best estimates	EirGrid's ERAA25 demand data submission is based on the Total Electricity Requirement (inclusive of embedded generation and network losses). It accounts for Government targets for the electrification of heat and transport as set out in the Climate Action Plan and is broadly consistent with the electricity demand projections set out in the NECP in 2030	Not specified in NECP	NECP only goes as far as 2030. Data extrapolated from All-Island Resource Adequacy Assessment 2025-2034.
IT	Aligned		Adjusted based on TSOs best estimates	Target year not covered by NECP
LT	Aligned		Not specified in NECP	Based on NECP data and the goals and objectives set out in the National energy independence strategy, the electricity TSO prepares forecasts for the coming years (after 2030) and coordinates them with the Ministry of Energy.
LU	Aligned		Not specified in NECP	even though it is not specified with the publicly available NECP data, we are aligned with the figures extending to 2050.
LV	Adjusted based on TSOs best estimates	Demand data are coming from TSO best estimate and compared with NECP, but not identically aligned.		
MD	Aligned		Aligned	

Country	Electricity demand aligned with NECP for 2030	If annual electricity demand is not aligned with the NECP for 2030, please justify	Electricity demand aligned with NECP for 2035	If annual electricity demand is not aligned with the NECP for 2035, please justify
ME	Adjusted based on TSOs best estimates	At the time of submitting the data, the draft NECP was not available. The draft NECP was published at the end of June 2025 as part of the public consultation process. The data were submitted on the basis of several materials, including data provided for previous plans, as well as data obtained through communication with institutions dealing with specific issues related to the type of data requested. With regard to the specific data, the differences are minor.	Adjusted based on TSOs best estimates	At the time of submitting the data, the draft NECP was not available. The draft NECP was published at the end of June 2025 as part of the public consultation process. The data were submitted on the basis of several materials, including data provided for previous plans, as well as data obtained through communication with institutions dealing with specific issues related to the type of data requested. With regard to the specific data, the differences are minor. Also, the current draft NECP covers only the period up to 2030, with certain indicative projections up to 2050.
MK	Aligned		Aligned	
MT	Aligned		Aligned	
NL	Adjusted based on TSOs best estimates	The NECP for the Netherlands only partly contains quantitative information which we require to build scenarios. Furthermore, most of the figures (for example in annex 4) are outdated. The data provided for NT+ stems for our national policy scenario, which has been consulted with external stakeholders (sector representatives, experts, energy companies, industrial customers, regional authorities, etc.) and the relevant ministry (KGG). See scenario report publication here: https://www.netbeheernederland.nl/artikelen/nieuws/netbeheer-nederland-scenarios-editie-2025	Adjusted based on TSOs best estimates	See response to same question on 2030 assumptions.
PL	Aligned		Aligned	
PT	Aligned		Not specified in NECP	Whenever necessary, datasets used for both ERAA and TYNDP were complemented by input data used in National Resource Adequacy Assessment
RO	Adjusted based on	TSO's historical data and own assumptions based on different sources for the evolution of both macroeconomic and energy indicators.	Adjusted based on	TSO's historical data and own assumptions based on different sources for the evolution of both macroeconomic and energy indicators.

Country	Electricity demand aligned with NECP for 2030	If annual electricity demand is not aligned with the NECP for 2030, please justify	Electricity demand aligned with NECP for 2035	If annual electricity demand is not aligned with the NECP for 2035, please justify
	TSOs best estimates		TSOs best estimates	
RS	Adjusted based on TSOs best estimates	Data delivered for the TYNDP and ERAA is aligned with the official data available to the TSO.	Adjusted based on TSOs best estimates	Data delivered for the TYNDP and ERAA is aligned with the official data available to the TSO.
SE				
SI	Aligned		Aligned	
SK	Aligned		Aligned	
TR	Aligned		Aligned	
UA	Adjusted based on TSOs best estimates	Due to the fast change of situation in Ukraine the electricity demand is lower than in any NECP scenario	Adjusted based on TSOs best estimates	The demand for 2035 is projected based on the consultations with Ministries and other stakeholders

Alignment of renewable electricity generation capacities with NECP

2030	
Aligned	19
Adjusted based on TSOs best estimates	13
Not specified in NECP	2

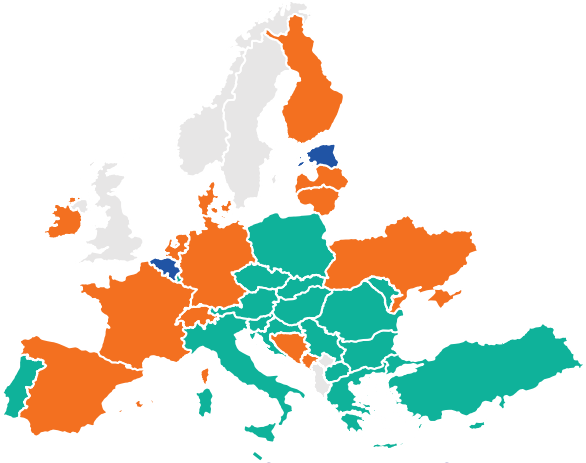


Figure 33: Please confirm alignment of renewable electricity generation capacities with the NECP for 2030

2035	
Aligned	15
Adjusted based on TSOs best estimates	6
Not specified in NECP	11

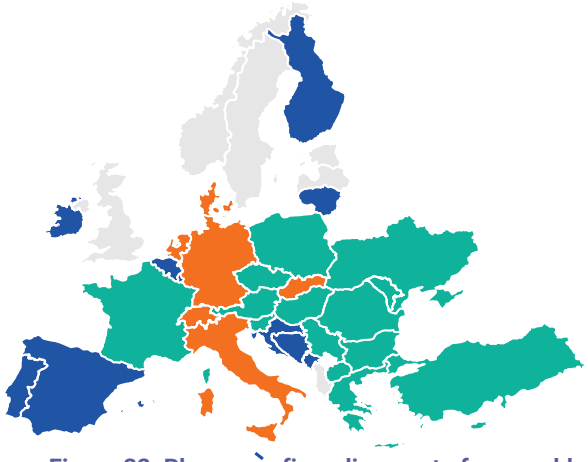


Figure 32: Please confirm alignment of renewable electricity generation capacities with the NECP for 2035

Country	RES electricity capacities aligned with NECP for 2030	If renewable electricity capacities are not aligned with the NECP for 2030, please justify	RES electricity capacities aligned with NECP for 2035	If renewable electricity capacities are not aligned with the NECP for 2035, please justify
AT	Aligned		Aligned	
BA	Adjusted based on TSOs best estimates	Indicative Development Generation Plan, www.nosbih.ba	Not specified in NECP	Indicative Generation Development Plan, www.nosbih.ba
BE	Not specified in NECP	At the time of the data collection in December '24, no final NECP was available for Belgium. The submitted data was aligned as best as possible	Not specified in NECP	See answers for 2030

Country	RES electricity capacities aligned with NECP for 2030	If renewable electricity capacities are not aligned with the NECP for 2030, please justify	RES electricity capacities aligned with NECP for 2035	If renewable electricity capacities are not aligned with the NECP for 2035, please justify
		with existing draft NECP together with available national and regional policies This is aligned with renewable targets from the regions and the public consultation of the "Adequacy and Flexibility study for Belgium 2026-2036"		
BG	Aligned		Aligned	
CH	Adjusted based on TSOs best estimates	For technologies (PV, Wind) where goals have been already reached or those where the goals do not seem realistic, new values where given. These new values have been agreed with the NRA as they are common to the most recent national adequacy assessment.	Adjusted based on TSOs best estimates	For technologies (PV, Wind) where goals have been already reached or those where the goals do not seem realistic, new values where given. These new values have been agreed with the NRA as they are common to the most recent national adequacy assessment.
CY	Aligned		Aligned	
CZ	Aligned		Aligned	
DE	Adjusted based on TSOs best estimates	Wind Onshore, PV and Biomass is aligned with the NECP. Wind Offshore is based on TSO project information taken into account for the draft of the network development scenario framework (Network Development Plan 2037/2045 (2025) | https://www.netzentwicklungsplan.de/en/nep-aktuell/netzentwicklungsplan-20372045-2025). Hydro capacities are also taken from this source.	Adjusted based on TSOs best estimates	PV and Biomass is aligned with the NECP. Wind Onshore is aligned with legally defined targets (Erneuerbaren-Energien-Gesetz 2023). Wind Offshore is based on TSO project information taken into account for the draft of the network development scenario framework (Network Development Plan 2037/2045 (2025) | https://www.netzentwicklungsplan.de/en/nep-aktuell/netzentwicklungsplan-20372045-2025). Hydro capacities are also taken from this source.
DK	Adjusted based on TSOs best estimates	For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are mainly concerning data after target year 2030 primo.	Adjusted based on TSOs best estimates	For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are

Country	RES electricity capacities aligned with NECP for 2030	If renewable electricity capacities are not aligned with the NECP for 2030, please justify	RES electricity capacities aligned with NECP for 2035	If renewable electricity capacities are not aligned with the NECP for 2035, please justify
		The details of the modified version and reasoning for this modification can be found here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. The modifications are postponing windfarms, Energy islands and electrolyser capacities, compared to the original dataset. The modified version is considered a more accurate projection for offshore wind capacity, PtX, and energy island development—particularly in the short/mid-term scope and hence within the ten-year horizon of ERAA. Overall, the data is in line with the long-term NECP/offshore goals, but adjusted in the short term to reflect recent developments.. The risk of not adjusting the ERAA submission to align with the modified version is that Denmark's adequacy assessment may be rated higher than expected, hence wrong conclusions will be made. Additionally the data collection guideline allowed for more freedom in terms of compliance with NECP for the ERAA submission, than for the TYNDP/SB. TYNDP/SB has a longer time horizon (main years of interest are 2040 and 2050) than ERAA, which provides greater opportunity to initiate political initiatives aimed at achieving the political objectives reflected in the NECP section A and the Member States' non-binding offshore targets. Hence why the original version of The Analysis Assumptions for Energinet 2024 has been submitted for the TYNDP/SB.		mainly concerning data after target year 2030 primo. The details of the modified version and reasoning for this modification can be found here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. The modifications are postponing windfarms, Energy islands and electrolyser capacities, compared to the original dataset. The modified version is considered a more accurate projection for offshore wind capacity, PtX, and energy island development—particularly in the short/mid-term scope and hence within the ten-year horizon of ERAA. Overall, the data is in line with the long-term NECP/offshore goals, but adjusted in the short term to reflect recent developments.. The risk of not adjusting the ERAA submission to align with the modified version is that Denmark's adequacy assessment may be rated higher than expected, hence wrong conclusions will be made. Additionally the data collection guideline allowed for more freedom in terms of compliance with NECP for the ERAA submission, than for the TYNDP/SB. TYNDP/SB has a longer time horizon (main years of interest are 2040 and 2050) than

Country	RES electricity capacities aligned with NECP for 2030	If renewable electricity capacities are not aligned with the NECP for 2030, please justify	RES electricity capacities aligned with NECP for 2035	If renewable electricity capacities are not aligned with the NECP for 2035, please justify
				ERAA, which provides greater opportunity to initiate political initiatives aimed at achieving the political objectives reflected in the NECP section A and the Member States' non-binding offshore targets. Hence why the original version of The Analysis Assumptions for Energinet 2024 has been submitted for the TYNDP/SB.
EE	Not specified in NECP	The Strategic Sector Development Plan was used as a source instead, as the final NECP data was not available at the time of submission		
ES	Adjusted based on TSOs best estimates	The renewable power associated with the electricity market—mainly wind and solar PV—differs slightly from the figures presented in the latest NECP. Additionally, the distinction between shared and dedicated RES has not been implemented, as ERAA models do not account for this capacity in their analysis. Regarding hydro pump storage and battery capacities for 2030, the values used reflect the outcomes of the ERAA2025 call for evidence, in line with the assumptions agreed at national level in the coordination framework established among TSO, Ministry and NRA and aligned with the NRAA.	Not specified in NECP	National Long-Term Strategy, information from stakeholders, etc
FI	Adjusted based on TSOs best estimates	The forecast horizon and granularity of NECP data are not sufficient for study, and the available data does not reflect the TSOs' latest view and analysis for the future developments.	Not specified in NECP	
FR	Adjusted based on TSOs best estimates	RES capacities are aligned with the NECP for 2030; nevertheless PV capacity submitted at 2030 appears slightly lower than in the NEC published in 2024, as it accounts for latest developments; Indeed, national renewable targets are currently being debated at the Parliament especially those of PV installed capacities. Targets have already been lowered in the updated version of the draft "Multi-	Aligned	

Country	RES electricity capacities aligned with NECP for 2030	If renewable electricity capacities are not aligned with the NECP for 2030, please justify	RES electricity capacities aligned with NECP for 2035	If renewable electricity capacities are not aligned with the NECP for 2035, please justify
		annual energy plan 3 of the French strategy for energy and climate" at the beginning of 2025. The values reported for ERAA correspond to the reference scenario from the latest national adequacy study performed by RTE, inline for 2035 with the national objectives currently discussed.		
GR	Aligned		Aligned	
HR	Aligned		Not specified in NECP	
HU	Aligned	The submitted renewable energy capacities are equal to/higher than the NECP targets.	Aligned	The submitted renewable energy capacities are equal to/higher than the NECP targets.
IE	Adjusted based on TSOs best estimates	Partially Aligned. Projection for wind and solar capacities are based of the latest information from the Sustainableiyt Energy Authority Ireland report "Forecasts of plausible rates of geenration technology deployment 2024-2040". This study indicates that electricity generation for 2030 is broadly aligned with NECP targets for onshore wind and solar PV, however the projection for offshore wind is less than the NECP target.	Not specified in NECP	NECP only goes as far as 2030. Data extrapolated from All-Island Resource Adequacy Assessment 2025-2034.
IT	Aligned		Adjusted based on TSOs best estimates	Target year not covered by NECP
LT	Adjusted based on TSOs best estimates	Due to the status of the first park project and the re-launch of the second offshore wind park development tender, the implementation of the offshore projects has been postponed. In the best case, the offshore wind capacity will reach 1400 MW in 2033 instead of 2030 as foreseen in NECP.	Not specified in NECP	Based on NECP data and the goals and objectives set out in the National energy independence strategy, the electricity TSO prepares forecasts for the coming years (after 2030) and coordinates them with the Ministry of Energy.
LU	Aligned		Not specified in NECP	even though it is not specified with the publicly available NECP data, we are aligned with the figures extending to 2050.

Country	RES electricity capacities aligned with NECP for 2030	If renewable electricity capacities are not aligned with the NECP for 2030, please justify	RES electricity capacities aligned with NECP for 2035	If renewable electricity capacities are not aligned with the NECP for 2035, please justify
LV	Adjusted based on TSOs best estimates	Generations capacities are best estimate from TSO based on technical applications and overall assumptions on RES development.		
MD	Aligned		Aligned	
ME	Adjusted based on TSOs best estimates	At the time of submitting the data, the draft NECP was not available. The draft NECP was published at the end of June 2025 as part of the public consultation process. Wind, hydro, and solar power plants, which are part of the updated transmission network development plan for the period 2023–2032, have been included. Data for the specified power plants have also been provided as input for the preparation of the NECP.	Not specified in NECP	The current draft NECP covers only the period up to 2030, with certain indicative projections up to 2050. The data have been harmonized in accordance with communication and inputs from the institutions concerned with the requested type of data.
MK	Aligned		Aligned	
MT	Aligned		Not specified in NECP	Onshore solar PV - no information beyond 2030 was provided in the NECP. Offshore renewables aligned with MS non binding agreements
NL	Adjusted based on TSOs best estimates	The NECP for the Netherlands only partly contains quantitative information which we require to build scenarios. Furthermore, most of the figures (for example in annex 4) are outdated. The data provided for NT+ stems for our national policy scenario, which has been consulted with external stakeholders (sector representatives, experts, energy companies, industrial customers, regional authorities, etc.) and the relevant ministry (KGG). See scenario report publication here: https://www.netbeheernederland.nl/artikelen/nieuws/netbeheer-nederland-scenarios-editie-2025	Adjusted based on TSOs best estimates	See response to same question on 2030 assumptions.
PL	Aligned		Aligned	
PT	Aligned		Not specified in NECP	Whenever necessary, datasets used for both ERAA and TYNDP were complemented by input data used in both

Country	RES electricity capacities aligned with NECP for 2030	If renewable electricity capacities are not aligned with the NECP for 2030, please justify	RES electricity capacities aligned with NECP for 2035	If renewable electricity capacities are not aligned with the NECP for 2035, please justify
				electricity and gas National Resource Adequacy Assessments
RO	Aligned		Aligned	
RS	Aligned	Data delivered for the TYNDP and ERAA is aligned with the official data available to the TSO. In NECP, only the minimal expected targets for RES integration are provided. Since values submitted by EMS exceed those significantly, those can be treated as aligned.	Aligned	Data delivered for the TYNDP and ERAA is aligned with the official data available to the TSO. In NECP, only the minimal expected targets for RES integration are provided. Since values submitted by EMS exceed those significantly, those can be treated as aligned.
SE				
SI	Aligned		Aligned	
SK	Aligned	RES capacities is aligned with the NECP up to 2030.	Adjusted based on TSOs best estimates	Projections beyond 2030 are based on internal prognoses. These relevant prognoses are used e.g. in the TSO's ten-year development plan as well as in the assessment of the adequacy resource of the Power system of the Slovak Republic for the Ministry of Economy purposes. However, the data provided may differ slightly from internal prognoses due to different processing times.
TR	Aligned		Aligned	
UA	Adjusted based on TSOs best estimates	Renewables are aligned with the national renewables development action plan until 2030	Aligned	These data are based on National Renewable Action plan until 2030 and further extrapolated

Alignment of thermal electricity capacities with NECP

2030	
Aligned	20
Adjusted based on TSOs best estimates	9
Not specified in NECP	4

Figure 35: Please confirm alignment of thermal (including nuclear) electricity generation capacities with the NECP for 2030

