

Winter Outlook 2022/2023

1 December 2022 – Stakeholder webinar



Gerald Kaendler, Chair of System Development Committee, ENTSO-E

Cindy Bastiaensen, Convenor of Seasonal Outlook Steering Group, ENTSO-E

Jacques Reberol, Modelling subject Manager, ENTSOG

Moderation: Alban Joyeau, Adequacy Manager, ENTSO-E



Housekeeping rules

You are welcome to place **your questions directly through [sli.do](#) (#2636536)**.

In **Sli.do**, feel free to vote for the most relevant questions posted.

Indicate **your name and company** when posting your question.

The moderator will select a couple of questions and ask the relevant speakers to comment.

Chat & 'raise the hand' features of Gotowebinar will not be used.

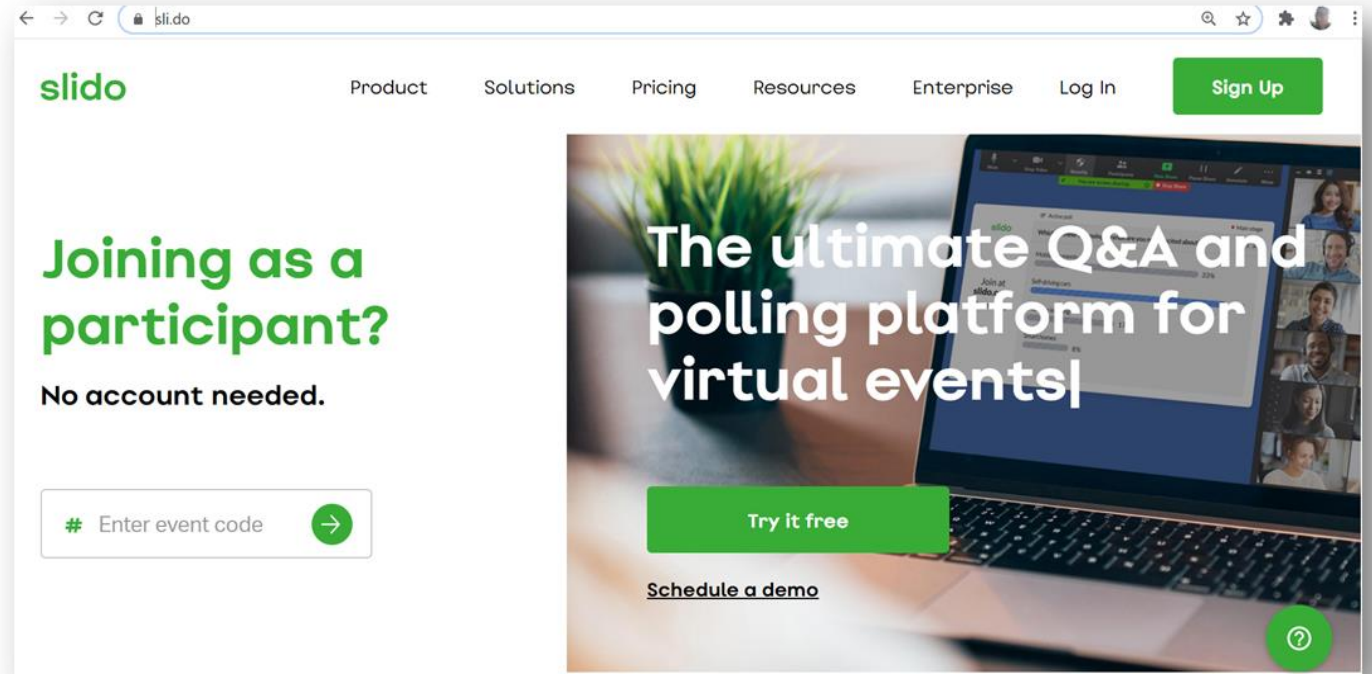
The recording of the webinar will be made available on the ENTSO-E website.



Q&A:



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Agenda

Introduction

Gerald Kaendler

Electricity Winter Outlook 2022/2023

Cindy Bastiaensen

Gas Winter Supply Outlook 2022/2023

Jacques Reberol

Q&A with the audience

Moderated by Alban Joyeau

Introduction

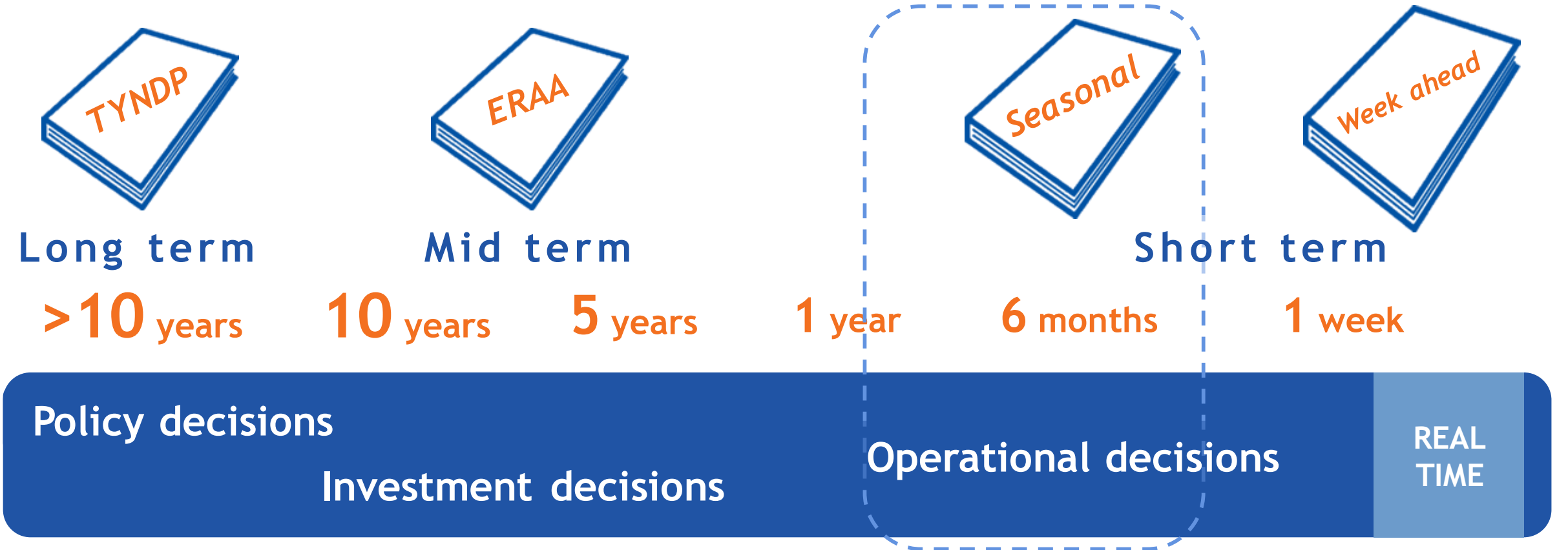
The European energy context is in a more critical situation than previous winters

- ① Winter outlooks provide **an assessment of the security of the electricity / gas supply for the upcoming winter season across Europe**. They identify adequacy risks that the European system faces. The assessment is based on a reference scenario and of various sensitivities, which consider uncertainties that could materialise.
- ② Winter outlooks give insights for actions by authorities and market actors. It informs on **measures ENTSO-E, ENTSOG and the TSOs** are taking to prepare for the winter and coordinate at all levels to build resilience to the uncertainties/risks for the power system in the current context of energy scarcities.
- ③ Measures need to be taken by all actors of the system. Continuous & **close dialogue between TSOs, and with European and national authorities** is ongoing to enable timely coordination and support risk preparedness efforts at all levels.

