

Baltic Sea region resource adequacy in winter 2024-2025

Baltic Sea Adequacy Working Group

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Stakeholder webinar scope

1. Key messages
 2. Risks and challenges
 3. Compiled analyses of the upcoming winter
 - ENTSO-E Winter outlook
 - Out-of-market capacity overview
 - ENTSO-G Gas supply outlook
 - Hydro reservoir levels
 4. Review of last season
 - Lessons learned
 5. The Baltics synchronization with CESA
- Country takeaways/comments

1. Key messages for winter 2024-2025

- There are **no significant resource adequacy related risks** identified for the Baltic Sea region, but there are some local risks:
 - **The margins** where supply exceeds demand **are lowest in Finland, Poland, and Estonia**. During scarcity periods export from these countries may be limited
 - **Risk of unexpected desynchronization** remains in the Baltics until February 2025
- In general, **all the quantifiable indicators** like hydro reservoir levels, gas storage levels and demand projections **are like last year's winter and upcoming months are expected to be stable**.
- If some unexpected outages or long cold spells should put the electricity market under stress, then **there is a significant amount of out-of-market capacity** which could be activated to ensure system reliability.
- Lessons learned from last year that **timely communication** about the stress in the electricity market **can be enough to allow the consumers to reconsider their energy consumption**
- **The successful synchronization with the Continental Europe Synchronous Area remains the main focus** in the Baltic countries for the upcoming winter. Preparatory works are proceeding according to plan and this risk of unexpected desynchronization from the Russian grid becomes more manageable

2. Risks and challenges

2. Realised, potential adequacy risks and challenges in the Baltic Sea region

	Downward regulation during high-RES periods
	Low level of dispatchable capacity compared to peak load
	Nuclear generation outages and/or risks for delays in start-ups
	Risk of unexpected desynchronization from Russian electricity system
	Gas supply disruption



There will always be risks related to longer cold spells, which could have unpredictable outcomes.

2. Potential adequacy risks and challenges in the Baltic Sea region - explanations

POTENTIAL RISKS

Sweden		Availability of nuclear power is reduced due to maintenance
Estonia, Finland		The ratio between peak demand and dispatchable capacity is showing increased reliance on imports and renewable generation to cover all the demand. This risk is further increased as both Finland and Estonia are usually influenced by the same cold spells and the need for imports from neighboring countries might coincide.
Estonia, Latvia, Lithuania		Unexpected desynchronization from the IPS/UPS means that the Baltics needs to synchronize with the CESA without a notice and possibly under unfavorable conditions. This could cause high prices and market interventions to ensure operational safety.

CHALLENGES

Poland		There is high RES increase in Poland observed recently, therefore downward regulation may be a challenge, especially during holidays / Christmas days, when high level of RES infeed will occur during low load periods. Some non-market actions might be necessary to ensure power balance
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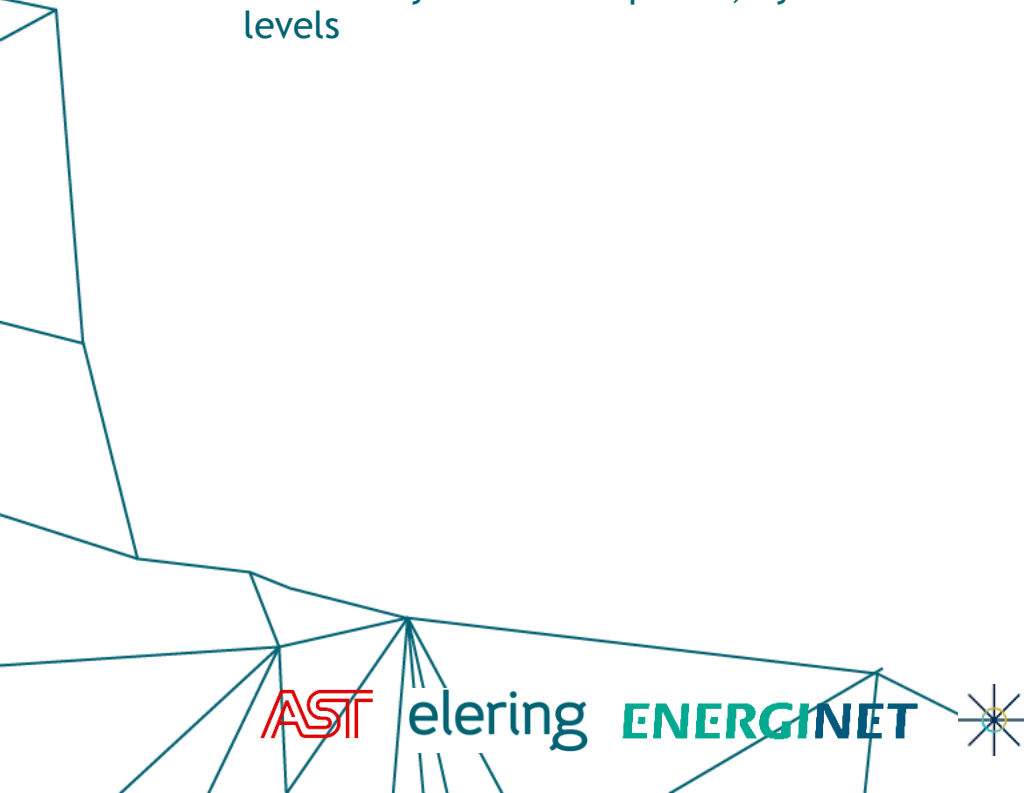
3. Compiled analyses of the upcoming winter



