

A background of a network diagram with white nodes and lines on a teal gradient. The nodes vary in size and are connected by thin white lines, creating a complex web-like structure.

# **Winter Outlook 2024-2025**

**Summer Review 2024**

A white outline map of Europe, showing the continent's borders and major islands like the British Isles and the Mediterranean coast.

**Country Comments**

entsoe

## ENTSO-E Mission Statement

### Who we are

ENTSO-E, the European Network of Transmission System Operators for Electricity, is the association for the cooperation of the European transmission system operators (TSOs). The 40 member TSOs, representing 36 countries, are responsible for the secure and coordinated operation of Europe's electricity system, the largest interconnected electrical grid in the world. In addition to its core, historical role in technical cooperation, ENTSO-E is also the common voice of TSOs.

ENTSO-E brings together the unique expertise of TSOs for the benefit of European citizens by keeping the lights on, enabling the energy transition, and promoting the completion and optimal functioning of the internal electricity market, including via the fulfilment of the mandates given to ENTSO-E based on EU legislation.

### Our mission

ENTSO-E and its members, as the European TSO community, fulfil a common mission: Ensuring the security of the inter-connected power system in all time frames at pan-European level and the optimal functioning and development of the European interconnected electricity markets, while enabling the integration of electricity generated from renewable energy sources and of emerging technologies.

### Our vision

ENTSO-E plays a central role in enabling Europe to become the first climate-neutral continent by 2050 by creating a system that is secure, sustainable and affordable, and that integrates the expected amount of renewable energy, thereby offering an essential contribution to the European Green Deal. This endeavour requires sector integration and close cooperation among all actors.

Europe is moving towards a sustainable, digitalised, integrated and electrified energy system with a combination of centralised and distributed resources. ENTSO-E acts to ensure that this energy system keeps consumers at its centre and is operated and developed with climate objectives and social welfare in mind.

ENTSO-E is committed to use its unique expertise and system-wide view – supported by a responsibility to maintain the system's security – to deliver a comprehensive roadmap of how a climate-neutral Europe looks.

### Our values

ENTSO-E acts in solidarity as a community of TSOs united by a shared responsibility.

As the professional association of independent and neutral regulated entities acting under a clear legal mandate, ENTSO-E serves the interests of society by optimising social welfare in its dimensions of safety, economy, environment, and performance.

ENTSO-E is committed to working with the highest technical rigour as well as developing sustainable and innovative responses to prepare for the future and overcoming the challenges of keeping the power system secure in a climate-neutral Europe. In all its activities, ENTSO-E acts with transparency and in a trustworthy dialogue with legislative and regulatory decision makers and stakeholders.

### Our contributions

ENTSO-E supports the cooperation among its members at European and regional levels. Over the past decades, TSOs have undertaken initiatives to increase their cooperation in network planning, operation and market integration, thereby successfully contributing to meeting EU climate and energy targets.

To carry out its legally mandated tasks, ENTSO-E's key responsibilities include the following:

- › Development and implementation of standards, network codes, platforms and tools to ensure secure system and market operation as well as integration of renewable energy;
- › Assessment of the adequacy of the system in different timeframes;
- › Coordination of the planning and development of infrastructures at the European level (Ten-Year Network Development Plans, TYNDPs);
- › Coordination of research, development and innovation activities of TSOs;
- › Development of platforms to enable the transparent sharing of data with market participants.

ENTSO-E supports its members in the implementation and monitoring of the agreed common rules.

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# Introduction

This document includes individual country reviews on the supply security situation in their system during the last season. The reviews are accompanied by country comments on the expected adequacy situation or specific operational conditions during the coming season.

The aim of the retrospective reviews is to present the most important events that occurred during the previous season and compare them to the previous Seasonal Outlook study results. Important or unusual events or conditions in the power system and the remedial actions taken by the transmission system operators (TSOs) are also mentioned.

Comments on the expected adequacy situation and additional information are presented to provide more background information about the particular power systems, which might not always be represented in pan-European adequacy models.

Countries only provided comments or reviews if there was relevant information to be reported.

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# Albania

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Austria

## Winter Outlook 2024-2025

This year's Winter Outlook report indicates no adequacy concerns for Austria. According to the input data for WOR, Austria is making good progress towards achieving its photovoltaic expansion goals, although the same does not yet apply to the expansion of wind turbines .

Overall, Austria is well prepared for the coming winter: contracted grid reserve capacity is available, and gas fuel storage and pump storage hydro plant reservoirs are at high fill levels.

## Summer Review 2024

In July, Austria recorded exceptionally high run-of-river power production, significantly boosted by heavy rainfall. These conditions led to the highest energy level fed into the grid from run-of-river plants since 2017. Overall, hydropower accounted for approximately 74% of renewable energy in July, generating 3,894 GWh, representing a 26% increase compared to the previous year. Wind power also grew by 19%, reaching 500 GWh, while PV production saw an impressive 145% increase, reaching 780 GWh due to significant capacity expansions. All of these circumstances led to Austria being able to generate over 100% of its load from renewable sources on a balance sheet basis up until August.

