

A background network diagram consisting of numerous white and light blue circles of varying sizes connected by thin white lines, creating a complex web-like structure. The background is a solid teal color.

# **Summer Outlook 2023**

**Winter Review 2022-2023**

**country comments**

A white outline map of Europe, showing the continent's borders and major islands. It is positioned in the lower half of the page, behind the text.

**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 42 member TSOs, representing 35 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.

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# Introduction

This document includes individual country reviews on the security of supply situation in their system during the last season. The reviews are also 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 previous season and to 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 TSOs are also mentioned.

Comments on the expected adequacy situation and any 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 did not provide comments or reviews if there was no relevant information to be reported.

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# Albania

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.

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# Austria

## Summer Outlook 2023

No adequacy issues are expected for summer 2023. However, since Austria is centrally located in Europe it is highly dependent on developments in the neighbouring countries. Therefore, the general adequacy situation will be closely monitored.

However, prolonged heat waves (and elevated temperatures in general) could potentially present a stressing factor for the summer 2023, as production out of run of river plants could decrease significantly. Furthermore, this could influence efficiency of some thermal units in Austria.

## Winter Review 2022–2023

Statistically, compared to the mean temperature between 1991 and 2020, the temperature last winter in Austria was 1.6°C above in the lowlands and 1.2°C above in the mountains.

The amount of precipitation was average on a country level, however with large regional differences. In the western part, it was 15–60% drier than average, while in the south and east last winter showed 15–45 % more precipitation than the long-term average.

The hydro coefficient for the December 2022 to February 2023 period was 0.95, slightly below the 2016–2022 average. A closer look reveals a wide range in run of river production from production coefficients between 0.66 (late January and most of the February) and 1.32 in December. The energy stored in the reservoirs of the control area of APG as of mid-April 2023 is around 20% of the maximum storage volume, which is an acceptable and expected value for that time of the year.

The natural gas reservoir filling levels were at 66% in mid-April, which is well above the average for that time of the year.

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# Belgium

## Summer Outlook 2023

Elia does not foresee any adequacy issues for this summer as the power-plant availability forecast remains quite high.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season even with phase-out of Doel 3 (September 2022) and Tihange 2 (February 2023) executed as scheduled.

Except for the start of the nuclear phase-out, the availability of the production park was high. The demand reduced by 7% compared to the previous winters.

This considered, Belgium kept positive margins during most of the winter.



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# Bosnia and Herzegovina

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.

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# Bulgaria

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023. Although due to the boom of new installed PV capacities there might be some days where excess generation in the afternoon may not be compensated due to the limited downward regulating capabilities (Chaira Pumped Storage Hydro Power Plant is out of order).

## Winter Review 2022–2023

No adequacy issues were registered though there were a couple of unplanned outages in NPP Kozloduy which led to the loss of more than a 1000 MW of power generation. The upward regulating reserves and the energy quantities procured through the functioning and coupled Intraday (ID) market proved to be sufficient to deal with these incidents. In terms of demand the winter 2022-2023 could be classified as mild.

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# Croatia

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.

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# Cyprus

## Summer Outlook 2023

It is unlikely that Cyprus would experience adequacy issues during the summer 2023. However, because Cyprus is an isolated island, there is a small probability that adequacy issues could arise, through a combination of unplanned outages and unfavourable weather conditions.

## Winter Review 2022–2023

There were a few instances with low replacement reserve availability, due to a combination of unfavourable weather conditions and unplanned outages. However, no adequacy issues materialised.

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# Czech Republic

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season. Winter conditions were mild with temperatures above average and energy-saving measures led to a lower electricity demand. High availability of domestic sources helped the capacity margins of the Czech Republic to remain positive for stable levels of export. At the end of the winter, the gas storage levels were at around 60% which is significantly higher than in the past.

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# Denmark

## Summer Outlook 2023

Energinet expects a stable summer period with no adequacy issues, as there are minimal planned outages on power plants and interconnectors, and as three power plants are expected to be reactivated, increasing the thermal power capacity. This is however based on availability etc. from neighbouring countries.