3. ENTSO-E Winter Outlook

- Winter Outlook 2024-2025 report is planned to be published on the 15th November
 - [REGISTRATION LINK](#)
- Region's average peak demand has remained in the same range, maximum peaks have increased by 2%
- Availability of thermal plants, hydro reservoir and gas storage levels are at high levels

Winter Outlook 2024–2025



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3.1 Out-of-market resources in the Baltic Sea region

In case countries deem it necessary significant amount of capacity could be activated to alleviate adequacy issues.

Reasons why some units are out-of-market (OoM):

- economically not viable
- emission limits are exceeded
- old equipment needs investments to remain operational
- they have tasks related to operational safety

In addition to generation side, a non-market DSR may be available e.g., as a part of Capacity Market.

3.2 Out-of-market resources in the Baltic Sea region

Country	Demand/Supply capacity, MW	Activation time/Comment
Germany	3440+6008+1146+400=11000	Respectively gas, hard coal, light oil and other capacity. Mostly reserved for grid services
Estonia	192+250=442	Activation can take up to 20 hours
Lithuania	53	Not available unless investments are made beforehand
Finland	565	OoM due to economic reasons, National emergency reserve for severe disruptions and emergencies
Sweden	560	Strategic reserve with normal activation time of 14 hours or under increased alertness 2 hours
Denmark	82+260+142+640+357=1481	If deemed necessary, it must be investigated with the specific operator whether these can be put back into operation, as this will depend on factors such as time limits and what they are intended to substitute. To restore operation, investments are required.
Poland	1469 (in Q4 2024) 1400 (in Q1 2025)	DSR in the Capacity Market. The activation can be done no later than 8 hours before scarcity period. DSR can be activated in weekdays only, between 7:00 and 22:00.
SUM	max 15570	

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3.3 Fuel supply- gas

- Pan-European geographical scope, might not be equally affected
- During a **normal/reference winter** no gas demand curtailment is expected even within main sensitivities scenarios like Russian supply disruption and low LNG supply- end of winter gas storage levels may vary
- During **cold winter**:
 - no demand curtailment is expected when no restrictions in LNG imports are happening
 - If LNG imports are low, then at the end of the winter some countries might empty their underground gas storages (UGS) to a lower level than is set as targets (target is 30% volume left by end of winter)
 - If no gas is imported from Russia throughout the winter, then LNG imports and UGS infrastructure might not be sufficient to supply peak demand and some demand curtailment of 3-8% can be expected (depending on LNG imports).