2035	
Aligned	12
Adjusted based on TSOs best estimates	8
Not specified in NECP	12

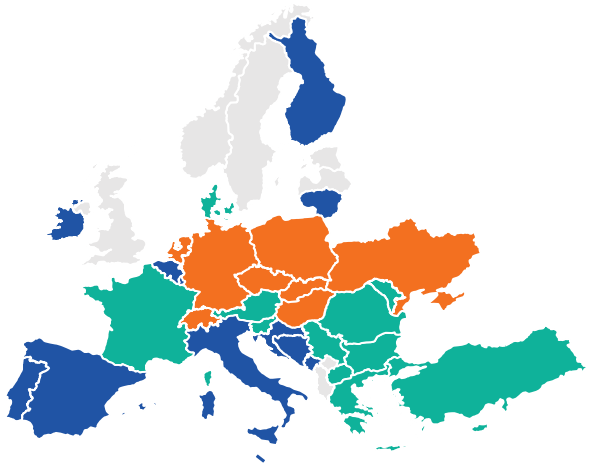


Figure 34: Please confirm alignment of thermal (including nuclear) electricity generation capacities with the NECP for 2035

Country	Thermal capacities aligned with NECP for 2030	If thermal (including nuclear) electricity generation capacities are not aligned with the NECP for 2030, please justify	Thermal capacities aligned with NECP for 2035	If thermal (including nuclear) electricity generation capacities are not aligned with the NECP for 2035, please justify
AT	Aligned		Aligned	
BA	Not specified in NECP	Indicative Development Generation Plan, www.nosbih.ba	Not specified in NECP	Indicative Generation Development Plan, www.nosbih.ba
BE	Not specified in NECP	At the time of the data collection in December '24, no final NECP was available for Belgium. The submitted data was aligned as best as possible with existing draft NECP together with available national and regional	Not specified in NECP	See answers for 2030

Country	Thermal capacities aligned with NECP for 2030	If thermal (including nuclear) electricity generation capacities are not aligned with the NECP for 2030, please justify	Thermal capacities aligned with NECP for 2035	If thermal (including nuclear) electricity generation capacities are not aligned with the NECP for 2035, please justify
		policies This is aligned with renewable targets from the regions and the public consultation of the "Adequacy and Flexibility study for Belgium 2026-2036"		
BG	Aligned		Aligned	
CH	Adjusted based on TSOs best estimates	Nuclear power plants were given a 60 year long lifetime as opposed to the 50 year long lifetime in the Swiss National Framework for Grid Planning as agreed with the NRA.	Adjusted based on TSOs best estimates	Nuclear power plants were given a 60 year long lifetime as opposed to the 50 year long lifetime in the Swiss National Framework for Grid Planning as agreed with the NRA.
CY	Aligned		Aligned	
CZ	Adjusted based on TSOs best estimates	All Thermal data were based on Data collection from operators in 2024 by CEPS.	Adjusted based on TSOs best estimates	All Thermal data were based on Data collection from operators in 2024 by CEPS.
DE	Adjusted based on TSOs best estimates	Coal: In the NECP scenario MWMS, a coal phase-out is predetermined exogenously by 2030 and in the scenario MMS for 2030 4 GW of coal are assumed. In ERAA25, however, the coal phase-out is reported based on the legal framework (KVBG, 08/2020), which means that a total of 15.4 GW of coal capacity is still installed in 2030. However, there is an option to decommission the power plants endogenously within the model as part of the EVA process. Gas: In the NECP scenario MWMS, 37.6 GW of natural gas and 10.6 GW of hydrogen power plants are assumed for 2030 – while in scenario MMS 34.1 GW of natural gas and no hydrogen. Currently, there is no legal basis or any other sign for such a rapid increase in installed capacity as shown in MWMS. Therefore, in ERAA 2025, similar to scenario MMS the current stock of natural gas power plants has been projected forward (including power plants with near term commissioning dates),	Adjusted based on TSOs best estimates	Coal: In the NECP scenario MWMS, a coal phase-out is predetermined exogenously by 2030 and in the scenario MMS for 2035. In ERAA25, however, the coal phase-out is reported based on the legal framework (KVBG, 08/2020), which means that a total of 4.8 GW of coal capacity is still installed in 2035. However, there is an option to decommission the power plants endogenously within the model as part of the EVA process. Gas: In the NECP scenario MWMS, 30.8 GW of natural gas and 23.8 GW of hydrogen power plants are assumed for 2035 – while in scenario MMS 32.3 GW of natural gas and no hydrogen. Currently, there is no legal basis or any other sign for a rapid increase in installed capacity. Therefore, in ERAA25, the current stock of natural gas power plants has been projected forward (including

Country	Thermal capacities aligned with NECP for 2030	If thermal (including nuclear) electricity generation capacities are not aligned with the NECP for 2030, please justify	Thermal capacities aligned with NECP for 2035	If thermal (including nuclear) electricity generation capacities are not aligned with the NECP for 2035, please justify
		considering an adoption curve toward fuel-switched hydrogen power plants. As a result, 1 GW is represented as hydrogen power plants in 2030.		power plants with near term commissioning dates), taking into account an adoption curve toward fuel-switched hydrogen power plants. As a result, 16.5 GW is represented as hydrogen power plants and 14.7 GW as natural gas power plants in 2035.
DK	Aligned		Aligned	
EE	Not specified in NECP	The Strategic Sector Development Plan was used as a source instead, as the final NECP data was not available at the time of submission		
ES	Aligned		Not specified in NECP	Nuclear: Official Closure Schedule. Others: NECP / Useful Lifetime.
FI	Aligned		Not specified in NECP	
FR	Aligned	Nuclear capacities are aligned with NECP for 2030/2035. There are no target for other thermal generation capacities in the NECP 2030 ; the data submitted corresponds to the best information made available by power producers in call for evidence performed in National adequacy studies.	Aligned	
GR	Aligned		Aligned	
HR	Aligned		Not specified in NECP	
HU	Adjusted based on TSOs best estimates	Nuclear and oil is aligned, we foresee more gas capacity than in NECP based on plans of power plants (regular consultation)	Adjusted based on TSOs best estimates	Nuclear is aligned, we foresee more gas and oil capacity than in NECP based on plans of power plants (regular consultation)
IE		Source of thermal electricity generation capacities from All-Island Resource Adequacy Assessment 2025-2034, published in March 2025.	Not specified in NECP	NECP only goes as far as 2030. Data extrapolated from All-Island Resource Adequacy Assessment 2025-2034.
IT	Not specified in NECP		Not specified in NECP	Target year not covered by NECP
LT	Aligned		Not specified in NECP	Thermal capacities are presented taking into account information, received during the annual survey of the largest electricity

Country	Thermal capacities aligned with NECP for 2030	If thermal (including nuclear) electricity generation capacities are not aligned with the NECP for 2030, please justify	Thermal capacities aligned with NECP for 2035	If thermal (including nuclear) electricity generation capacities are not aligned with the NECP for 2035, please justify
				producers on long-term capacity development/decommissioning plans.
LU	Aligned		Not specified in NECP	no nuclear generation considered
LV	Aligned			
MD	Aligned		Aligned	
ME	Adjusted based on TSOs best estimates	At the time of submitting the data, the draft NECP was not available. The draft NECP was published at the end of June 2025 as part of the public consultation process. For the Pljevlja Thermal Power Plant, data previously available were used, as well as data obtained from the competent authorities during the preparation of the NECP.	Not specified in NECP	The current draft NECP covers only the period up to 2030, with certain indicative projections up to 2050. The data have been harmonized in accordance with communication and inputs from the institutions concerned with the requested type of data.
MK	Aligned		Aligned	
MT	Aligned		Not specified in NECP	Time horizon of the NECP is till 2030.
NL	Adjusted based on TSOs best estimates	The NECP for the Netherlands only partly contains quantitative information which we require to build scenarios. Furthermore, most of the figures (for example in annex 4) are outdated. The data provided for NT+ stems for our national policy scenario, which has been consulted with external stakeholders (sector representatives, experts, energy companies, industrial customers, regional authorities, etc.) and the relevant ministry (KGG). See scenario report publication here: https://www.netbeheernederland.nl/artikelen/nieuws/netbeheer-nederland-scenarios-editie-2025	Adjusted based on TSOs best estimates	See response to same question on 2030 assumptions.
PL	Adjusted based on TSOs best estimates	Up-to-date information available for TSO from producers.	Adjusted based on TSOs best estimates	Up-to-date information available for TSO from producers.
PT	Aligned		Not specified in NECP	Whenever necessary, datasets used for both ERAA and TYNDP were complemented by input data used in both electricity and gas National Resource Adequacy Assessments

Country	Thermal capacities aligned with NECP for 2030	If thermal (including nuclear) electricity generation capacities are not aligned with the NECP for 2030, please justify	Thermal capacities aligned with NECP for 2035	If thermal (including nuclear) electricity generation capacities are not aligned with the NECP for 2035, please justify
RO	Adjusted based on TSOs best estimates		Aligned	
RS	Aligned	/	Aligned	
SE				
SI	Aligned		Aligned	
SK	Aligned		Adjusted based on TSOs best estimates	Projections beyond 2030 are based on internal prognoses. These relevant prognoses are used e.g. in the TSO's ten-year development plan as well as in the assessment of the adequacy resource of the Power system of the Slovak Republic for the Ministry of Economy purposes. However, the data provided may differ slightly from internal prognoses due to different processing times.
TR	Aligned		Aligned	
UA	Adjusted based on TSOs best estimates	The data rather aligned with the vision of electricity market participants - owners of appropriate generating facilities, than with NECP	Adjusted based on TSOs best estimates	These data are based on consultations with Ministries and stakeholders

Alignment of DSR with NECP

2030	
Aligned	8
Adjusted based on TSOs best estimates	3
Not specified in NECP	21

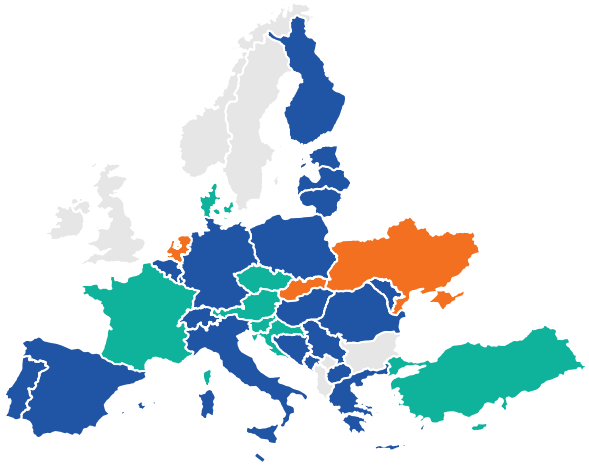


Figure 37: Please confirm alignment of DSR with the NECP for 2030

2035	
Aligned	8
Adjusted based on TSOs best estimates	3
Not specified in NECP	20

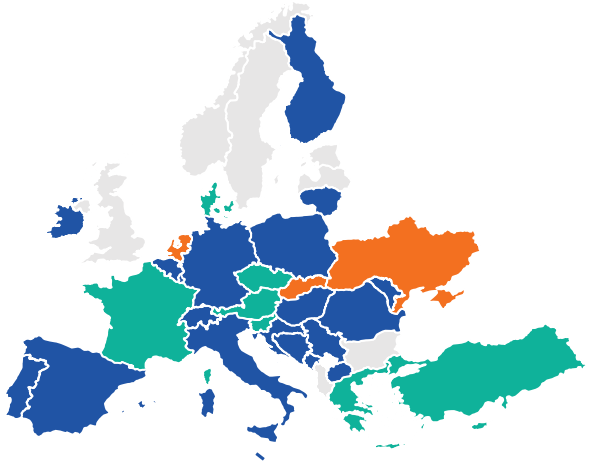


Figure 36: Please confirm alignment of DSR with the NECP for 2035

Country	DSR aligned with NECP for 2030	If DSR is not aligned with the NECP for 2030, please justify	How is demand-side flexibility reflected in data for 2030?	DSR aligned with NECP for 2035	If DSR is not aligned with the NECP for 2035, please justify	How is demand-side flexibility reflected in data for 2035?
AT	Aligned		Demand shedding and demand shifting	Aligned		Demand shedding and demand shifting
BA	Not specified in NECP	No data.	No data.	Not specified in NECP	No data.	No data.
BE	Not specified in NECP	See previous answers above	See previous answers above	Not specified in NECP	See answers for 2030	See answers for 2030

Country	DSR aligned with NECP for 2030	If DSR is not aligned with the NECP for 2030, please justify	How is demand-side flexibility reflected in data for 2030?	DSR aligned with NECP for 2035	If DSR is not aligned with the NECP for 2035, please justify	How is demand-side flexibility reflected in data for 2035?
BG			There is no Demand- Side Flexibility included in the data sets for 2030.			No Demand - Side Flexibility is considered in the NECP
CH	Not specified in NECP	No explicit DSR provided, only implicit DSR.	Only implicit DSR provided for EV, HP and decentralised batteries, as derived from the Swiss National Framework for Grid Planning.	Not specified in NECP	No explicit DSR provided, only implicit DSR.	Only implicit DSR provided for EV, HP and decentralised batteries, as derived from the Swiss National Framework for Grid Planning.
CY	Aligned		No DSR in 2030.	Aligned		No DSR for 2035.
CZ	Aligned		DSR is assumed to be implemented as load shedding in the industrial sector.	Aligned		DSR is assumed to be implemented as load shedding in the industrial sector.
DE	Not specified in NECP	DSR is not specified in the NECP and taken from national studies. Data refers to the scenario framework draft of the German grid development plan (Network Development Plan 2037/2045 (2025) | https://www.netzentwicklungsplan.de/en/nep-aktuell/netzentwicklungsplan-20372045-2025) and the system analysis (Bundesnetzagentur - Netzreserve |	Demand side flexibility is considered by Electrolysis, Power to Heat and DSR. For the latter different bands for industrial processes and flexibilities in the commerce, trade, and service sector are defined, where the demand can be shifted or shaded based on an activation price. It should be noted that shiftable DSR could not be modelled in the ERAA. Assumption: The shiftable DSR is assigned to demand shedding or not considered	Not specified in NECP	DSR is not specified in the NECP and taken from national studies. Data refers to the scenario framework draft of the German grid development plan (Network Development Plan 2037/2045 (2025) | https://www.netzentwicklungsplan.de/en/nep-aktuell/netzentwicklu	Demand side flexibility is considered by Electrolysis, Power to Heat and DSR. For the latter different bands for industrial processes and flexibilities in the commerce, trade, and service sector are defined,

Country	DSR aligned with NECP for 2030	If DSR is not aligned with the NECP for 2030, please justify	How is demand-side flexibility reflected in data for 2030?	DSR aligned with NECP for 2035	If DSR is not aligned with the NECP for 2035, please justify	How is demand-side flexibility reflected in data for 2035?
		https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Versorgungssicherheit/Netzreserve/start.html). It should be noted that shiftable DSR could not be modelled in ERAA 2026. Assumption: The shiftable DSR is assigned to demand shedding or not considered based on the recovery window time.	based on the recovery window time.		ngsplan-20372045-2025) and the system analysis (Bundesnetzagentur - Netzreserve | https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Versorgungssicherheit/Netzreserve/start.html). It should be noted that shiftable DSR could not be modelled in the ERAA. Assumption: The shiftable DSR is assigned to demand shedding or not considered based on the recovery window time.	where the demand can be shifted or shaded based on an activation price. It should be noted that shiftable DSR could not be modelled in the ERAA. Assumption: The shiftable DSR is assigned to demand shedding or not considered based on the recovery window time.
DK	Aligned		The DSR which has been submitted for Denmark in the PEMMDB app is P2X and P2H. The activation price for P2X is calculated centrally by ENTSO-E. The activation price for P2H is based on market model simulations.	Aligned		The DSR which has been submitted for Denmark in the PEMMDB app is P2X and P2H. The activation price for P2X is calculated centrally by ENTSO-E. The activation price for P2H is based on market

Country	DSR aligned with NECP for 2030	If DSR is not aligned with the NECP for 2030, please justify	How is demand-side flexibility reflected in data for 2030?	DSR aligned with NECP for 2035	If DSR is not aligned with the NECP for 2035, please justify	How is demand-side flexibility reflected in data for 2035?
						model simulations.
EE	Not specified in NECP	The Strategic Sector Development Plan was used as a source instead, as the final NECP data was not available at the time of submission	It was assumed that a share of demand would become flexible once the day-ahead price exceeds a specified threshold			
ES	Not specified in NECP	e-TSO projections	DSR (demand shedding) has not been considered in demand figures (DFT), but in supply capacities (PEMMDB).	Not specified in NECP	It is included in the expansion analysis of the EVA process	It is included in the expansion analysis of the EVA process
FI	Not specified in NECP		DSR data reflects the TSOs' latest views on DSR developments, which includes industrial, residential and heating sector developments of DSR.	Not specified in NECP		DSR data reflects the TSOs' latest views on DSR developments, which includes industrial, residential and heating sector developments of DSR.
FR	Aligned	Demand response — particularly demand shedding capacities — is consistent with the national target of reaching around 6.5 GW by 2030. This target covers demand shedding across various sectors, excluding new electricity uses such as electric mobility and hydrogen, for which no NECP target has been set. Several flexibility	To model demand-side response, two approaches are considered: • For demand-side response not participating in the electricity market (e.g., time-of-use tariffs): it is integrated into the electricity load dataset as a specific demand profile, reflecting consumption patterns shaped by tariffs that encourage flexibility (such as	Aligned		

Country	DSR aligned with NECP for 2030	If DSR is not aligned with the NECP for 2030, please justify	How is demand-side flexibility reflected in data for 2030?	DSR aligned with NECP for 2035	If DSR is not aligned with the NECP for 2035, please justify	How is demand-side flexibility reflected in data for 2035?
		scenarios have been analyzed.	shifting consumption to PV peak periods). This approach applies to water heating in France. • For demand-side response participating in market mechanisms: specific data is submitted using PEMMDB database. This includes demand shedding capacities, flexible operation of electrolysers, and electric mobility.			
GR	Not specified in NECP		explicit DSR was submitted at the PEMMDB	Aligned		explicit DSR was submitted at the PEMMDB
HR	Aligned			Not specified in NECP		
HU	Not specified in NECP	No concrete provision about DSR is included in the NECP.	No explicit/implicit DSR capacities submitted. EVA process takes expansion potential of DSR into account.	Not specified in NECP	No concrete provision about DSR is included in the NECP.	No explicit/implicit DSR capacities submitted. EVA process takes expansion potential of DSR into account.
IE			ERAA25 hourly demand profiles calculated using ENTOE's Demand Forecasting Toolbox (DFT). Input data to the DFT captures demand flexibility, through smart EV charging and the uptake of smart meters, as detailed in	Not specified in NECP	NECP only goes as far as 2030. Data extrapolated from All-Island Resource Adequacy Assessment 2025-2034.	As per Q32

Country	DSR aligned with NECP for 2030	If DSR is not aligned with the NECP for 2030, please justify	How is demand-side flexibility reflected in data for 2030?	DSR aligned with NECP for 2035	If DSR is not aligned with the NECP for 2035, please justify	How is demand-side flexibility reflected in data for 2035?
			the All-Island Resource Adequacy Assessment 2025-2034. Demand side units (DSUs) are modelled in Plexos on the supply (generation) side.			
IT	Not specified in NECP		Internal assumptions based on TSO studies	Not specified in NECP	Target year not covered by NECP	Internal assumptions based on TSO studies
LT	Not specified in NECP	Only importance of DSR is mentioned in NECP, not specific values. Values used in ERAA 2025 are best estimated of TSO.	Steady increase of DSR from now until 2030 is forecasted. A single price band is used. Type of DSR is demand shedding.	Not specified in NECP	Same as 2030	Same as 2030
LU	Not specified in NECP		generalized flexibility of 3–30%, depending on the sector	Not specified in NECP	generalized flexibility of 3–30%, depending on the sector	generalized flexibility of 3–30%, depending on the sector
LV	Not specified in NECP	DSR assumptions are made based on previously carried out study and hasn't been updated in a while.	TSO doesn't have explanation.			
MD	Not specified in NECP	TSOs' own internal scenarios		Not specified in NECP	TSOs' own internal scenarios	
ME	Not specified in NECP	DSR is not part of the data provided.	DSR is not part of the data provided.	Not specified in NECP	The current draft NECP covers only the period up to 2030, with certain indicative projections up to 2050. DSR is not part of the data provided.	DSR is not part of the data provided.