Electricity Winter Outlook

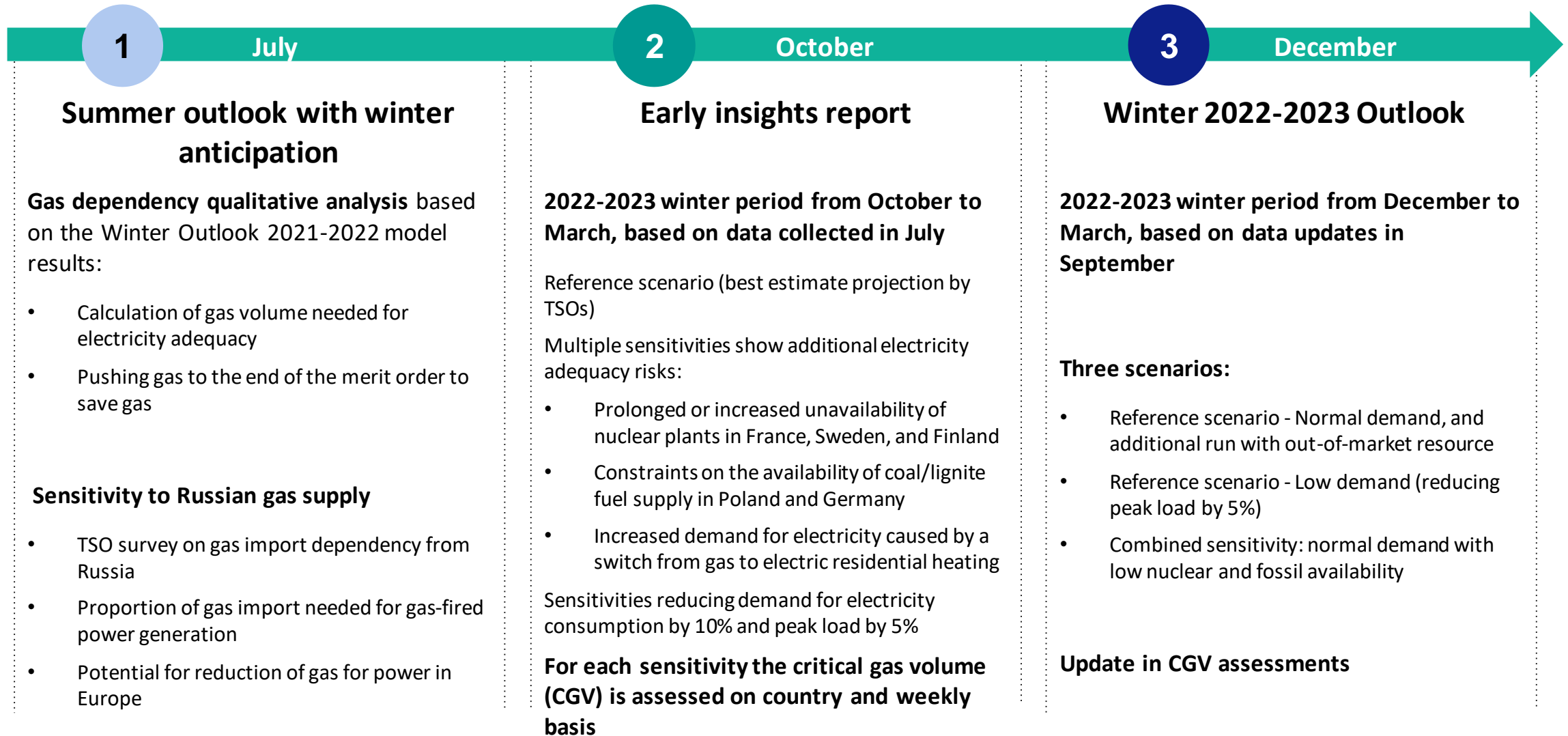


Different risks are addressed within different timeframes



← UNCERTAINTY INCREASES OVER TIME

Earlier and deeper analyses in a specific context



Winter Outlook 2022/2023 scenarios assessed

REFERENCE CASE

Reference case - Normal demand

 Reference case - Peak demand reduction

Best estimate projections for period December to March

- All available market resources
- Including confirmed national mitigation measures
- Gas considered last in the merit order
- Efficient integrated European market system

Based on initial demand data, not accounting for demand reduction measures. In case of issues, supplementary analysis with available non-market resources

Effect of EU Emergency Intervention for a 5% power reduction during peak hours

COMBINED SENSITIVITY

 Normal demand with low-nuclear and fossil constraints

Potential increased/ prolonged unavailabilities of plants in France, Sweden, Finland. Together with constraints on supply of coal and lignite in Poland and Germany during scarcity

Reference Scenario – Normal Demand : Adequacy Situation

- Higher adequacy risk compared to recent winter periods.
- Adequacy is especially stressed in Jan./Feb. (W1-W8). Some countries see issues already in Dec.

Adequacy (over winter)

Highest adequacy risks in **France, Ireland.**

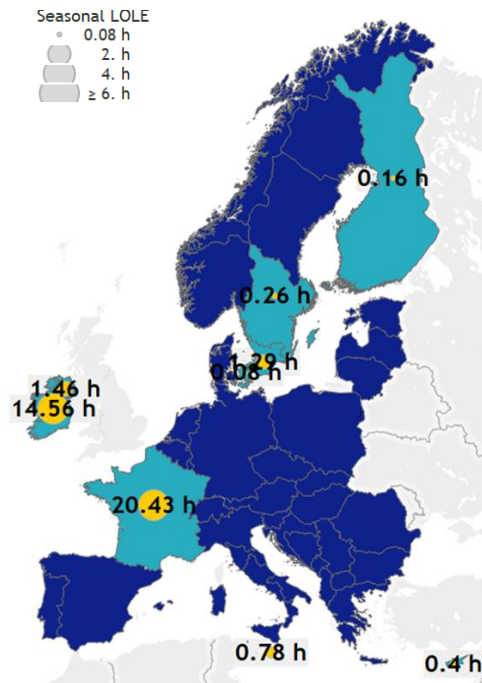
- Uncertain import availability to Ireland
- Risks increase in Ireland compared to initial insights report due to update in thermal fleet unplanned outage and modest demand recalibration

Risks emerge in **Sweden and Finland.**

- Risk decreases in Nordic region due to improved situation in Germany (extended nuclear availability).
- Risks in Finland appear due to update/reduction in DSR availability.

Risks in isolated/peripheral systems such as **Malta and Cyprus** as every winter.

- Risks decrease in Malta as planned outage of interconnection is done before December.

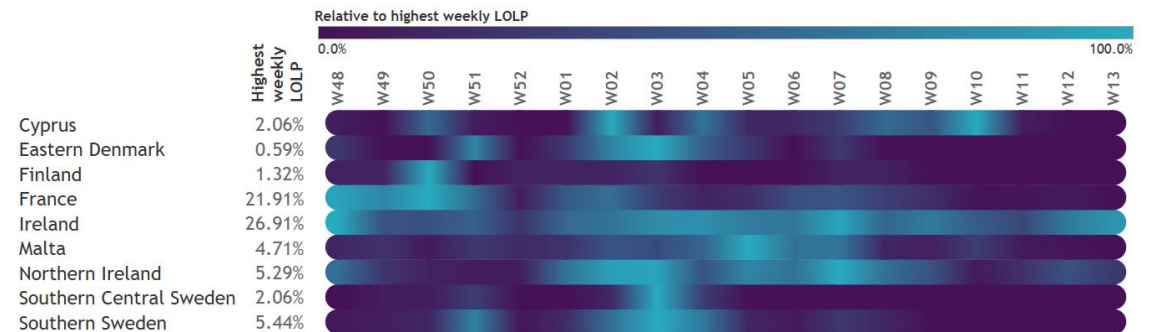


Adequacy (week)

Ireland and Malta experience higher risks before end of 2022(*).

Most risks in other countries emerge **as of January 2023** (W01) until end of February (W8).

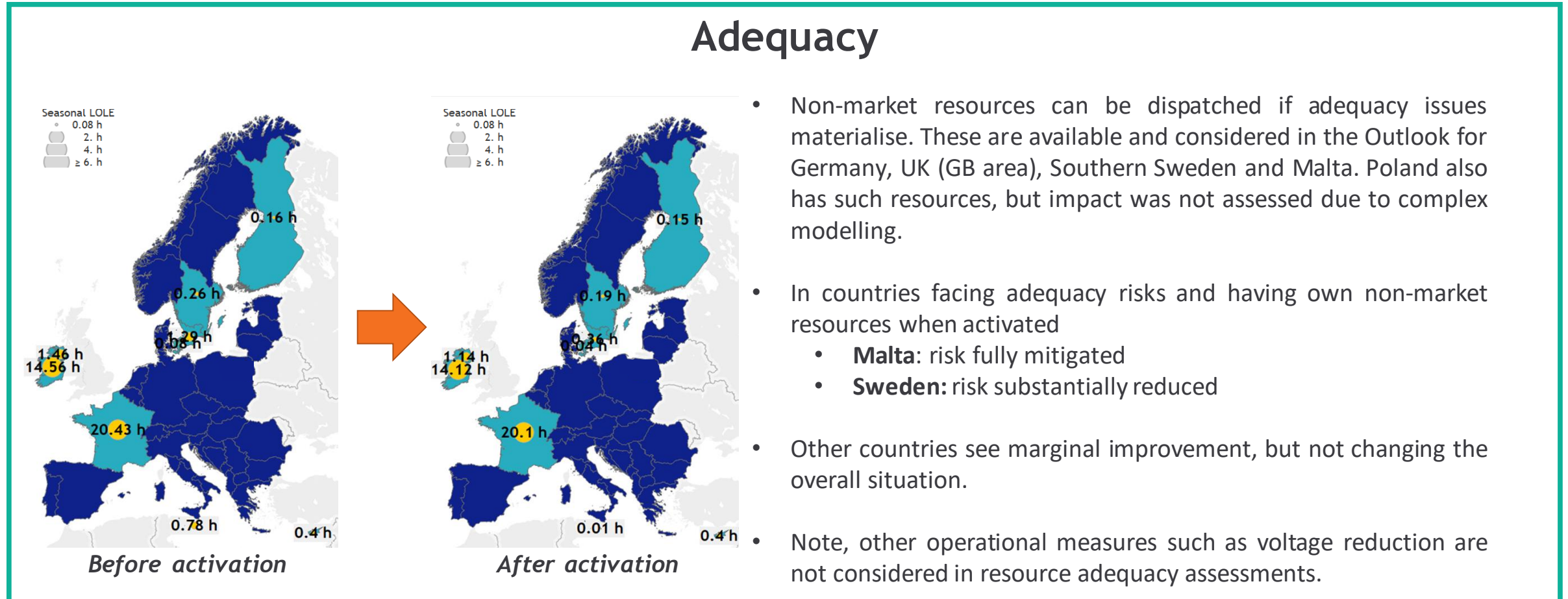
Some countries see constant risk levels throughout winter, others are more focused on specific weeks.



(*). In France the combined effect of lower nuclear availability and lower consumption levels in France according to RTE's updated projections (18/11/2022) lead to observing a medium risk for December and beyond end-February, and a higher risk for January 2023 compared to the Winter Outlook analyses.