ENTSO WINTER SUPPLY OUTLOOK 2024/2025

Including Summer 2025 Overview

Source: <https://www.entsog.eu/outlooks-reviews#winter-outlooks-and-reviews>

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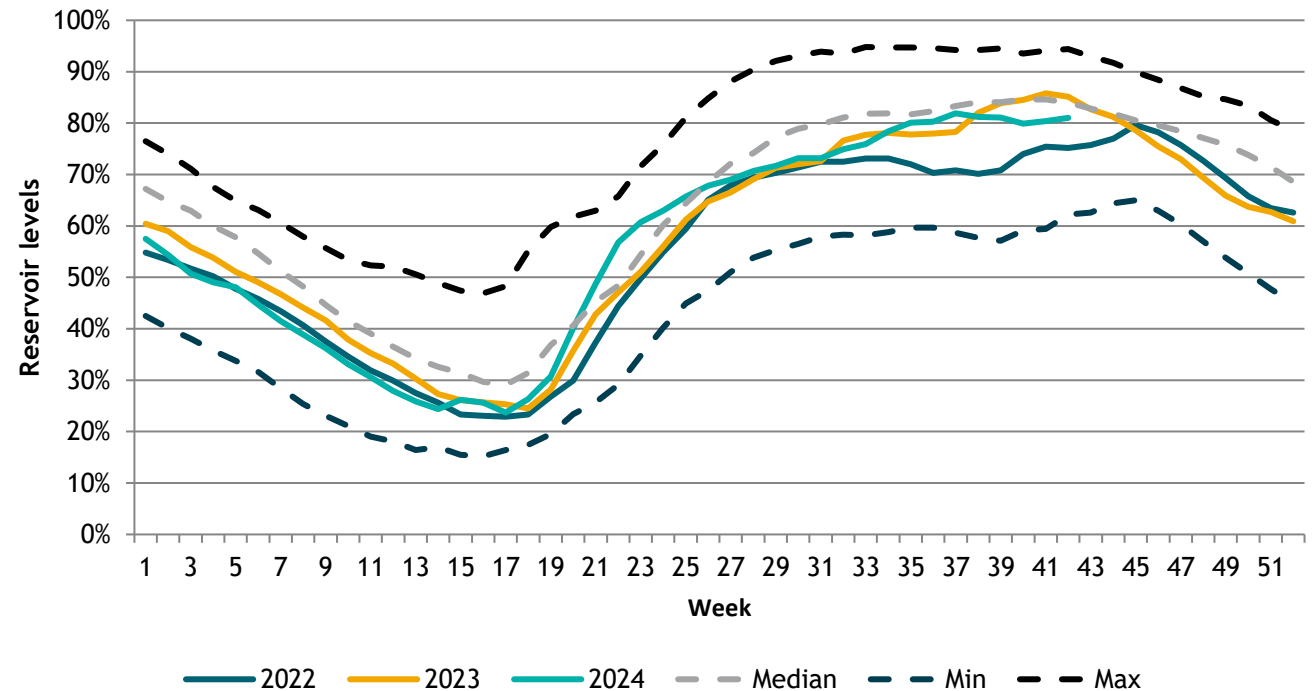
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3.4 Fuel supply- hydro

- Hydro reservoir levels in the Nordics are good- almost at median level of the last 20 years.
- At week 42 there is 103 TWh of energy, last year at the same time it was 5 TWh higher.
- All time maximum was 121 TWh in 2012.



Source: <https://hydro-reservoir.nordpoolgroup.com/rescontent/area/rescontent.cgi>

4. Last winter review & lessons learned



4. Case 1- of Beginning of January in the Nordics and Baltics

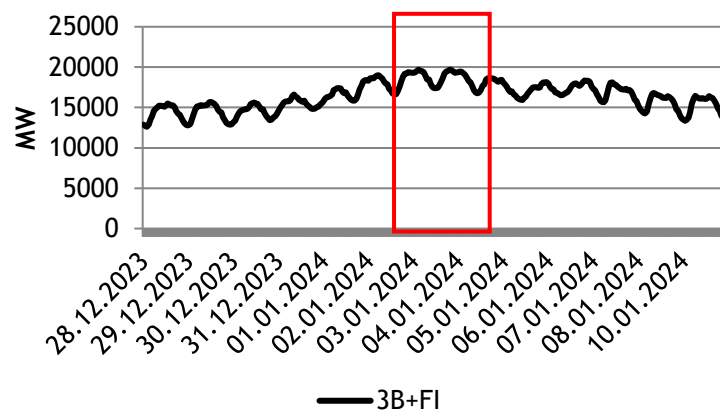
Storyline:

- The Baltics and Nordics (especially Finland) experienced a several-day long cold spell. Lowest temperature records were recorded or repeated in some areas.
- Electricity demand kept growing as long-lasting cold cooled down even buildings with a large thermal inertia, and keeping these heated required a lot of energy.
- Some powerplants were in maintenance during this time, but there was no “perfect storm” in terms of bad coincidences with outages. Electricity market was able to well supply the critical region as import to 3B+FI was maxed out. In 3B+FI there was no major bottlenecks, as there was sufficient distribution of generating units.
- Most stressful was 4th of January, Thursday, that’s also when the regional peak demand of 19 690 MW was recorded (*see graph on the next slide*). There were several times where the price for balancing energy in Finland reached 3000 €/MWh. In the first days most likely the BRP-s did not know how the consumers were reacting to the weather and forecasted lower demand than realized and on the 5th January the consumers were better informed about the severity of the situation and due to that demand was lower than forecasted. On the 4th of January Fingrid and the Finnish Minister of Energy made a call-for-action to reduce consumption if possible, which might have helped to reduce the realized demand on the 5th January.
- By analyzing the Nordpool supply and demand curves (without block bids) the lowest supply margin was of in the range of 300-600 MW (*see graph on the next slide*).



4.2 Overview of the Baltics and Finland

3B+FI DEMAND 28.12-11.01



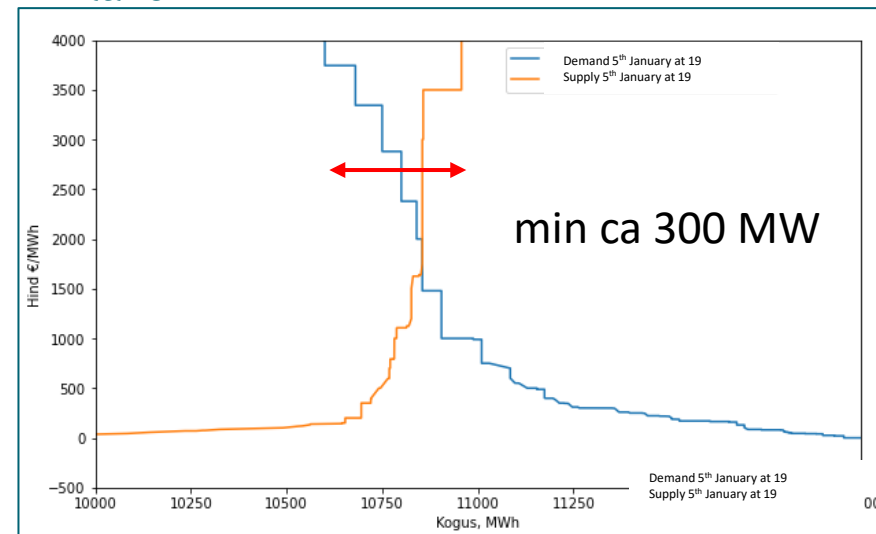
Realized

- Max 19 687 MW
- 4th January 09:00:00

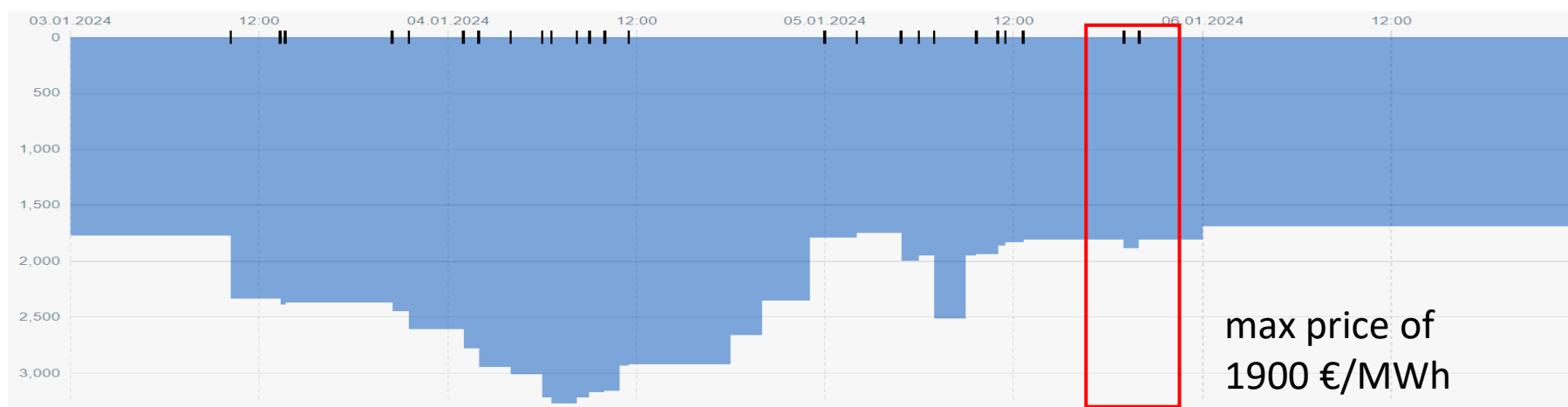
Forecasted by ENTSO-E / TSO for Winter Outlook 2023-2024