Country	DSR aligned with NECP for 2030	If DSR is not aligned with the NECP for 2030, please justify	How is demand-side flexibility reflected in data for 2030?	DSR aligned with NECP for 2035	If DSR is not aligned with the NECP for 2035, please justify	How is demand-side flexibility reflected in data for 2035?
MK	Not specified in NECP		N/A	Not specified in NECP		N/A
MT	Not specified in NECP	No data on Demand-Side Response was provided.	Not reflected.	Not specified in NECP	No data on DSR was provided.	Not reflected.
NL	Adjusted based on TSOs best estimates	The NECP for the Netherlands only partly contains quantitative information which we require to build scenarios. Furthermore, most of the figures (for example in annex 4) are outdated. The data provided for NT+ stems for our national policy scenario, which has been consulted with external stakeholders (sector representatives, experts, energy companies, industrial customers, regional authorities, etc.) and the relevant ministry (KGG). See scenario report publication here: https://www.netbeheerned erland.nl/artikelen/nieuws/ netbeheer-nederland-scenarios-editie-2025	See national scenario report publication for more background: https://www.netbeheernederla nd.nl/artikelen/nieuws/netbeh eer-nederland-scenarios-editie-2025 All relevant assumptions on flexible demand-side resources have been provided via the PEMDB data questionnaire.	Adjusted based on TSOs best estimates	See response to same question on 2030 assumptions.	See response to same question on 2030 assumptions.
PL	Not specified in NECP	In the NECP there is a common level of DSR and import provided.	Non-market DSR coming from Capacity Market was provided. Market DSR is allowed to expand up to expansion constrains provided in PEMMDB.	Not specified in NECP	In the NECP there is a common level of DSR and import provided.	Market DSR is allowed to expand up to expansion constrains

Country	DSR aligned with NECP for 2030	If DSR is not aligned with the NECP for 2030, please justify	How is demand-side flexibility reflected in data for 2030?	DSR aligned with NECP for 2035	If DSR is not aligned with the NECP for 2035, please justify	How is demand-side flexibility reflected in data for 2035?
						provided in PEMMDB.
PT	Not specified in NECP	DSR was not included in both ERAA and TYNDP since there is no indication regarding DSR in PT NECP	DSR was not included in both ERAA and TYNDP since there is no indication regarding DSR in PT NECP	Not specified in NECP	DSR was not included in both ERAA and TYNDP since there is no indication regarding DSR in PT NECP	DSR was not included in both ERAA and TYNDP since there is no indication regarding DSR in PT NECP
RO	Not specified in NECP		N/A	Not specified in NECP		N/A
RS	Not specified in NECP	There are no reliable sources that could be taken into account for DSR value estimation.	/	Not specified in NECP	There is no reliable source available for this parameter.	/
SE						
SI	Aligned		Main numbers come as projections of future DSR capabilities	Aligned		DSR numbers are existing NECP projections ....
SK	Adjusted based on TSOs best estimates	The NECP intends to implement DSR from 2035 onwards. Projections of the DSR beyond 2030 were not provided .	The NECP intends to implement DSR from 2035 onwards. Projections of the DSR beyond 2030 were not provided .	Adjusted based on TSOs best estimates	Projections of the DSR beyond 2030 were not provided .	Projections of the DSR beyond 2030 were not provided .
TR	Aligned			Aligned		
UA	Adjusted based on TSOs best estimates	We are only preparing for development of DSR in Ukraine NECP - general roadmap, the actual situation is dramatically different than in the NECP	absent	Adjusted based on TSOs best estimates	We are preparing to develop roadmap for DSR implementation in Ukraine	absent

Alignment of electrolysers installed capacities with NECP

2030	
Aligned	14
Adjusted based on TSOs best estimates	7
Not specified in NECP	13

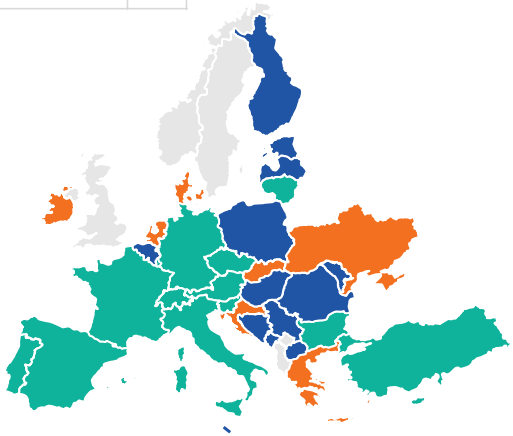


Figure 38: Please confirm alignment of electrolysers installed capacities with the NECP for 2030

2035	
Aligned	8
Adjusted based on TSOs best estimates	7
Not specified in NECP	17

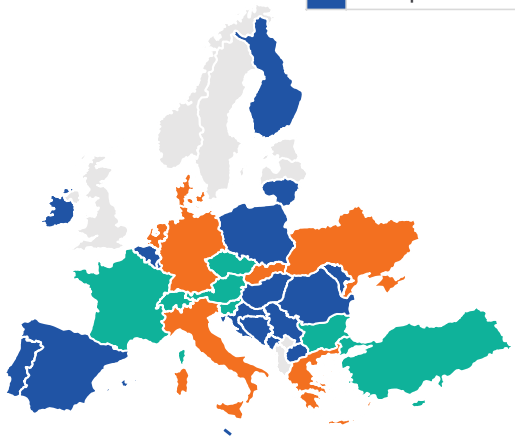


Figure 39: Please confirm alignment of electrolysers installed capacities with the NECP for 2035

Country	Electrolysers capacity aligned with NECP for 2030	If electrolysers capacity not aligned with NECP for 2030	Electrolysers capacity aligned with NECP for 2035	If electrolysers capacity not aligned with NECP for 2035
AT	Aligned		Aligned	
BA	Not specified in NECP	No data.	Not specified in NECP	No data.
BE	Not specified in NECP	See previous answers above When NECP data is missing or not quantitatively defined, input was based on authorities and market signals, internal modelling and projections, and other available publications.	Not specified in NECP	See answers for 2030
BG	Aligned		Aligned	
CH	Aligned		Aligned	

Country	Electrolysers capacity aligned with NECP for 2030	If electrolysers capacity not aligned with NECP for 2030	Electrolysers capacity aligned with NECP for 2035	If electrolysers capacity not aligned with NECP for 2035
CY	Aligned		Aligned	
CZ	Aligned		Aligned	
DE	Aligned		Adjusted based on TSOs best estimates	In the NECP the national strategy on hydrogen imports (BMWE - National Hydrogen Strategy Update | https://www.bundeswirtschaftsministerium.de/Redaktion/EN/Publikationen/Energie/national-hydrogen-strategy-update.html) was not considered. This strategy is reflected in the national system development strategy (BMWE - Die Systementwicklungsstrategie | https://www.bundeswirtschaftsministerium.de/Redaktion/DE/Dossier/ses.html), that defines boundaries for the national system development of the electricity and gas infrastructure. To align with the hydrogen demand and import share projections, the electrolyser capacities have been increased compared to the NECP. The draft of the scenario framework for the NEP2037/2045 has been used as reference (Network Development Plan 2037/2045 (2025) | https://www.netzentwicklungsplan.de/en/nep-aktuell/netzentwicklungsplan-20372045-2025).
DK	Adjusted based on TSOs best estimates	For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are mainly concerning data after target year 2030 primo. The details of the modified version and reasoning for this modification can be found here (in	Adjusted based on TSOs best estimates	For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are mainly concerning data after target year 2030 primo. The details of the modified version and reasoning for this modification can be found

Country	Electrolysers capacity aligned with NECP for 2030	If electrolysers capacity not aligned with NECP for 2030	Electrolysers capacity aligned with NECP for 2035	If electrolysers capacity not aligned with NECP for 2035
		Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. The modifications are postponing windfarms, Energy islands and electrolyser capacities, compared to the original dataset. The modified version is considered a more accurate projection for offshore wind capacity, PtX, and energy island development—particularly in the short/mid-term scope and hence within the ten-year horizon of ERAA. Overall, the data is in line with the long-term NECP/offshore goals, but adjusted in the short term to reflect recent developments.. The risk of not adjusting the ERAA submission to align with the modified version is that Denmark's adequacy assessment may be rated higher than expected, hence wrong conclusions will be made. Additionally the data collection guideline allowed for more freedom in terms of compliance with NECP for the ERAA submission, than for the TYNDP/SB. TYNDP/SB has a longer time horizon (main years of interest are 2040 and 2050) than ERAA, which provides greater opportunity to initiate political initiatives aimed at achieving the political objectives reflected in the NECP section A and the Member States' non-binding offshore targets. Hence why the original version of The Analysis Assumptions for Energinet 2024 has been submitted for the TYNDP/SB.		here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. The modifications are postponing windfarms, Energy islands and electrolyser capacities, compared to the original dataset. The modified version is considered a more accurate projection for offshore wind capacity, PtX, and energy island development—particularly in the short/mid-term scope and hence within the ten-year horizon of ERAA. Overall, the data is in line with the long-term NECP/offshore goals, but adjusted in the short term to reflect recent developments.. The risk of not adjusting the ERAA submission to align with the modified version is that Denmark's adequacy assessment may be rated higher than expected, hence wrong conclusions will be made. Additionally the data collection guideline allowed for more freedom in terms of compliance with NECP for the ERAA submission, than for the TYNDP/SB. TYNDP/SB has a longer time horizon (main years of interest are 2040 and 2050) than ERAA, which provides greater opportunity to initiate political initiatives aimed at achieving the political objectives reflected in the NECP section A and the Member States' non-binding offshore targets. Hence why the original version of The Analysis Assumptions for

Country	Electrolysers capacity aligned with NECP for 2030	If electrolysers capacity not aligned with NECP for 2030	Electrolysers capacity aligned with NECP for 2035	If electrolysers capacity not aligned with NECP for 2035
				Energinet 2024 has been submitted for the TYNDP/SB.
EE	Not specified in NECP	The Strategic Sector Development Plan was used as a source instead, as the final NECP data was not available at the time of submission		
ES	Aligned		Not specified in NECP	g-TSO projections
FI	Not specified in NECP		Not specified in NECP	
FR	Aligned		Aligned	
GR	Adjusted based on TSOs best estimates	In ERAA25, the capacity of electrolysers for 2030 was considered to be zero.	Adjusted based on TSOs best estimates	in ERAA25, a reduced pace of electrolysers adoption is assumed, which also affects the year 2035.
HR	Adjusted based on TSOs best estimates	Hydrogen strategy data is used	Not specified in NECP	
HU	Not specified in NECP	For 2030 we consider the HU H2 strategy (2021).	Not specified in NECP	Partially we consider the HU H2 strategy (2021) and the NECP data for electricity for H2 production. Electrolyser and SMR/pyrolysis capacities were estimated based on the NECP trajectories of electricity demand and renewable electricity production. 2035 values are interpolated.
IE	Adjusted based on TSOs best estimates	Large-scale electrolysis not expected by 2030, as per SEAI's National Energy Projections 2024.	Not specified in NECP	NECP only goes as far as 2030
IT	Aligned		Adjusted based on TSOs best estimates	Target year not covered by NECP
LT	Aligned		Not specified in NECP	Data - N/A.

Country	Electrolysers capacity aligned with NECP for 2030	If electrolysers capacity not aligned with NECP for 2030	Electrolysers capacity aligned with NECP for 2035	If electrolysers capacity not aligned with NECP for 2035
LU	Aligned		Not specified in NECP	even though it is not specified with the publicly available NECP data, we are aligned with the figures extending to 2050.
LV	Not specified in NECP	NECP doesn't have projectiles on electrolysers development capacity.		
MD	Not specified in NECP	TSOs' own internal scenarios	Not specified in NECP	TSOs' own internal scenarios
ME	Not specified in NECP	Electrolysers are not included in the submitted data. At the time of submitting the data, the draft NECP was not available. The draft NECP was published at the end of June 2025 as part of the public consultation process.	Not specified in NECP	Electrolysers are not included in the submitted data.
MK	Not specified in NECP		Not specified in NECP	
MT	Not specified in NECP	No electrolysers are invisaged for hydrogen production for 2030 in any of the data sets or NECP	Not specified in NECP	Time horizon of NECP is till 2030, however we do not expect any installation of electrolysers by 2035.
NL	Adjusted based on TSOs best estimates	The NECP for the Netherlands only partly contains quantitative information which we require to build scenarios. Furthermore, most of the figures (for example in annex 4) are outdated. The data provided for NT+ stems for our national policy scenario, which has been consulted with external stakeholders (sector representatives, experts, energy companies, industrial customers, regional authorities, etc.) and the relevant ministry (KGG). See scenario report publication here: https://www.netbeheernederland.nl/artikelen/nieuws/netbeheer-nederland-scenarios-editie-2025	Adjusted based on TSOs best estimates	See response to same question on 2030 assumptions.
PL	Not specified in NECP	Reverse-engineering carried out to retrieve some data from supporting analysis.	Not specified in NECP	Reverse-engineering carried out to retrieve some data from supporting analysis
PT	Aligned		Not specified in NECP	Whenever necessary, datasets used for both ERAA and TYNDP were complemented by input data used in both electricity and gas PT National Resource Adequacy Assessments

Country	Electrolysers capacity aligned with NECP for 2030	If electrolysers capacity not aligned with NECP for 2030	Electrolysers capacity aligned with NECP for 2035	If electrolysers capacity not aligned with NECP for 2035
				and/or on data provided by the Portuguese Directorate for Energy and Geology - DGEG.
RO	Not specified in NECP		Not specified in NECP	
RS	Not specified in NECP	There are no reliable sources that could be taken into account for electrolyser value estimation.	Not specified in NECP	There is no reliable source available for this parameter.
SE				
SI	Aligned		Aligned	
SK	Adjusted based on TSOs best estimates	Electolysers installed capacity is based on TSO's internal prognoses. TSO's internal prognoses are based on the outcomes of studies by an independent external consultancy company. These relevant prognoses are used e.g. in the TSO's ten-year development plan as well as in the assessment of the adequacy resource of the Power system of the Slovak Republic for the Ministry of Economy purposes. However, the data provided may differ slightly from internal prognoses due to different processing times.	Adjusted based on TSOs best estimates	Electolysers installed capacity is based on TSO's internal prognoses. TSO's internal prognoses are based on the outcomes of studies by an independent external consultancy company. These relevant prognoses are used e.g. in the TSO's ten-year development plan as well as in the assessment of the adequacy resource of the Power system of the Slovak Republic for the Ministry of Economy purposes. However, the data provided may differ slightly from internal prognoses due to different processing times.
TR	Aligned		Aligned	
UA	Adjusted based on TSOs best estimates	The hydrogen development roadmap for Ukraine is absent. The data for the electrolysers are absent. NECP is a general roadmap only	Adjusted based on TSOs best estimates	no electrolysers for 2035

Alignment of electrolysers capacity with NECP

2030	
Aligned/Consistent datasets	21
Differentiated datasets	14

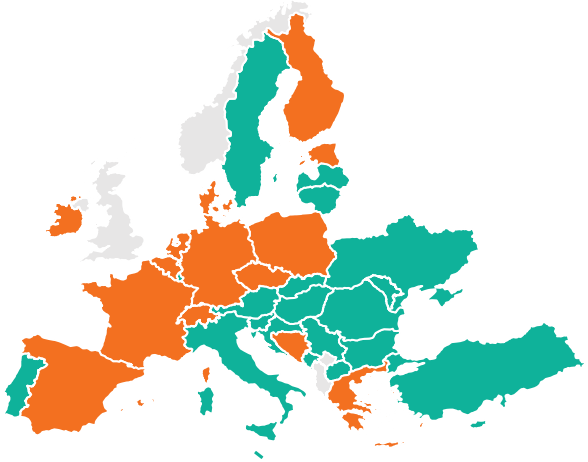


Figure 40: Are all submitted datasets consistent among TYNDP 2026 and ERAA 2025 for 2030 time horizon?