Following an initial estimate by the Austrian Weather Service (ZAMG), 2024 reported the warmest August in the history of measurements. Compared to August of the previous year, hydropower recorded a decline of around 20%, particularly due to the extremely dry and hot weather conditions. August was the first month in 2024 when Austria had to import more electricity than it could export.

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# Belgium

## Winter Outlook 2024-2025

The availability of the production park in Belgium is high during the whole winter period.

The expected demand remains in line with previous years, with a target of 81.5 TWh.

There are no outages planned on the Elia 400 kV grid during the December-February period that would have a significant impact on capacity calculation mechanisms in the CORE area.

Therefore, under normal market conditions, Belgium expects to remain with limited import needs (<1 GW) throughout the winter.

However, it is necessary to pay attention to the stop of Doel 4, which is out of service due to damage detected to the reactor's outer concrete casing. If this unavailability period extends throughout the winter, combined with other unforeseen forced outages, extreme temperatures, and low renewable production, import needs in Belgium could increase to 4 GW between W2 and W5 and 3 GW between W6 and W13.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.



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# Bosnia and Herzegovina

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded for summer 2024. The maximum load was detected on 17 July at 15:00 (1,643 MW), being roughly 6% higher than in the last two years. Renewable energy from solar power plants continued to grow after some of the new photovoltaic power plants started to work.

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# Bulgaria

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Croatia

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Cyprus

## Winter Outlook 2024-2025

As there are no interconnections to rely upon in case of emergency due to Cyprus being an isolated island, there is a small probability that adequacy issues could arise through the coinciding of unplanned outages and unfavourable weather conditions.

## Summer Review 2024

Summer 2024 was characterised by prolonged heat wave conditions, which began earlier than usual (early June) and lasted throughout the summer. There were periods with low replacement reserve availability due to unplanned outages and high demand. The national regulatory authority (NRA) was formally informed.

On some occasions, the available replacement reserve was insufficient to cover the loss of the largest synchronised generator. Moreover, on 22 July, the TSO issued a public call to reduce energy consumption, warning of the possibility of cyclic load shedding.

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# Czech Republic

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Denmark

## Winter Outlook 2024-2025

The main focus throughout the winter will be placed on ensuring the successful operation of new market models that have already been implemented and those in the process of being introduced. In addition, a focus will be placed on several planned outages for certain key lines. Some of these outages are expected to reduce the capacity of the interconnectors, although none of the outages are expected to pose challenges to power adequacy.

## Summer Review 2024

In general, it was a very lax summer. No major disturbances were recorded, therefore assuring a satisfactory power situation.

There were fluctuating amounts of wind and solar energy throughout the summer, although this did not pose any challenges regarding power adequacy.

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# Estonia

## Winter Outlook 2024-2025

In the upcoming winter, Estonia – along with Latvia and Lithuania – is planning a significant change in its energy infrastructure by disconnecting from the Russian-Belarusian electricity system (known as BRELL) in early 2025. This long-planned process is set to be completed by 8 February 2025, when the Baltic states will temporarily operate as an “electricity island” before reconnecting the next day to the Central European synchronous area. Despite the complexity of this switch, no adequacy issues are expected for winter 2024-2025.

The Baltic power systems joining the Central European synchronous area will imply fundamental changes in the operations of the power systems and require an entirely new model of balancing. For this purpose, Baltic TSOs plan to create a Baltic load and frequency control (LFC) block comprising three LFC areas: Estonia, Latvia, and Lithuania. The estimated preliminary volume of each type of reserve necessary for the Baltic LFC block operation is published in the Baltic Balancing Roadmap<sup>1</sup>.

The ongoing Winter Outlook 2024/2025 study does not include new reserve volume requirements.

## Summer Review 2024

No adequacy issues were detected. Summer 2024 showed a continuation of renewable energy growth and stable electricity consumption.

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<sup>1</sup> [https://elering.ee/sites/default/files/2024-04/Baltic\\_Balancing\\_Roadmap-2024\\_final.pdf](https://elering.ee/sites/default/files/2024-04/Baltic_Balancing_Roadmap-2024_final.pdf).

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# Finland

## Winter Outlook 2024-2025

The trend in the Finnish power system has remained consistent over recent years, with thermal power plants utilising fossil fuels being decommissioned and a notable increase in wind power capacity. Over the past year, wind power capacity has increased by 1,400 MW and solar by over 200 MW. It has been decided to decommission two combined heat and power plants with a total capacity of 200 MW, which will not be in operation during the upcoming winter. In addition, the National Emergency Supply Agency has reserved the production of the Meri-Pori coal condensing power plant for severe disruptions and emergencies.

Besides the decrease in thermal capacity caused by the shutdown of thermal power plants, there are capacity reductions that are not included in the analysis. The Olkiluoto 2 nuclear power plant unit will operate at a reduced output level to mitigate the risk of a generator rotor failure, which will reduce production by 155 MW. Furthermore, if the Olkiluoto 3 system protection scheme becomes unavailable, the capacity could be reduced by up to 350 MW starting in January.

Besides the Olkiluoto 3 NPP annual maintenance scheduled to begin on 1 March, there is no scheduled maintenance of power plants or interconnectors during the winter season. The failure of the Estlink 2 interconnector between Finland and Estonia at the beginning of 2024 has been repaired, and transmission capacity was restored to normal in September. Additionally, the gas supply is expected to be sufficient due to the Balticconnector gas pipeline being operational, unlike in the previous winter.