Reference Scenario – Normal Demand with non-market resources

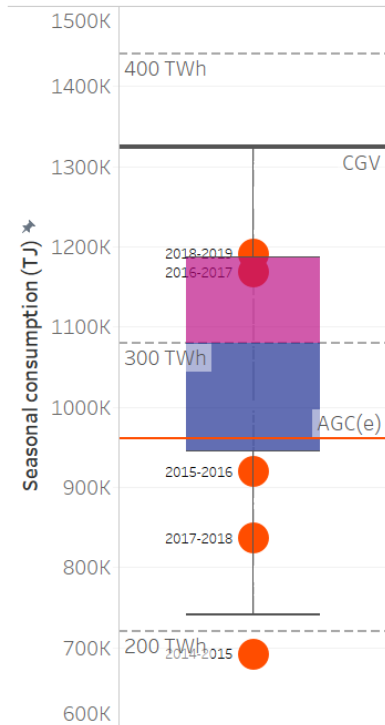
- Risks substantially decrease in countries facing adequacy risks and having own non-market resources (Malta, Sweden)
- Same weeks with risks are identified



Reference Scenario – Normal Demand : Critical Gas Volume

- Gas for electricity generation needed to ensure system adequacy over the four-month winter period becomes higher than historical volumes.
- Gas consumption on weekly basis surges as of January for most countries.

Critical Gas Volume (Europe)



Distribution of gas consumption for power from December to March is **above historical consumption**, with CGV still around a third of the Working Gas Volume in Europe (~368 TWh_{CGV}*).

Major volumes in **Italy, Germany, Spain, France, Netherlands**.

CGV projections are **spread over winter**. Actual volumes will depend on weather conditions.

Increased volumes compared to early analyses mainly due to **updates in must-run units**.

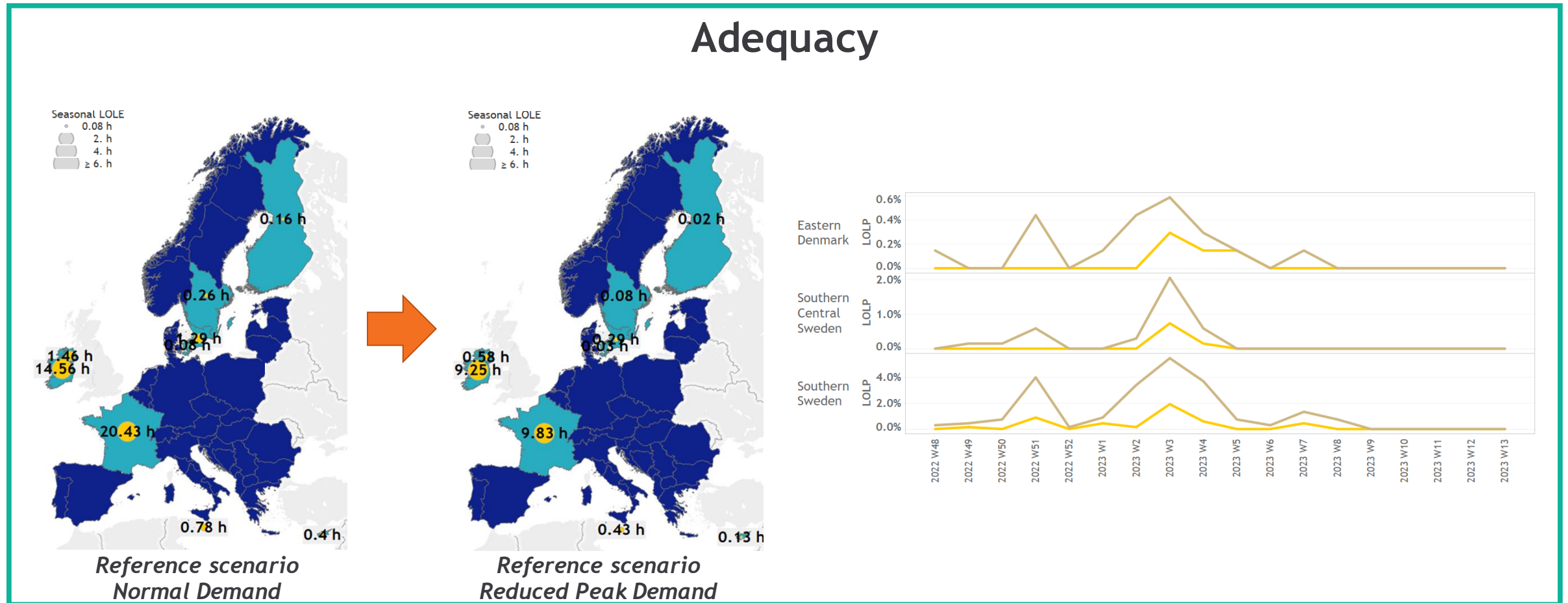
Critical Gas Volume (country/week)



Note: Gas offtake data reported in Gross Calorific Value.
In early insights report the reporting was in Net Calorific Value.
Conversion takes 1 TWh_{GCV} = 1.108 TWh_{NCV}

Reference Scenario – 5% Reduced Peak Demand: Adequacy Situation

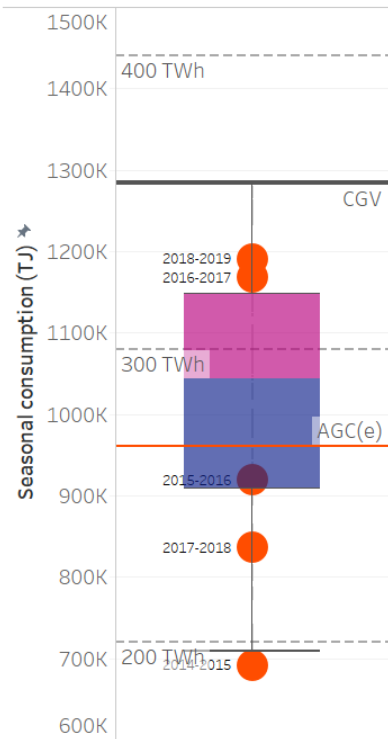
- Efforts to reduce demand peaks can address adequacy risks.
- Notable risks remain in France and Ireland, very limited risks in other systems.
- Risks in all weeks would be mitigated.



Reference Scenario – 5% Reduced Peak Demand: Critical Gas Volume

- Gas consumption (for electricity generation) to ensure system adequacy over the 4-month winter period is higher than historical volumes, also with reduced demand (-5% for the peak 10% hours).
- Gas consumption on weekly basis surges as of January for most countries.

Critical Gas Volume (Europe)



Peak demand reduction causes a **-3% downwards shift** of results distribution with respect to the reference scenario with unchanged demand.

CGV decreases by ~11 TWh_{GCV} compared to the first reference (now around 357 TWh_{GCV}*).

Relative impact is the highest for **Netherlands and Greece**. **France** is almost unaffected.

Increased figures with respect to early insights explained mainly by **adjustments in must-run units**.

Critical Gas Volume (country/week)



Note: Gas offtake data reported in Gross Calorific Value.
In early insights report the reporting was in Net Calorific Value.
Conversion takes 1 TWh_{GCV} = 1.108 TWh_{NCV}

Combined Sensitivity – scenario assumptions



Assessing the combined impact of

- **Prolonged unavailability of nuclear power-plants** in France, Finland and Sweden
- **Limitation of fossil fuel production** in Germany and Poland
- **Demand at projected levels**, not accounting for peak demand reductions



France: 5GW less nuclear for the whole winter compared to reference scenario, which is consistent with RTE's lower bounds of the "intermediate scenario" in national winter outlook published on 14 September



Finland: 1.6 GW not available throughout the winter compared to availability from mid-December in reference scenario, due to delay in commissioning of Olkiluoto 3. However, import capacity increases by 300 MW if Olkiluoto 3 is not operational.



Sweden: 1.1 GW less as of February due to the risks of planned outage extension of Ringhals 4. In addition, internal NTC drops for the second half of March, decreasing by 800 MW from SE02 to SE03 and by 1700 MW from SE03 to SE04.



Germany: reduced hard coal (- 4.65 GW on average) and lignite (- 0.27 GW on average) power plant availability

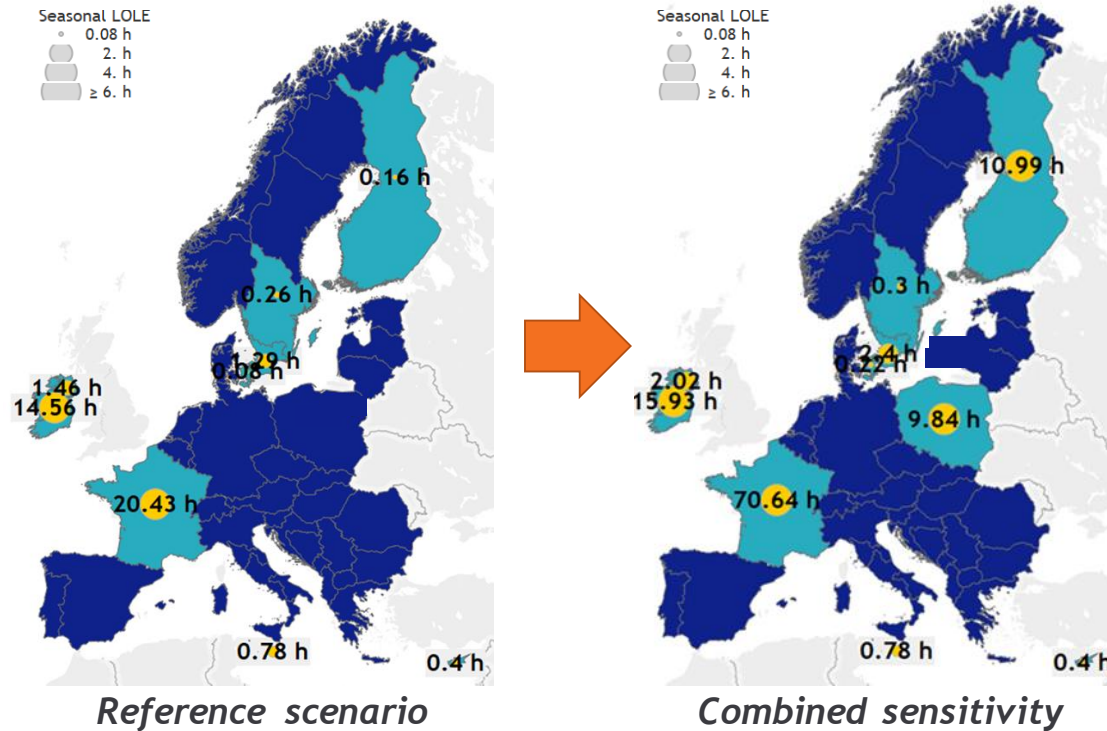


Poland: limitation on seasonal generation from hard coal (-7 TWh) and lignite (-2.3 TWh) with respect to historical generation from December until March of winter 2021/2022

Combined Sensitivity – Adequacy Situation

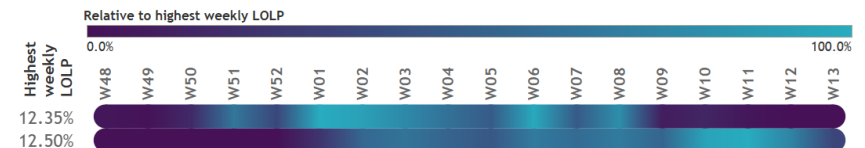
- Risks appears in Poland and significantly increases in Finland and France.
- In Finland continuous risks appear for December–February months.
- In Poland risks emerge from January until end of winter.