2035	
Aligned/Consistent datasets	20
Differentiated datasets	15

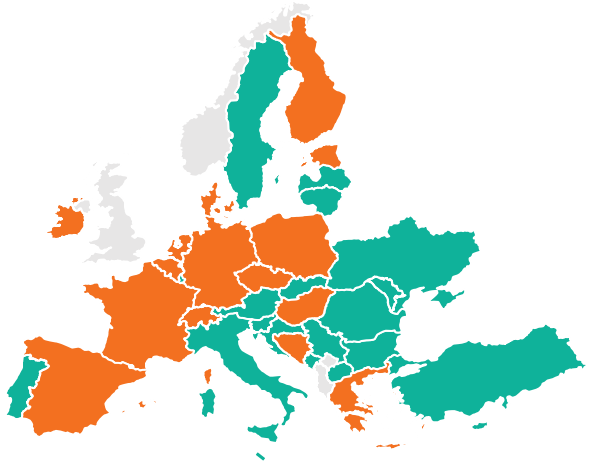


Figure 41: Are all submitted datasets consistent among TYNDP 2026 and ERAA 2025 for 2035 time horizon?

Country	Electrolysers capacity aligned with NECP for 2030	If electrolysers capacity not aligned with NECP for 2030	Electrolysers capacity aligned with NECP for 2035	If electrolysers capacity not aligned with NECP for 2035
AT	Aligned/Consistent datasets		Aligned/Consistent datasets	
BA	Differentiated datasets		Differentiated datasets	
BE	Differentiated datasets	In ERAA lifetime extension units are subject to Economic Viability Assessment. In TYNDP these units are assumed to be available.	Differentiated datasets	In ERAA lifetime extension units are subject to Economic Viability Assessment.

				In TYNDP these units are assumed to be available.
BG	Aligned/Consistent datasets		Aligned/Consistent datasets	
CH	Differentiated datasets	Difference in NTC data with more conservative but plausible values in ERAA. The rest is consistent.	Differentiated datasets	Difference in NTC data with more conservative but plausible values in ERAA. The rest is consistent.
CY	Aligned/Consistent datasets		Aligned/Consistent datasets	
CZ	Differentiated datasets	Additional expected gas power plants included for TYNDP. TYNDP demand also not aligned with NECP in contrast with ERAA.	Differentiated datasets	Additional expected gas power plants included for TYNDP. TYNDP demand also not aligned with NECP in contrast with ERAA.
DE	Differentiated datasets	While the submitted dataset for the electricity demand in the TYNDP is based on the NECP, the demand for ERAA is based on national studies and its underlying research. This data has been considered more adequate to fill the DFT. With 2.5% deviation on the overall demand the difference is very small. Gas respectively hydrogen power plants that could be incentivized by a capacity mechanism were not considered in ERAA but in TYNDP. As shiftable DSR could not be modelled in TYNDP and ERAA, different assumptions have been taken to translate this technology to existing ones. In ERAA it is divided into load shedding DSR or not considered based on the recovery window time, in the TYNDP this distinction has been made based on the activation price to account for the different purposes of the studies.	Differentiated datasets	While the submitted dataset for the electricity demand in the TYNDP is based on the NECP, the demand for ERAA is based on national studies and its underlying research. This data has been considered more adequate to fill the DFT. With 2.5% deviation on the overall demand the difference is very small. Gas respectively hydrogen power plants that could be incentivized by a capacity mechanism were not considered in ERAA but in TYNDP. As shiftable DSR could not be modelled in TYNDP and ERAA, different assumptions have been taken to translate this technology to existing ones. In ERAA it is divided into load shedding DSR or not considered based on the recovery window time, in the TYNDP this distinction has been made based on the activation price to account for the different purposes of the studies.
DK	Differentiated datasets	For TYNDP/SB: The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been utilized as the main scenario reported, which is generally compliant with section A of the Danish NECP. For ERAA: For ERAA 2025 data submission, The Analysis	Differentiated datasets	For TYNDP/SB: The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been utilized as the main scenario reported, which is generally compliant with section A of the Danish NECP. For ERAA: For ERAA 2025 data submission, The Analysis

		Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are mainly concerning data after target year 2030 primo. The details of the modified version and reasoning for this modification can be found here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. The modifications are postponing windfarms, Energy islands and electrolyser capacities, compared to the original dataset. The modified version is considered a more accurate projection for offshore wind capacity, PtX, and energy island development—particularly in the short/mid-term scope and hence within the ten-year horizon of ERAA. Overall, the data is in line with the long-term NECP/offshore goals, but adjusted in the short term to reflect recent developments.. The risk of not adjusting the ERAA submission to align with the modified version is that Denmark's adequacy assessment may be rated higher than expected, hence wrong conclusions will be made. Additionally the data collection guideline allowed for more freedom in terms of compliance with NECP for the ERAA submission, than for the TYNDP/SB. TYNDP/SB has a longer time horizon (main years of interest are 2040 and 2050) than ERAA, which provides greater opportunity to initiate political initiatives aimed at achieving the political objectives reflected in the NECP section A and the Member States' non-binding offshore targets. Hence why the original version of The Analysis Assumptions for Energinet 2024 has been submitted for the TYNDP/SB.	Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are mainly concerning data after target year 2030 primo. The details of the modified version and reasoning for this modification can be found here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. The modifications are postponing windfarms, Energy islands and electrolyser capacities, compared to the original dataset. The modified version is considered a more accurate projection for offshore wind capacity, PtX, and energy island development—particularly in the short/mid-term scope and hence within the ten-year horizon of ERAA. Overall, the data is in line with the long-term NECP/offshore goals, but adjusted in the short term to reflect recent developments.. The risk of not adjusting the ERAA submission to align with the modified version is that Denmark's adequacy assessment may be rated higher than expected, hence wrong conclusions will be made. Additionally the data collection guideline allowed for more freedom in terms of compliance with NECP for the ERAA submission, than for the TYNDP/SB. TYNDP/SB has a longer time horizon (main years of interest are 2040 and 2050) than ERAA, which provides greater opportunity to initiate political initiatives aimed at achieving the

				political objectives reflected in the NECP section A and the Member States' non-binding offshore targets. Hence why the original version of The Analysis Assumptions for Energinet 2024 has been submitted for the TYNDP/SB.
EE	Differentiated datasets	Different forced outage rates for subsea cables	Differentiated datasets	Different forced outage rates for subsea cables
ES	Differentiated datasets	Electricity demand aligned Generation Capacity: Differences due to modelling requirements, in line with the assumptions agreed at national level in the coordination framework established among TSO, Ministry and NRA and aligned with the NRAA	Differentiated datasets	Electricity demand aligned Capacity: Differences due to modelling requirements, in line with the assumptions agreed at national level in the coordination framework established among TSO, Ministry and NRA and aligned with the NRAA
FI	Differentiated datasets	In ERAA datasets there are assumed less flexiblity on demand side as there are more inflexble industrial demand compared to TYNDP where are more flexible eletrolysers. Different datasets are used to avoid too high and optimistic flexibility assumptions in adequacy study.	Differentiated datasets	In ERAA datasets there are assumed less flexiblity on demand side as there are more inflexble industrial demand compared to TYNDP where are more flexible eletrolysers. Different datasets are used to avoid too high and optimistic flexibility assumptions in adequacy study.
FR	Differentiated datasets	ERAA25 integrates 36 nuclear availability time series to strengthen security of supply analysis whereas TYNDP relies on only one central nuclear availability scenario. TYNDP's offshore wind power trajectories have been revised downward to account for delays in the sector, these changes could not be made at the time of the ERAA25 data collection. In some cases, NTC data is reported with finer granularity for ERAA25 (seasonal and hourly breakdown), whereas it is based on yearly granularity for TYNDP26.	Differentiated datasets	ERAA25 integrates 36 nuclear availability time series to strengthen security of supply analysis whereas TYNDP relies on only one central nuclear availability scenario. TYNDP's offshore wind power trajectories have been revised downward to account for delays in the sector, these changes could not be made at the time of the ERAA25 data collection. In some cases, NTC data is reported with finer granularity for ERAA25 (seasonal and hourly breakdown), whereas it is based on yearly granularity for TYNDP26.
GR	Differentiated datasets	Differentiation in electrolyser capacity, pumped storage capacities, small variations in the evolution of wind onshore and pv technologies, differentiation in offshore wind installed capacity, and in electricity demand. All of the aforementioned discrepancies were based in	Differentiated datasets	Datasets are mostly aligned. Variations in electrolyser capacity and wind offshore

		TSO's best estimate for 2030, the reason being, that 2030 is closer to short-term than long-term, and the current status (or lack of), strongly dictates the respective 2030 status for specific technological developments (e.g. offshore wind)		
HR	Aligned/Consistent datasets		Aligned/Consistent datasets	
HU	Aligned/Consistent datasets		Differentiated datasets	Electrolyser capacities differ due to TYNDP gas coordination
IE	Differentiated datasets	ERAA data is taken from the All-Island Resource Adequacy Assessment 2025-2034 which reports on resource adequacy out to 2034. This purpose differs to the Tomorrow's Energy Scenarios study, from which the TYNDP data was taken. This study looks to assess the future electricity network, operating at net zero emissions, over a longer time horizon. As such, the portfolio of generation and demand forecast differ.	Differentiated datasets	ERAA data is taken from the All-Island Resource Adequacy Assessment 2025-2034 which looks to identify any risk in the security of electricity supply out to 2034. This purpose differs to the Tomorrow's Energy Scenarios study, from which the TYNDP data was taken. This study look to assess the future electricity network, operating at net zero emissions, over a longer time horizon. As such, the portfolio of generation and demand forecast differ.
IT	Aligned/Consistent datasets		Aligned/Consistent datasets	
LT	Aligned/Consistent datasets		Aligned/Consistent datasets	
LU	Aligned/Consistent datasets		Aligned/Consistent datasets	
LV	Aligned/Consistent datasets		Aligned/Consistent datasets	
MD	Aligned/Consistent datasets		Aligned/Consistent datasets	
ME	Aligned/Consistent datasets		Aligned/Consistent datasets	
MK	Aligned/Consistent datasets		Aligned/Consistent datasets	
MT	Aligned/Consistent datasets	Input assumptions for ERAA and TYNDP aligned. Datasets for electricity demand for ERAA based on local modelling. Datasets for electricity demand for TYNDP based on ETM tool.	Aligned/Consistent datasets	Input assumptions for ERAA and TYNDP aligned. Datasets for electricity demand for ERAA based on local modelling. Datasets for electricity demand for TYNDP based on ETM tool.

NL	Differentiated datasets	This only concerns scenario assumptions on gas power plant capacity. For ERAA2025, we consider all announced decommissioning plans whereas for TYNDP2026 we assume today's gas power plants to remain largely open due to another study scope and in the course of an expected increasing electricity demand.	Differentiated datasets	This concerns scenario assumptions on gas power plant capacity. For ERAA2025, we consider all announced decommissioning plans of producers but do not consider new-built of additional backup power plant capacities. For TYNDP2026, we assume today's gas power plants to remain largely open and additional backup capacity to be introduced on the longer term, based on system balance and flexibility need analyses.
PL	Differentiated datasets	Thermal: Up-to-date information available for TSO from producers. DSR: For ERAA purpose a specific numbers of out-of-market DSR were taken into account for years in which CM is contracted. For TYNDP: The estimation of non-market DSR was provided for entire time horizon of the analysis	Differentiated datasets	Thermal: Up-to-date information available for TSO from producers. DSR: For ERAA purpose a specific numbers of out-of-market DSR were taken into account for years in which CM is contracted. For TYNDP: The estimation of non-market DSR was provided for entire time horizon of the analysis
PT	Aligned/Consistent datasets		Aligned/Consistent datasets	
RO	Aligned/Consistent datasets		Aligned/Consistent datasets	
RS	Aligned/Consistent datasets		Aligned/Consistent datasets	
SE	Aligned/Consistent datasets		Aligned/Consistent datasets	
SI	Aligned/Consistent datasets		Aligned/Consistent datasets	
SK	Aligned/Consistent datasets	Regarding the consistency of the input data on the supply side (generation capacity), it is possible conclude, that the submitted dataset is aligned among the ERAA and TYNDP/SB2026. The situation is a bit different in the case of consistency of the input data on the demand side between ERAA and TYNDP. Some common parts of the electricity consumption can differ each other (e.g. EVs consumption, heat pumps consumptions ...etc.) due to the different approaches to data collection by	Aligned/Consistent datasets	Regarding the consistency of the input data on the supply side (generation capacity), it is possible conclude, that the submitted dataset is aligned among the ERAA and TYNDP/SB2026. The situation is a bit different in the case of consistency of the input data on the demand side between ERAA and TYNDP. Some common parts of electricity consumption can differ each other (e.g. EVs consumption, heat pumps consumptions ...etc.) due to the

		the ETM and PEMMDB tools, which are not compatible with each other. An important factor contributing to the inconsistency is that the ENTSO-E/G fallback solution dataset (an average of the DA and GA scenarios of the TYNDP2024) for TYNDP/SB2026 through the ETM tool was used. However, despite that it is possible to conclude ,t the final and also the total electricity consumption shows acceptable deviations from the ERAA electricity consumption, which comes from the NECP. Ultimately, the two (ERAA and TYNDP/SB2026 electricity consumption) can be considered as aligned. Consistency is also ensured on the common technologies with Gas TSO.		different approaches to data collection by the ETM and PEMMDB tools, which are not compatible with each other. An important factor contributing to the inconsistency is that the ENTSO-E/G fallback solution dataset (an average of the DA and GA scenarios of the TYNDP2024) for TYNDP/SB2026 through the ETM tool was used. However, despite that it is possible to conclude, the final and also the total electricity consumption shows acceptable deviations from the ERAA electricity consumption, which comes from the NECP. Ultimately, the two (ERAA and TYNDP/SB2026 electricity consumption) can be considered as aligned. Consistency is also ensured on the common technologies with Gas TSO.
TR	Aligned/Consistent datasets		Aligned/Consistent datasets	
UA	Aligned/Consistent datasets		Aligned/Consistent datasets	

Alignment of hydrogen production with NECP

2030	
Aligned	6
Adjusted based on TSOs best estimates	6
Not specified in NECP	20

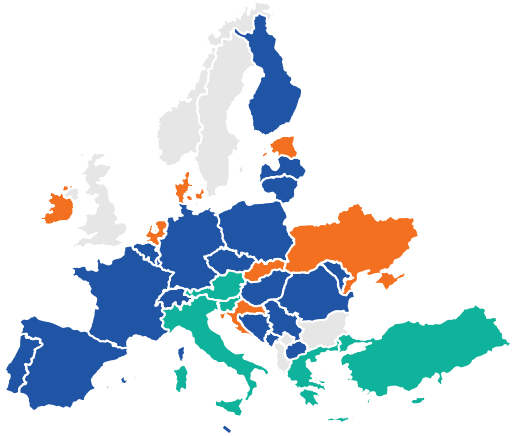


Figure 43: Please confirm alignment of hydrogen production (SMR & pyrolysis) capacities with the NECP for 2030

2035	
Aligned	5
Adjusted based on TSOs best estimates	5
Not specified in NECP	21

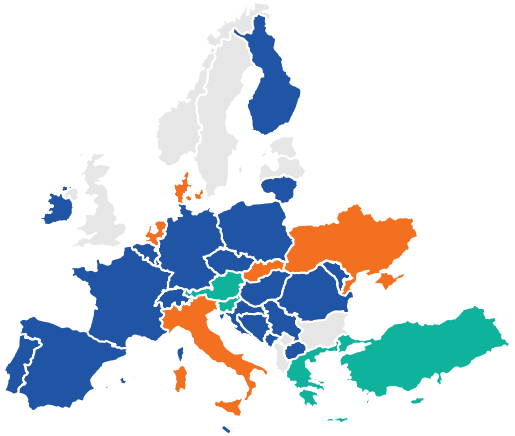


Figure 42: Please confirm alignment of hydrogen production (SMR & pyrolysis) capacities with the NECP for 2035

Country	Hydrogen capacity aligned with NECP for 2030	If hydrogen capacity not aligned with NECP for 2030	Hydrogen capacity aligned with NECP for 2035	If hydrogen capacity not aligned with NECP for 2035
AT	Aligned		Aligned	
BA	Not specified in NECP		Not specified in NECP	
BE	Not specified in NECP	See previous answers above When NECP data is missing or not quantitatively defined, Fluxys input was based on authorities and market signals, internal modelling and projections, and other available publications.	Not specified in NECP	See answers for 2030
BG				
CH	Not specified in NECP	Since hydrogen production values are not available in the Swiss National Framwork for Grid Planning, the values	Not specified in NECP	Since hydrogen production values are not available in the Swiss National

Country	Hydrogen capacity aligned with NECP for 2030	If hydrogen capacity not aligned with NECP for 2030	Hydrogen capacity aligned with NECP for 2035	If hydrogen capacity not aligned with NECP for 2035
		where taken from internal references from Swissgas or from the EP2050+.		Framwork for Grid Planning, the values where taken from internal references from Swissgas or from the EP2050+.
CY	Aligned		Aligned	
CZ	Not specified in NECP	No data on SMR / pyrolysis are available in the CZ NECP (only electrolysers) - not considered in data collection.	Not specified in NECP	No data on SMR / pyrolysis are available in the CZ NECP (only electrolysers) - not considered in data collection.
DE	Not specified in NECP		Not specified in NECP	
DK	Adjusted based on TSOs best estimates	For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are mainly concerning data after target year 2030 primo. The details of the modified version and reasoning for this modification can be found here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. The modifications are postponing windfarms, Energy islands and electrolyser capacities, compared to the original dataset. The modified version is considered a more accurate projection for offshore wind capacity, PtX, and energy island development—particularly in the short/mid-term scope and hence within the ten-year horizon of ERAA. Overall, the data is in line with the long-term NECP/offshore goals, but adjusted in the short term to reflect recent developments.. The risk of not adjusting the ERAA submission to align with the modified version is that Denmark's adequacy assessment may be rated	Adjusted based on TSOs best estimates	For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are mainly concerning data after target year 2030 primo. The details of the modified version and reasoning for this modification can be found here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. The modifications are postponing windfarms, Energy islands and electrolyser capacities, compared to the original dataset. The modified version is considered a more accurate

