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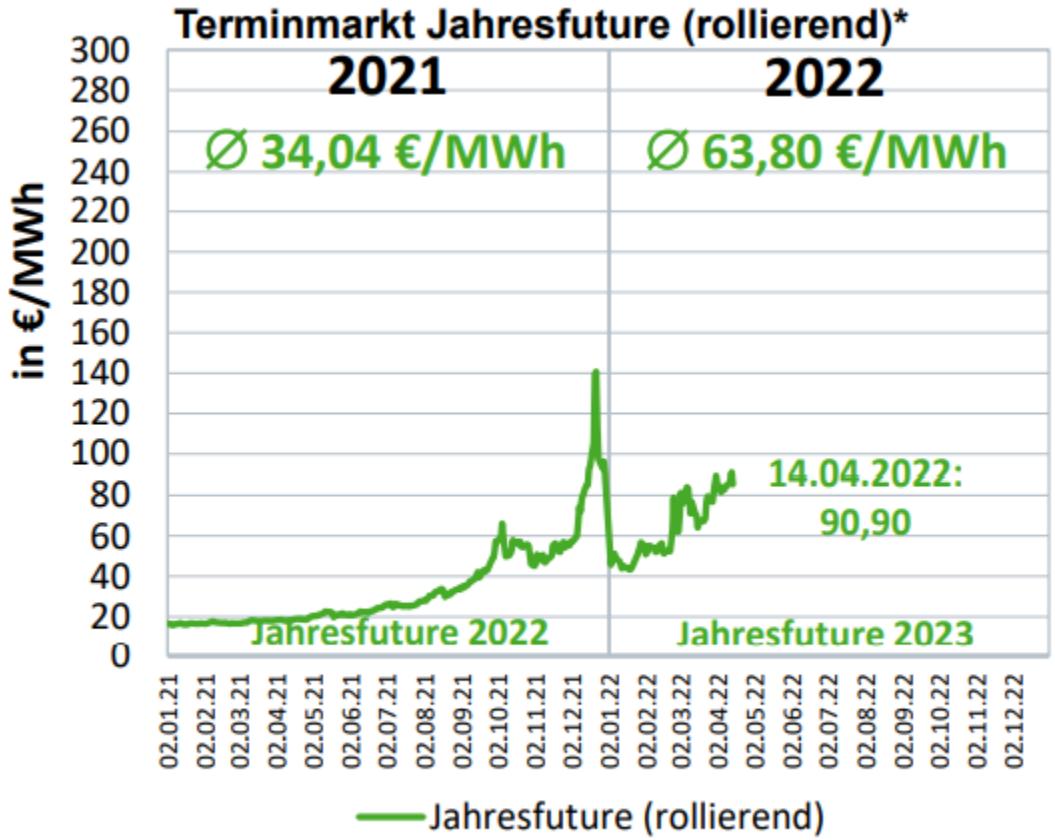
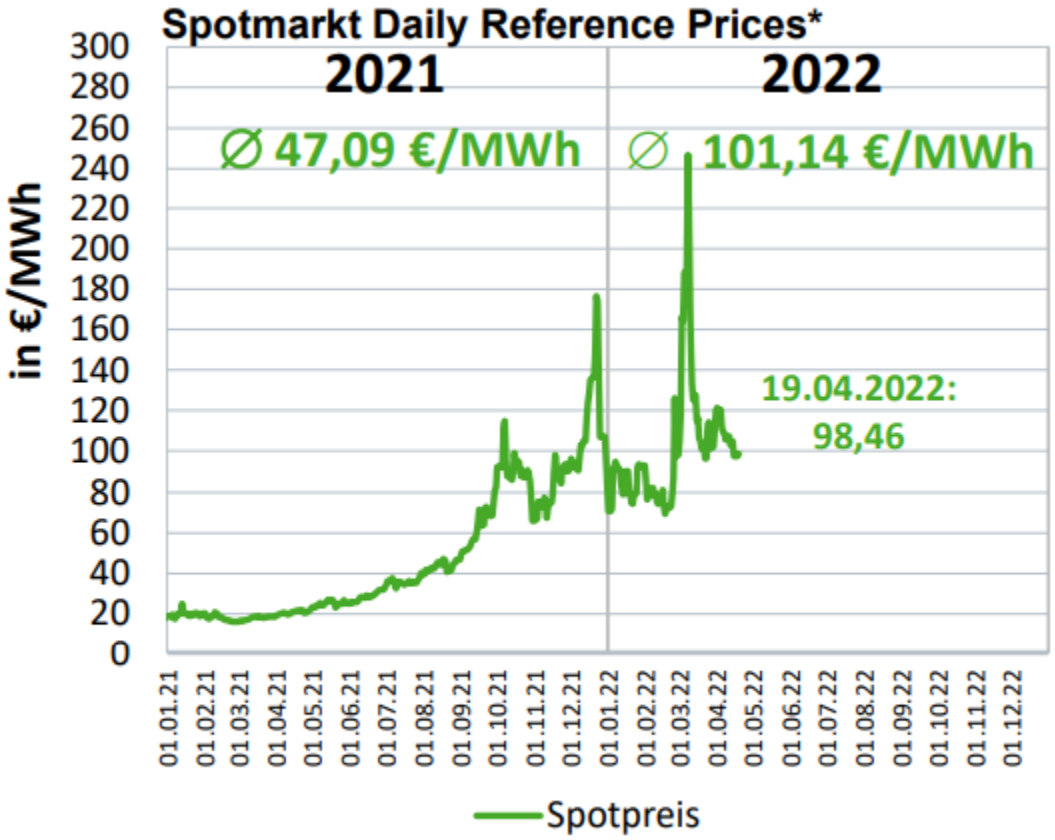
Outlook – What are the consequences of the 2021/2022 winter?