- Average peak demand 19 527 MW
- Max peak demand (cold winter) 20 838 MW

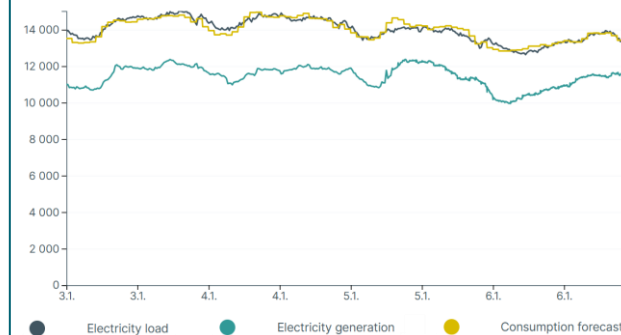
• Nordpool's aggregated bidding curve for Finland



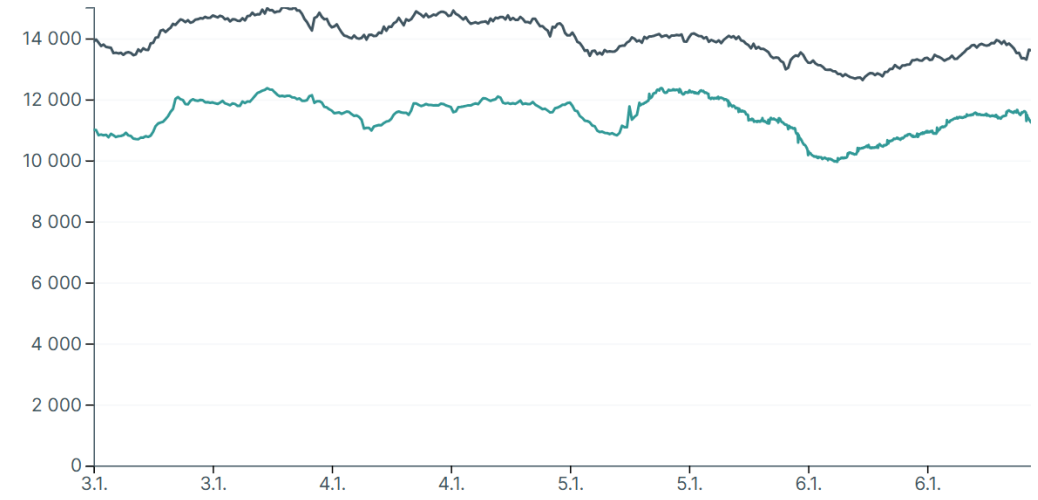
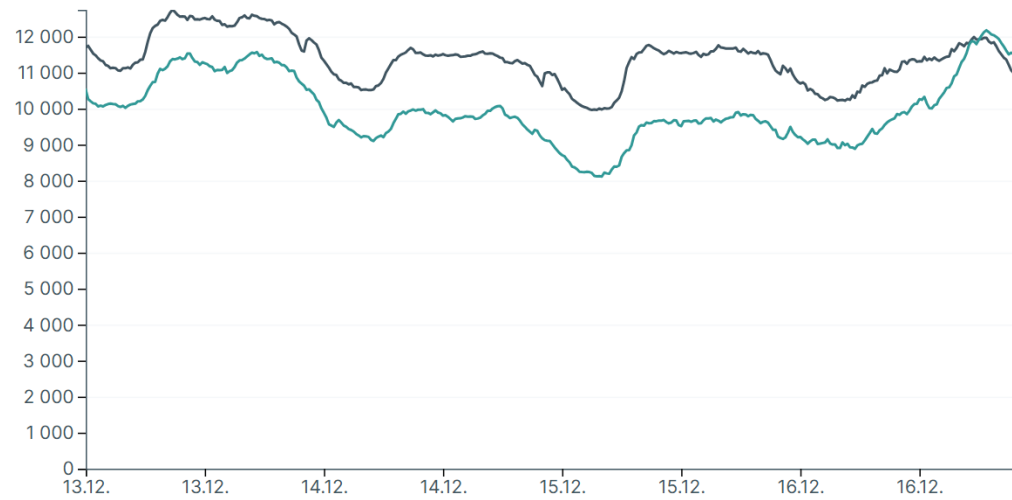
Outages for 3B+FI during 3rd-6th January