There has been a rapid increase in the use of electric boilers for district heating, with the total capacity reaching 1,000 MW this winter. While this will influence overall demand, it is expected that most of these boilers will not be in use when the market prices are high, thus minimising their impact on adequacy. The adequacy of electricity increasingly relies on wind power generation, and the reliability of domestic power generation and interconnectors is crucial during cold and calm days.

## Summer Review 2024

Overall, the security of supply was at a good level during the summer season. Typically, power plants and interconnectors undergo their annual maintenance during the summer months. This year, the cross-border transmission capacity was at times reduced to less than half of the total capacity. Besides interconnector maintenance, the reduction was caused by the failure of Estlink 2 and additional constraints due to construction activities, including the new cross-border transmission connection between Finland and Sweden.

However, the power system faced a challenging situation at the beginning of June due to an unanticipated failure at a nuclear power plant combined with reduced transmission capacity and the prolongation of annual maintenance of another nuclear power plant. The situation was resolved by utilising reserve power plants for a short period when the nuclear power plant was disconnected from the grid, and construction work on the transmission lines was suspended the following day to increase the transmission capacity from northern Sweden.



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# France

## Winter Outlook 2024-2025

A very low risk of adequacy issues is expected in France for the upcoming winter, similar to last year. The risk of imbalance between electricity supply and demand is considered to be very low due to the following key drivers:

- After the decline beginning in autumn 2022, demand in France stabilised during 2023 at a historically low level, around -7% annually compared to before the COVID crisis.
- Nuclear availability is estimated to be similar to last winter. Although it has not yet returned to pre-crisis levels, it is expected to be more robust than during the critical periods of 2022-2023, which were marked by stress corrosion issues affecting several units.
- Other positive factors include increased renewable energy system (RES) capacity compared to last year, significant gas reserves, and very high hydraulic stocks for the season, with RTE observing levels higher than in recent years.

Nevertheless, adequacy issues could arise with a combination of unfavourable factors, such as a cold winter (due to the high thermo-sensitivity of French electric demand), a structural increase in demand levels if energy-saving efforts are not maintained, lower-than-expected nuclear availability, and/or limited exchanges compared to last winter.

RTE is closely monitoring all parameters contributing to supply security in France and remains specifically focused on the evolution of French power demand and planned outages of nuclear power plants.

## Summer Review 2024

No adequacy issues were recorded during summer 2024. However, downward regulation received particular attention from RTE during summer 2024 as the system margins were low during certain periods. Since July, an operational process has been agreed with the French authorities and implemented to reduce the renewable generation in case of an unbalance (last resort before emergency means). RTE continues working to gain approval for normal processes (through balancing market) to reduce renewable generation when needed, whereby this issue should be monitored very closely in the future and demonstrates the importance of having sufficient flexibility in the system during such periods.

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# Germany

## Winter Outlook 2024-2025

### Non-market resources

Based on the knowledge at the time of data collection, the German non-market resources contain:

- Capacity reserve: Since 1 October 2024 and until 30 September 2026, a total contracted capacity of 1.2 GW of power plants (9 MW of which is interruptible load) is available for unforeseeable demand balancing events. These power plants must be available within twelve hours and can also partially be used to resolve grid congestion.
- Grid reserve: This is used to resolve congestion and contains different types of power plants in Southern and Western Germany. It comprises a total capacity of 8.2 GW as of 31 December 2024. Secondary to capacity reserve, it can also maintain generation adequacy.
- Special network equipment power plants: These are fast-starting gas-fired power plants with an overall capacity of 1.2 GW, primarily intended to restore grid stability after a disturbance in the transmission grid. Secondary to the grid reserve, they can also maintain generation adequacy.

Parts of the aforementioned non-market resources primarily have a different purpose than coping with resource adequacy risks, such as congestion management. Therefore, non-market resources might already be partly exhausted for their primary purpose and unavailable for resource adequacy purposes.

After the end of data collection but before the winter period, one power plant switched from the market to grid reserve. This leads to 460 MW less power in the market and 440 MW more power in the grid reserve (in addition to the aforementioned figures).

### Additional remarks on the German data collection

The pumped-storage power plants (PSPs) of the Kraftwerksgruppe Obere Ill-Lünersee (turbine capacity: 2.1 GW; pumping capacity: 1.4 GW) – which are installed in Austria but assigned to the German control block – remain in the German dataset. For the same reason, the Kühtai pumped-storage power plant and Silz storage power plant (total turbine capacity: 0.8 GW; total pumping capacity: 0.25 GW) are also included in the German dataset.

### Load

The forecasted load was estimated to be 503 TWh for 2024 and 2025 in Germany, assuming a slight increase compared to 494 TWh in 2023 according to preliminary (at the time of data collection) German Association of Energy and Water Industries (BDEW) publications.<sup>2</sup> The peak demand is 83.0 GW for winter 2024/25. The load can be considered relatively moderate as new consumers (e.g. heat pumps and electric vehicles) have not reached the expected expansion rates.