Development of wholesale gas prices

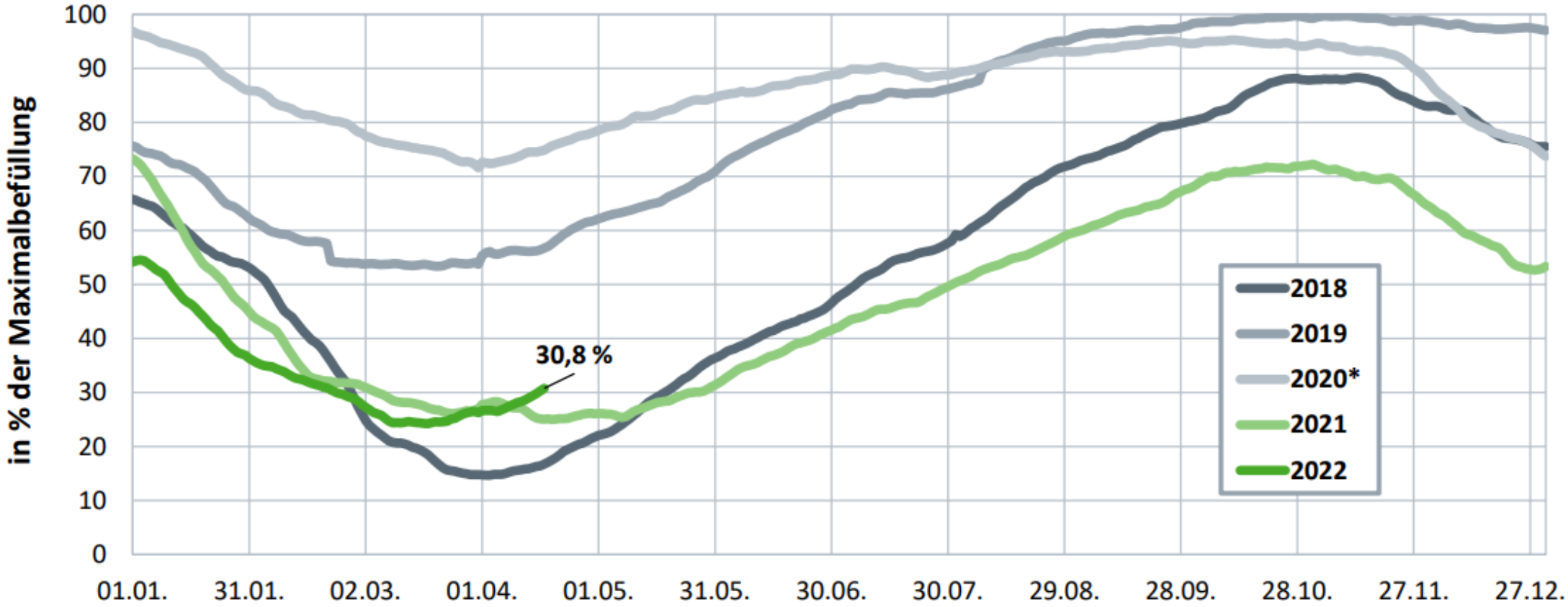




Quelle: EEX

* Mittelwerte aus Preisen der Marktgebiete von Gaspool und NCG, ab Oktober 2021 THE

Storage levels in per cent



* aus Gründen der Vergleichbarkeit Wert des Schalttages 2020 ausgeblendet

Die Darstellung beinhaltet die Daten aller auf gie.eu zum angegebenen Datum erfassten Speicher.

Quelle: Gas Infrastructure Europe

Options for reducing balancing requirements

Status quo for SLP allocations

- The SLP consumption forecast is made by the DSOs for each SLP exit point according to the selected SLP procedure
  - synthetically
  - analytically
- The DSO submits the allocation for day D to the MAM **on day D-1.**
- The MAM forwards the allocation to the balancing group manager.
- The BGM uses the SLP allocation for the entry nomination for **day D+1**

The time offset in the SLP procedure leads to deviations between consumption and forecast, which may require balancing actions.

What remedial measures could be taken?

Gas forecast temperature (II/II)

	A	B	C	E	F	G	H	I	J	K
1	Datum	Tats. Allokationsmenge (Basis GPT)	Als-Ob-Allokationsmenge Ist-Temperatur	Restlast	Delta tats. Allokation [kWh] (GPT)	Delta tats. Allokation [%] (GPT)	Kum. sald. Netzkonto tats. Allokation (GPT)	Delta tats. Allokation [kWh] (IST)	Delta tats. Allokation [%] (IST)	Kum. sald. Netzkonto tats. Allokation (IST)
313	17.12.2021	35.476.266	31.294.979	33.995.750	-1.480.516	-4,17%	1.480.516	2.700.771	8,63%	2.700.771