Country	Hydrogen capacity aligned with NECP for 2030	If hydrogen capacity not aligned with NECP for 2030	Hydrogen capacity aligned with NECP for 2035	If hydrogen capacity not aligned with NECP for 2035
		higher than expected, hence wrong conclusions will be made. Additionally the data collection guideline allowed for more freedom in terms of compliance with NECP for the ERAA submission, than for the TYNDP/SB. TYNDP/SB has a longer time horizon (main years of interest are 2040 and 2050) than ERAA, which provides greater opportunity to initiate political initiatives aimed at achieving the political objectives reflected in the NECP section A and the Member States' non-binding offshore targets. Hence why the original version of The Analysis Assumptions for Energinet 2024 has been submitted for the TYNDP/SB.		projection for offshore wind capacity, PtX, and energy island development—particularly in the short/mid-term scope and hence within the ten-year horizon of ERAA. Overall, the data is in line with the long-term NECP/offshore goals, but adjusted in the short term to reflect recent developments.. The risk of not adjusting the ERAA submission to align with the modified version is that Denmark's adequacy assessment may be rated higher than expected, hence wrong conclusions will be made. Additionally the data collection guideline allowed for more freedom in terms of compliance with NECP for the ERAA submission, than for the TYNDP/SB. TYNDP/SB has a longer time horizon (main years of interest are 2040 and 2050) than ERAA, which provides greater opportunity to initiate political initiatives aimed at achieving the political objectives reflected in the NECP section A and the Member States' non-binding offshore targets. Hence why the original version of The Analysis Assumptions for Energinet 2024 has been submitted for the TYNDP/SB.
EE	Adjusted based on TSOs best estimates	The Strategic Sector Development Plan was used as a source instead, as the final NECP data was not available at the time of submission		

Country	Hydrogen capacity aligned with NECP for 2030	If hydrogen capacity not aligned with NECP for 2030	Hydrogen capacity aligned with NECP for 2035	If hydrogen capacity not aligned with NECP for 2035
ES	Not specified in NECP	Not applicable to ERAA	Not specified in NECP	N/A
FI	Not specified in NECP		Not specified in NECP	
FR	Not specified in NECP		Not specified in NECP	
GR	Aligned		Aligned	
HR	Adjusted based on TSOs best estimates	Hydrogen strategy data is used	Not specified in NECP	
HU	Not specified in NECP	Partially we consider the HU H2 strategy (2021) and the NECP data for electricity for H2 production.	Not specified in NECP	Partially we consider the HU H2 strategy (2021) and the NECP data for electricity for H2 production. Electrolyser and SMR/pyrolysis capacities were estimated based on the NECP trajectories of electricity demand and renewable electricity production. 2035 values are interpolated.
IE	Adjusted based on TSOs best estimates	No hydrogen included in ERAA25 data as it is not included in the the All-Island Resource Adequacy Assessment 2025-2034	Not specified in NECP	NECP only goes as far as 2030
IT	Aligned		Adjusted based on TSOs best estimates	Target year not covered by NECP
LT	Not specified in NECP	Gas TSO forecast used for SMR.	Not specified in NECP	Data - N/A.
LU	Not specified in NECP	no specification in the NECP	Not specified in NECP	no specification in the NECP focus
LV	Not specified in NECP	TSO doesn't have any estimates on this technology.		
MD	Not specified in NECP	TSOs' own internal scenarios	Not specified in NECP	TSOs' own internal scenarios

Country	Hydrogen capacity aligned with NECP for 2030	If hydrogen capacity not aligned with NECP for 2030	Hydrogen capacity aligned with NECP for 2035	If hydrogen capacity not aligned with NECP for 2035
ME	Not specified in NECP	At the time of submitting the data, the draft NECP was not available. The draft NECP was published at the end of June 2025 as part of the public consultation process.	Not specified in NECP	Hydrogen is not included in the submitted data. The current draft NECP covers only the period up to 2030, with certain indicative projections up to 2050.
MK	Not specified in NECP		Not specified in NECP	
MT	Not specified in NECP	No hydrogen is invisaged for hydrogen production for 2030.	Not specified in NECP	Time horizon of NECP is till 2030, however we do not expect any hydrogen production by 2035.
NL	Adjusted based on TSOs best estimates	The NECP for the Netherlands only partly contains quantitative information which we require to build scenarios. Furthermore, most of the figures (for example in annex 4) are outdated. The data provided for NT+ stems for our national policy scenario, which has been consulted with external stakeholders (sector representatives, experts, energy companies, industrial customers, regional authorities, etc.) and the relevant ministry (KGG). See scenario report publication here: https://www.netbeheernederland.nl/artikelen/nieuws/netbeheer-nederland-scenarios-editie-2025	Adjusted based on TSOs best estimates	See response to same question on 2030 assumptions.
PL	Not specified in NECP	Out of scope of the data collection for ERAA purpose.	Not specified in NECP	Out of scope of the data collection for ERAA purpose.
PT	Not specified in NECP	There is no indication regarding SMR and pyrolysis production of H2 in NECP (just green H2) There is	Not specified in NECP	There is no indication regarding SMR and pyrolysis production of H2 in NECP (just green H2), but regarding SMR capacity included in 'ENTSOG data collection' the data was provided by the Portuguese Directorate for Energy and Geology - DGEG.
RO	Not specified in NECP		Not specified in NECP	
RS	Not specified in NECP	There are no reliable sources that could be taken into account for this.	Not specified in NECP	There is no reliable source available for this parameter.
SE				

Country	Hydrogen capacity aligned with NECP for 2030	If hydrogen capacity not aligned with NECP for 2030	Hydrogen capacity aligned with NECP for 2035	If hydrogen capacity not aligned with NECP for 2035
SI	Aligned	No SMR capacities, only electrolizers.	Aligned	No SMR capacities, only electrolizers.
SK	Adjusted based on TSOs best estimates	Hydrogen production was not provided for the ERAA 2025. Hydrogen production is not subject of the ERAA 2025 data collection.	Adjusted based on TSOs best estimates	Hydrogen production was not provided for the ERAA 2025. Hydrogen production is not subject of the ERAA 2025 data collection.
TR	Aligned		Aligned	
UA	Adjusted based on TSOs best estimates	The hydrogen development roadmap for Ukraine is absent. The data for the electrolysers are absent. NECP is a general roadmap only	Adjusted based on TSOs best estimates	no hydrogen production for 2035

Compliance with Member States' non-binding offshore agreements

Fully aligned	8
Partially aligned	4
Not aligned	6
Not applicable (no MS agreement)	12

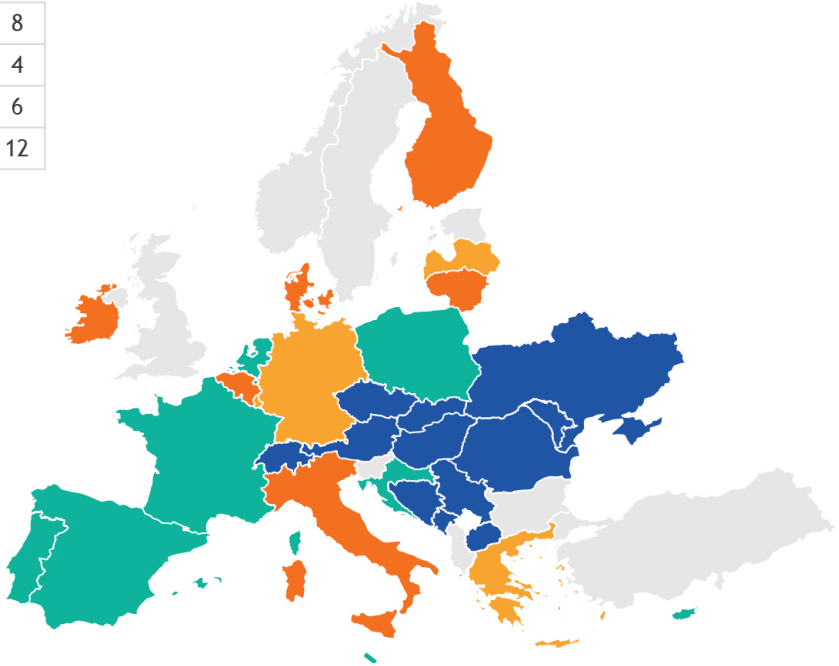


Figure 44: Is the 2030 dataset aligned with Member States' non-binding offshore agreements?

Country	2030 dataset aligned with MS' non-binding offshore agreements	If 2030 dataset is not/partially aligned with MS' non-binding offshore agreements, please justify
AT	Not applicable (no MS agreement)	
BA	Not applicable (no MS agreement)	
BE	Not aligned	The non-binding target is 6GW (5.8GW) for 2030 is no longer possible. Recent developments and alignment with the assumptions of the latest "Adequacy and Flexibility study for Belgium 2026-2036" have been taken into consideration for 2030.
BG		

Country	2030 dataset aligned with MS' non-binding offshore agreements	If 2030 dataset is not/partially aligned with MS' non-binding offshore agreements, please justify
CH	Not applicable (no MS agreement)	
CY	Fully aligned	
CZ	Not applicable (no MS agreement)	
DE	Partially aligned	Based on the current project status it is unlikely to reach the envisaged 30 GW of offshore wind power in North and Baltic sea. This is already stated in footnote 11 of the non-binding offshore agreements: "expansion may fall short of the target by approximately 1 year due to project lead times and grid delays".
DK	Not aligned	For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are mainly concerning data after target year 2030 primo. The details of the modified version and reasoning for this modification can be found here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. The modifications are postponing windfarms, Energy islands and electrolyser capacities, compared to the original dataset. The modified version is considered a more accurate projection for offshore wind capacity, PtX, and energy island development—particularly in the short/mid-term scope and hence within the ten-year horizon of ERAA. Overall, the data is in line with the long-term NECP/offshore goals, but adjusted in the short term to reflect recent developments.. The risk of not adjusting the ERAA submission to align with the modified version is that Denmark's adequacy assessment may be rated higher than expected, hence wrong conclusions will be made. Additionally the data collection guideline allowed for more freedom in terms of compliance with NECP for the ERAA submission, than for the TYNDP/SB. TYNDP/SB has a longer time horizon (main years of interest are 2040 and 2050) than ERAA, which provides greater opportunity to initiate political initiatives aimed at achieving the political objectives reflected in the NECP section A and the Member States' non-binding offshore targets. Hence why the original version of The Analysis Assumptions for Energinet 2024 has been submitted for the TYNDP/SB. Important to keep in mind that the member States' non-binding offshore agreements are targets for end of year, where the submitted data for ERAA are for the start of the year, hence to compare the target with the dataset, one should compare the target with start of year capacities for 2031 in the dataset. By doing so, there is a discrepancy of 7 GW between the dataset and the Member States' non-binding offshore agreements, due to above reasons.
EE		

Country	2030 dataset aligned with MS' non-binding offshore agreements	If 2030 dataset is not/partially aligned with MS' non-binding offshore agreements, please justify
ES	Fully aligned	
FI	Not aligned	Based on the status of current offshore projects and latest TSO view it is assumed that any projects are not commissioned before 2030.
FR	Fully aligned	
GR	Partially aligned	ERAA25 offshore wind capacity is significantly lower then NECP (550 MW vs 1900 MW in necp)
HR	Fully aligned	
HU	Not applicable (no MS agreement)	
IE	Not aligned	Atlantic & Northern Sea non-binding offshore goals specifies 0.45 GW & 4.7 GW of offshore renewable generation by 2030, respectively. ERAA25 submitted data, aligning with the All-Island Resource Adequacy Assessment 2025-2034 which uses the Sustainability and Energy Authority of Ireland's report entitled "Forecasts of plausible rates of generation technology deployment 2024 - 2040", is approx 1.3 GW of offshore capacity in 2030.
IT	Not aligned	The dataset reports higher values than those indicated in the non-binding agreements
LT	Not aligned	Due to the status of the first offshore wind park project and the re-launch of the second offshore wind park development tender, the implementation of the offshore projects has been postponed. In the best case, the offshore wind capacity will reach 1400 MW in 2033 instead of 2030 as foreseen in NECP. For 2040 and 2050 offshore wind capacities meet targets.
LU	Partially aligned	While Luxembourg, having no national maritime space, does not participate through specific offshore renewable target contributions, Luxembourg plans to contribute significantly through cooperation on cross- border projects, especially through contributing via the Renewable Energy Financing Mechanism in exchange of statistical transfers
LV	Partially aligned	Data has been updated and have an different projectile in 2030.
MD	Not applicable (no MS agreement)	
ME	Not applicable (no MS agreement)	Montenegro is not an EU Member State and therefore these non-binding agreements between EU Member States on offshore activities do not apply. However, such agreements may be considered as references or best practices in planning offshore energy projects.
MK	Not applicable (no MS agreement)	MK is not EU Member
MT	Fully aligned	
NL	Fully aligned	
PL	Fully aligned	
PT	Fully aligned	
RO	Not applicable (no MS agreement)	

Country	2030 dataset aligned with MS' non-binding offshore agreements	If 2030 dataset is not/partially aligned with MS' non-binding offshore agreements, please justify
RS	Not applicable (no MS agreement)	
SE		
SI		
SK	Not applicable (no MS agreement)	
TR		
UA	Not applicable (no MS agreement)	

Interconnections

Compliance with 70% for borders

Country	Compliant borders	Borders with existing derogations of 70% rule compliance	Non-compliant borders	Borders that cannot be assessed
AT	CH, CZ, IT, SI, HU, DE			
BE	DE, NL, FR			70% target not relevant for BE-UK
CH	N/A			
CY	N/A	N/A	N/A	N/A
CZ	AT,DE,PL,SK			
DE		Until 2025: SE, NO, PL, CZ, AT, FR, LU, NL, BE		DK, CH
DK	DKW1-DE00,DKW1-NOS0,DKW1-SE03,DKE1-SE04,DKW1-NL00,DKW1-UK00,DKE1-DE00, DKW1-DKE1,DKKF-DEKF	N/A	N/A	N/A
ES	ES-FR and ES-PT	N/A	N/A	N/A
FI	EE, SE1, SE3	N/A	N/A	NO4
FR	FR-ES, FR-IT, FR-BE, FR-DE			70% target not relevant for FR-UK and FR-CH
HU	AT, HR, RO, RS, SI, SK	N/A	N/A	UA
IE				IE-UK (UK not bound by EU Law), IE-FR (Celtic Interconnector not yet energised)
IT	All compliant borders: ITN1, ITCA, ITCN, ITCS, ITS1, ITSA, ITSI			
LT	LT-SE, LT-LV, LT-PL			
MD	N/A	N/A	N/A	MD-UA, MD-RO
MT	Yes- MT-It border complies with the 70% target	N/A	N/A	N/A
NL	NL-DK1, NL-NO2	Core	For the CORE region: For 91% of the time, TenneT has provided capacity margings at or above the required minimum levels on all its network elements.	

			Although this is a step back compared to the 100% score in 2023, it is important to note that the cause of the reduction can be traced back to an error in TenneT's local derogation tool with a limited impact of provided capacities. For 9% of the time the actual MACZT scores on one or more CNEs missed the MACZTmin by a margin of 1-2% of Fmax. Nonetheless, overall provision of capacities increased in 2024 as TenneT provided on average 4%pt more minimum MACZT per MTU in 2024 compared to 2023	
NI	N/A	N/A	N/A	N/A
PL	SE, LT*, technical border with DE, CZ, SK.	N/A	UA	N/A
PT			PT-ES	
RO	N/A	RO-HU, RO-BG	N/A	RO-RS, RO-MD, RO-UA
RS	/	/	/	/
SE	N/A	N/A	N/A	All borders
SK	PLE0-SK00;SK00-PLI0;SK00-CZ00;;SK0-UA01;	SK00-HU00;		
UA	UA is not EU Member State			

Primary data related to interconnections

70% target	3
NECP	6
Projects of common interest	2
Specific project delays	2
Other	9

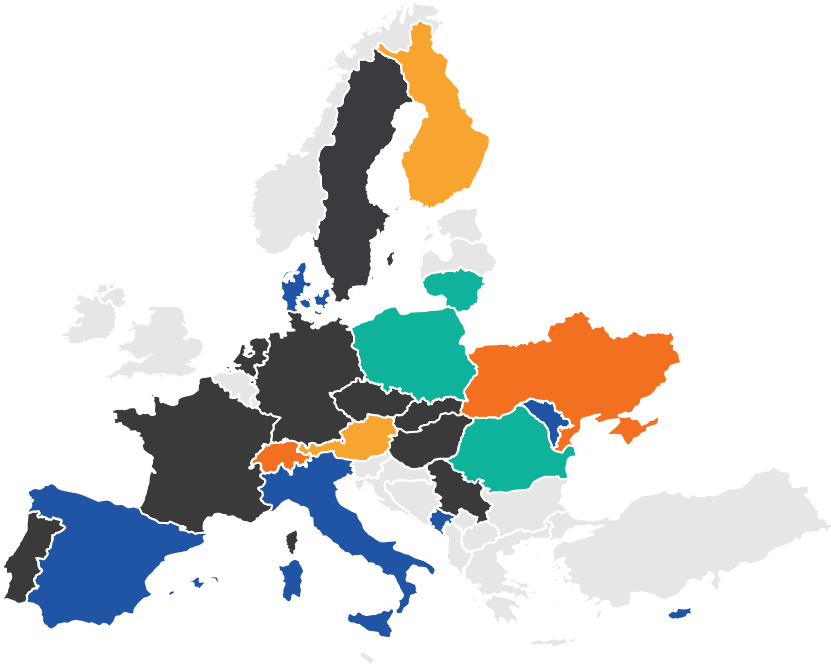


Figure 45: What were the primary drivers for the data related to interconnections?

