Short Term Gas Demand Forecasting

Case study by Austria

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Regulator Role in Gas Forecasting

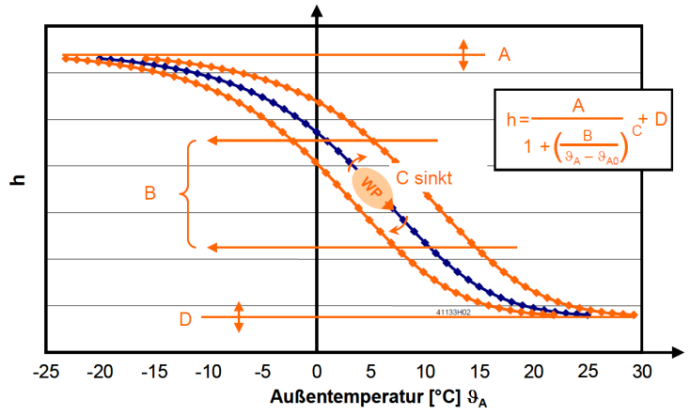
Long term forecasting

- Monitoring of compliance of gas supplier with gas supply standard for protected customers (households, social institutions, district heating), long-term procurement forecast of gas supplier and proof of diversification efforts through submission of security of supply concepts.
- Event-driven forecast: Scenario-based approach for the winter outlook similar to ENTSOG winter outlook (e.g. possible interrupted gas supply) or intervention measures in case of emergency.

Regulator Role in Gas Forecasting

Short term forecasting: Day-ahead forecast by market area manager (AGGM)

- Gas Market Model Ordinance 2012 mandates AGGM daily SLP consumption forecasts for each grid area, each supplier and each SLP type (updated 3 times per day depended on temperature).
- The calculation uses suitable temperature forecasts in cooperation with the respective DSO and on the basis of the SLP transmitted by the balance group coordinator.
- Methodology is an asymmetric sigmoid function and coordinated with E-Control.
- Function shows the dependence of the daily gas demand on the temperature.