• Load, generation and load forecast of Finland



4.3 Change in demand during cold spell and extreme prices in Finland



Electricity load



Electricity generation

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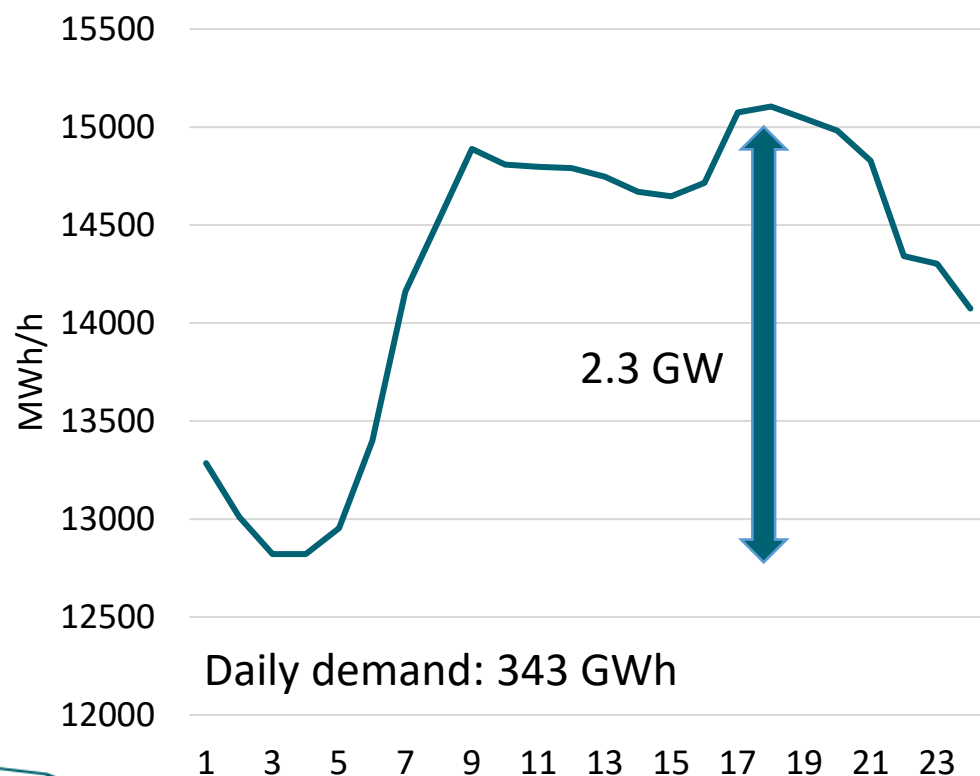


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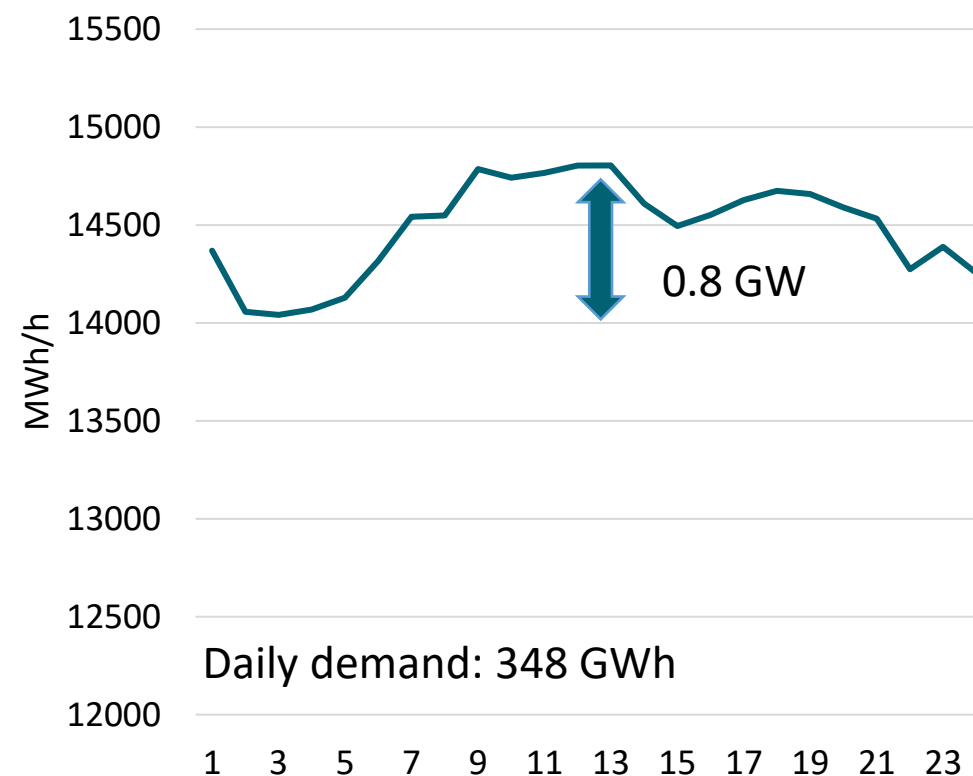
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4.4 Demand response & shifting was the main reason why the hourly consumption record was not shattered