Adequacy



Risk increases notably in few countries

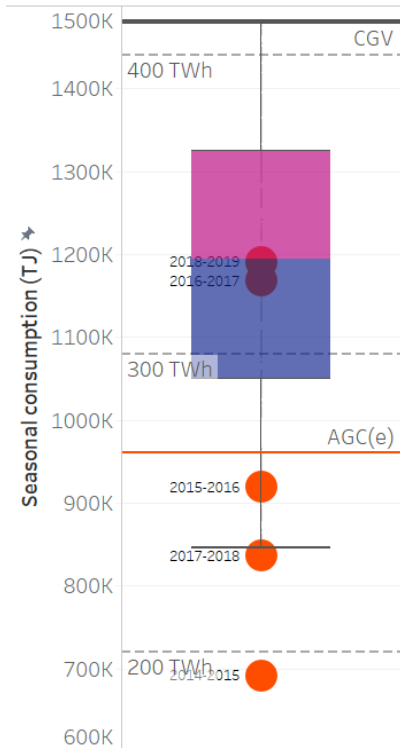
- Risks appear in **Poland** (> 9h LOLP) compared to the reference scenarios. Risks appear from January and peaks in mid-March.
- Risks significantly increase in **Finland** (11h LOLP) and **France** (70 h LOLP). In Finland risks appear in December–February months.
- Modest risk increase in southern **Sweden**



Combined Sensitivity: Critical Gas Volume

- Gas consumption (for electricity generation) needed to ensure system adequacy over the 4-months winter period increases significantly with respect to reference, impacting not only countries directly affected by constraints.
- Gas consumption on weekly basis surges as of January for most countries.

Critical Gas Volume (Europe)

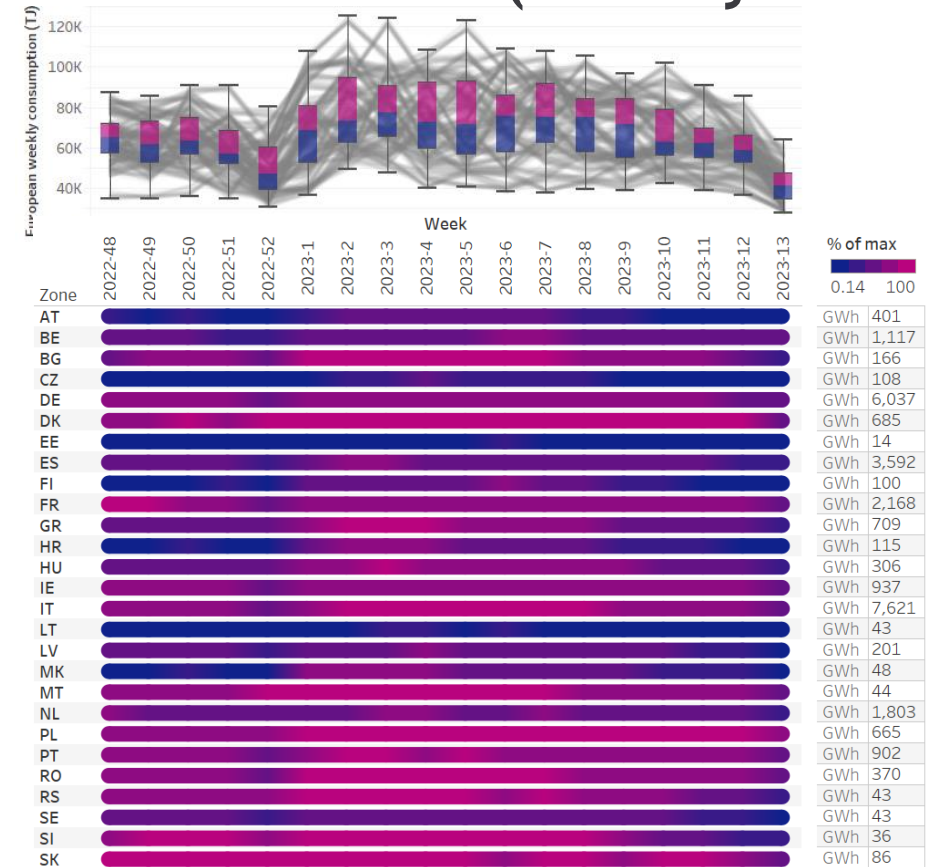


Coinciding unavailability of coal and nuclear would give a **12% upwards shift** of gas offtake compared to the reference scenario if demand reductions are not met.

CGV increases by ~44 TWh_{GCV} compared to the reference scenario (~411 TWh_{GCV}*).

Relative impact is the highest for **Finland, Poland and Czech Republic**. Highest CGV in absolute figures in same high demand countries as in the reference scenario.

Critical Gas Volume (country/week)



Note: Gas offtake data reported in Gross Calorific Value.
In early insights report the reporting was in Net Calorific Value.
Conversion takes 1 TWh_{GCV} = 1.108 TWh_{NCV}

Key messages for Winter 2022/2023



1

Tight periods foreseen with best available projections (reference case)

- Situation this winter is critical but manageable with operational measures.
- Hydrological situation to be closely monitored.
- Nuclear availability is low and adds stress to the system.
- Electricity supply depends strongly on gas in all winter scenarios.
- Simultaneous scarcity situations in various countries need close attention.

- System stress in Irish system, France, Southern Sweden, Finland, Malta and Cyprus when counting on use of market resources, non-market resources reduces the risk in Sweden and Malta.
- Loss of Load Expectation raises to higher levels than last winters.
- Minimum gas needs for electricity adequacy equals about one third of total European usable gas storage.

2

Additional risks can materialise (sensitivities)

- Additional stress elements can materialise, especially if they coincide.
- Nuclear availability, if lower than foreseen, will have local but strong impact.
- Further constraints in fuel supply increase adequacy risks.

- Additional nuclear unavailability in Nordic system has notable impact
- French nuclear unavailability has high local impact.
- Further fuel constraints in Germany and Poland would have a rather local impact on adequacy.
- Combined impact shows increased risk mainly in Poland and Finland

3

Need for early coordinated measures (preparedness)

- TSOs are pro-actively taking measures at national level and closely coordinating at regional and pan-European levels.
- Coordination and cooperation among the European countries and acting on National Risk Preparedness Plans are key for this winter.
- Efficient demand reduction measures reduce significantly system risk
- System adequacy relies on all market participants.

- A 5% peak shaving can mitigate most risks in continental Europe, with a remaining substantial risk in France and Ireland.
- Transmission exchange capacities remain an essential resource for system adequacy.

Effective coordination and mitigation strategies at all levels is key

Adequacy risks for the interconnected power system this winter can be mitigated with concerted preparation, coordination and cooperation at national, regional and European level.

	National	Regional	European
Planning cooperation	<ul style="list-style-type: none"> ▪ TSOs national study updates & raising awareness; ▪ Continuously optimised outage planning; ▪ Risk preparedness with governments, NRAs, market actors 	<ul style="list-style-type: none"> ▪ TSOs coordination via established regional STA (short-term adequacy) processes; ▪ Outage planning coordination via established OPC (outage planning coordination) processes 	<ul style="list-style-type: none"> ▪ TSOs coordination via established PAN-EU STA (short-term adequacy) processes ▪ Close ENTSO-E monitoring of the situation and potential Outlook updates
Market integration	<ul style="list-style-type: none"> ▪ Facilitate markets & incentives for demand response measures as well as cross-border cooperation 	<ul style="list-style-type: none"> ▪ Cross-border exchanges and cooperation to maximise capacities in a secure manner regionally 	<ul style="list-style-type: none"> ▪ Efficient pooling of resources is also key for adequacy support
Operational coordination	<ul style="list-style-type: none"> ▪ Coordination with governments, NRAs, key stakeholders; ▪ Data sharing; ▪ Operational mitigation measures 	<ul style="list-style-type: none"> ▪ Weekly monitoring in RCCs regional short-term adequacy assessments; ▪ Established inter-TSO and RCC processes 	<ul style="list-style-type: none"> ▪ Close coordination across ENTSO-E ▪ Alignment ENTSOG/ENTSO-E

Our values define who we are, what we stand for and how we behave.
We all play a part in bringing them to life.



EXCELLENCE

We deliver to the highest standards.
We provide an environment in which people can develop to their full potential.



TRUST

We trust each other, we are transparent and we empower people.
We respect diversity.



INTEGRITY

We act in the interest of
ENTSO-E



TEAM

We care about people. We work transversal and we support each other.
We celebrate success.