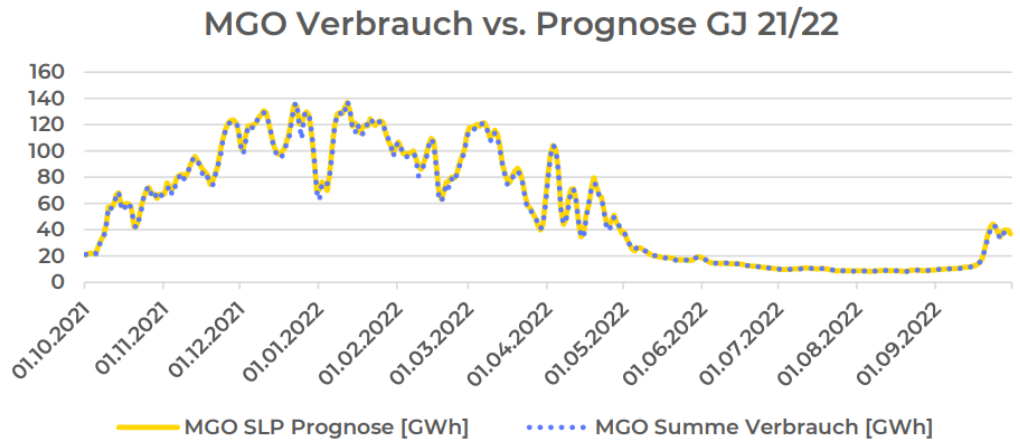


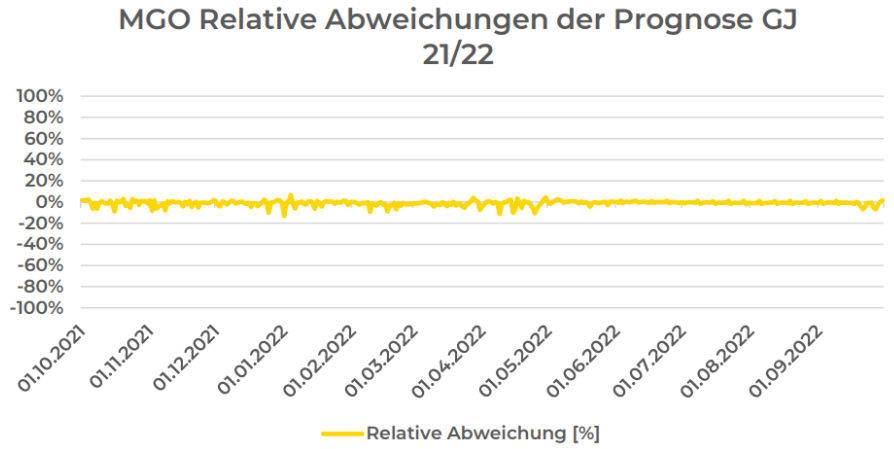
Sources:

- https://www.aggm.at/fileadmin/AGGM/Bilder-Dokumente/Downloads/Berichte/SLP_Bericht_2021.22_DE.pdf
- https://www.agcs.at/agcs/clearing/lastprofile/lp_studie2008.pdf

Regulator Role in Gas Forecasting

- According to NC-Bal Article 42 (3), a report on the accuracy of the forecast of a network user's non daily metered off-takes shall be published by the forecasting party at least every two years.
- The stable and small deviations in the forecasts indicate that the model accurately predicts actual consumption.





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Purpose and Objectives of the Gas Demand Forecasting

- Analysis of security of gas supply for prevention, intervention and diversification.
- Reduction of daily imbalance charges for suppliers.
- New TSO tariffs from 1 January 2025: Quantities used for calculation of tariffs and now determined on the basis of existing and expected bookings (in the past based on average previous bookings) due to changing flow pattern (less transit).
- DSO tariffs: Quantities are determined on the basis of the supply and feed-in quantities in kWh, the arithmetic mean of the highest hourly output in kWh/h determined or measured monthly in the period under review and the number of metering points of the last available financial year per grid level.

Segmented Gas Demand Forecasting

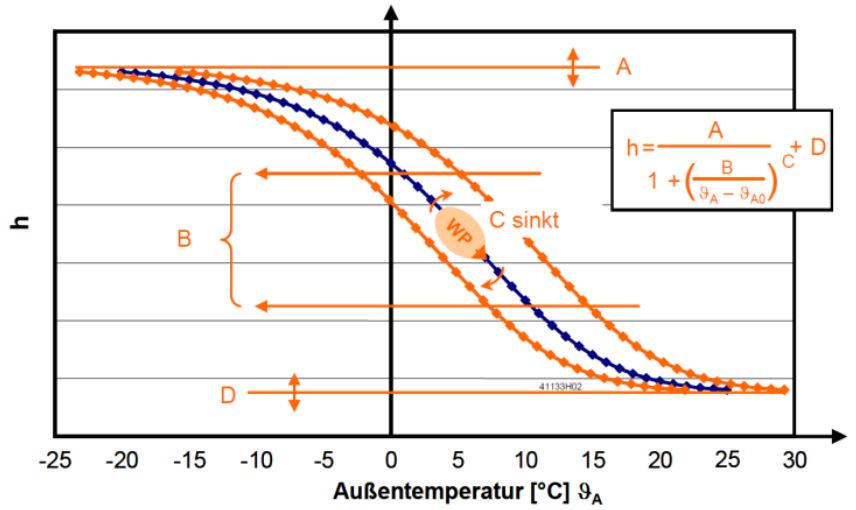
- Model for winter outlook provides the following outputs:
  - Total supply
  - Consumption by group and total
  - Varying storage levels depending on supply and demand changes.
- Intervention measures lead to reduction of gas consumption
  - Calls for savings and instructions
  - Substitution of natural gas with other energy sources (except electricity)
  - Call/obligation to offer consumption reduction quantities from end consumers on the on the FlexMOL
  - Restrictions on large consumers
  - Restrictions on end consumers with load metering