- Consumption 7.1.2016 (day of the all-time high hourly demand)



- Consumption 4.1.2024



Source: Fingrid

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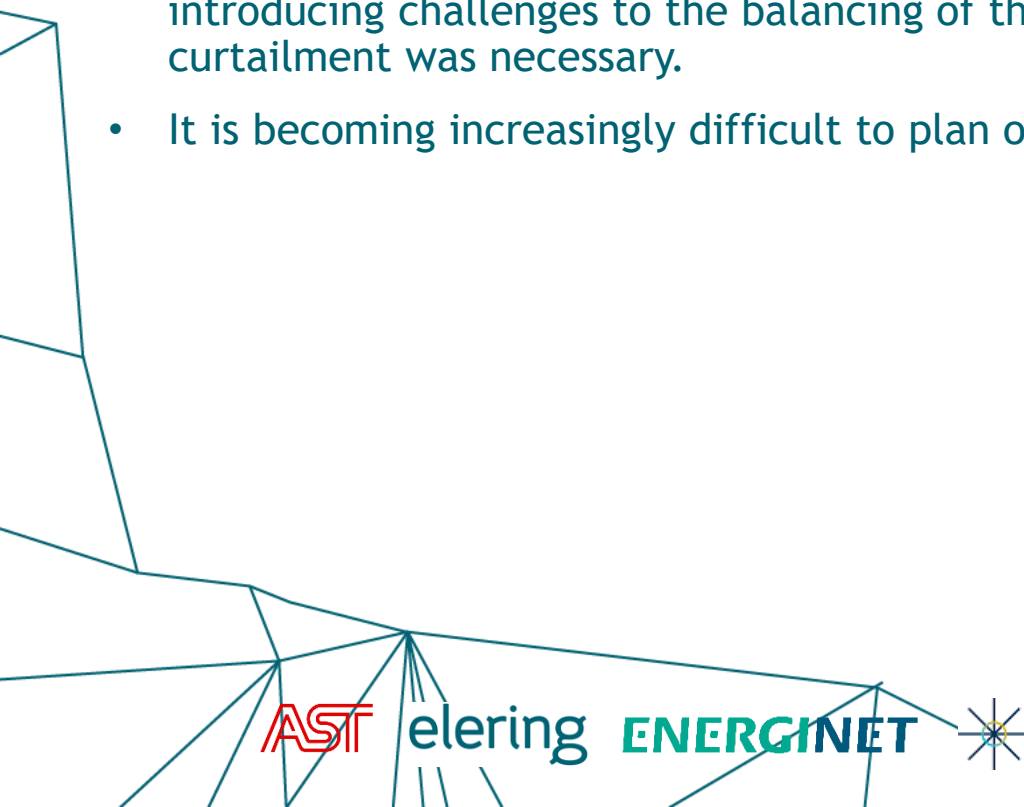
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4.5 Lessons learned

Overall

- Combination of market (price) signals and communication from TSO/authorities can effectively relieve stress in the grid already the next day.
 - Market participants are learning quickly from their experience (visually seen from bidding curves).
 - The difference between day and night demand has seen to decrease.
- Operating a RES-heavy system is becoming a systematic challenge for several TSO-s. RES forecast errors are introducing challenges to the balancing of the system and overproduction has caused many cases where RES curtailment was necessary.
- It is becoming increasingly difficult to plan outages due to increasing number of both consumers and producers



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5. The Baltics synchronization with CESA