Country	What were the primary drivers for the data related to interconnections?	If other drivers, please specify here	Please further explain the primary drivers for the data related to interconnections submitted in the PEMMDB app
AT	Projects of common interest	NECP	
BE			See ERAA2025 data for BE is based on the Adequacy and flexibility study for Belgium (2026-2036) See chp5 of Adequacy and flexibility study for Belgium (2026-2036) for details

			https://issuu.com/eliagroup/docs/adequacy_and_flexibility_study_for_belgium_2026-2?fr=sZGQ5Njg2NjM5NTg
CH	Specific project delays		Interconnection data is based on the current grid state and the expected commissioning dates of projects under development.
CY	NECP		
CZ	Other	The provided values respect the real physical capabilities of the interconnections.	Although the calculation of NTCs is compatible with the core flow-based calculations, it is only an approximation, as NTCs are not part of the flow-based results.
DE	Other	National Grid Development Plan and current TYNDP project state	NTC values are based on the current status of interconnection projects and bilateral exchanges with neighboring TSOs. FBMC and DC borders will be compliant to the 70% rule from 2026 onwards and are subject to derogations until end of 2025. For NTC borders and the NTC-values provided by the German LACs for the ERAA-process in the PEMMDB app, it is not guaranteed that they are CEP-compliant due to the fact, that there is no consistent method to determine the NTC values which fulfill the 70% minRAM requirements. German TSOs would appreciate, if ENTSO-E provides a consistent method for all TSOs.
DK	NECP		Full NTC capacity on all borders have been provided in the PEMMDB app for all Danish borders.
ES	NECP	The Spanish National Development Plan	In addition to the driver included in the selection, I would mention the followings:70%target, projects of common interest and The Spanish National Development Plan mentioned. Proposed values for Spanish interconnections were based on available historical data that met the 70% target andfuture targets established either in the Spanish NDP or NECP
FI	Projects of common interest		
FR	Other	Current NTC values based on close historical data and estimated increase of NTC related to interconnection projects based on network calculations	Current NTC for FR-ES and FR-IT are based on close historical data that were in line with the 70% target. 70% assessment method for CORE region (Belgium and Germany borders) is only valid with flow-based method (which is the method used in ERAA). Status of NTC values regarding 70% target can not be provided.
HU	Other	Best estimation based on previously existing NTCs and new interconnection	The data is based on best estimation. Hungary has an Action Plan to achieve CEP70-compliance by the end of the derogation period (2025), which has been already fulfilled. This influences flow-based compliance

		projects (for the grid model: CEP70 Action Plan also).	(through the grid model), besides that no effects on long-term NTCs can be estimated.
IE			
IT	NECP		The primary driver is improving electric market system efficiency indicators that the interconnection enables, such as the increase of the Social Economic Welfare (composed of consumer surplus, producer surplus, and congestion rent), the reduction of Market Prices for the consumers, considering the costs associated specified within the cost-benefit analysis. Moreover, to reach RES EU targets, the future grid needs to have an increasingly interconnected system to guarantee the stability, quality, and safety of the electricity system
LT	70% target		
MD	NECP		
MT	NECP		To account for increased electricity demand and overall increased electrification, the revised NECP establishes that Malta should explore further electricity interconnections with neighboring countries. Although Malta already complies with the 70% target as a result of the existing electricity interconnection with Italy, a 2nd electricity cable is being commissioned to ensure system adequacy and to meet projected peak demand.
NL	Other	Known expansion projects	
NI			
PL	70% target		* The Baltic Countries, LT, LV and EE have been synchronized with Continental Europe (CE) in February 2025. The DC connection between PL and LT became an AC connection with limited power that can be offered to the market - this is the single synchronous connection between CE and Baltic States Power System. Nevertheless, this limited, technically calculated power, will be treated as 100% of the target at the time of calculation moment".
PT	Other	Grid Investment Plan	Data submitted are based on most recent REN's Grid Investment Plan.
RO	70% target		The NTC s values provided for the EU borders are in line with the Action Plan developed by Romanian TSO in accordance with the provision of Art.15 of Regulation (UE) 2019/943 and Derogation for 2025.
RS	Other	IoSN results from TYNDP and need to ensure the system flexibility and stability in the upcoming period.	/

SE	Other	Svenska kraftnät's best estimate based on existing ICs and known IC projects.	Svenska kraftnät's best estimate based on existing ICs and known IC projects.
SK	Other	cross-border exchanges and transits	SEPS has received derogation from NRA for the 400 kV OHLs Veľký Ďur - Levice for the year 2025. We are further requesting derogation for these OHLs for 2026. Multiple projects to comply with the 70% target have been identified. These projects are in various stages of planning and permitting and first will be commissioned in 2027. - Looping of 400 kV OHL Veľký Ďur - Horná Ždaňa into Levice substation, fulfilling the 70% target. - Dynamic line rating on 400 kV OHLs Veľký Ďur - Levice, fulfilling the 70% target.
UA	Specific project delays		UA is not EU Member State

NTC values and Study Zones

Yes	15
Partially	5
No	2

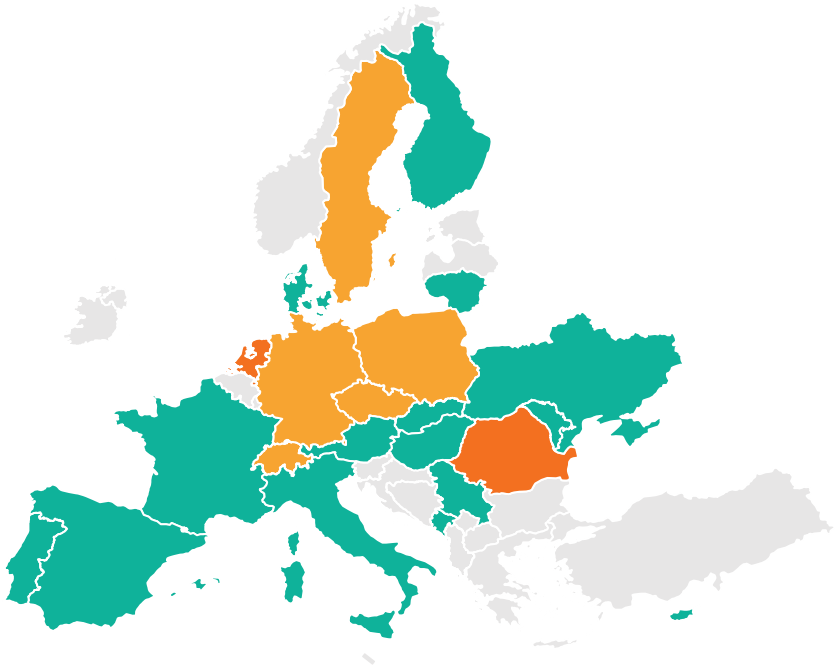


Figure 46: Are your submitted NTC values coordinated with the neighboring TSO and, thus, consistent?

Country	Are your submitted NTC values coordinated with the neighbouring TSO and, thus, consistent?	If not or partially, please indicate the interconnections for which this is not the case
AT	Yes	
BE	Yes	
CH	Partially	Border FR00-CH00, AT00-CH00, ITN1-CH00 could not be coordinated in the time of the data collection.
CY	Yes	
CZ	Partially	For the CZ00-DE00 (and DE-CZ), there are slight differences between the TSOs regarding future plans for NTC capacity. All TSOs agreed to align in more detail for ERAA 2026 data collection.
DE	Partially	Where possible, NTC values were coordinated with neighboring TSOs beforehand and should be consistent. German TSOs do not submit maintenance-based NTC values, which is why there could be slight differences.
DK	Yes	
ES	Yes	

FI	Yes	
FR	Yes	
HU	Yes	
IE		
IT	Yes	The NTC values are coordinated. Any variations of these values are allowed by the ERAA methodology (e.g. adopting a conservative approach in case a neighbouring TSO communicates lower NTC values).
LT	Yes	
MD	Yes	
MT	Yes	
NL	No	
NI		
PL	Partially	SE and LT NTC is consistent. NTC with DE, CZ, SK is not coordinated as PSE provides NTC for common border with DE, CZ, SK (technical profile).
PT	Yes	
RO	No	The NTC values provided are not coordinated with the neighboring TSOs and represent the capacity of the electricity grid of Romania.
RS	Yes	/
SE	Partially	Svenska kraftnät's best estimate based on existing ICs and known IC projects
SK	Yes	
UA	Yes	

Study zones, network developments, interconnection capacity

Country	Please list and describe the new Study Zones included in ERAA 2025 data collection.	Please share notable network development projects expected with certainty to be commissioned over the ERAA time horizon.	In general, are they expected to increase interconnection capacity?
AT		"Austrian NDP25" is currently in approval process by Austrian NRAs and covered a 10y-horizon period up to 2035	
BE	BEO1, BEO2	These zones are defined as proxy of possible future offshore study zones within the BE EEZ	
CH		Current projects being developed by Swissgrid can be found here: https://www.swissgrid.ch/en/home/projects/future-grid/grid-development-requirements.html. Those considered for the interconnection capacities are:	Yes

		- Beznau – Mettlen: alleviate internal grid congestion. - Transformers Mettlen: increase grid stability and improve the controllability of electricity flows in the transmission grid. - Transformers Lachmatt: increase security of supply in the Basel area and support the increasing cross-border exchange of electricity with Germany and France. - Mettlen – Ulrichen : strengthen the north-south axis and enable the expansion of hydropower in the canton of Bern. - Bickigen – Chippis: allow for better transport of hydro power from the Alps toward the consumer centres. - Beznau – Tiengen: increase capacity between Germany and Switzerland. - PST romands: increase exchange capacities, reduce redispatch costs and increase grid security. - Laufenburg – Beznau – Breite: see https://tyndp2024.entsoe.eu/projects-map/Transmission/1233 for more information. This project increases exchange capacities with Germany. - HVDC Line DE-CH: see https://tyndp2024.entsoe.eu/projects-map/Transmission/1058 for more information. This concept project concerns an extension of German internal HVDC lines towards Switzerland via an additional HVDC interconnector.	
CY	N/A		
CZ	No change in Study zones.	All considered projects which are expected to increase the interconnection capacity are listed and described at the link below: https://www.ceps.cz/en/pci-projects-of-common-interest	Yes
DE		Detailed information about relevant projects can be found in the TYNDP and its respective regional investment plans.	Yes
DK	DKB2, DKN3, DKN4, DKN5, DKN6, DKN7, DKN8, DKN9	The DKW1-DE00 interconnector will be increased when the internal grid on the Danish west coast has been reinforced. The increase goes from 2500 MW to 3500 and will be in 2027. https://ens.dk/media/4360/download	Yes
EE	EE01		
ES	ESA1, ESA2, ESAS, ESC1, ESG1, ESG2	Project Biscay Gulf: consists of 370 km HVDC-VSC link (2 bipoles of 1000 MW each) mainly subsea in the Biscay Gulf, between Gatica (Basque Country, ES) and Cubnezais (Aquitaine, FR). Online reference: https://www.inelfe.eu/es/proyectos/golfo-de-bizkaia. Increasing cross border capacity, enhancing flow distribution and RES integration with a reduction of RES spillage. This project will also reduce the French-Spanish yearly average marginal price	Yes
FI		Aurora Line 1 & 2 - Strengthening the AC connection between Finland and Sweden is necessary due to market needs, security of supply in the Nordics, new RES generation and larger conventional units. Aurora Line expect to be commissioned by 2025 and Aurora Line 2 by 2034. https://tyndp2024.entsoe.eu/projects-map/Transmission/111 https://tyndp2024.entsoe.eu/projects-map/Transmission/1095	Yes
FR			

HU		TYNDP Project 1074: Pannonian Corridor (HU-RS) TYNDP Project 259: New HU-RO interconnector TYNDP Project 1235: Second circuit of the 400 kV OHL Sajóivánka (HU) – Rimavská Sobota (SK)	Yes
IE	IE01, IE02, IE03, IE04, IE05, IE06, IE07, IE08, IE09, IE10, IE11, IE12, IE13, IE14, IE15, IE16, IE17, IE18, IE19, IE20, IE21, IE22, IE23, IE24	The Celtic Interconnector is a 700 MW sub-sea cable connecting Ireland to France. It is expected to energise in April 2028 and will once again connect Ireland to mainland Europe study zones after Brexit. The second North-South Interconnector (commonly referred to as the second tie-line) is a 400kV overhead line connecting the Republic of Ireland to Northern Ireland, with an NTC of +900/-950 MW North to South. It is expected to energise towards the end of 2031 and will create a more secure transmission network, alleviate restriction on cross-border flows between the North and South of Ireland, and bring more renewable energy onto the grid whilst making it more efficient.	Yes
IT		For Terna all projects are important and crucial to reach the EU decarbonization targets and improve the security of the system. Here, only a short list: Project 1157 (HG North Tyrrhenian Corridor) - 525kV HVDC between the Central South market area and the North market area - increasing of NTC between CSouth and North of the Italy, RES integration, reducing cost for the system Project 339 (Tyrrhenian link) - Italian HVDC link between Campania, Sicily and Sardinia – RES integration, improving security and adequacy of the islands electric grid, optimizing the use of energy production sources Project 29 (Italy-Tunisia) - The project consists of a new HVDC submarine interconnection between Tunisia (Mlaabi - Cape Bon Peninsula) and Sicily (Partanna) with a rated power of 600 MW - increasing the interconnection capacity of the Euro-Mediterranean system, optimizing the use of energy production sources, enabling the share of balancing resources, improving the security of supply and increasing the operational flexibility of both electricity systems Project 1110 (Sicily - Calabria) - New 400 kV subsea cable between Sicilia and Calabria – increasing of NTC between market zones and integration of new RES power attended in Sicily, reducing dispatching cost for the system Project 28 (Italy-Montenegro) - second pole of the HVDC subsea cable interconnection between the Italy and Montenegro – Providing greater integration of the Italian electricity market with the South-Eastern Europe (SEE) energy systems, enabling the share of balancing resources Project 1166 (HG Adriatic Corridor) - HVDC connections between the South and North of Italy - increasing the operational flexibility, RES integration, reducing cost for the system Project 299 (SACOI3) - New HVDC line between Italy mainland, Corsica and Sardinia replacing existing	No

		link SACOI2 - increasing the operational flexibility, increasing of NTC between market zones, RES integration Project 1112 (GRITA 2) - The project consists of a new HVDC terrestrial and submarine link of 1000 MW between the Italian and Greek transmission systems – increasing transfer capabilities, guaranteeing higher reliability in terms of power exchanges between Italy and Greece to address future challenges and EU targets set Project 1167 (HG Central Link) - Rebuilding of the current 220 kV AC backbone that goes from Villavalle to S.Barbara, using new technologies to achieve an increase in exchange power of 600 MW between the Central South and Central North market areas - increasing of NTC between market zones, RES integration, reducing cost for the system	
LT	LTH1	Harmony Link interconnector - 220 kV double circuit AC line between Lithuania and Poland. More info: https://www.litgrid.eu/index.php/synchronisation/synchronisation-projects/construction-of-harmony-link-interconnector/31599 Project goal - tonsure the integration of the electricity market after synchronisation with the continental Europe System.	Yes
MD		400 kV OHL Vulcanesti (MD) – Chisinau (MD) and extension of the Chisinau and Vulcanesti substations; 400 kV OHL Balti (MD) – Suceava (RO) interconnection and extension of the Balti substation; 330 kV OHL Balti (MD) – Dnisterhydro pumping (UA); 400 kV OHL Straseni (MD) – Gutinas (RO).	
MT		Malta-Italy Cable Link No.2 - The project consists of a new ~122km long 225MWe HVAC electrical cable interconnection through a submarine cable operating at 220kV between Malta (Maghtab) and Sicily (Ragusa) to be laid in parallel but at a safe distance to the existing AC cable link. The project is part of Maltese Government's future energy strategy in meeting the 2030 climate and energy targets and the longer term decarbonisation objectives. It aims at diversifying the island's energy sources and meet the projected increase in electricity demand from economic growth and electrification of the transport sector. The Project will also strengthen the electricity interconnectivity with the EU electricity network, allow for increased importation of electricity sourced from renewables, optimise the use of local power generation, whilst allowing the increase in local renewable energy sources through the enhancement of the grid stability and balancing of intermittent RES. Link - https://icm.mt/projects/	Yes
NL	NL0A, NL0B, NL0C, NL0D, NL0E, NL0F, NL0G, NL0H, NL0J, NL0K, NL0L, NL0M,	LionLink UK-NL, multi-purpose interconnector. Increase interconnection with UK and connect offshore wind.	Yes

	NL0N, NL0P, NL0Q, NL0R, NL0S, NL0T, NL0U, NL0V, NL0W, NL0X, NL0Y, NL0Z		
NI	NI10, NI11, NI12	The second North-South interconnector is a 400kV overhead line which will connect Northern Ireland and the Republic of Ireland with an NTC of +900/-950 MW North to South. It is expected to energise towards the end of 2031 and will create a more secure transmission network by alleviating restrictions on cross border flows between the North and South of Ireland.	Yes
NO	NONC, NOND, NOSF, NOWB, NOWF	These are nodes for potential offshore wind projects in the future: Nordvest C, Nordavind D, Sørvest F, Vestavind F, Vestavind B and Vestavind F respectively	
PL		No projects at the moment.	No
PT	No study zones were added	Project Portugal-Spain Interconnection - The Project enables increasing the interconnection capacity between Portugal and Spain, in line with the objectives established in the Iberian Electricity Market ("MIBEL") framework and those of cross-border capacity defined at the European level (https://www.ren.pt/en-gb/activity/main-projects/portugal-spain-interconnection). Increasing cross border capacity and alleviating internal congestion'	Yes
RO	N/A	PROJECT 259: HU-RO: Commissioning 2030,The project consists of a 400 kV new interconnection line Debrecen Dél (HU) - Oradea (RO) and 2nd circuit of 400 kV OHL Nadab (RO) - Békéscsaba (HU). In Romania, the following internal investments are necessary associated to this project: new 400/220 kV transformer in substation Rosiori and reconductoring of 220 kV OH line Urechesti-Tg. Jiu-Paroseni-Baru Mare-Hasdat. Supports EU 15% interconnection target by 2030 and renewable integration. PROJECT 341: NORTH CSE CORRIDOR: Commissioning 2029,The project consists of four investments: SS 400/110 Belgrade 50, OHL 400 kV SS Belgrade 50 - SY Čibuk, new line OHL 400 kV Portile de Fier (RO) - Đjerdap 1 (RS) and reconductoring of the 220 kV double circuit OHL Portile de Fier – Resita. Every investment included in this project represents a segment of the new significant corridor in the East-to-West direction,The project will enhance the market integration in the region, allowing the lower difference in marginal energy costs, allow the connection of huge capacities of renewable sources that have applied for connection in the observed area. Facilitates renewable integration and market convergence PROJECT 1138: 400 KV OHL SUCEAVA -BALTI: Commissioning 2030,The project consists of a 400kV single circuit OHL Suceava (Romania) - Balti (Moldova), a new 400kV OHL Suceava (RO) - Gadalin (RO) and a 400/330 kV substation in Balti (Moldova). The project will increase transmission capacity between Romania and Republic of Moldova, allowing creating the necessary premises for the development of electricity production from renewable sources in both countries, through the development of the energy infrastructure necessary for the integration of renewable energy into the national energy systems, the expansion of the electricity market at the EU level and the reduction of bottlenecks in the energy infrastructure, through greater flexibility and	Yes

		sustainability of the two energy systems. Facilitates renewables development in Romania and Moldova.	
RS	/	Period until 2035: - Transbalkan Corridor (project 227) - RS-BA and RS-ME borders; - Pannonian Corridor (project 1074) - RS-HU border; - North CSE Corridor (project 341) - RS-RO border; - Central-Balkan Corridor (project 342) - RS-BG border. Period after 2035: - New RS-HR interconnection (project 243) - RS-HR border.	Yes
SE	No new study zones are planned in Sweden at the moment.	See new electricity transmission projects here: https://tyndp2024.entsoe.eu/projects-map/transmission	Yes
SK	N/A	330: 4th 400kV CZ-SK interconnector Otrokovice (CZ) - Ladce (SK): This new 400 kV cross-border overhead line between the substations Otrokovice (CZ) - Ladce (SK) will strenghten the transmission capacity between Slovak and Czech transmission systems, aiming to maintain secure operation of both transmission systems. 1235: Second circuit of the 400 kV OHL Sajóivánka (HU) – Rimavská Sobota (SK): The project involves the installation of the second circuit on existing 400 kV OHL Sajóivánka (HU) – Rimavská Sobota (SK), which was commissioned in 2020, and built with double circuit towers. 1239: Interconnection Ukraine-Slovak Republic: The Slovak transmission system is interconnected with Ukraine transmission system by a single 400 kV overhead line from subst. Veľké Kapušany (SK) to subst. Mukacheve (UA), which SEPS envisages to operate until 2030 without significant investment interventions. It is very loaded cross-border line whose importance is multiplied in case of maintenance/fault conditions on one of the existing interconnections between Slovakia and Hungary.	Yes
UA	new zones are absent	After 2032/2035, the certainty of implementation becomes increasingly difficult to assess Proj A - UA-SK: 400kV Mukacheve (UA) - Velki Kapushany (SK); Proj B - UA-RO: 400kV Arcyz (UA) - Isakcha (RO); Proj C - UA-MD: 330(400)kV Dnister hydro pumping (UA) - Belci (MD); Proj D - UA-PL: 400kV Khmelnytska NPP (UA) - Zheshuv (PL)	Yes