314	18.12.2021	36.711.701	37.612.016	35.263.115	-1.448.586	-3,95%	1.448.586	-2.348.901	-6,25%	2.348.901
315	19.12.2021	38.223.134	39.956.189	37.447.649	-775.485	-2,03%	775.485	-2.508.540	-6,28%	2.508.540
316	20.12.2021	39.118.704	38.668.144	40.450.659	1.331.955	3,40%	1.331.955	1.782.514	4,61%	1.782.514
317	21.12.2021	44.874.705	47.004.901	45.068.951	194.246	0,43%	194.246	-1.935.950	-4,12%	1.935.950
318	22.12.2021	46.735.291	49.569.940	47.256.264	520.973	1,11%	520.973	-2.313.676	-4,67%	2.313.676
319	23.12.2021	42.335.518	39.118.704	40.931.209	-1.404.309	-3,32%	1.404.309	1.812.505	4,63%	1.812.505
320	24.12.2021	35.236.481	21.986.714	31.384.896	-3.851.585	-10,93%	3.851.585	9.398.182	42,74%	9.398.182
321	25.12.2021	32.366.850	24.640.591	29.874.816	-2.492.035	-7,70%	2.492.035	5.234.224	21,24%	5.234.224
322	26.12.2021	32.854.984	30.640.307	29.593.106	-3.261.878	-9,93%	3.261.878	-1.047.202	-3,42%	1.047.202
323	27.12.2021	31.430.494	26.592.985	29.538.347	-1.892.146	-6,02%	1.892.146	2.945.362	11,08%	2.945.362
324	28.12.2021	28.123.918	22.818.538	28.839.531	715.613	2,54%	715.613	6.020.993	26,39%	6.020.993
325	29.12.2021	27.299.200	21.065.031	27.461.081	161.882	0,59%	161.882	6.396.050	30,36%	6.396.050
326	30.12.2021	21.836.694	12.268.337	22.111.129	274.435	1,26%	274.435	9.842.792	80,23%	9.842.792
327	31.12.2021	22.967.569	19.601.762	23.850.504	882.935	3,84%	882.935	4.248.741	21,68%	4.248.741