FUTURE THINKING

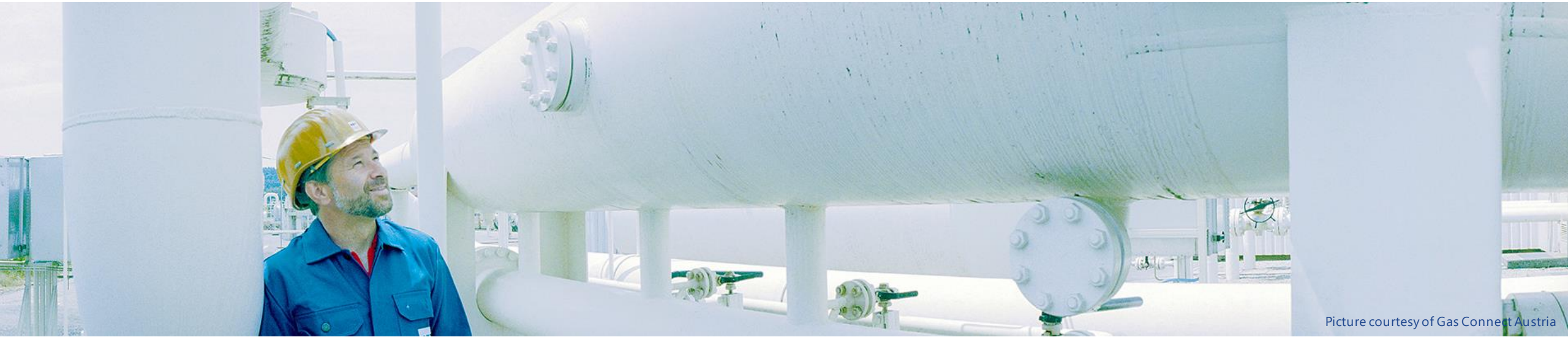
We are a learning organisation.
We explore new paths and solutions.

We are ENTSO-E

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Picture courtesy of Gas Connect Austria

Winter Supply Outlook 2022-2023 and prolonged disruption of Russian supply

ENTSOE – ENTSOG Webinar

Jacques Rebérol - System Development - Modelling Subject Manager

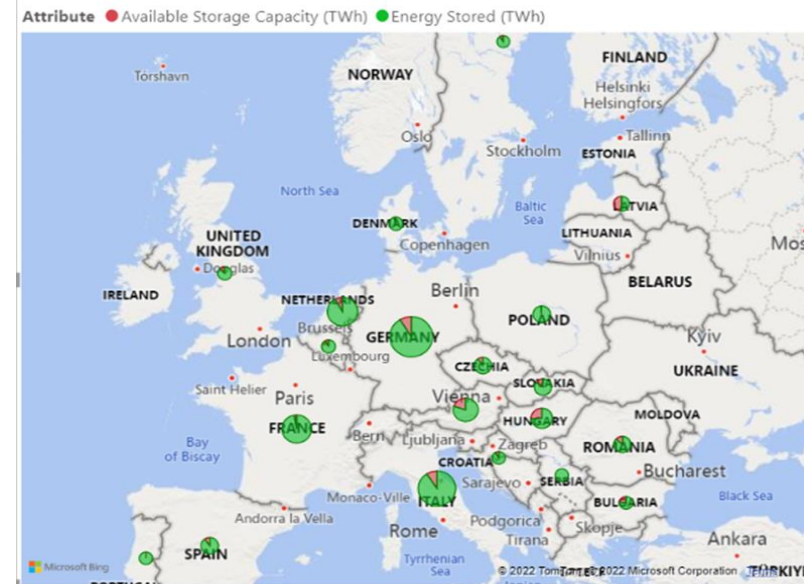
WSO concept and assumptions

Assumptions

- System assessment under different demand scenarios: Reference Winter and Cold Winter (highest demand since 2009/10),
- sensitivity analysis -15% demand response
- Peak day (1-in-20 years) and 2-Week Cold Spell (1-in-20 years),
- Import Potentials based on 10 years of historical data,
- Russia supply limitation via Ukraine to Slovakia and via Turk Stream (870 GWh/d)

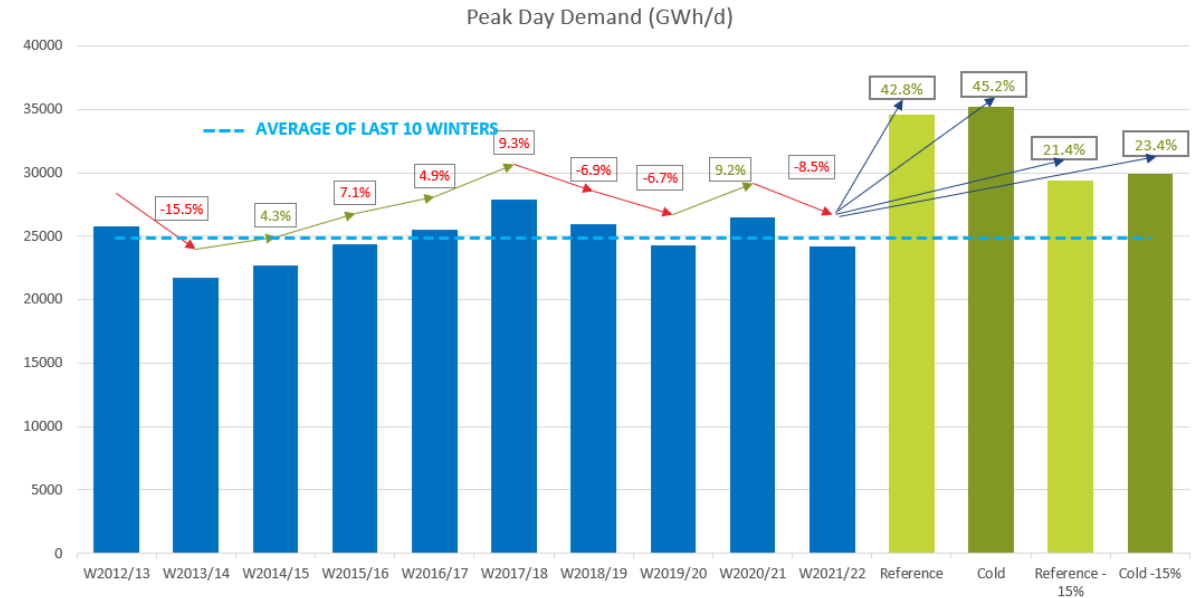
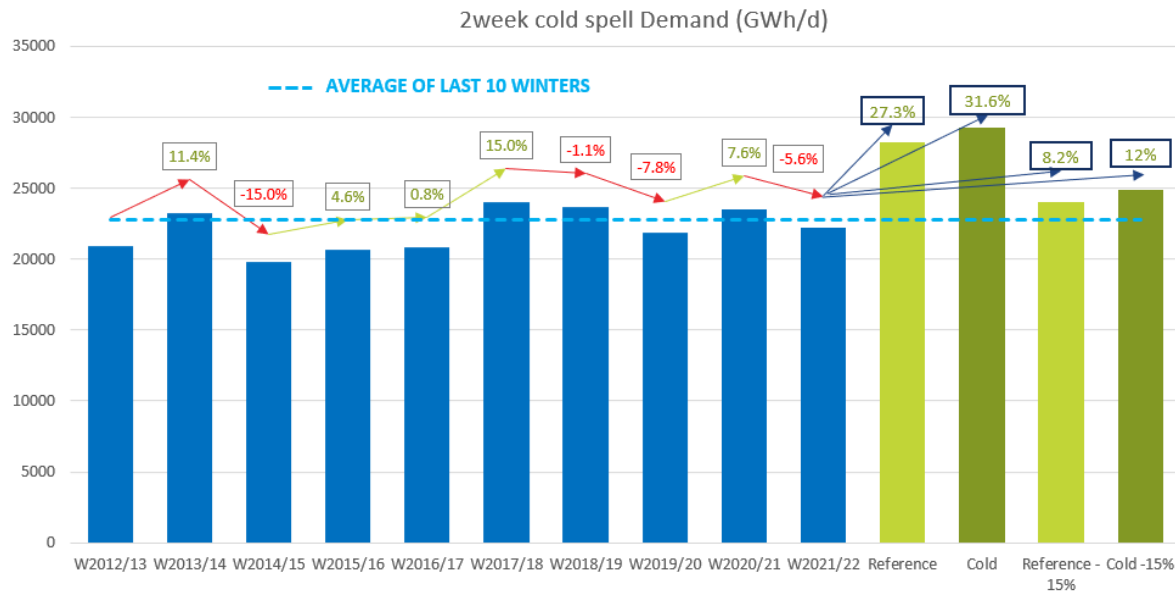
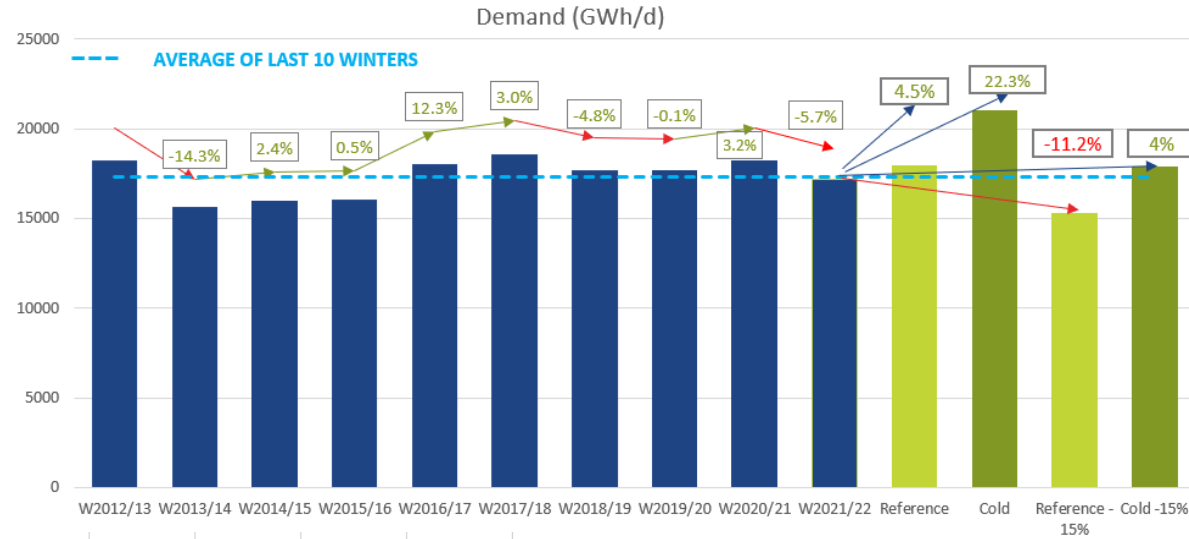
Supply situation

The storage inventory level on 1 October 2022 (985 TWh, 89%) is one of the highest in any ENTSOG Winter Supply Outlook (985TWh), with different situations among countries. European Commission EC has strongly encouraged member countries to inject during the summer a minimum of 90% or 35% of the winter gas demand (when the WGV allows it).