## Winter Review 2022–2023

No adequacy issues were recorded during the past winter, primarily due to the mild weather and decreased demand. Additionally, in December, both power consumption and gas consumption were lower than expected, with power consumption down by 8% and gas consumption down by 21%.

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# Estonia

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.

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# Finland

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

Typically, summer peak demand in Finland amounts to 60–70 % of winter peak demand. Therefore, summer is not as critical from an adequacy perspective as winter. However, as summer is the high season for power plant maintenances and overhauls, there is less generation capacity available in summer than in winter. In addition, some maintenances on interconnections are foreseen for the summer season. Maintenances are considered in the Summer Outlook simulations according to the information available via urgent market messages during the time of data collection and estimated for smaller units that do not publish such information. Nevertheless, no adequacy or downward regulation issues are expected for the coming season.

## Winter Review 2022–2023

During the past winter, there were no adequacy issues recorded. However, there were uncertainties regarding adequacy caused by cutting Russian electricity and gas imports among others, and therefore many measures were taken ahead to prevent power shortages. Some old power plants prolonged phase-out and came back to the market, fuel supply was secured by Gasgrid Finland by commissioning a floating LNG terminal and Fingrid launched a voluntary power system support procedure, which helped to capture over 500 MW of capacity that was previously out of the balancing market. In addition, electricity saving reduced demand by 10% in November and December and by 5% in January and February. Peak demand decreased by over 8% compared to a normal situation. Besides these measures, mild weather kept demand at a low level.

Availability of domestic generation and imports were in general on a high level despite the few challenges faced during winter: Olkiluoto 3 commissioning was delayed and was not operating continuously through the winter; there was an unplanned outage of AC connection between Northern Sweden and Finland in December and availability of imports was lower than expected from Southern Sweden during Oskarshamn 3 outage. However, all situations were resolved without power shortages.

The peak demand hour was recorded on 9 March 2023 between 8:00 and 9:00 EET (Eastern European Time) with a demand reaching 12192 MWh which was nearly 3000 MW lower than all-time highest electricity demand recorded in Finland. At the peak demand, domestic electricity production was 11240 MWh and net imports were 952 MWh. In addition, the all-time highest electricity production was recorded on 8 January 2023 between 17:00 and 18:00 EET. At that time, the production was 13122 MWh and the electricity generation was high due to the strong winds and Olkiluoto 3 being in trial operation.



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# France

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023, neither on the upward nor downward margins. The decrease of the demand and a better nuclear availability are the main drivers of this conclusion.

RTE (TSO in France) remains highly focused on the evolution of planned outages of nuclear and hydro power plants (following ongoing social movement), on the hydraulic storage levels/energy and on the gas supply for the next winter outlook period.

## Winter Review 2022–2023

Due to a low availability of French nuclear power plants and to a lesser extent due to a low availability of hydro production resulting from the drought, adequacy risks were expected in France in winter 2022-2023. Finally, no adequacy issues were recorded during the past winter.

Adequacy situation in France has evolved favorably for the following reasons :

- **Nuclear:** Despite a high level of uncertainty due to the stress corrosion problem, the availability of French nuclear power plants was in line with RTE central scenario published in September 2022.
- **Hydro:** Responsible management of stocks (at the lowest in summer 2022) by operators and favourable weather conditions in the fall 2022 made it possible to maximize hydro production during the winter 2022–2023.
- **Interconnections:** The exchanges between European countries (electricity and gas) worked properly (no trade restrictions).
- **Demand:** electric demand dropped significantly and in an unprecedented way during autumn 2022 and 2022–2023. On average, a decrease of 9% was recorded compared to the pre-crisis average (2014–2019) under normal weather conditions. Power demand reduction affected all sectors (residential, tertiary and industry) both for economic reasons (either directly linked to high electricity prices or indirectly via inflation) and sobriety measures.
- **Temperature:** French electric demand is highly thermosensitive and despite occasional cold spells, winter 2022–2023 was relatively mild.

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# Germany

## Summer Outlook 2023

On 15 April 2023 the three last German nuclear power plants in operation were decommissioned.