- Due to the sometimes unusually high daily temperatures in December, the DSO would have underallocated up to approx. 10,000 MWh on individual days. Thanks to the gas forecast temperature, this was only approx. 300 MWh on the same day.
- Financial impact on THE's balancing actions at a price of approx. 75 €/MWh in December 2021: € 750,000 to € 22,500 on 30.12.21.

Gas forecast temperature (I/II)

Effects of the use of the gas forecast temperature at a DSO (in use since 1.7.2017):

L	M	N	P	Q	S	T	V	W
					Jahressicht			
Jahr	Tats. Allokationsmenge (Basis GPT)	Als-Ob-Allokationsmenge Ist- Temperatur	Kum. sald. Netzkonto tats. Allokation (GPT)	Kum. sald. Netzkonto tats. Allokation (IST)	**Allokationsgüte (GPT) in kWh/MWh**	**Allokationsgüte (IST) in kWh/MWh**	**Anzahl Tage >35% Allokationabweichung (GPT)**	**Anzahl Tage >35% Allokationabweichung (IST)**
2017	7.044.923.139	6.842.312.375	507.871.679	686.295.238	72,09	100,3	1	25
2018	6.732.264.210	6.355.948.107	453.114.318	676.978.009	67,3	106,51	0	27
2019	6.855.326.713	6.721.434.576	400.620.814	740.702.839	58,44	110,2	2	21
2020	6.817.638.811	6.674.475.435	478.993.231	782.890.436	70,26	117,3	0	22
2021	7.652.465.817	7.587.787.221	461.152.088	711.820.768	60,26	93,81	1	13

- The table compares the 'as-if' allocation/actual temperature with the actual allocation/gas forecast temperature. The actual temperature is therefore used in this analysis in order to exclude possible forecast errors of the meteorological service in the daily mean temperature forecast.
- According to the studies referred to in the status report, the "natural" limit of the SLP procedure is 100 kWh/MWh.
- These values are generally reached by the DSO when the forecast/actual temperatures are used and are significantly undercut when the gas forecast temperature is used.

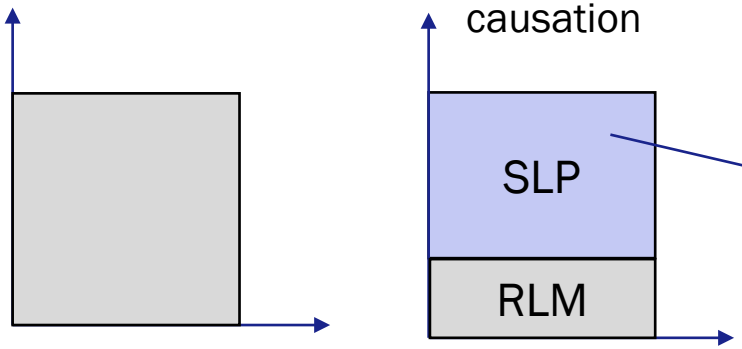
Introduction of an MAM factor

- **Idea: Shift system balancing transactions required as a result of SLP deviations to the BGMs.**
- **Approach for the formation of a MAM factor**
  - The MAM forecasts the balancing requirements (SLP share) which are then assigned to the SLP allocations by means of a suitable key (e.g. if a need to purchase balancing gas is forecast for tomorrow, the SLP allocations are increased; if a need to sell balancing gas is forecast for tomorrow, the SLP allocations are reduced).
  - Gas balancing requirements are assessed in relation to the SLP allocation
  - This factor is applied to all SLP allocations
  - The adjusted allocations are sent to the network operator and to the BGM
  - Use of a threshold value possible
- **Combination of network operator-specific residual load and forecast balancing requirement**
  - Network operator-specific adjustments add up to the forecast balancing requirement, i.e. the allocations of individual network operators could be reduced, others increased. The sum of the increase gives the forecast balancing requirement.