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<sup>2</sup> Final figures available at [20241021\\_D\\_Stromerzeugung1990\\_2023.pdf](#)  
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## Remarks on Winter Outlook 2024/2025 scenarios and results

Traces of ENS (LOLE: 0.09 h and EENS: 0.058 GWh) are visible for Poland in the scenario without non-market resources. As Poland's direct neighbour, Germany will monitor the resource adequacy situation through short-term resource adequacy processes.

## Summer Review 2024

No problems were observed due to low water levels in rivers during the summer.

Compared to 2023, approximately 9 GW less thermal and hydro power plant capacity was available on the market in summer 2024. Of this, 3.4 GW was transferred back to the grid reserve as of 1 April 2024 and is also in the grid reserve for winter 2024-2025. This reduction of market resources was foreseeable due to the end of legislation at the end of March 2024, which had been introduced in 2022 to cope with the gas shortage in winter 2022/23 due to the war in Ukraine (cf. German country comments for Summer Outlook 2024).

On 3 June, Germany saw a tense situation in the intraday market with high prices. The reason for this was a PV forecast error of up to 10 GW at peak times and presumably excessive start-up times for the power plants to cover the missing energy in the short term. Therefore, this was not an adequacy problem as generally sufficient generation capacity was available, albeit not at such short notice. Such a situation shows the strong importance of accurate variable generation forecasts.

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# Great Britain

## Winter Outlook 2024-2025

On 8 October, the National Energy System Operator (NESO) published the Winter Outlook for 2024/25. The analysis shows that margins are expected to be adequate and within the reliability standard. The current base case de-rated margin is 5.2 GW (representing 8.8% of peak cold spell demand). The associated loss of load expectation (LOLE) is below 0.1 hours, which is higher than the 4.4 GW (7.4%) published in the Winter Outlook report for 2023-2024.

The challenge of reliably operating a changing electricity system is expected to be met as new technologies and diverse forms of capacity contribute to supply security. Sufficient operational surplus throughout winter is anticipated, allowing for natural variations in demand, wind, and outages. Some tight days might still occur during which it is necessary to use standard operational tools, including system notices.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Greece

## Winter Outlook 2024-2025

For the upcoming winter, there is no scheduled maintenance of generation units during the high demand period (15 December to 15 February). The possibility of an extension of scheduled unit maintenance within the high demand period is low.

A new thermal (gas) unit with an installed capacity of 800 MW is expected to enter the day-ahead market within the forthcoming winter, while a new thermal (gas) unit with an installed capacity of 850 MW is expected to start the commissioning mode operation.

IPTO is in continuous contact with the gas transmission system operator to initiate the switch fuel procedure in some bi-fuel units (gas to oil) in case of emergency. The operation with alternative fuel is limited to a few days and only considered as an urgent countermeasure in case of a lacking gas supply rather than being a continuous operation mode.

Water reservoir levels are lower than the previous years (marking a decade low) due to the drought during the spring and summer period and the absence of inflows. The continuing lack of rain and consequent drought conditions raises concerns about the availability of hydropower plants during winter.

There are no scheduled maintenance or capacity limitations on any interconnection lines for the forthcoming high demand period.

An increase in consumption during the upcoming winter is expected compared with winter 2023-2024, which was mild regarding environmental conditions.

The expected generation, the increase of RES installed capacity, and import capacity are sufficient to cover Greek energy needs under normal conditions. No adequacy issues are expected given that gas supplies will be continuous and redundant to cover domestic demand.

However, in case of scarcity of gas supplies, the Greek system will be highly dependent on imports during high demand periods in combination with low RES generation to avoid facing any adequacy issues in high demand peaks.

The DC connection line between the mainland Greece and Crete island transmission systems will be in operation in 2025. Thermal units on the island of Crete will be decommissioned after the DC connection line has been fully set into operation. Moreover, several small portable generators are added to strengthen the Crete island transmission system and assure adequacy for the winter season.

## Summer Review 2024

An increase of +7% in average electricity demand was observed during the last summer period (May to September 2024).

Temperatures during the entire summer period were very high compared to previous years. There were consecutive heat waves during the summer (second fortnight of July and first fortnight of August), which caused very high electricity demand and stressed the transmission system.

Especially in June, the average load increased more than 25% compared with June 2023, while in July the average load increased by 4.5% and in August by 4% compared with the corresponding months of 2023.

The heat waves were combined with extended fires in all Greek territories. The impact of such fires was insignificant and only caused limited outages in the local electricity systems (lines under which the fire occurred).

No adequacy issues were recorded during the summer period.

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# Hungary

## Winter Outlook 2024-2025

Based on previous years' system loads and observed typical trends such as the spread of electrification, a new peak might be reached, especially in extreme weather conditions. The continuously increasing PV generation in the Hungarian system can cause higher uncertainty in operational planning periods and real-time system operation, resulting in a higher level of reserve requirement even in the winter period. In order to secure the estimated reserve requirement, new improvements have been introduced since last winter, such as IT developments. Furthermore, the level of maintenance is low and the almost constantly required import is expected to be available over the period under review. In addition, network developments are continuously made to manage higher voltage levels and improve operational security.

In preparation for the previous winter period, MAVIR tested almost all of the gas power plants' ability to switch to oil as an alternative fuel and its impact on the power plants' balancing capacity. It was found that most of the gas power plants can use oil as an alternative fuel, this causes a reduction in some of their balancing capacity.