Based on knowledge/assumptions at the time of data collection, the non-market resources for Germany contain as of 1 July 2023:

- Grid reserve: Used to resolve congestions and contains different types of power plants located in Germany. Currently, it comprises a total capacity of 3.6 GW. In the course of the preparations for the winter 2022–2023 coal-fired grid reserve power plants were allowed to return to the market. This of course reduced the grid reserve capacity accordingly in comparison to the previous years.
- Capacity reserve: Since 1 October 2022 and until 30 September 2024, a total contracted capacity of 1.1 GW of power plants outside the market is available as reserve for unforeseeable demand balancing events. These power plants must be available within 12 hours and are activated markets are not cleared (D-1 and ID). They can also be used to resolve grid congestions.
- Supply reserve („Versorgungsreserve“): Certain units of former lignite stand-by (“Sicherheitsbereitschaft”), which were transferred into the new supply reserve (from 1 October 2022 to 31 March 2024) according to German Energy industry act (“Energiewirtschaftsgesetz”). Currently, those plants are allowed to operate on the market according to an ordinance concerning the supply reserve until 30 June 2023. From 1 July 2023 they are assumed as non-market resources. They comprise an installed capacity of 1.8 GW, which has to be operational within 240 hours after activation.
- Special grid equipment (“Besondere netztechnische Betriebsmittel” [bnBm]): Quick-start capable power plants primarily intended to restore grid stability after a disturbance in the transmission grid. They can also be used to maintain generation adequacy, however, secondary to other non-market resources. One bnBm is currently already available (installed capacity of 300 MW). Three more bnBms will follow in the course of the summer (with installed capacity of additional 900 MW).

Parts of the above-mentioned non-market resources have primarily a different purpose than coping with resource adequacy risks, such as congestion management. Therefore, non-market resources may already partly be exhausted for their primary purpose and may not be available for the resource adequacy purposes.

In summer 2022 hard coal shipping problems due to low water levels in the rivers Rhine and Neckar and other logistic issues (e. g. limited railway transportation capacity) led to reduced availability of affected power plants especially in Southwestern Germany due to lack of the primary energy source. In case of similar weather conditions problems with coal transportation by ship could occur also in summer 2023.

In addition to the terminals already in operation, three further LNG terminals are planned to be operational in winter 2023–2024.

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 pumped-storage power plant Kühtai and storage power plant Silz (total turbine capacity: 0.8 GW; total pumping capacity: 0.25 GW) are also included in the German dataset.

## Winter Review 2022–2023

As described in German Country comments of Winter Outlook 2022–2023 there had been intensive preparations for the last winter, including return to and stay in the market of hard coal and lignite power plants and extension of operation of three remaining nuclear power plants by 3.5 months to 15 April 2023. Therefore, and due to favourable weather conditions no generation adequacy problems occurred.

The first LNG terminals, of which construction started last summer, were completed in winter 2022–2023. Due to the mild winter, the gas storage facilities are well filled at about 64% as of 1 April 2023.

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# Great Britain

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.

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# Greece

## Summer Outlook 2023

For the upcoming summer, there is no scheduled maintenance of generation units during high demand period (from mid-June until mid-August). There is low possibility that scheduled maintenance may be urgently extended to those high demand periods increasing adequacy uncertainty in case of simultaneous high demand due to possible heat waves.

In addition, the two new units (610 MW lignite [Ptolemaida 5]; 810 MW gas [Agios Nikolaos II]) are expected to still be in commissioning mode operation during the summer period. Both units are expected to be dispatchable after the summer.

IPTO (TSO in Greece) is in continuous contact with the Gas Transmission System Operator to be able to initiate the switch fuel procedure in some bi-fuel units (gas to oil) in case of an emergency. The operation with alternative fuel is limited to a few days and is only considered as an urgent countermeasure in case of lack of gas supply and not a continuous operation mode.

Water reservoir levels are lower than in the previous years due to the drought during winter 2023–2024 and the absence of inflows. The continuing absence of rain and drought conditions during the spring 2023 raises concerns about the availability of hydro power plants in the summer.

The total Net Transfer Capacities (NTCs) in the northern border are expected to increase, due to the new interconnection line between Greece and Bulgaria (Nea Santa—Maritsa) which is expected to operate within the summer period. There is no scheduled maintenance or capacity limitations on any of the other interconnection lines for the upcoming summer.