Rationale of MAM factor

Balancing requirement in market area

Balancing requirement subdivided by causation



Proportionate distribution of the balancing requirement for SLP among the BGM with BG with SLP.

BGM1

Entry	Exit
90	90 (NO allocation)
	+5 (MAM factor)
5	
Saldo = 0	

Afterwards, the MAM factor quantities are transmitted to the NOs to ensure consistency with the quantity reconciliation process later on

Approaches to determining the factor

- **Approach via global SLP forecast by MAM**
  - Global SLP forecast made by MAM
    - AI
    - Forecast model based on historical values, taking into account other factors if necessary
  - Global SLP forecast of the MAM is compared with the allocations of the network operators to determine the applicable factor
- **Approach via residual load determination (comparison of residual load D-1 vs. D-1 allocation)**
  - The MAM calculates the residual load for day D-1 on day D.
  - The NO's SLP allocation (for day D-1) is compared with the residual load calculated by the MAM (for day D-1)
- **Approach via residual load determination (comparison of residual load D-1 vs. D+1 allocation)**
  - The MAM calculates the residual load for day D-1 on day D.
  - The NO's SLP allocation (for day D+1) is compared with the residual load calculated by the MAM (for day D-1)

SLP forecast by the BGM

- **Idea: Shift the SLP forecast risk to the BGM**
- **Approach to SLP forecasting by the BGM**
  - Each network operator shares the residual load proportionally for each BGM
  - Each BGM receives information on its previous share/quantity of the residual load per network during the day D.
  - The BGM uses this information for the entry nominations for day D
  - Deviations in the balancing group are settled at the end of the day as balancing gas (analogous to RLM today)

Summary

- Gas forecast temperature
  - Can be used in current GabiGas regime
  - Many TSOs have seen the SLP allocation quality improve (nevertheless: each DSO must check the use of the gas forecast temperature for themselves!)

- MAM factor
  - Cannot be used in current GabiGas regime.
  - May reduce procurement costs for MAM, but this depends on the quality of the factor

- SLP forecast by BGM
  - Cannot be used in current GabiGas regime
  - May reduce system balancing, but this depends on the quality of the intraday data
  - Increases costs for DSOs due to increased data provision

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Gas Storage Act

Gas Storage Act (amendment of EnWG)

- **Introduction of minimum storage levels for gas storage facilities in Germany**
  - 01.10, 01.11, 01.02
- **Three-stage model for gas injection into storage facilities**
  - Monitoring and enforcement of gas injection into storage
- **Introduction of a new levy to cover costs and potential contractual design of Strategic Storage Based Options (SSBO)**
- **Close alignment of national regulations with the European Commission’s "REPower EU" plans**

Gas Storage Act (amendment of EnWG)

Obligation for storage operators in Germany to gradually fill their storage facilities. The aim is to guarantee energy supply and contain sharp price fluctuations especially in the coming winter (22/23).

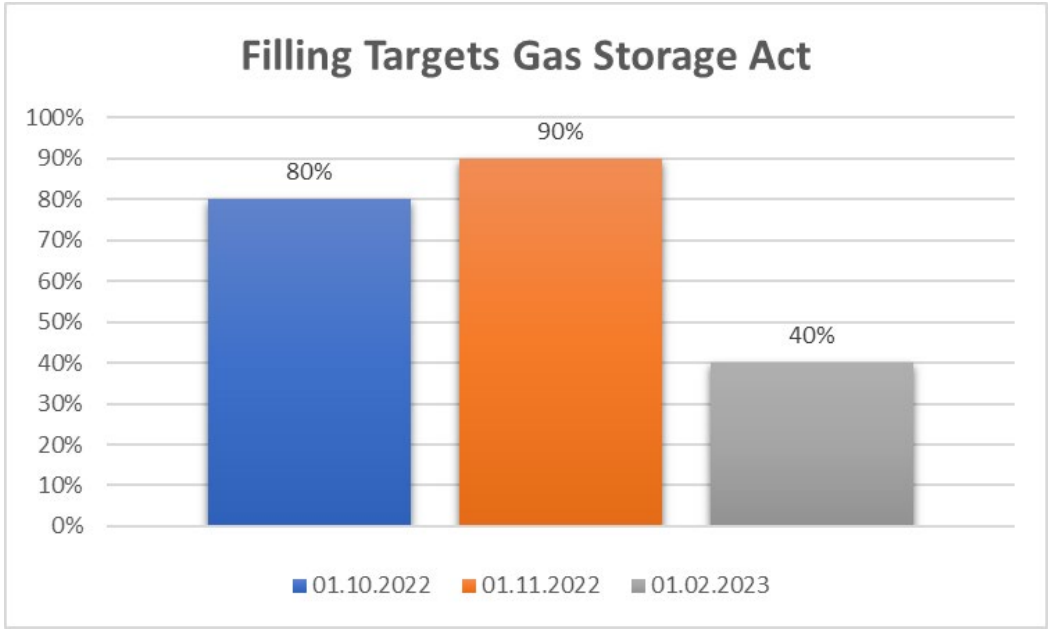
25.03.2022
Gas Storage Act
adopted by Bundestag