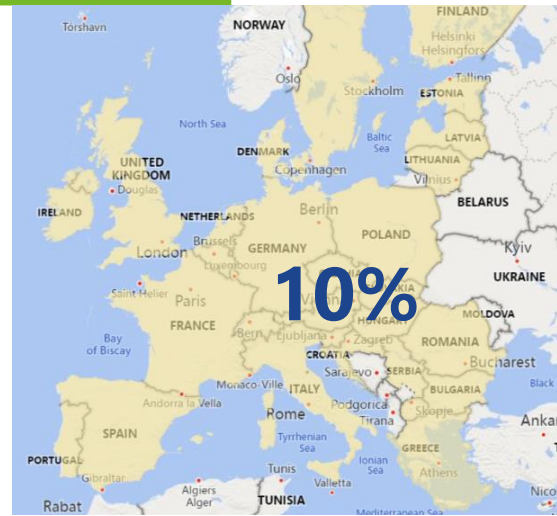
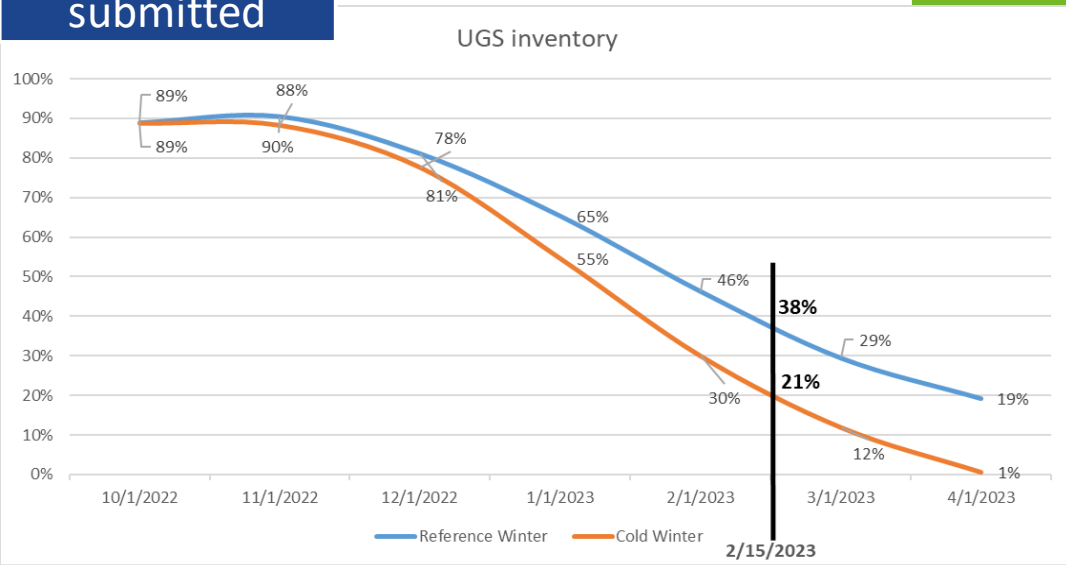
Country	WGV (TWh)	Energy Stored (TWh)	Filling Level (%)
Austria	95.55	76.22	79.77%
Belgium	8.70	8.01	92.09%
Bulgaria	5.80	4.40	75.81%
Croatia	4.77	4.35	91.21%
Czech Republic	35.81	32.29	90.16%
Denmark	9.23	8.78	95.12%
France	132.61	129.00	97.28%
Germany	236.77	215.98	91.22%
Hungary	67.70	49.98	73.83%
Italy	193.44	175.52	90.73%
Latvia	24.07	12.67	52.63%
Netherlands	138.99	127.37	91.64%
Poland	36.41	35.81	98.34%
Portugal	3.67	3.86	105.31%
Romania	32.79	28.27	86.19%
Serbia	4.53	4.53	100.00%
Slovakia	36.05	30.65	85.03%
Spain	35.25	31.78	90.14%
Sweden	0.10	0.09	92.89%
United Kingdom	10.62	9.25	87.08%

Demand assumptions



Reference and Cold Winter

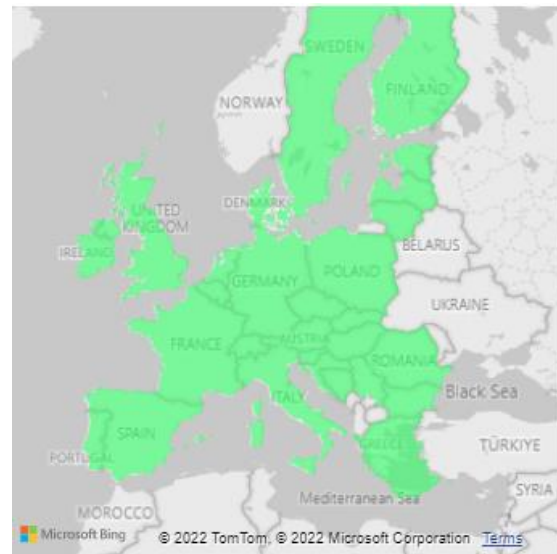
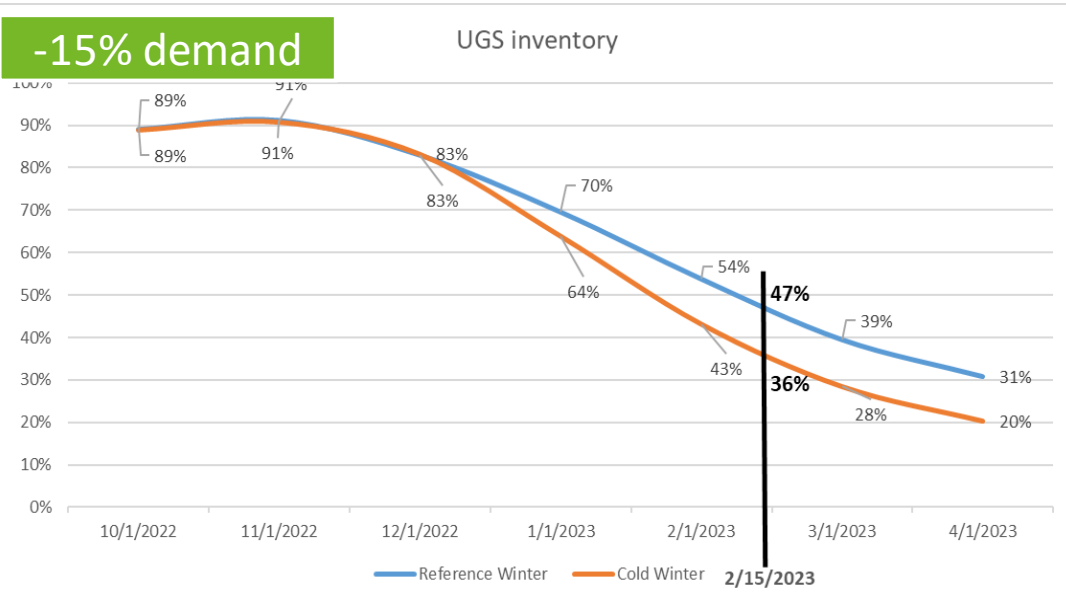
Demand as submitted



Demand curtailment – Monthly – Cold Winter

In both scenarios, 30% target can't be reached.

Ca. 10% of demand curtailment in Cold Winter.

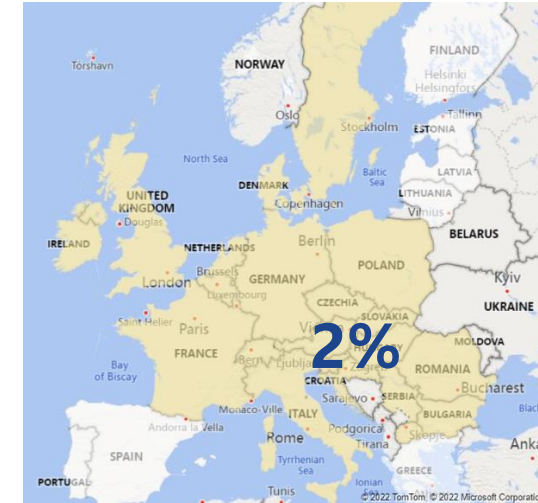


With 15% demand reduction, 30% target can be reached in Reference winter but not in Cold Winter.