Altogether, the Hungarian power system is expected to be safe during this winter period. However, it is important to note that the oil embargo and a possible natural gas crisis could still have unforeseen effects.

## Summer Review 2024

On average, higher system load was observed in the summer 2024 compared to the previous year. The maximum load (7,036 MW) was reached on 16 July, above the previous historical peak load for the summer period but below the all-time peak load. This is mainly due to the prolonged heatwave experienced. Besides, during this year as well as the summer period, the PV output was exceeded several times, peaking on 23 August with a value of 3,338 MW. This can be explained by the high level of PV integration and the beneficial weather conditions. In addition, significant downward regulation was necessary on several occasions, in one instance approaching 953 MW.

Even though some maintenance activities took longer than expected, they were carefully distributed over to guarantee system adequacy. Furthermore, the reserve procurement methodology has recently been renewed to match current challenges and conditions, ensuring that the amount of balancing capacity available was sufficient to secure the occurring reserve requirement.

On a few occasions, the Hungarian system entered the alert state and twice even the emergency state due to IT and network problems, although these were all withdrawn within a few hours. Although some difficulties have been faced due to extreme weather conditions – among other things – summer 2024 passed without any major adequacy issues thanks to careful advanced planning.

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# Ireland

## Winter Outlook 2024-2025

The outlook for this winter in Ireland is much improved compared to the last three winters. In the last year, 190 MW of new gas plant, 270 MW of new batteries and 425 MW of new wind and solar plant have become operational in the market. In addition, 505 MW of gas and distillate temporary emergency generation (non-market resources) will also become operational. While peak demand is forecast to increase this winter, it is outweighed by the increase on the generation side. There is an expectation that the system could enter the alert state at times, most likely at periods of low wind and low interconnector imports. There is a low probability of the system entering the emergency state due to insufficient generation being available to meet demand. November and December are expected to be the most onerous periods from a capacity margin perspective.

## Summer Review 2024

There were no system alerts in Ireland during the summer period. While the dispatchable generation margin in Ireland was sometimes negative over the period, strong imports from Great Britain and Northern Ireland coupled with wind and solar power meant that margins were always sufficient.



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# Italy

## Winter Outlook 2024-2025

### Upward adequacy assessment

Import from neighbouring countries is expected to be necessary to restore adequacy margins and cover consumption in critical hours, with a lesser necessity than during the previous winter. The main driver of this improvement is an increase in the expected hydro production.

Analyses still estimate that the risk for adequacy is within standard levels.

Critical situations could occur in the unlikely case of high demand due to cold spells, low renewables, and low imports from neighbouring countries (or even exports to them), or if the unplanned outage rate of generation units is higher than the typical values.

The postponement and/or cancellation of maintenance could be used as countermeasures together with demand response measures and additional market interventions.

In addition, improved regional coordination processes (including regional weekly adequacy assessment through the STA project and critical grid situation process) will support defining proper and efficient countermeasures in case the risk of incurring critical situations is detected in a short-term horizon.

### Generation capacity in Italy

In the last year, renewable generation capacity has increased by about 7 GW. The small increase in thermal power capacity due to new power plants selected in capacity market auctions and repowering of existing power plants balanced some decommissioning.

At present the total amount of installed renewable (wind, solar, and hydro generation) is around 68 GW and has exceeded thermal capacity, which stands at 62 GW. Moreover, new utility-scale storages for almost 1 GW have been installed since last year.

### Downward regulation assessment

The worst weeks for downward regulation are expected to be the last week of December and the first week of January – characterised by several public holidays – and the end of the winter period due to a typical decrease in load and increase in renewables. In order to guarantee system security, Terna could adopt enhanced coordination with neighbouring TSOs and special remedial actions, such as the curtailment of inflexible generation. Further special actions such as the application of allocation constraints to transmission capacity could be planned in cooperation with neighbouring TSOs.

## Summer Review 2024

The demand for electricity increased (+3.3%) last summer compared to the same period during the previous year, partly due to higher consumption. The increase in demand without considering the temperature effect was +1.7%. Temperature values influenced the demand trend, as summer 2024 was on average warmer than

in 2023, especially in July and August. In addition, in July 2024, peak power was recorded on Friday 19 July, amounting to 57.9 GW (-1.1% year-on-year).

Finally, there were no critical adequacy issues for load coverage during this period.

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# Latvia

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Lithuania

## Winter Outlook 2024-2025

At the beginning of this winter season, net generating capacity in Lithuania will be 6,118 MW. Most noticeable changes can be seen in renewable energy sources generation. Wind net generating capacity has increased by 24% and solar by 76% compared to last year's winter season. These numbers will rise through winter and all the way to the beginning of the next year, due to the rapid growth of solar power and the addition of new wind parks. The Lithuanian PP CCGT (371 MW) will be in maintenance from 4-15 November.

In February, there will be significant changes in the Lithuania-Poland cross-border interconnection due to the planned disconnection from IPS/UPS power system followed by synchronisation with the Continental Europe synchronous area (CESA). The Lithuania-Poland high voltage direct current (HVDC) interconnector will be replaced with two 400 kV AC lines between the Ełk Bis and Alytus substations. According to a preliminary evaluation, the capacity of the Lithuania-Poland AC interconnection will be 150 MW in both directions.