A decrease in consumption during the upcoming summer is expected in comparison with Summer 2022, due to the high energy prices and global energy saving measures.

Due to the worsening environmental conditions, extended fires in all Greek territories in summer periods occur increasingly more frequently in the last years, resulting in many cases in outages in parts of the Transmission System.

The expected generation and import capacity are sufficient to cover Greek energy needs under normal conditions and IPTO does not expect any adequacy issues, given that Gas supplies will be continuous and sufficient to cover domestic demand.

However, the Greek system will be highly depended on imports during high demand periods in order not to face any adequacy issues in high demand peaks.

## Winter Review 2022–2023

In context, last Winter was mild and dry while the average consumption decreased by 10% in comparison with Winter 2021–2022.

There was limited snowfall and rainfall resulting in lower water reservoir levels than expected.

Two newly constructed units entered into commissioning mode operation during the winter 2022–2023; Ptolemaida 5 a 610MW lignite unit and Agios Nikolaos II an 810MW gas unit.

No adequacy issues recorded.

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# Hungary

## Summer Outlook 2023

Based on the electricity demand in previous years, Mavir (TSO in Hungary) does not expect a new demand record, except under exceptional extreme weather conditions. Recently, numerous new PV plants have been added to the Hungarian power-plant park, however, no major conventional power plants have been installed. The continuously increasing PV generation in the Hungarian system can cause higher uncertainty in operational planning and real-time operation periods, which causes a higher level of reserve requirement. Fortunately, the level of maintenances is low and carefully distributed in periods which is an important to ensure system adequacy besides reliance on imports. Furthermore, our reserve procurement methodology has been renewed to match current challenges and conditions, so the amount of balancing capacity expected to be available is sufficient to secure the estimated reserve requirement over the period under review.

Altogether, the Hungarian power system is expected to be safe during this summer period. However, it is important to note that the oil embargo and a possible natural gas crisis could have unforeseen effects. In addition, high water temperatures and low water levels in major rivers due to low snow cover in the Alps can also be a risk in the following summer period.

## Winter Review 2022–2023

Compared to the previous year, a moderate consumption was observed in the winter period 2022–2023 due to milder weather and the market conditions. The maximum demand (7030 MW) was reached on 14 December 2022, which is below the historical peak demand. However, during the winter period, the PV generation record has been exceeded several times, peaking on 18 March 2023 with a value of 2362 MW. This can be explained by the high level of PV integration and the beneficial weather conditions. This is also one of the reasons why import were lower and export were higher than a year earlier. In addition, on several occasions significant downward regulation was necessary, once exceeding 1200 MW. The utilisation of conventional power plants was overall lower than in the previous winter. This occurred due to the fact that the market situation has made it economically unprofitable for some of the power plants to operate, resulting in a smaller, but still sufficient, amount of reserves available.

As preparation for the winter period 2022–2023 MAVIR (TSO in Hungary) tested almost all of the gas power plants' ability to switch to oil as an alternative fuel and its impact for the power plants' balancing capacity. We found that while most of the gas power plants can use oil as an alternative fuel, it causes a reduction in some of their balancing capacity. During the last heating season, the gas power plants, which can use alternative fuel also supplied data weekly to MAVIR about their alternative fuel storage levels, which we plan to apply again next winter if necessary. Fortunately, thanks to the milder weather and the fact that the gas situation did not escalate, last winter passed without any adequacy issues.

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# Ireland

## Summer Outlook 2023

We expect tight generation margins throughout the summer period at times of low wind generation output. There is risk of the system entering the Alert State. Currently, mid-May and the second half of September appear the most onerous periods.

## Winter Review 2022–2023

Dispatchable generation margins remained tight throughout the winter period. Despite a high unplanned outage rate (16.9%) and a cold snap in December, no System Alerts were issued. There was a record peak demand of 5544 MW on 14 December 2022 (17:25 local time). This was an increase of 153 MW over the record peak demand set during winter 2021–2022.