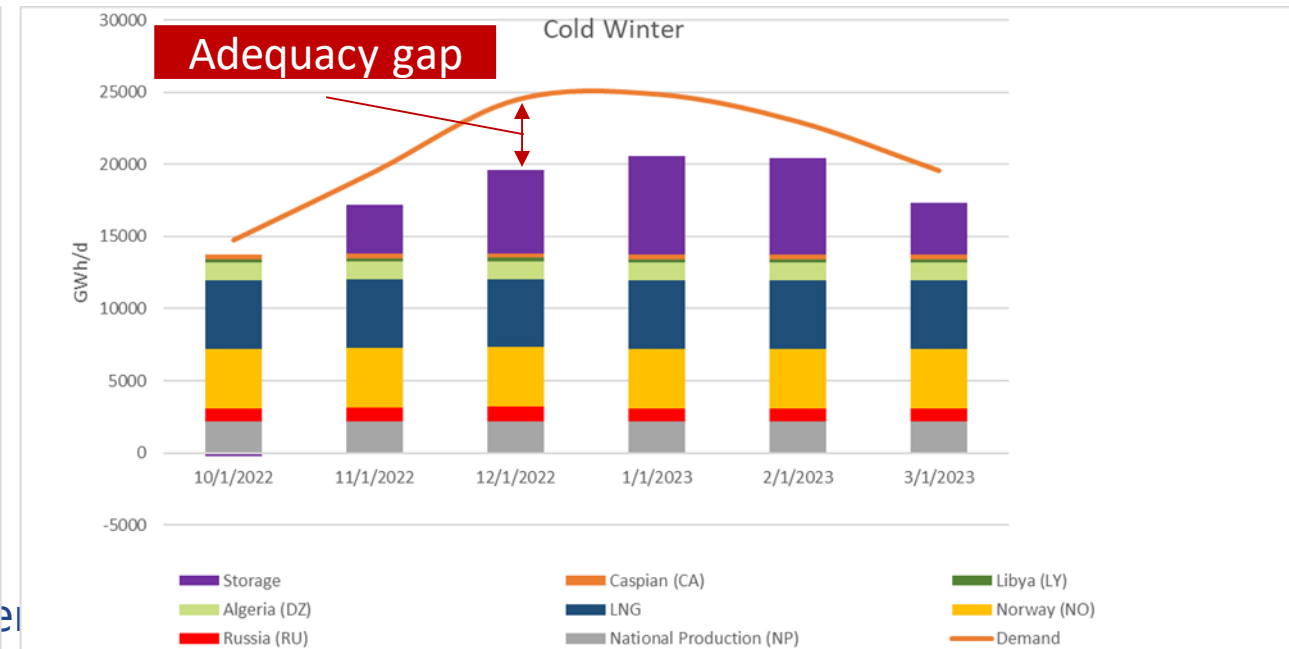
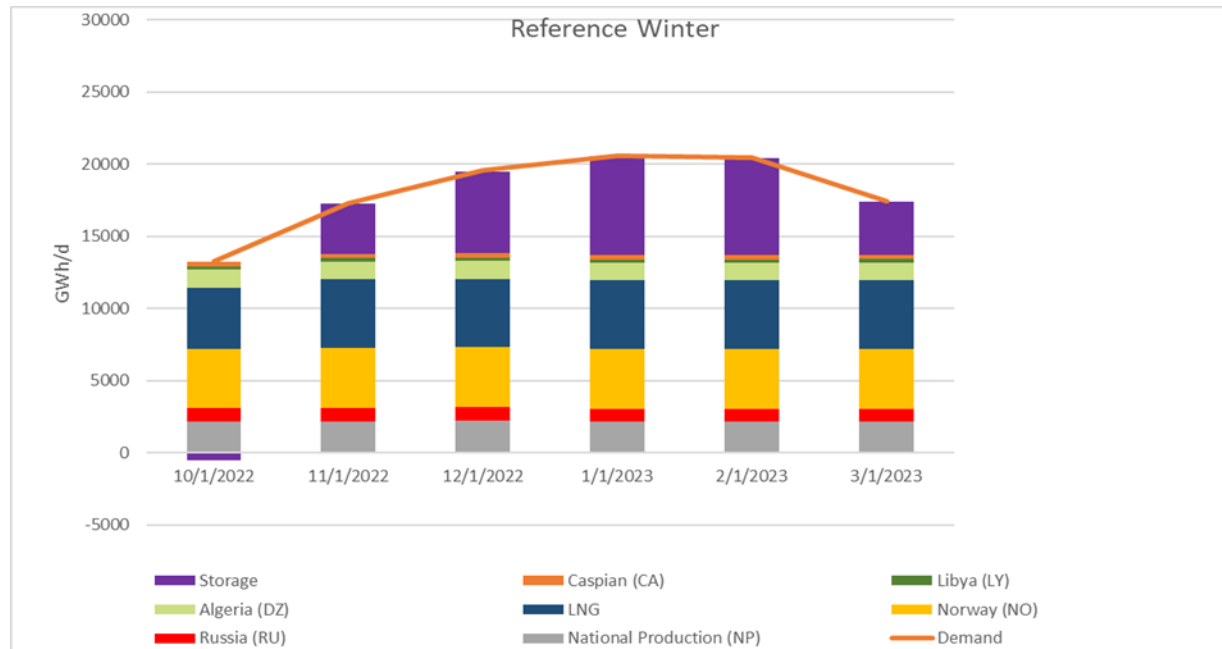
No risk of demand curtailment in both scenarios.

Supply Mix

- UGS can provide the necessary flexibility in case of Reference winter – not in Cold Winter
- Indigenous production keeps on decreasing
- Additional supply (LNG) can reduce demand curtailment down to 2%.
- Russian supply potential is limited (only Ukraine route and Turkstream available to some extent)



Demand curtailment - Monthly- Cold Winter – unrestricted LNG access



High demand – 2-Week cold spell and Peak day

2-Week cold spell

European countries are exposed to 10% demand curtailment in **Cold Winter scenario only.**

30% storage level by mid-February can fully mitigate demand curtailment.

15% demand reduction can fully mitigate any risk of demand curtailment.



Demand curtailment - 2-Week – Cold Winter

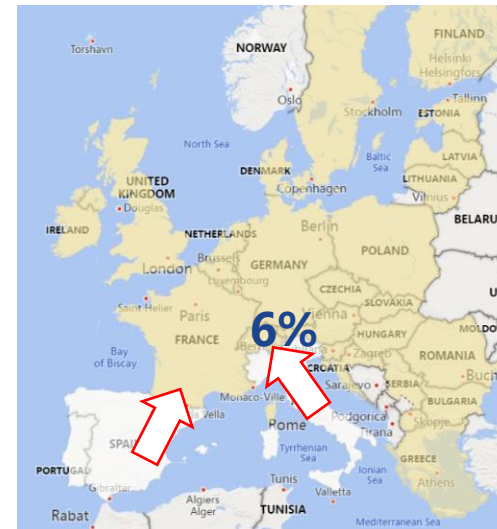
Peak Day

Reference Winter and Cold Winter

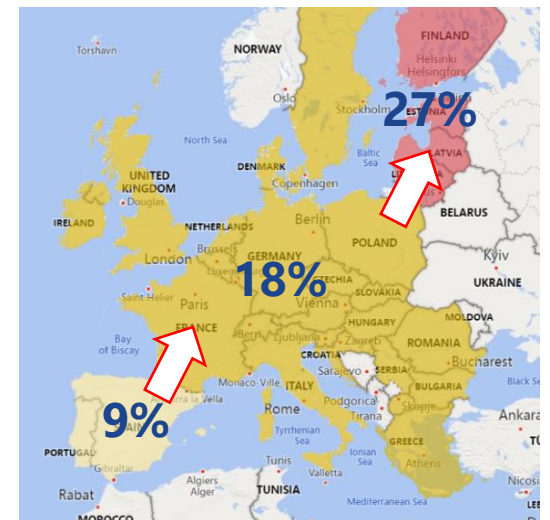
European countries are exposed to demand curtailment in case of Peak day (6% in reference winter, 9% to 27% in cold winter).

30% storage level by mid-February can fully mitigate demand curtailment.

15% demand reduction can fully mitigate any risk of demand curtailment.



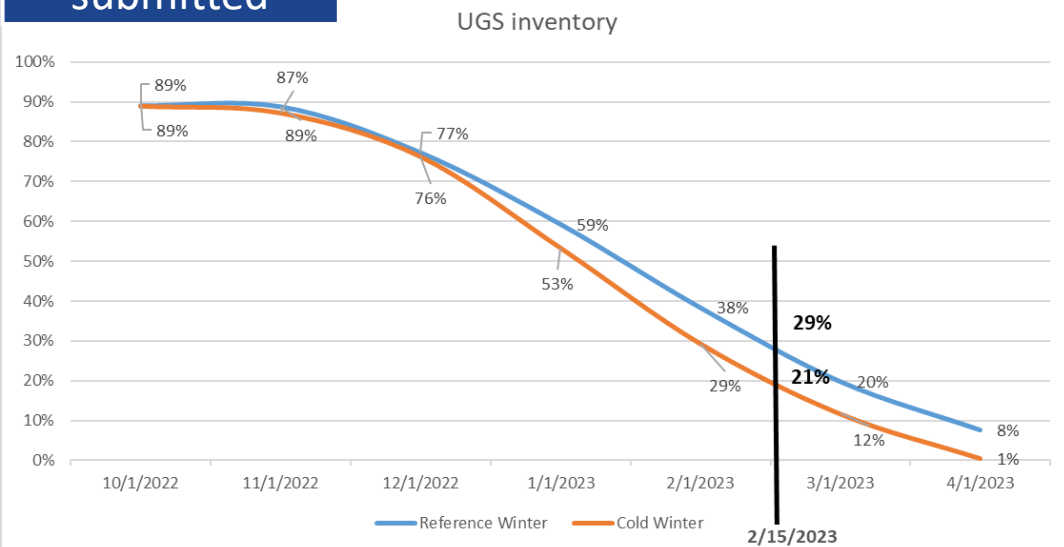
Demand curtailment – Peak – Reference Winter