08.04.2022
Gas Storage Act
is approved by
Bundesrat

no later than 01.05.2022
Gas Storage Act
enters into force

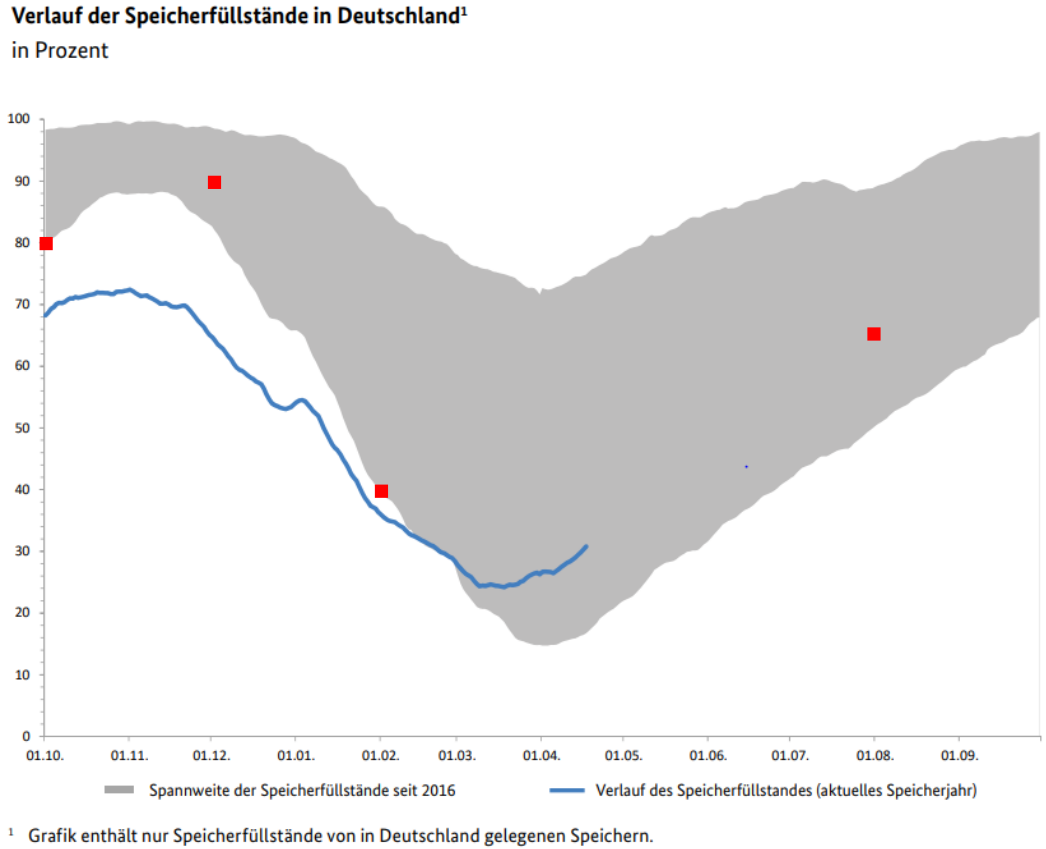
01.04.2025
Gas Storage
Act expires

Gas Storage Act (amendment of EnWG)



- **Minimum filling levels for gas storage facilities in Germany**
  - 01.10: 80%
  - 01.11: 90%
  - 01.02: 40%

Gas Storage Act (amendment of EnWG)



[1] Grafik enthält nur Speicherfüllstände von in Deutschland gelegenen Speichern.