A number of initiatives were implemented in order to prepare for what was expected to be a very challenging winter period:

- Significant public communication through a "Reduce Your Use" campaign
- "Beat the Peak" initiative piloted by DSO with business and residential customers
- Demand Control procedures enhanced and exercised, including exercises on response by large energy users
- A multi-stakeholder exercise (gas, electricity and oil) was undertaken with the National Emergency Coordination Group
- Enhanced planning for areas previously not considered (secondary fuel replenishment in the event of extended gas emergency)
- System Margin Outlook reports issue twice a week to market participants and large energy users

Close coordination between government, regulator, TSO and DSO was effective in driving a range of interventions. Daily and weekly engagements between EirGrid(Ireland), SONI (Northern Ireland), National Grid (Great Britain) and other TSOs in the region were highly effective in leveraging the benefits of interconnection with significant support from Great Britain; trades as well as support when interconnector imports from EU were constrained.



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# Italy

## Summer Outlook 2023

### Upward adequacy assessment

Import from neighboring countries is expected to be necessary to ensure adequacy and to cover consumption in critical hours.

Coherently with internal analysis, this dependence from import is confirmed also by the ENTSO-E Summer Outlook Report 2023. The analysis results show that import is consistently high among different scenarios and that in many of them the transfer capacity is fully utilized during peak hours.

Critical situations could happen in case of high demand due to a heat wave, low import availability from neighboring countries, low renewable generation or if unplanned outages of generation units are higher than the typical values.

Furthermore, as emerged from last year, problems of adequacy are identified in a potential "extremely dry" scenario, with severely reduced hydro production and unavailability of thermal power plants that use water from rivers for cooling. According to long-term weather forecasts this scenario is possible and the situation is continuously being monitored by Terna.

Planned outages of power plants have been distributed in a way that minimize the unavailable capacity during the most critical weeks of the summer. Nevertheless, postponement and/or cancellation of planned outages could be further adopted as countermeasures together with demand response measures and additional market interventions.

In addition, improved regional coordination processes (regional weekly Short-Term Adequacy assessment [STA]; and Critical Grid Situation process) will support the identification of proper and efficient countermeasures in case the critical situation risk will be detected at the short-term horizon.

### Generation capacity in Italy

Since 2021, renewable capacity has increased (by 3.4 GW). Currently the total amount of installed renewable is around 60.1 GW.

Installed conventional thermal capacity also slightly increased and is now around 62 GW.

While some improvement has been observed in recent weeks, the level of hydro reservoirs remains critical, with values halved compared to mean historical values, slightly higher than last year.

### Downward regulation assessment

The worst weeks for downward regulation are expected to be the central weeks of August, the starting and the ending part of the summer period (June and September). In order to cope with this risk, the Italian TSO (Terna) prepared preliminary actions and emergency plans and, in case of need, will adopt the appropriate countermeasures. 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 Net Transfer Capacity (NTC) reductions, could be planned in cooperation with neighbouring TSOs.

## Winter Review 2022–2023

During last winter, the electricity demand decreased by approx. -5.8% as compared to the same period of the previous year.

Both consumption contraction and temperature trend influenced the decrease in demand, being the winter 2022–2023 warmer than the same period in 2022 (on average 1.4 °C warmer). Without considering the effect of temperature, the demand decrease was around 4.2%.

In light of the European scenario of gas demand reduction, during last winter Terna adopted as mitigation measure authorized by the Competent Authority the maximization of electricity production from alternative fossil fuels.

During the period under review there were no incidents with significant consequences on the electricity system or on the supply of electricity to consumers.

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# Latvia

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.

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# Lithuania

## Summer Outlook 2023

At the beginning of summer 2023 season net generating capacity Lithuania will be 4506 MW. Most noticeable changes were made in renewable energy sources generation. Wind net generating capacity increased by 53% and solar by 143%. These numbers will be rising through summer and all the way to the end of the year, due to the rapid growth of solar power and an additions of new wind parks. Starting 12 June Lithuanian PP G-8 (255 MW) will be on maintenance for the remainder of the summer season. This maintenance plan was not included in data collection for summer outlook 2023 adequacy assessment. It is expected to have no impact on the adequacy.