Cross-zonal capacity limitations of the Lithuania-Poland and Lithuania-Sweden (DC) interconnections are planned from 8 February 2025, to ensure frequency stability during Baltic PS's isolated operation test and during the first two weeks of Baltic PS's synchronous operation with CESA.

In order to ensure isolated operation in 2025, if necessary, Litgrid has a production availability reserve of 1,092 MW.

No adequacy or downward regulation issues are expected for the coming season.

## Summer Review 2024

In summer 2024, national consumption was 6% higher than in the previous summer. Maximum total load (1,672 MW) was reached on 21st August 2024.

The summer balance portfolio comprised 64% local generation and 36% imports from neighbouring countries. The largest import provider this summer was Sweden. Litgrid imported 12% more electricity from Sweden than in the previous summer season. Solar generation increased by 207% and wind generation by 35% compared with last summer. Local generation was largely higher than usual this summer season due to the growth of renewable energy sources, with an increase in wind net generating capacity of 24% (by 253 MW) and solar of 99% (by 779 MW) compared to the beginning of last year's summer season.

Imports significantly contributed to adequacy in Lithuania.

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# Luxembourg

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Malta

## Winter Outlook 2024-2025

The maximum peak demand projected for winter 2024-2025 using the demand forecasting methodology employed by ENTSO-E is lower than that projected in national studies (by around 3%). A noteworthy issue is the historical temperature profiles used in the model, which significantly deviate from meteorological data collected in Malta. Nonetheless, no risks of EENS and LOLE are foreseen for winter 2024-2025.

No adequacy issues are expected in Malta for winter 2024-2025, with the additional 175 MW of non-market resources in the form of emergency gas-oil-fired back-up plants available for dispatch at any time to meet local demand and/or abrupt scenarios that might arise.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Moldova

## Winter Outlook 2024-2025

Moldova faces several system adequacy risks for the upcoming winter, including a strong dependence on gas, the unavailability of imports from Ukraine, limited capacity for potential imports from Romania, weak interconnections at the Romanian border, the strong reliance on a single power source, and vulnerability to disturbances in the Ukrainian power system. Other concerns include a lack of flexibility in the power system.

To prepare for winter 2024-2025, Moldova has implemented monthly, day-ahead, and intraday capacity allocation at the Moldova-Romania border to maximise the available capacities. As of 1 January 2025, Energocom will be nominated as the sole buyer/seller of MGRES electricity, while any other market participant can become a buyer/seller of electricity from any other sources. These preparations – along with infrastructure upgrades, demand reduction measures, and gas stocking in Ukraine and Romania – aim to significantly reduce system risks.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Montenegro

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.



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# Netherlands

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Northern Ireland

## Winter Outlook 2024-2025

It is expected that there will be sufficient generation to meeting consumer demand over the winter period in normal operating conditions, provided that new generation in receipt of a market readiness certificate will be available for dispatch throughout the winter period. As with previous winters, there is a risk of tight days on the system, should periods of cold, still weather overlap with forced or unplanned outages of conventional generation. Early November is expected to be the most onerous period during winter from a capacity margin perspective.

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

From July to September 2024, the Northern Ireland system experienced several prolonged forced generator outages. This led to tight margins at times and influenced the system's ability to accommodate planned generator and transmission maintenance. There were two system alerts in Northern Ireland during summer 2024 due to insufficient levels of dispatchable generation, and these challenges are expected to continue ahead of the winter period.

No adequacy issues were recorded during summer 2024.

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# North Macedonia

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Norway

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Poland

## Winter Outlook 2024-2025

### Input data

For winter 2024-2025, no constraints on hard coal availability are expected in Poland. However, there are limitations regarding lignite availability for one of the lignite power plants (capacity of around 1,000 MW), resulting from depleted lignite stocks and the upcoming closure of the power plant. These constraints limit the available capacity and amount of possible generation for this power plant quite significantly. For the two remaining lignite power plants, lignite supply restrictions shall not impact the available generation capacity, while the total possible generation of these plants might be slightly limited.

As for the previous outlooks, in order to avoid providing an incorrect picture of the situation with the possible level of Polish exports/imports, PSE provided an estimate of allocation constraints for the period analysed. Given that the current fuel supply situation is significantly better than the previous winter, these constraints are much less conservative than last year's values. However, it should be noted that the actual allocation constraints are calculated daily based on the best available up-to-date information, and might differ from the estimated values provided for the Winter Outlook 2023-2024. For a detailed description of the allocation constraints and the reasons for its application, see the Polish country comments from Winter Outlook 2022-2023.<sup>3</sup>

### Adequacy situation

Some risks of ENS/LOLE have been recorded in Poland for the coming winter. The highest hourly ENS amounts to 189 MW and takes place in February. A detailed analysis of LOLE/ENS shows that this occurs under unfavourable weather conditions, i.e. with very high demand (the highest load among all CYs) and low RES generation.

Due to uncertainty of the declared availability of thermal power units – which were submitted for the Winter Outlook purpose as fully available – the adequacy situation may worsen, and PSE will therefore monitor the situation in the system.