Demand curtailment - Peak – Cold Winter

Russian supply disruption - Reference and Cold Winter

Demand as submitted

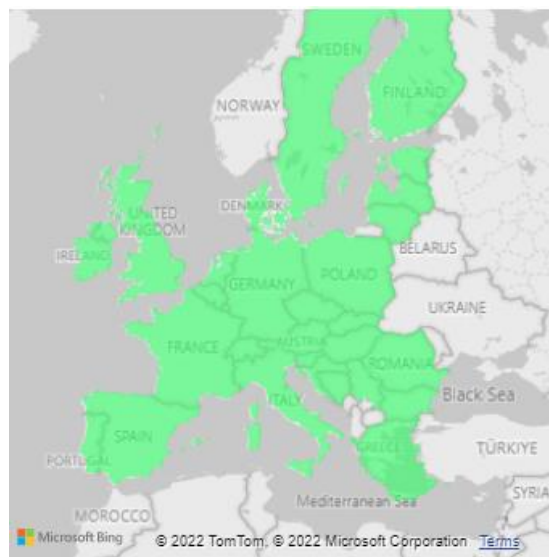
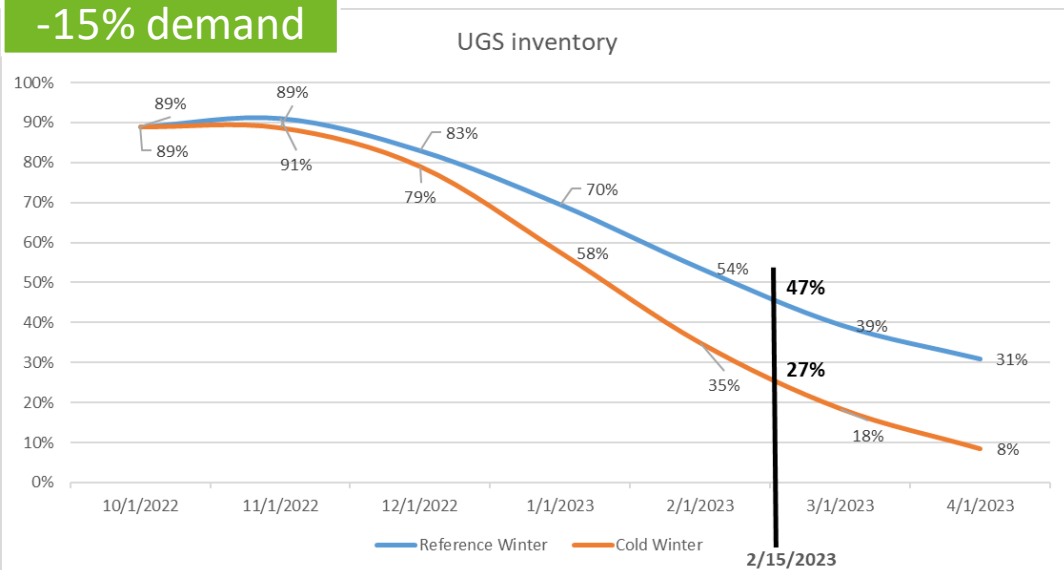


Demand curtailment – Monthly – Cold Winter

In both scenarios, 30% target can't be reached.

Ca. 12% of demand curtailment in Cold Winter.

-15% demand



With 15% demand reduction, 30% target can be reached in Reference winter but not in Cold Winter.

No risk of demand curtailment in both scenarios.

Russian supply disruption – 2-Week cold spell and Peak day



2-Week cold spell

European countries are exposed to 10% demand curtailment in Cold Winter scenario.

30% storage level by mid-February can fully mitigate demand curtailment (except 14% in RO)

15% demand reduction can fully mitigate any risk of demand curtailment (except 7% in RO)

Peak Day

Reference Winter and Cold Winter

Most European countries are exposed to demand curtailment in case of Peak day (12% in reference winter, 20% in cold winter).

50% and 30% storage level by mid-February can mitigate demand curtailment:

- down to resp. 3% and 9% in reference winter
- Down to resp. 5% and 20% in cold winter

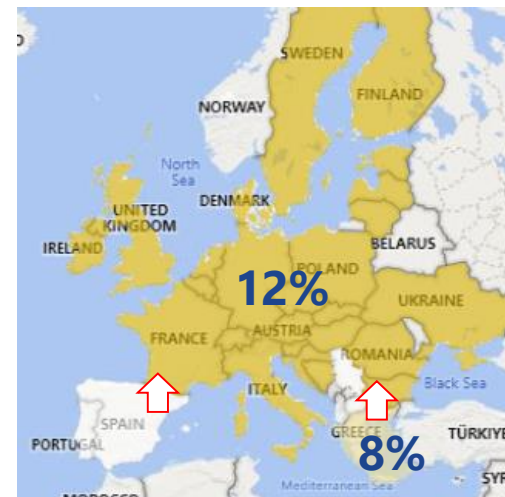
15% demand reduction can fully mitigate any risk of demand curtailment in reference winter and reduce it down to 4% in cold winter



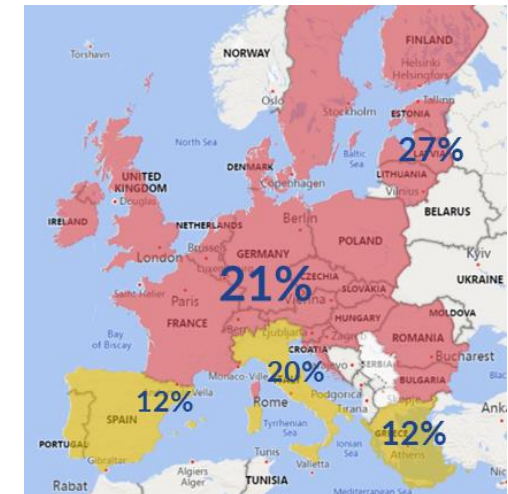
Reference Winter



Cold Winter



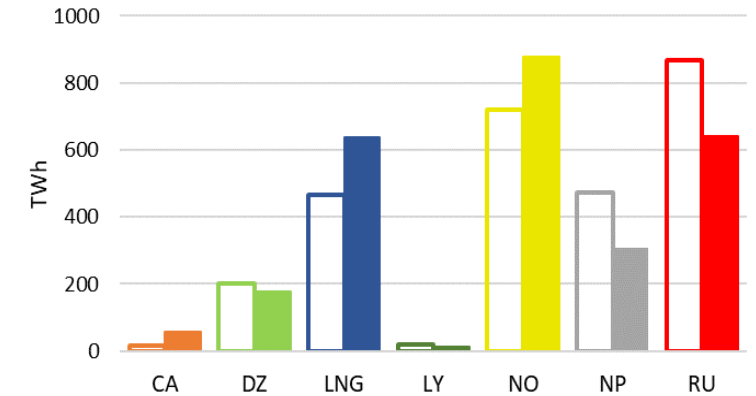
Peak day – Reference Winter



Demand curtailment - Peak – Cold Winter

Winter Review 2021/2022

- Gas demand started to decrease and reached 2015/16 equivalent level
- During the winter 2021/2022 LNG and NO supply reached highest level compared to last 10 years. Russia supply was minimized to the lowest level ever observed before.
- Algeria and Libya supply sources decreased and have been compensated by Caspian supply source.
- The storage level at end of the winter season reached 291,3 TWh, the lowest seen in last 5 winters, due to the low UGS level in October 2021.
- European gas prices increased during winter without reaching unusual level (> 120 €/MWh).



Total supply by source

	Gas in the storages 1-Oct (TWh)	Gas in the storages 31- Mar (TWh)	UGS Utilisation (TWh)
W2012/13	741.0	225.7	515.2
W2013/14	749.1	445.4	303.6
W2014/15	893.3	283.1	610.1
W2015/16	862.9	372.9	490.0
W2016/17	1000.5	288.8	711.8
W2017/18	928.4	193.8	734.6
W2018/19	910.5	437.8	472.7
W2019/20	1077.7	611.1	466.7
W2020/21	1069.7	336.9	732.8
W2021/22	832.2	291.3	540.9

UGS Utilisation (TWh) Winter 2012/2013 – 2021/2022. (Source: AGSI)

Conclusions

- High storage levels and the gas infrastructure, including new projects to be commissioned in the upcoming winter, can efficiently reduce the dependence on Russian supply thanks to enhanced cooperation and additional LNG import capacities.
- In case of Russian supply disruption, **cooperation among all European countries** can partially mitigate the risk of demand curtailment. However, without **demand reduction** most countries would be exposed to significant risk of demand curtailment in case of a cold winter.
- An early and significant storage withdrawal will result in low storage levels at the end of the winter season. This will have a negative impact on the flexibility of the gas system - and may increase exposure to demand curtailment in the second half of the winter season especially in case of cold and high demand events. Therefore, it is important that all European storages continue to inject gas to the extent possible and that European system continues to maximize import to prepare for high demand situations as well as to ensure security of supply also in the following periods.
- Reminder from the Yearly Outlook 2022-2023 report: Storages play an essential role to ensure security of supply. However, without preparedness for Winter 2023/2024, the situation could deteriorate over the next gas year 2022/2023: storages would be depleted in April 2023 and sites located in Central and South-Eastern Europe would be filled less than 15% on 1 October 2023, leaving the EU more exposed to risks of SoS for the winter 2023/2024.
- The European gas system is also capable of cooperating with Energy Community Contracting Parties and other EU neighbouring countries to mitigate the exposure to demand curtailment to the minimum possible extent,
- ENTSOG will monitor the evolution of the storage levels and import volumes throughout the Winter and report on the situation on regular basis.



Thank you for your attention

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