Litgrid (TSO in Lithuania) in order to ensure security of supply under isolated system operation (for isolated system test in 2023) has 1092 MW extra generation availability.

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

## Winter Review 2022–2023

In winter 2022–2023, national consumption was 11% lower than in winter 2021–2022. Maximum total demand (2136 MW) was reached on 12 January 2023.

The winter balance portfolio consisted of 37% local generation and 63% imports from neighboring countries. Largest import provider this winter was Poland. Litgrid has imported from Poland 58% more electricity than in the previous winter season. Solar generation increased by 23% compared with the previous winter. Main reason why local generation this winter season was higher than usual winter season was reduced national consumption and growth of renewable energy sources.

Import contributed significantly to adequacy in Lithuania.

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# Luxembourg

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.

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# Malta

## Summer Outlook 2023

No adequacy issues are expected for the summer of 2023, with non-market resources reducing the risk of EENS and LOLE in Malta. In Malta, the additional 215 MW of non-market resources in the form of emergency gasoil-fired back-up plants are available for dispatch at any time.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.

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# Montenegro

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.

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# Netherlands

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.



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# Northern Ireland

## Summer Outlook 2023

Ireland (IE00) is marked with adequacy risks in September. These risks are driven by unplanned outages of aging powerplants and will depend on wind generation if such outages will occur. The planned outage of conventional generation in Northern Ireland (expected to exceed 600 MW) also limits the capability to rely on imports from the Northern Ireland system. The actual adequacy situation in Ireland will depend on the operational conditions: on unplanned outages of aging generation fleet in Ireland and especially on wind generation.

## Winter Review 2022–2023

Dispatchable generation margins remained tight throughout the winter period at times of low levels of renewable generation. This was due to a number of unplanned outages on thermal units and reduced capacity on two large coal units. However, the system did not enter an Alert State. We experienced good wind conditions for most of the winter apart from a few short periods. Close co-ordination with other TSOs in the region enabled imports on a number of occasions to ensure we did not enter an alert state.

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# North Macedonia

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.

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# Norway

## Summer Outlook 2023

Adequacy problems could have appeared in the spring (weeks 17–20) if the reservoir levels have not improved and have there been supply shortages in neighbouring countries. But as mentioned under winter review 2022–2023 below, the problems disappeared, and Statnett (TSO in Norway) does not expect any adequacy problems in the summer.

Statnett expects this to be the situation also at the start of winter 2023–2024, however depending on the weather. Under average hydro inflows, no adequacy risks in any of the Norwegian areas are expected; which means Loss of Load Expectation and Expected Energy Not Served in Norwegian areas are expected to be close to zero.

If hydro inflow would be low in 2023, Norway will rely on imports. If in addition neighbouring countries experience long-lasting nuclear powerplant outages or shortage of gas supply, we may have a strained situation in Norway in winter 2023–2024. On the other hand, high power prices, might reduce the demand and increase import, which leads to an improved adequacy situation in the next winter.

## Winter Review 2022–2023

In mid-2022 there were concerns about the reservoir levels in southern Norway. This was due to a very dry weather combined with a high export from Norway early 2022.

Due to the combination of high precipitations from September 2022, demand reductions, moderate temperatures, some imports during the winter and an increased awareness, the reservoir levels have improved, and are now at a normal levels for this time of the year.

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# Poland

## Summer Outlook 2023

Based on the recent RES development observed, especially PV sources, PSE expects downward regulation problems on days with high RES generation, PV in particular, and low demand. Detailed analysis will be performed over the week ahead and operational planning horizon.

On 2 May 2023 the former PL-UA Rzeszów–Khmelnyska 750kV line, not in operation since 1993, was recommissioned on the voltage of 400kV. This creates new opportunities in the electricity exchange with Ukraine, since the existing interconnection, the 220kV Zamość–Dobrotvirska line, is a radial connection (generating units in Dobrotvirska PP separated from the UA system) and only allows imports to Poland.

## Winter Review 2022–2023

From operational point of view, a situation during autumn 2022 and winter 2022–2023 was highly challenging. PSE (TSO in Poland) had to manage the system in the tight power balance resulting from large scale of unavailability of units in coal-fired power plants, caused by low level of coal stocks.