- **17.04.2022: 73.80 TWh (30.78%)**
- **Storage levels back to a level in the lower range of the last 5 years (only) since approx. mid-February 2022**
- **Since 18.03.2022 gas has predominantly been injected into storage on balance**

Source: Gas supply situation report by Federal Network Agency of 19.04.2022

■ (future) min. levels according to Gas Storage Act

Gas Storage Act (amendment of EnWG)

- **Three-stage model for filling/monitoring storage facilities***
  - **Stage 1:** Filling by market participants (storage users), tender for Strategic Storage Based Options (SSBO) could provide incentive for gas injection already in spring, if necessary
  - **Stage 2:** Option of additional special tenders for SSBOs, if minimum storage levels are not reached by the specified deadlines
  - **Stage 3:** If minimum levels are still not reached, MAM can buy and store gas itself.
- **MAM has to book the necessary capacities not booked in order to reach the required storage levels.**
- **The storage operator has to hand over to the MAM any storage capacities booked but not used by storage users ("use it or lose it" principle).**

* The three steps are not cast in stone, but can be designed and combined with each other as needed to achieve the purpose of the law (ensuring security of supply by setting and maintaining minimum storage levels). If necessary, steps can be skipped and adapted in terms of their scope.

Gas Storage Act (amendment of EnWG)

- **Introduction of a new charge to cover the costs of achieving the statutory minimum storage levels**
  - **Allocation of costs to BGM (Type of Time Series: SLP, RLM, cross-border IP/VIP)**
  - **MAM can request appropriate payments on account (no impact on net profit for MAM)**
- **Possible contractual design of the Strategic Storage Based Options (SSBO) in the context of Stage 1***
  - **The Stage 1 SSBO product comprises two contract components:**
    - **Contract component 1: Single-storage commitment with proof of filling level as of a specific reporting date.**
    - **Contract component 2: Guaranteed provision of a partial quantity for call-off by the MAM at any time (call-off option)**
  - **This is a uniform contract for the contracted total quantity ("storage quantity"), of which a partial quantity ("call-off quantity") is subject to separate restrictions for possible access by the MAM ("purchase option").**
  - **20% of the contracted storage quantity is "reserved" for the call option.**
  - **The Provider must keep the call-off quantity available for a call order by the MAM at any time up until the end of the contract period.**
  - **The Provider must provide the storage and transmission capacities (withdrawal capacity, entry into network) required for gas withdrawal.**
  - **If the MAM does not issue a call order, the contracted call-off quantity must remain in full in the storage facility until the end of the contract period.**
  - **Fixed "lots" are defined for the submission of bids; initial thoughts:**
    - **32,500 MWh = storage quantity per lot.**
    - **of which 6,500 MWh = call-off quantity per lot**
    - **Withdrawal capacity of 10 MW per lot to be kept available for gas withdrawal**

**Non-binding key elements for the presentation of the preliminary status of discussion in preparation for the implementation of the Gas Storage Act – subject to change.*
As at: 20.04.2022

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Gas Storage Act (amendment of EnWG)

- **National regulations geared closely to the European Commission's "REPower EU" plans**
- **EU Storage Act (Draft) of 23.03.2022**
  - Mandatory certification for gas storage operators to prevent non-EU Member States from exerting influence over critical storage infrastructure.
  - As an incentive for the (increased) use of gas storage facilities, there is the option to set the transportation tariff for exit/entry points at gas storage facilities to zero euro.

EU's minimum storage levels for Germany in 2022			
01.08.2022	01.09.2022	01.10.2022	01.11.2022
62%	68%	74%	80%

EU's minimum storage levels for Germany from 2023				
01.02	01.05	01.07	01.09	01.11
47%	39%	56%	73%	90%

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