Appendix 2: Survey on Year-on-Year changes and other data assumptions

Complete TSO feedback

Out-of-market measures

Country	What out-of-market measures (e.g. capacity market strategic reserves, voltage reduction, eco gestures, etc.) do you have at your disposal in order to address potential shortfalls in supply?	Please provide a quantification of the out-of-market measures that could be used to address potential shortfalls in supply	Please explain how the out-of-market measures listed above contribute to system adequacy for your country
AT	Grid reserves coming from thermal units	Assumptions regarding individual units	These units are not included in the input data
BE	The strategic reserve mechanism is no longer in place for BE		
CH	Strategic reserves.	The capacity of strategic reserves amounts to more than 450 MW in ERAA 2024. Presently they include more than 500 MW.	The reserves would be activated in case of the SPOT market failing to close in day-ahead.
CY	None.	N/A	N/A
CZ	Explicit DSR in the form of industrial load shedding. Implicit DSR is not considered, since provided data are based on NECP.	Explicit DSR of 110-190 MW within the ERAA 2025 time horizon	Explicit DSR helps reducing the load in times of insufficient generation during Economic Dispatch.
DE	The out-of-market resources for Germany include: - Capacity reserve: Reserve for unforeseeable events, which are activated in case of a lack of market clearance (D-1 and ID). They can also be used to resolve grid congestions. - Grid reserve: Used to resolve congestions and contains different types of power plants	- Capacity reserve: Since 1 October 2024 and until 30 September 2026, a total capacity of 1205 MW of gas-fired power plants outside the market is available. These power plants must be available within maximum 12 hours. - Out-of-market demand-side response: A mechanism with up to around 600 MW has been implemented to support system	The capacity reserve of 1205 MW contributes to national adequacy (from October 2024 until September 2026). Other reserves have a different purpose than coping with resource adequacy, such as grid stabilization. Even though they shall be activated to ensure resource adequacy as last resort, these may already be partly

Country	What out-of-market measures (e.g. capacity market strategic reserves, voltage reduction, eco gestures, etc.) do you have at your disposal in order to address potential shortfalls in supply?	Please provide a quantification of the out-of-market measures that could be used to address potential shortfalls in supply	Please explain how the out-of-market measures listed above contribute to system adequacy for your country
	located in Germany. In emergency situations, it can be used for adequacy in grid operation, if not yet in operation for solving grid congestion. However, in terms of system forecasting, its availability is not sufficiently reliable to be counted on during national scarcity situations. Therefore, it is excluded in ERAA25. - Out-of-market demand-side response - Frequency restoration reserves - Special network equipment: used only for redispatch	stability. However, due to a lack of offers, this reserve cannot yet be called up in full. - Grid reserve: Currently, it comprises a total capacity of 5.1 GW for winter 2025/26. - Special Network Equipment: a total of 1200 MW is available for curative redispatch. - Ancillary services: FCR of 564 MW and FFR of 2600 MW (positive)	exhausted when operating for their primary purpose.
DK	Besides FRR and FCR, Energinet has not reported any out-of-market measures as part of the ERAA dataset, because capacity mechanisms/capacity markets/strategic reserves are not utilised in DK. Reserve/ancillary service capacity is normally considered out-of-market (day-ahead market). Data for both FCR and FRR have been provided. The National Resource Adequacy Assessment 2024 of Denmark, performed by Energinet, proposed, in cooperation with the Danish Energy Agency, an investigation of the possibility of and impact of establishing a capacity mechanism in Denmark. The result of this analysis is not yet finalized.	Total reserve requirement in the ERAA 2025 is estimated for DKE1 to be 625 MW in 2035. For DKW1, the requirement is estimated to be 600 MW in 2035.	The fast frequency regulating reserves (FCR, FFR) cannot be expected to be used for maintaining adequacy of power supply, as they are reserved for responding to instantaneous and major operational disturbances at the synchronous area level. FCR and FFR comprises a very small share of the total reserve requirement. In situations where scarcity from the day-ahead market carries over into the operational hour, this will manifest as an imbalance between electricity consumption and production, which must be managed by the control center. This imbalance will need to be mitigated through activation of the imbalance reserves (FRR), which means that this type of reserve can, in fact, be used in cases of power scarcity.
ES	No out of market measures are currently available.	0 MW.	
FI	National Emergency Supply Agency has reserved the production of the Meri-Pori coal	Meri Pori, 565 MW	Meri-Pori power plant is reserved to respond for severe disruptions and emergencies to

Country	What out-of-market measures (e.g. capacity market strategic reserves, voltage reduction, eco gestures, etc.) do you have at your disposal in order to address potential shortfalls in supply?	Please provide a quantification of the out-of-market measures that could be used to address potential shortfalls in supply	Please explain how the out-of-market measures listed above contribute to system adequacy for your country
	condensing power plant for severe disruptions and emergencies. Finland has strategic reserve scheme in place, but no capacity has been contracted by Energy Authority based view of next winter adequacy.		guarantee security of supply in the electricity system in Finland in case of most serious crises and disturbances. It is not planned to be available during normal conditions or available on market.
FR	The various post-market measures that RTE can activate before resorting to targeted load shedding are highly heterogeneous and include: - reducing voltage on distribution networks, - contractual interruptibility for large consumers, - public calls for citizen action (EcoWatt), and - margins generated by exceptional agreements with neighbouring grid operators (via 'back-up contracts')	Voltage reduction results in approximately 4% load reduction but is limited to a few consecutive hours. The impact of other measures is more uncertain in terms of load reduction and duration.	Out-of-market measures are activated by RTE when needed
HU	Balancing market products (FRR, FCR) are available; however, these are used for frequency containment and restoration, not for addressing potential shortfalls in supply. There is a process in place for rotational load shedding, based on national regulation. This can be activated as a last resort, after all market-based methods are deemed insufficient to solve the shortfall in supply.	The capacity available for rotational load shedding is 75% of the average hourly load on a winter day specified for country-level measurement, based on national regulation. The requirement is that the electricity supply of the key consumers need to be maintained as long as possible even during a crisis situation.	Rotational load shedding is available as a last resort when all market-based mechanisms fail to solve the adequacy problem.
IE	Temporary Emergency Generation ('TEG') has been procured and installed under the direction of Government and the Commission for the Regulation of Utilities, pursuant to the provisions in the Risk Preparedness Plan for Ireland (the 'RPP') and the EirGrid, Electricity and Turf (Amendment) Act 2022.	As given in the submitted ERAA data set, Ireland has 520 MW of out-of-market generation from REUs that could be used to address potential shortfalls in supply. There is an additional 653 MW of TEG capacity detailed in the Security of Supply programme of Work. This capacity is not to be used in the	This 520 MW of REU capacity is operated under strict policy, acting as the units of last resort. It may only be used when deemed necessary by EirGrid and meet the criteria listed in the below publication: https://cruie-live-96ca64acab2247eca8a850a7e54b-5b34f62.divio-

Country	What out-of-market measures (e.g. capacity market strategic reserves, voltage reduction, eco gestures, etc.) do you have at your disposal in order to address potential shortfalls in supply?	Please provide a quantification of the out-of-market measures that could be used to address potential shortfalls in supply	Please explain how the out-of-market measures listed above contribute to system adequacy for your country
	Additionally, the Electricity Security of Supply Programme of Work identified the need to extend the operation of older generation units, on a temporary basis (Retention of Existing Units). Details of the TEG and REU units can be found here: https://cruie-live-96ca64acab2247eca8a850a7e54b-5b34f62.divio-media.com/documents/Electricity_Security_of_Supply_Programme_of_Work_Update_April_2024_.pdf	adequacy modelling or post-processing in the ERAA.	media.com/documents/Security_of_Electricity_Supply_Retention_of_Moneypoint_Units_Information_Paper.pdf Details on both TEG & REU can be found here: https://cruie-live-96ca64acab2247eca8a850a7e54b-5b34f62.divio-media.com/documents/Electricity_Security_of_Supply_Programme_of_Work_Update_April_2024_.pdf
IT	In the upcoming months, CM auction for target year 2028 will be held. Other measures prescribe by dispatching department are PESSE (emergency plan for electricity system security), used when generation shortages occur, load shedding of contracted interruptible loads ("interrompibili") and MSD0 (buying extra capacity in advace in ancillary markets)	PESSE is expressed as % percentage and varies across the years. MSD0 around 500-1000 MW. CM has awarded 2.1 GW in 2022, 4.7 GW in 2023, 3.2 GW in 2024 and 0.1 GW in 2025 of new capacity (mainly split between thermal and storage) for 15 years contract. CM has also awarded around 35-38 GW of existing capacity, only for the target year of the auction.	CM auction prevent missing money and phase out of "not in the money" thermal capacity fleet PESSE implies load shedding (it is basically ENS but ensures system security) MSD0 provides and optimize thermal capacity for peak hours (it has a cost on the system) "interrompibili" implies load shedding (by paying shedded loads, usually industries and big consumers)
LT	Isolated operation reserve service	200 MW	The energy storage system provides a single service and cannot provide other services/products, including trading on the exchange.
MD	Emergency supply contracts with RO and UA. Multilateral emergency assistance agreement is under negotiation.	Based on availability from RO and UA	They don't contribute to system adequacy for Moldova
MT	Malta has Multiple emergency plants to make up for generation shortfalls, These are the D2A and D2B emergency generation	D2A, D2B, and GT9 emergency power plant, capacity: 175MW during winter and 150MW during summer in total.	D2A, D2B,and GT9 are used for the N-1 contingency or to balance demand and generation in case load increases above what market resources can provide.

Country	What out-of-market measures (e.g. capacity market strategic reserves, voltage reduction, eco gestures, etc.) do you have at your disposal in order to address potential shortfalls in supply?	Please provide a quantification of the out-of-market measures that could be used to address potential shortfalls in supply	Please explain how the out-of-market measures listed above contribute to system adequacy for your country
	units, the GT9 unit and the Leased emergency plant (owned by UNEC).	Leased emergency plant, capacity: 60MW.	Leased emergency plant can also be used to balance demand, however its primary purpose is to maintain N-1 contingency if D2A and D2B are being used for demand. D2A and GT9 also have black-start capability. The emergency plants also run on diesel, where as the main power plants run on natural gas. Therefore, the emergency plants also provide a fuel mix in case one fuel type is unavailable. Note: the D3 generation plant has 4 units that can run both on natural gas and diesel.
NL	None		
NI	At present, no out of market measures are forecast to be required in Northern Ireland and therefore none exist.	N/A	N/A
PL	1. DSR contracted for the period up to 2029, as a part of the already concluded Capacity Market auctions. 2. Voluntary DSR contracted with consumers for the period from April 2024 till March 2025. 3. Additional must-run understood as the increase of the contracted infeed of CHPs. 4. Administrative load reduction according to the national legislation: ˜Regulation of the Council of Ministers of 23 July 2007 on the Detailed Principles and procedures of Introducing Limitations on Sale of Solid	1. Average values: - 2026: 1559-1737 MW a), b) - 2027: 1539 MW c) - 2028: 981 MW[39] c) - 2029: 1693 MW c), d) a) level dependent on quarter; b) values from main and additional CM auctions; c) reduction tests did not proceed yet, effective level may be lower; d) probability of overestimation, verification is ongoing; 2. Level cannot be assessed. Availability not	These out-of-market measures are operational ones, their role is to restore reserves in the system and therefore they do not contribute to the system adequacy in medium- and long-term perspective. The exception is DSR within CM, which is applied in ERAA simulation/report with a dedicated comment.

[39] The level of DSR from CM is based on concluded auctions. As reduction tests have not proceeded yet, effective level may be lower

Country	What out-of-market measures (e.g. capacity market strategic reserves, voltage reduction, eco gestures, etc.) do you have at your disposal in order to address potential shortfalls in supply?	Please provide a quantification of the out-of-market measures that could be used to address potential shortfalls in supply	Please explain how the out-of-market measures listed above contribute to system adequacy for your country
	Fuels and Supply and Consumption of Electricity or Heat (Journal of Laws of 2007, No. 133, item 924). The description of this measure is also described in the draft of Risk-preparedness plan (draft is not publicly available). 5. Agreements on emergency energy exchange with neighbouring TSOs / Agreement on assistance for active power delivery with CEPS ("NCER 21").	guaranteed and depends on voluntary counterparty offers. 3. Availability and level depend on weather conditions (heat demand). 4. Administrative load reduction refers to electricity consumers throughout the year, for which the contracted power is set above 300 kW. There are many exceptions for the above-mentioned consumers, for which load curtailment cannot be used. 5. Level depends on availability of interconnections and power in neighbouring TSOs	
PT	No out-of-market measures were considered in PT for ERAA 2025	No out-of-market measures were considered in PT for ERAA 2025	No out-of-market measures were considered in PT for ERAA 2025
RO	No out-of-market measures considered for ERAA 2025. Data for both FCR and FRR have been provided. In crisis situations in the operation of the national power system, the Romanian TSO may apply the safeguard regulation issued by the NRA	N/A	N/A
RS	/	/	/
SE	For the winter of 2025/26 Svk did a procurement for a strategic reserve. However, the bids that came in were higher than the maximal allowed price per MW for a strategic reserve according to EU legislation (120000 SEK/MW). Therefore we do not have a strategic reserve for 2025/26.	N/A	N/A
SK	No out-of-market measures are implemented in ERAA2025.	N/A	N/A
UA	load shedding	this info is restricted	allows maintain IPS in safe mode

Year-on-year (YOY) changes

Expected impact on adequacy by YOY data changes from ERAA 2024

	No impact	10
	Minor improvement	5
	Minor degradation	3
	Substantial degradation	6

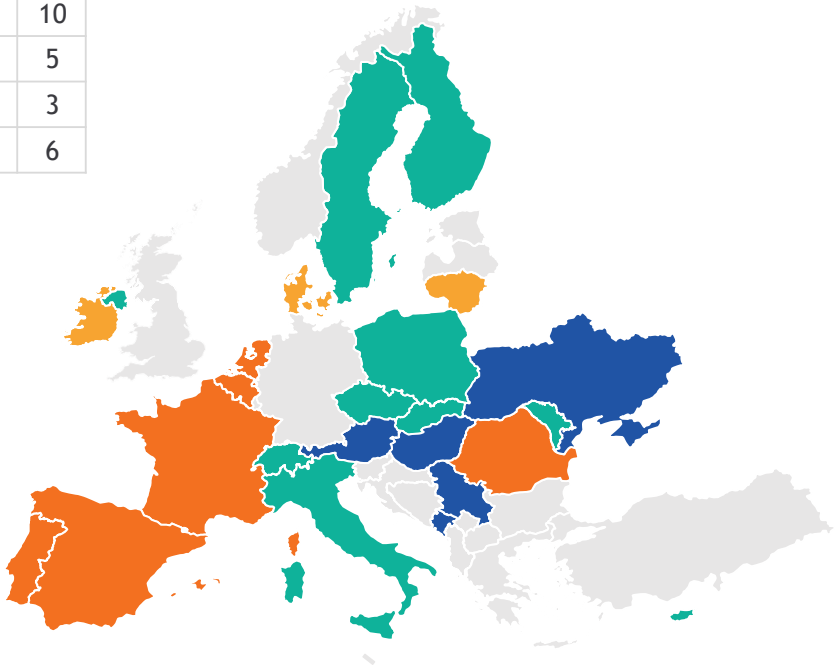


Figure 47: How do TSOs expect adequacy to be impacted by the national year-on-year data changesfrom ERAA 2024?