Nevertheless, for the scarcity periods, PSE can activate several remedial measures to manage such shortages. One such measure is activating resources contracted under the Polish capacity market, which includes generating units and demand side response (DSR). When PSE announces a system stress event and calls upon the resources contracted under the capacity market to be activated, all of these resources are obliged to deliver their obligations. These obligations are applicable for all contracted resources, meaning that all generators and all DSR units must react adequately (it is thus non-selective). However, when the availability of thermal units remains at the Winter Outlook target, the level of inadequacy (189 MW) compared with the scale of the system (highest load up to 28,000 MW) implies that a problem can be managed operationally even without capacity market activation.

### Other important information

The synchronisation of Baltic power systems with CESA is planned for 9 February 2025, with a formal expected at the RG CE meeting on 26 November. The synchronisation will take place via an existing Polish-

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<sup>3</sup> [Link to country comments for WOR 2023-2024.](#)  
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Lithuanian interconnection – the 400kV Eik Bis-Alytus double circuit line – after removing the currently operating B2B in the Alytus substation. According to preliminary studies, commercial exchanges will be limited until a level of around 150 MW, compared with 500 MW via the existing interconnection with B2B. No commercial exchanges are forecasted for the first two weeks after synchronisation.

The Continental Europe regional group has decided to increase the total possible export from Continental Europe (PL, SK, HU, RO) to UA/MD for the coming winter from 1,700 MW to 2,100 MW.

## Summer Review 2024

### RES overproduction

Due to a continuation of high RES development – especially PV sources – PSE experienced significant downward regulation problems during summer 2024 (also during spring). This happened on days with high RES infeed – PV in particular – and days with low demand during both weekends and working days. PSE used the following countermeasures to manage RES overproduction:

1. Centrally dispatched unit reduction (temporarily below technical minimum, power plant or unit)
2. Pumped-storage PP manual activation (if no market contracts)
3. Non-centrally dispatched unit reduction order (below thermal production required programme)
4. Emergency exchange (export)

Unfortunately, in some cases, the countermeasures applied were not sufficient to balance the system and non-market reduction of RES was necessary to recover downward regulation. For example, in June a reduction was necessary during eight days (in May it amounted to as many as fourteen days).

This reduction was the very last resort, in accordance with 2019/943 Regulation Article 13.6 (a): “*power-generating facilities using renewable energy sources shall only be subject to downward redispatching if no other alternative exists or if other solutions would result in significantly disproportionate costs or severe risks to network security*”, i.e. after energy emergency exchange with neighbouring TSOs was exhausted.

It is worth mentioning that switching off PV has become a major challenge as disconnection from most capacity (from the 110 kV and medium voltage network) can sometimes only be performed manually.

## Balancing market reform

On 14 June 2024, PSE implemented a major project of the balancing market reform, with the following key elements:

1. New rules for operational planning of generation and demand resources:
  - Power plant operators are responsible for proposing generation schedules, which form the basis for the subsequent integrated scheduling process (ISP).
  - The aforementioned generation schedules submitted by generators (unit-based) must be compliant with technical conditions of generation units and should reflect their contractual position in the energy market.
  - Five-minute generation scheduling in real-time planning processes.
2. New rules for pricing:
  - Fostering incentives to improve planning by balancing responsible parties (BRPs) so that they submit balanced positions on the balancing market.
  - Improving market price signals, especially during periods of scarcity and oversupply.
  - Eliminating economic incentives to arbitrage between day-ahead and balancing markets.
  - Differentiation between BRP and BSP (balancing service provider) roles.
  - New rules for pricing balancing energy.
  - Imbalance energy prices determined based on balancing energy prices and a scarcity component.
  - Fifteen-minute imbalance period.
  - The imbalance payment must not be more interesting than single day-ahead coupling (SDAC) unless individual imbalance is helping the system balance.
3. Explicit procurement of balancing capacity reserves:
  - Reserves are purchased by the TSO on a daily basis (FCR, aFRR, mFRR, RR).
  - Primary procurement (portfolio-based) at 8:00 on D-1, supplementary procurement (unit-based) in the evening of D-1 and during the day (D).
4. More options for active participation of resources in the balancing market:
  - Increased pool of resources able to offer balancing energy and balancing capacity.
  - Aggregation is allowed for smaller units, mandatory unit bidding for larger units.

Below is a summary of the first results, four months after the reform's implementation:

1. The price dynamics on the balancing market are higher and better reflect the system state/contracting status.
2. Balancing market prices provides better signals for the day-ahead market, SDAC results (export and import) support power system balancing.
3. Although imbalance pricing is less attractive, some BRPs are still not properly balancing their portfolios.
4. Explicit procurement of balancing reserves suffers from a lack of liquidity (insufficient supply/competition).
5. In the near future, certification of new BSPs (such as RES) is expected, and market developments and general maturing of the market are expected to alleviate aforementioned problems to some degree:
  - Provision of balancing energy
  - Provision of balancing capacity (various types)

### **Other operational information**

A major modernisation of the Słupsk Wierzbęcino HVDC substation began on 20 August. The substation connects to the Starno substation in Sweden via submarine cable with a capacity of 600 MW. Modernisation finished at the end of October, and the interconnection was unavailable for market participants and any emergency delivery during this entire period.