Inputs when Forecasting the Gas Demand

- Gas supply standard: metering points, supply contracts, storage contracts, transit contracts, historical data, regional temperature and standard load profile leads to specifications for certain gas volumes in storage.
- Model for winter outlook based on following input parameters:
  - Data basis Consumption: Year 2021 or 5-year average
  - Storage level: What quantities are available for Austria?
  - Production: Different scenarios
  - Restrictions: Large consumers, power plants, big industrial customers with load metering.
  - More details: https://www.e-control.at/documents/1785851/1811582/20221108-04-Leo-Lehr.pdf/e309f05b-c5a7-a867-7bd8-45b1667de375?t=1667924495664
  - Tool also used for recent study on gas supply scenarios in Austria from 1 January 2025 onwards (https://www.bmk.gv.at/dam/jcr:cf327092-0f97-48c3-9186-bb8aaafc0758/Szenarien_Gasversorgung_Analyse_202406.pdf)

Mathematical Models for Forecasting

- Sigmoid function of the standard load profiles provides a graph follows a logistic function (s curve in graph).



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Challenges and Best Practices in Gas Demand Forecasting

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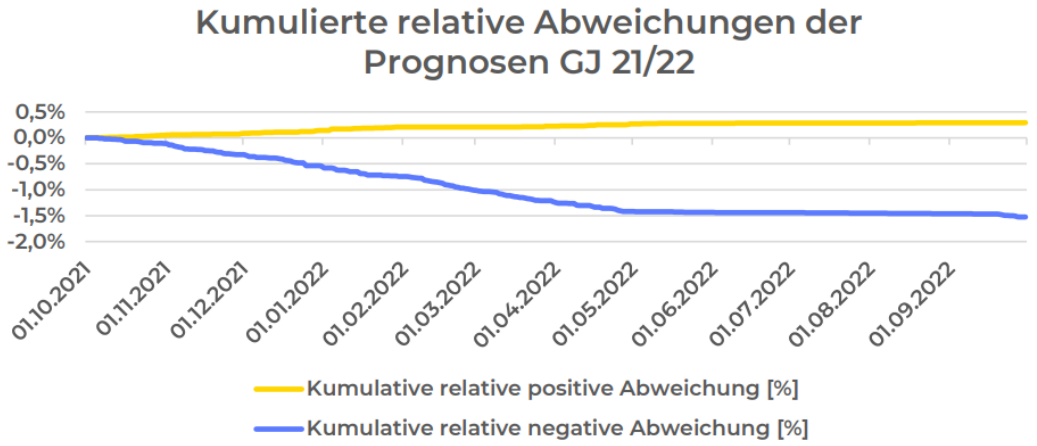
Challenges

- Deviations from the forecast can be attributed to the following factors:
  - temperature deviations
  - seasonal deviations
  - changes in consumption behaviour
  - public holidays
  - unfavourable choice of SLP parameters
- Forecast model can only be an approximation.

Challenges and Best Practices in Gas Demand Forecasting

Best Practices: Day-ahead forecast by market area manager

- The data analyses indicates that this model is reliable and predicts actual consumption well.
- The stable and small deviations in the forecasts indicate that the models accurately predict actual consumption. However, it should be noted that a cold snap and higher gas prices due to the geopolitical energy crisis may have had an impact on the accuracy of the forecasts.
- The positive cumulative deviation remains stable at around 0.3%, which indicates that the positive deviations in this period are very low and constant.
- The negative cumulative deviation decreases continuously until it levels off at -1.5%. This indicates a tendency for the forecasts to be minimally underestimated.



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THANK YOU FOR YOUR ATTENTION!

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