In fact, the problem started at the beginning of the winter of 2021–2022, when gas prices increased. As a result, coal-fired power plants were used more often. Their high utilisation led to a significant fall of coal stocks at power plants which required level is determined by national regulations. Russia's military aggression against Ukraine in February 2022 increased the levels of risk and uncertainty over the future availability of fuels and pushed up their prices to unprecedented levels. Polish government's decision, taken two months after the invasion, to stop coal imports from Russia (total import in 2021 accounted c.a. 15% of domestic coal consumption) resulted in the deterioration of coal balance situation at the national level. It should be noted that hard coal in Poland is used not only for electricity generation, but also for heating purposes: by district heating plants and by large number of households. All these factors as well as extremely reduced coal supply in Europe resulted in the inability to rebuild coal stocks at the power plants in the spring and summer of 2022.

In the early summer 2022 it became clear that the country's coal balance in the coming autumn–winter period would be very tight. Therefore, Polish authorities decided to emergently procure coal and to create joint PSE and ministerial team tasked to monitor coal balance; and to identify and remove possible administrative barriers related to the coal handling and transportation. It was necessary, as typical import direction was changed from east (by railway only) into north (via seaport handling and internal transportation with limited coal wagons). PSE contributed to the estimations of the coal needed for electricity generation and assessment of possible limitations of the use of coal-fired power plants. The information on the limitations were also transferred to the dedicated ENTSO-E Winter Outlook scenario —combined sensitivity. The Winter Outlook simulations, under this scenario, showed adequacy risks in Poland (LOLE reaching 10h on average) with consideration of possible imports from abroad. The detailed results per climate year (weather scenario) highly varied, as risks depend on weather conditions: RES infeed and temperature affecting the demand. The correlation was following: high RES generation and low–moderate demand meant no adequacy risks; low RES generation and high demand—adequacy problems.

At the same time PSE simulated the scenarios in which the coal generation would actually be limited, just to be ready for the worst case situation: rolling disconnection procedures were reviewed and updated. Power balance management has also been improved to better anticipate possible scarcity periods. PSE also took an active part in the development of amendments to the regulation on mandatory fuel stocks for power companies.

Eventually, the autumn and winter 2022–2023 were rather mild from a weather perspective, also RES generation helped PSE to balance the system and operate safely. On the other hand, there were days and hours with downward regulation problems, especially during the Christmas and New Year period, when it was necessary to curtail windfarms (reduce generation) to maintain downward reserves at a safe level.

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# Portugal

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

There were initially some fears about the impact of a dry winter on system adequacy, especially in conjunction with the outage of an important combined cycle unit that would last all season. However, from mid-November hydro conditions changed to favourable and no issues were recorded.

In our National Adequacy Assessment Monitoring Report (RMSA-E 2022), demand reduction needs (market balancing product for eligible consumers with whom there should be annual contracts for the provision of this service) were identified for 2023 ranging between 600 and 1050 MW, depending on hydro conditions. For this purpose, two auctions for a specific market balancing product were launched by the Portuguese National Regulatory Authority (NRA) resulting in 317 MW to be available during 2023. So far, this measure was not needed.

Moreover, following the REPowerEU Plan on May 2022, the Resolution of the Portuguese Minister Council nr. 82/2022 defined preventive measures to deal with short-term expected energy adequacy crisis and possible future energy disruptions, bearing in mind the guarantee of security of energy supply. Strategic limitations to hydro levels in large reservoir were established (and maintained in 2023) as well as the Energy Savings Plan for 2022–2023 that includes separate reduction measures for the areas of energy, water efficiency and mobility, and covers the Public Administration and private sectors.

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# Romania

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.

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# Serbia

## Summer Outlook 2023

For the upcoming summer, we do not expect problems to cover demand. Coal mining is stable, the hydro reservoir levels are high and the levels of maintenance are moderate. The significant energy exports are expected under normal weather conditions through the summer months.

Severe weather conditions—i.e. extremely high temperatures and longer dry periods, or extremely high peak of demand—might lead to a lower than expected export of energy or even to the energy import to cover the demand.