Country	How do TSOs expect adequacy to be impacted by the national year-on-year data changes from ERAA 2024?	Please elaborate the reasons behind the expected impact
AT	Minor improvement	Minor improvement coming from load reduction and increased photovoltaic capacity
BE	Substantial degradation	ERAA2025 data for BE is based on the Adequacy and flexibility study for Belgium (2026-2036) See pg 12 of Adequacy and flexibility study for Belgium (2026-2036) for details

Country	How do TSOs expect adequacy to be impacted by the national year-on-year data changes from ERAA 2024?	Please elaborate the reasons behind the expected impact
		https://issuu.com/eliagroup/docs/adequacy_and_flexibility_study_for_belgium_2026-2?fr=sZGQ5Njg2NjM5NTg
CH	No impact	Updated figures for distributed PV, alpine PV and decentralised batteries are higher in ERAA 2025 than in the past edition. Nuclear power plants have been modelled with longer operation times than in ERAA 2024. This should have a positive impact on adequacy. On the other hand, wind development is modelled at a slower pace, based on the present trends. The hydro inflows computation in ERAA 2025 is done based on the additional inflows of expected projects and no longer on their installed capacity. This leads to a decrease in the hydro inflows within the ERAA 2025 time horizon, when compared to ERAA 2024. This should have a negative impact on adequacy results.
CY	No impact	TSO-Cyprus didn't participate in ERAA 2024.
CZ	No impact	Significant decrease of demand should balance out with the minor decreases in capacity for CZ.
DE		There are multiple factors with different impacts on adequacy. The overall assessment of the adequacy is part of the ERAA.
DK	Minor degradation	For ERAA 2024 data submission, The Analysis Assumptions for Energinet 2023, delivered by the Danish Energy Agency to Energinet was utilized as the main scenario reported. For ERAA 2025 data submission, The Analysis Assumptions for Energinet 2024, delivered by the Danish Energy Agency to Energinet, has been modified by Energinet in terms of developments in the Danish energy sector and then utilized as the main scenario reported. The modifications are mainly concerning data after target year 2030 primo. The details of the modified version and reasoning for this modification can be found here (in Danish): https://energinet.dk/media/uc1er5fd/central-folsomhed-for-opdateret-havvind-i-analyseforudsaetninger-2024.pdf. The Danish Energy Agency has been notified about this modified version. A minor deterioration is expected due to the differences between the two datasets...
ES	Substantial degradation	The Spanish national assumptions for ERAA 2025 consider some elements that suggest a deterioration of the adequacy risks: -Reduction in capacities of hydro storage and batteries, as NECP considers a capacity mechanisms to be in place in order to achieve the targets, but ERAA is assessing a scenario were only already contracted capacities are considered. This is in line with the recently published NRAA. -Weekly availability of pumped hydro storage has been considered, instead of assuming a 100% availability throughout the year. This is in line with the recently published NRAA.

Country	How do TSOs expect adequacy to be impacted by the national year-on-year data changes from ERAA 2024?	Please elaborate the reasons behind the expected impact
		-Increase in the forced outage rate and duration has been considered for existing CCGTs due to observed ageing of the fleet. This is in line with the recently published NRAA. -Increase in yearly load values and peak load, in line with final NECP targets that were published in September 2024.
FI	No impact	There have only been minor changes in the data compared to ERAA25.
FR	Substantial degradation	RTE foresees a deterioration in security of supply evaluation in ERAA25, mainly due to the reduced size of Flow-Based domains — which appeared to be overestimated in ERAA24 — and the introduction of 36 nuclear availability time series.
HU	Minor improvement	Minor increase in RES capacities, substantial increase in battery capacities and substantial decrease in demand forecast have a stronger impact on adequacy than the minor decrease in NTC values.
IE	Minor degradation	This is dependent on the study year in question as new plant deliverability is updated. ERAA25 assumes lower offshore wind capacities in forecast years compared to projections submitted in ERAA24. In 2030, ERAA24 assumes 5 GW of offshore wind to align to the Irish Government's Climate Action Plan targets. This target is revised downward to 1.3 GW in ERAA25, following the Sustainability Energy Authority of Ireland's "Forecasts of plausible rates of generation technology deployment 2024-2040". Although offshore wind isn't the only data change for ERAA25, relative to ERAA24, it is the most significant.
IT	No impact	no significant change in submitted input dataset. It is actually difficult to say how adequacy indicators will vary in advance, as they are also impacted by import levels from abroad
LT	Minor degradation	Taking into account the latest information, the postponement of the implementation of offshore wind farms and the LT-PL interconnection Harmony Link has been assessed.
MD	No impact	
MT	Minor improvement	The commissioning of the 2nd MT-IT interconnector, which was included in the ERAA 2024, is expected to significantly increase Malta's electricity system adequacy. The ERAA 2025 now includes utility-scale BESS and offshore RES. These are expected to improve system adequacy in Malta but not as much as IC2.
NL	Substantial degradation	
NI	No impact	Northern Ireland's projections for onshore wind and offshore wind for ERAA 2025 have decreased in comparison to ERAA 2024, lessening the contribution from RES. There is slightly more solar in ERAA 2025 but it takes longer to materialise in comparison to the growth seen in ERAA 2024. This overall decrease in contribution from RES has been mostly off-balanced by a decrease in forecasted demand, resulting in the adequacy position remaining broadly the same between ERAA 2024 and ERAA 2025.

Country	How do TSOs expect adequacy to be impacted by the national year-on-year data changes from ERAA 2024?	Please elaborate the reasons behind the expected impact
PL	No impact	
PT	Substantial degradation	There were no significant differences between ERAA 2024 and ERAA 2025 regarding generation input data. However, from 2030 onwards forecasted demand has increased substantially due to new large consumers that are expected to rely on the system. Therefore impacts are expected with high degradation of adequacy indicators. (note that in order to match published data from NECP and ERAA 2025, we have considered for the first time the electricity demand related to self-consumption of CHP, new industrial consumers and rooftop PV. Nevertheless, the corresponding generation was added to the supply capacity we have provided, which should result in a zero-sum balance.)
RO	Substantial degradation	In the current NT scenario have been cancelled or delay investments in new CCGTs, accordingly with the most recent data available. However the total coal phase-out has been also delayed accordingly and three lignite units had their lifetime extended till 2030. Also the nuclear program has been delay.
RS	Minor improvement	More RES are expected to be in the mix, with the thermal and hydro production staying the same. However, since ERAA 2024 results did not indicate any issues with the adequacy in the Serbian system, this improvement is difficult to quantify.
SE	No impact	For ERAA 2024, we reported higher electricity use and higher electricity production than for ERAA 2025. The electrification of the industrial sector in Sweden is expected to take longer to accelerate, and establishments of new production is also expected to take longer. Overall, the energy balance is similar, so we don't expect to see a major change in adequacy.
SK	No impact	
UA	Minor improvement	high level of uncertainty

Expected impact per technology type

Country	Thermal NGC	RES	Demand	DSR	Batteries	Electrolysers	Interconnection capacities (NTC & FB)	Please explain the reasons behind the change (e.g., postponed nuclear phaseout, NECP update)

Substantial Increase
Minor increase
Substantial decrease
Minor decrease
No change
No response

AT								Update with new data based on new assumptions
BE								ERAA2025 data for BE is based on the Adequacy and flexibility study for Belgium (2026-2036) Thermal BE - No changes up to 2035 (NUC extension was considered also in ERAA24) RES BE - decrease (offshore wind PEI; DC part delayed compared to ERAA24) Demand BE - decrease (Delayed electrification of industry, slower flex, growth of data centres) Interconnection BE - decrease (Nautilus and Triton delayed compared to ERAA24) See Adequacy and flexibility study for Belgium (2026-2036) for details https://issuu.com/eliagroup/docs/adequacy_and_flexibility_study_for_belgium_2026-2?fr=sZGQ5Njg2NjM5NTg
CH								The changes are based on public information (decommissioning date for one nuclear power plant), updated statistics for renewables and batteries showing faster/slower development pace, and assumptions from the latest NRAA for the rest of the nuclear fleet.
CY								
CZ								NECP update, updated plans of operators.
DE								RES: Comparison between RES capacities depends on the energy carrier and the respective year. While in 2028,2033 and 2035 the RES capacities remain quite constant between the ERAAs, in 2030 the ERAA25 shows reduced capacities. Onshore wind expansion falls short of expectations and offshore projects are delayed. In addition to that the ERAA25 data reflects greater interest in rooftop PV systems compared to PV farm systems, while the overall PV capacities remain rather stable from reference year 2030 on. Demand: The electricity demand remains in the same order of magnitude, with a minor decrease especially in the early target years. This is due to delayed electrification and a slower than expected recovery of the electricity demand after the Pandemic. The market availability (iDSR) of heat pumps and electric vehicles was reduced compared to ERAA2024, due to a delay in the smart meter roll-out.

		Thermal NGC: Compared to ERAA24, the installed capacity of gas-fired power plants (natural gas and hydrogen) in ERAA25 has been reduced by approximately 6 GW. This decline is primarily due to a shift in political priorities, which cast doubt on the viability of the gas power plant expansion strategy that was still expected at the time of ERAA24. DSR: Minor decreased capacity in ERAA25 compared to ERAA24 due to slightly different scenario assumptions and consideration of different DSR processes. Batteries: Battery storage capacities were estimated as part of national grid planning processes based on real grid connection applications, a market survey and the development of PV capacity expansion. In total this resulted in a lower assumed battery storage capacity available on the market in the different target years of ERAA25 compared to ERAA24. However, there is an increase of Stationary Battery Storage Systems based on current market trends, whereas a decrease of home battery storages available on market is assumed due to a delayed smart meter roll-out.Electrolysers: Based on a recent project survey on planned projects, the capacity of electrolysers is increasing slightly overall compared to ERAA24. However, in 2030 the value is lower than in ERAA24, as it corresponds to the latest hydrogen strategy. NTC: At the border with SE04, there is a reduction in the NTC values compared to ERAA24, as the project P176 (TYNDP24) has been dropped. At the border with Austria, there are slightly different NTC values compared to ERAA24 due to project changes.
DK		The change in Danish data between ERAA 2024 and ERAA 2025 is primarily due to an update from the AF23 to the AF24 central sensitivity assumptions. This update reflects a revised outlook on offshore wind development, driven by recent market developments and project delays. Key factors include: Cancellations and postponements of offshore wind tenders, particularly in the North Sea and around Bornholm. These delays affect RES, Electrolysers and Interconnector capacities. Adjusted expectations for project commissioning timelines and capacities. The increase in demand is primarily due to an expectation of more datacenters in Denmark.
ES		See answer in previous table ‘How is adequacy expected to be impacted by the year-on-year data changes from ERAA 2024?’.
FI		The updated view takes into account policies and measures from the NECPs so the developments are aligned regarding for example climate goals. However, Fingrid's view is

							continuously updated and therefore considers also latest developments (e.g. industrial activities, political decisions) on top of the NECP.
FR							French assumptions are based on the latest NRAA available at the time of ERAA25 data collection, namely “RTE Bilan Prévisionnel 2023”. This was also the case for ERAA24, which explains why most assumptions remain aligned with those used in ERAA24. However, RTE has introduced some changes for ERAA25, in particular: - The introduction of 36 nuclear availability time series in ERAA25, compared to a single one in ERAA24 - Batteries commissioned in 2024 are now assumed to be dedicated to ancillary services
HU							RES: due to new network connection requests and NECP update. Demand: due to change in consumer network connection requests and NECP update. Batteries: due to new network connection requests. NTCs: the values have partly increased, partly decreased, due to alignment with neighbouring TSOs.
IE							This is dependent on the study year in question, however, in general: Thermal NGC: Minor decrease in thermal capacity due to a correction in the classification of out-of-market units, ensuring they are correctly accounted for within the ERAA25 data submission and modelling. RES: Substantial change in the forecast RES, particularly in offshore wind, as ERAA25 aligns to latest SEAI projections (see previous question response for more detail).
IT							light NECP update
LT							In the short term, consumption growth in the ERAA2025 is more moderate in line with recent years' trends, but in the long term, consumption grows faster in line with the updated strategic goals.
MD							
MT							Projections for onshore solar PV capacity in 2030 in the ERAA 2025 study have been updated to align with the NECP 2021–2030 targets, increasing from 266 MWp (ERAA 2024) to 350 MWp. Similarly, offshore renewable projections (350 MW in 2035) provided for ERAA 2025 are consistent with Member States' non-binding agreements. Assumptions for conventional generation capacity, interconnector capacity, and electricity demand have been aligned with the latest national electricity resource adequacy study (2023). Furthermore, two utility-scale battery storage systems, totaling 84 MWh, have been included in the ERAA 2025 assessment.
NL							This year an NECP compliant scenario was used with significantly higher demand. This leads to a substantial deterioration of security of supply.

NI							The North-South Interconnector between Northern Ireland and Ireland is predicted as coming online in ERAA 2025 by 2031. In ERAA 2024 this was predicted as coming online in 2027. As such there is a delay to interconnector capabilities in ERAA 2025, however the capacity that the interconnector will provide remains the same. Changes to RES and Batteries is driven in part by the best information available from our Connections Team regarding current applications to connect. Northern Ireland has an 80% Renewable Penetration target by 2030 which also drives assumptions. Demand is forecast to decrease slightly based on the impact of government policy and underlying trends observed in demand growth and decline.
PL							Thermal: up-to-date information available for TSO from producers. RES: latest NECP project (WAM scenario) which was available at the time of data collection process. Demand: latest NECP project (WAM scenario) which was available at the time of data collection process. Batteries: Significant volume of batteries capacity after the latest Capacity Market auctions. Electrolysers: latest NECP project (WAM scenario) which was available at the time of data collection process
PT							NECP and NRAA updates
RO							In the NT scenario was considered the most recent information submitted by the generators and other market participants and validated by the Ministry of Energy. In this scenario have been canceled or delay investments in new CCGTs, postponed total coal phase-out and also nuclear program has been delay. The RES growth has been considered based on the updated NECP.
RS							New data was available between ERAA 2024 and ERAA 2025 data collection.
SE							The electrification of the industrial sector in Sweden is expected to take longer to accelerate, and establishments of new production is also expected to take longer.
SK							
UA							1) national action plan for renewables until 2030; 2) national strategy for distributed generation development; 3) national emission reduction plan for big combustion facilities; 5) NECP 1-st version was approved 2024 and needs to be reviewed.

Validity of data submitted for report submission (~November 2025)

	Yes	8
	Yes, with minute changes or minute impact on ERAA results	12
	No, impact on ERAA results are expected	5

Figure 48: Is the data submitted for ERAA 2025 expected to be still valid in November 2025?

	If data is expected to change, what would be the key drivers?					
Country	Is the data submitted for ERAA 2025 expected to be still valid in November 2025?	Policy changes as key driver	Market participant announcements as key driver	Other key drivers	If other, please specify here	Please elaborate on the key drivers behind anticipated changes
AT	Yes					
BE						ERAA2025 data for BE is based on the Adequacy and flexibility study for Belgium (2026-2036)

					See pg 12 of Adequacy and flexibility study for Belgium (2026-2036) for details https://issuu.com/eliagroup/docs/adequacy_and_flexibility_study_for_belgium_2026-2?fr=sZGQ5Njg2NjM5NTg
CH	Yes				
CY	No, impact on ERAA results are expected		X	Changes to input assumptions regarding conventional unit and natural gas availability in the next 5 years.	
CZ	No, impact on ERAA results are expected		X	NECP contains outdated expectations regarding development of RES and batteries.	NECP is very optimistic regarding wind generation, but fails to capture recent surge in battery storage installations.
DE	Yes with minute changes or minute impact on ERAA results	X			There is an ongoing political debate on how to incentivize additional power plant capacity to ensure resource adequacy and to support decarbonization. For this purpose, a power plant strategy has been revised several times. Based on the latest draft legislation, together with information from a joint gas and electricity market survey and the German Grid Development plan a fuel switch from natural gas-fired power plants to hydrogen power plants has been assumed. With the change of the Government in May 2025 there seems to be less ambition to enforce a fuel switch to hydrogen, what comes along with more ambition to ensure technological neutrality. The amount of hydrogen power plants may be overestimated in ERAA 2025. Respectively the amount of natural gas power plants may be underestimated.
DK	No, impact on ERAA results are expected		X	Annual update of the Danish Analysis Assumptions (AF) from AF24 to AF25.	The anticipated changes are primarily driven by updates to the pipeline lists, which reflect expected projects. The inclusion of battery installations stems directly from these revised pipeline projections. Regarding the Bornholm energy island, the delay is a result of previously noted setbacks—already described during the transition from AF23 to AF24 central sensitivity. For AF25, however, the timeline for the island is being further postponed. The Bornholm energy island has a significant impact on the DKE1 adequacy situation. Apart from the batteries and the energy island, there is no significant changes to the assumption.

ES	Yes with minute changes or minute impact on ERAA results			X	Recently observed trends.	Some updates can be expected both in demand behaviour and generation deployment, depending on observed trends or possibly derived from new network development plan proposal.
FI	Yes					
FR	No, impact on ERAA results are expected			X	RTE will update France's assumptions in ERAA26 based on the ongoing update of the French NRAA "Bilan Prévisionnel 2025", to account for the latest changes in the power system.	All hypotheses will be updated in next ERAA; main changes will include : delay in electrification, delay in wind-offshore commissioning, update on gas capacities trajectories, update on nuclear availability
HU	Yes with minute changes or minute impact on ERAA results	X	X			The drivers are mainly the new and expired network connection requests, furthermore policy changes (e.g. supporting schemes for batteries).
IE	Yes with minute changes or minute impact on ERAA results					
IT	Yes with minute changes or minute impact on ERAA results	X				
LT	Yes with minute changes or		X			

	minute impact on ERAA results					
MD	Yes					
MT	Yes				N/A	
NL	No, impact on ERAA results are expected			X	Grid congestion and delay in connection of new load will likely lead to significantly less load than assumed in the scenario.	The upcoming NRAA and ERAA scenarios will use a scenario based on expected developments rather than NECP compliance.
NI	Yes					
PL	Yes with minute changes or minute impact on ERAA results		X			Ongoing market decisions of producers.
PT	Yes with minute changes or minute impact on ERAA results	X				New ongoing NRAA could change some input parameters
RO	Yes with minute changes or minute impact on ERAA results	X	X			Due to different investment plans or changes in some economic, political, social drivers, the data may deviate from the current scenario.
RS	Yes				/	/
SE	Yes	X	X	X	Electrification of the industrial sector is not expected to increase as early or as fast as assumed in ERAA 2025.	Not all planned projects are keeping up with their timelines.

SK	Yes with minute changes or minute impact on ERAA results	X		
UA	Yes with minute changes or minute impact on ERAA results	X		high level of uncertainty