Regardless of the market's results, whenever Ukraine asked for emergency assistance, Poland did its best to offer support by providing the requested level of power.



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# Portugal

## Winter Outlook 2024-2025

Portuguese national studies are performed using high detailed modelling, taking into account the specificities of the system, namely hydro generation.

As required by the current Portuguese national legislative framework, REN collaborates with the Portuguese General Directorate of Energy in elaborating the annual National Resource Adequacy Assessment Monitoring Report (Portuguese NRAA) to identify the mix of resources required to comply with the reliability standards in force. The National Resource Adequacy Assessment Monitoring Report (RMSA-E 2024) is currently under preparation and will address the electricity security of supply for the 2025-2040 horizon.

Although not fully comparable with the Winter Outlook performed by ENTSO-E in terms of methodology and assumptions, the expected report (RMSA-E 2024) for 2025 foresees some risk of dependence on imports from Spain and non-compliance with the current national reliability standards. Under these conditions, some mitigating measures might be necessary to handle operational reserve needs and ensure supply security, as listed below:

**Demand**    Load reduction market product for eligible consumers with whom there are annual contracts for the provision of this service.

Supply	Request for the activation of a support programme with the Spanish system operator.
Demand	Occasional load shedding of non-priority consumptions, according to the protocol between the electricity transmission and distribution network operators.

In RMSA-E 2024, load reduction needs (first measure above) will be identified for 2025, depending on available generation capacity and taking into account RES and hydro conditions. For this purpose, the Portuguese NRA will launch an auction for specific market products.

The security of the electricity supply in Portugal is highly dependent on generation from CCGT based on natural gas. However, no risks for the gas supply are expected during winter as long as there is no stress in the gas markets (at the end of October ,the level of underground gas storage was 3.7 TWh, at >95% full capacity).

## Summer Review 2024

As expected, no adequacy issues were found during the 2024 summer season, as hydro storage was high and weather conditions were less severe than in previous years.

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# Romania

## Winter Outlook 2024-2025

Transelectrica expects possible adequacy issues for winter 2024-2025. In case of the peak loads, the consumption cannot be covered by own resources in the absence of production in the wind and solar power plants. Consumption coverage can be achieved by importing from neighbouring systems if electricity is available in the region. The situation will be critical in case of unexpected unavailability of other generation units. The existence of sources available for export at the regional (European) level has a high degree of uncertainty. Other aspects that will increase the risks for adequacy are high consumption values at peak load, an estimated decrease in production in classical power plants, low production in solar power plants during the winter season, volatility of the wind power plants, limited capacity to compensate the deficit through hydro power plants, a lack of storage and demand side response, and the need to supply Ukraine and Moldova.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Serbia

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Slovakia

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Slovenia

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Spain

## Winter Outlook 2024-2025

No adequacy issues are expected for the upcoming winter, mainly due to the following key drivers:

- No problems related to gas supply are foreseen.
- The level of hydro reserves was at 55% at the end of October, 16% higher than the ten-year average value. This value is higher than the level of reserves expected at the beginning of the process for the Winter Outlook 24-25.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

Electric demand moderately increased with respect to summer 2023. Compared with 2023, demand was similar in July and rose by 3% in August, driven by the high temperatures recorded in this month. Nonetheless, maximum peak demand was lower than the previous summer, substantially due to PV self-supply.

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# Sweden

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

No adequacy issues were recorded during summer 2024.

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# Switzerland

## Winter Outlook 2024-2025

No adequacy issues are expected for winter 2024-2025.

## Summer Review 2024

Switzerland experienced its sixth warmest summer since measurements began in 1864. June was grey and damp in some regions, while July experienced above-average temperatures. August was the second-warmest month of August ever, with considerable sunshine and little precipitation in some regions.

Due to high reserves in snow and plenty of precipitation in the summer, the hydrological situation in Switzerland was outstanding. Between May and September, Switzerland exported on average 3,000 MW, with the peak in July averaging 5,300 MW. The availability of nuclear power plants was normal.



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# Ukraine

Russia's military aggression against Ukraine starting in February 2022 has continued during 2023 and 2024 and caused increased levels of risk and uncertainty in Ukraine's and Moldova's energy systems. Power generation and grid infrastructure availabilities in Ukraine are uncertain due to risks of attacks on these infrastructure objects, which might determine the actual situation in Ukraine's power system.

Since June 2024, following the destruction of numerous power plants in Ukraine and the anticipated large electricity deficit during winter 2024-25, the TSOs of Continental Europe have evaluated the feasibility of increasing the electricity export capacity from the neighbouring EU countries to Ukraine and Moldova, while ensuring power system stability and operational security.

For this purpose, the TSOs have jointly assessed the power system conditions and sought ways to maximise capacity for this winter. The results of the calculations have enabled the TSOs to secure an increase in export capacity limit to Ukraine and Moldova to 2,100 MW during this winter, representing an increase of 400 MW from the previous value.

This important increase in electricity export capacity is another sign of the strong support and solidarity of the European TSO community with the people of Ukraine and Moldova.

The 2,100 MW export capacity limit will apply from 1 December 2024. From March 2025, TSOs will be able to reassess the commercial capacity limit between the EU and Ukraine and Moldova on a monthly basis.