5. The Baltics synchronization with CESA

- In August, 2024 the Baltic Transmission System Operators informed other parties of their joint decision not to renew the BRELL contract and to withdraw from the UPS system. The Lithuanian, Latvian and Estonian systems are scheduled to be **disconnected from the Russian system on February 8, 2025** and the first joint isolated operation test will begin. **Connection to the Continental European synchronous area is scheduled for February 9, 2025.**
- The risk of unexpected desynchronization from the Russian (IPS/UPS) network remains in the Baltic countries. Preparatory works are proceeding according to plan and this risk is becoming more manageable with each passing month

Country takeaways/comments

Country comments - Germany

Changes in market and non-market generation capacity

Germany's so-called market returnees, which were brought back to the market in 2022 due to the gas crisis, expired at the end of March 2024. This summer, there were 9 GW fewer capacity of thermal and hydro power plants on the market. Of these, 3.4 GW returned to the grid reserve at the beginning of April. The remaining 5.6 GW were permanently decommissioned.

Germany has around 11 GW of reserve capacity outside the market. At 8.6 GW, the grid reserve accounts for a large fraction of all reserves. It is primarily used to manage grid congestions.

Load

The national load increases relatively moderate at a rate of roughly 1%, as economic growths is stagnating and new consumers (e. g. heat pumps and electric vehicles) didn't reach the expected expansion rates.

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Country comments - Poland

Comments/takeaways

Successful synchronization with the CESA is our main challenge this winter.

OUT-OF-MARKET CAPACITY

PSE has non-market resource, DSR as a part of Capacity Market, which can be activated to mitigate adequacy. The potential level amounts is:

- 1469 MW in Q4.2024
- 1400 MW in Q1.2025

In the context of adequacy, this is important level of capacity and fully prevent identified risk.



Country comments - Denmark

Comments/takeaways

The main focus throughout the winter will be on the new market models, both those that have already been implemented and those that are in the process of being introduced, to ensure their successful operation.

In addition to this, we will also be concentrating on several planned outages for some of our key lines. Some of these outages are expected to reduce the capacity on the interconnectors, however none of the outages are expected to pose challenges for power adequacy.

OUT-OF-MARKET CAPACITY

Central power plants that have been approved for conservation and decommissioned by the Danish Energy Agency. If deemed necessary, it must be investigated with the specific operator whether these can be put back into operation, as this will depend on factors such as time limits and what they are intended to substitute. To restore operation, investments are required.

Conserved power plant units that can potentially be recommissioned:

- H.C. Ørstedsværket HCV7 (82 MW)
- Kyndbyværkets blok 21 (260 MW)
- Asnæsværkets Blok 2 (142 MW)
- Asnæsværkets Blok 5 (640 MW)
- Studstrupværkets blok 4 (357MW)

Country comments - Finland

The trend in the Finnish power system has remained consistent over the past years, with thermal power plants utilizing fossil fuels being decommissioned and a notable increase in wind power capacity. Over the past year, wind power capacity has increased by 1400 MW and solar by over 200 MW. The adequacy of electricity increasingly relies on wind power generation, and during cold and calm days, the reliability of domestic power generation and interconnectors is crucial.

DECOMMISSIONED CAPACITY

- Naantali (130 MW) - The unit is being mothballed in December 2024 due to environmental reasons and its low usage.
- Suomenoja (70 MW) - The last coal burning unit of Suomenoja was mothballed in April 2024 due to environmental reasons and its needs for investments which are no longer technically and economically viable.

OUT-OF-MARKET CAPACITY

- Meri-Pori (565 MW) - National Emergency Supply Agency has reserved the production for severe disruptions and emergencies and has not been available for market since March 2024 due to not being commercially viable anymore.

Country comments - Estonia

Comments/takeaways

Successful synchronization with the CESA is our main challenge this winter.

OUT-OF-MARKET CAPACITY

- Balti 11 is mothballed since April 2024 due to economic reasons. Will be back on the market if TSO requests. Activation will be up to 20 hours. [UMM link](#)
- Estonian TSO has an emergency powerplant OCGT for black start capability which can also provide ancillary services until the end of 2027. Could be activated within minutes.

Country comments - Lithuania

Comments/takeaways

The main focus in the coming winter season is to make the synchronization with the continental European network happen as planned (February, 2025)

OUT-OF-MARKET CAPACITY

- In Lithuania 53 MW capacity is mothballed since 2017. This capacity will never be available again, because useful lifetime is expired. To restore operation a large investment is required, and power plant is quite old (1975).