## Winter Review 2022–2023

The last winter passed without major problems. Weather conditions were with periods of higher temperatures than usual and without longer periods of very low temperatures. The energy situation in Serbia last winter was stable thanks to the measures established by the government, a mild winter and stable electricity production.

The electricity generation in the winter 2022–2023 significantly exceeded generation in the previous winter. The hydrological situation was significantly better than in the previous winter, which had an impact on higher hydro power plants production of electricity. Thermal capacities are also achieving good results compared to the previous year.

All this led to slight surpluses and energy exports.



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# Slovakia

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.

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# Slovenia

## Summer Outlook 2023

For the upcoming summer expected generation and import capacities are sufficient to cover all energy needs of Slovenia and consequently we do not expect any adequacy issues.

Scheduled maintenance of generation units is similar to previous years, with all major units in operation during the whole period. During the period from 3 June till 16 June 2023 the pumping hydro power plant ČHE Avče (nominal power 180 MW) will be in maintenance, therefore we expect that in the event of low demand and high solar generation an export of maximum 100 MW might be required.

## Winter Review 2022–2023

The winter was mild, without long periods of extremely low temperatures and without plenty of snowfall. During it, nuclear powerplant Krško was in planned maintenance from 1 October till 2 November 2022. Simultaneously, from 14 October till 5 December 2022 our biggest thermal power plant TEŠ6 was out service due to lack of primary energy source as a consequence of a coal mine pit collapse. So, during that time our two biggest power plants were simultaneously not available, however we did not identify any adequacy issues, mainly because we made good preparation before the winter. Our gas supplies were full, our import capacities are always high and also the overall demand in the period was low, thus the winter passed without any adequacy issues.

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# Spain

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

Nevertheless, adequacy margins can get tighter at the end of the summer if the drought conditions in Spain continue in the next months combined with extended heat waves and high temperatures.

## Winter Review 2022–2023

Despite the uncertainties at the start of the season, no adequacy issues were recorded during the past winter. Main reasons of this result are:

- Due mainly to favourable weather conditions at the end of the year, the level of hydro reservoirs increased from a low point of 20% at the beginning of October to 45% at the end of December.
- Demand decreased substantially. For example, electrical consumption decreased by 8% in December 2022 with respect to the same month of the previous year. Mild temperatures and public measures to reduce consumption were the drivers of this factor.

In addition, Red Electrica (TSO in Spain) developed a specific balancing product for demand: Active Demand Response Service, to be applied to tackle shortages of balancing reserves. However, it was not needed during the season due to the factors mentioned above.

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# Sweden

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

Due to several factors, such as uncertain fuel supply on the continent, low reservoir levels in Norway and nuclear power plant unavailability in Sweden and Finland, readiness was elevated prior to and during the winter 2022–2023 winter. A task force was created to monitor the development. Resources for counter trade were contracted to keep transmission capacities high from northern to southern Sweden.

In the end, no adequacy issues occurred during the winter and the strategic reserve was never activated. The peak demand was lower than normal due to mild weather, high electricity prices and public campaigns about the current situation. Even though an adequacy issue was not close, the net import during the peak hour was record high.

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# Switzerland

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

The wintery first half of December 2022 was followed by a very mild period that lasted until the middle of January 2023. There was little snowfall in the Alps. During the second half of January, the temperature dropped. In February again, the weather was mild; there was a lot of sunshine in some regions and particularly low precipitation.

The operation of the transmission grid was rather smooth in the winter. At the end of 2022 and the beginning of 2023, almost the entire grid was available. Manageable bottlenecks appeared only temporarily and locally. The construction and the commissioning of the second 380 kV link between Pradella and Robbia relieved the grid in that region. The temporary 380 kV operation of the lines between Chippis and Bickigen as well as between Bassecourt and Mühleberg also positively influenced grid security. The problem consisting of too high voltages lessened during the winter. There were no large disturbances of grid elements as well as no exceptional events.

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# Turkiye

## Summer Outlook 2023

No adequacy issues are expected for the summer 2023.

## Winter Review 2022–2023

No adequacy issues were recorded during the past season.