Balancing Network Code

NDM Forecast Accuracy Report
BeLux H-gas and L-gas balancing zones

FLUXYS

Context

- Following Article 42(3) of EU Regulation 312/2014 establishing a Network Code on Gas Balancing of Transmission Networks:
  - *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*
- In the BeLux market, non daily metered (NDM) off-takes refer to domestic consumption on the distribution networks
- The BeLux market consists of 2 balancing zones
  - H-gas zone: high calorific gas networks in Belgium and Luxemburg
  - L-gas zone: low calorifc gas network in Belgium
- There are 2 forecasting parties in BeLux:
  - Fluxys Belgium for Belgium
  - Creos for Luxemburg

FLUXYS

Forecasting process in Belgium

- Forecasts are done for Public Distribution, combining NDM and small daily metered customers
- Taking into account several parameters:
  - Weather forecast (temperature, wind, cloud cover…)
  - Consumption on reference days
  - Day type (day in week, weekend…)
- Based on dedicated algorithms under human supervision

FLUXYS

Approach (1/2)

- NDM forecasted consumption for a specific gas day D is monitored each hour and saved 4 times: at 10h and 22h on gas day D-1 and at 10h and 18h on gas day D
- Our analysis uses forecasts made between 1st October 2015 and 31st December 2017, or for 823 gas days
- Most of the time, we used the forecast made at 10h on gas day D-1. However, for 52 days we had to use another forecast. The repartition of the forecasts used for the study is as follows (for H-zone as well as for L-zone):

10h gas day D-1	771
22h gas day D-1	37
10h gas day D	6
18h gas day D	4
No data available	5

- For each analyzed day, we compared the validated allocation (NDM_{actual}) to the forecasted consumption ($NDM_{forecast}$)

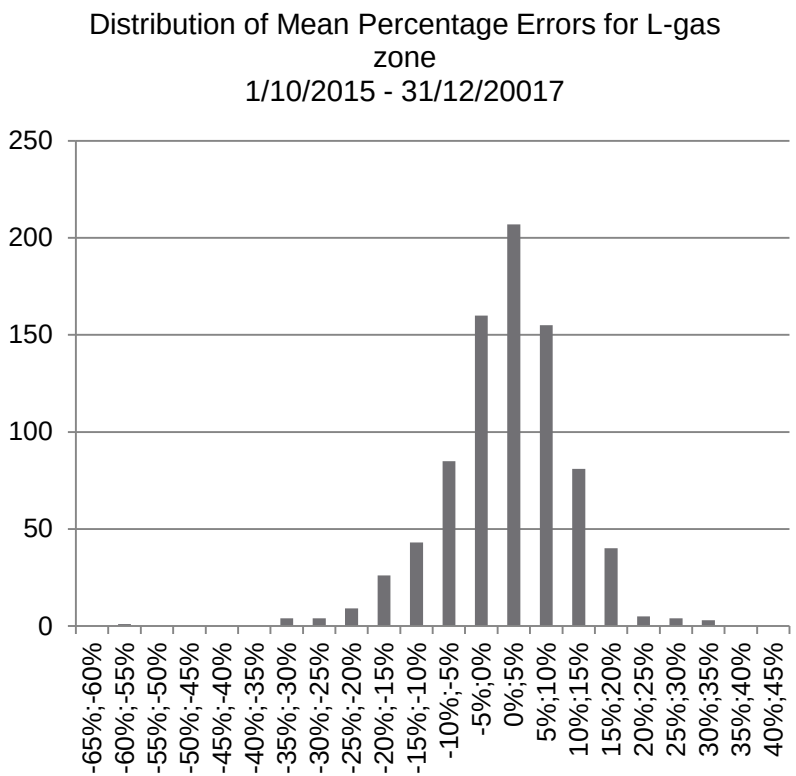
FLUXYS

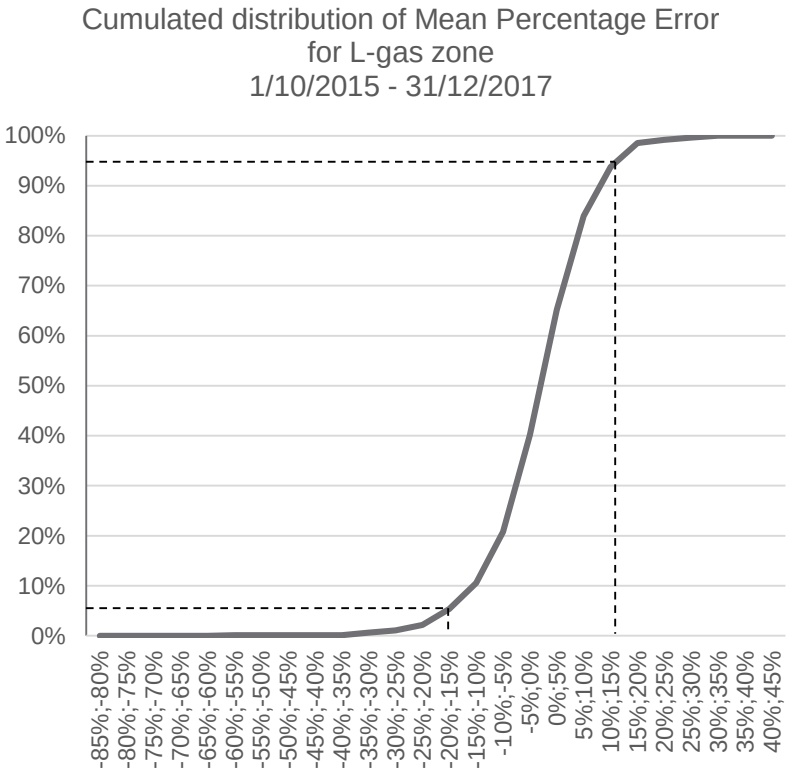
Approach (2/2)

- For each gas day and each balancing zone, we determine 2 metrics
  - The Mean Percentage Error (MPE)
    - » $MPE = \frac{NDM_{actual} - NDM_{forecast}}{NDM_{actual}}$
  - The Mean Absolute Percentage Error (MAPE)
    - » $MAPE = \frac{|NDM_{actual} - NDM_{forecast}|}{NDM_{actual}}$
- These metrics are then used to
  - Plot a distribution of the MPE
  - Plot the cumulated distribution of MPE
  - Derive the average and standard deviation (σ) of the MPE population
  - Define the 90% interval of the MPE population (based on cumulated distribution of MPE)
  - Determine the average MAPE and the Mean Forecasting Accuracy (MFA)
    - » $MFA = 1 - \frac{\sum_{i=1}^{N} MAPE_i}{N}$ where N is the total number of gas days analyzed

FLUXYS

Results for L-gas zone



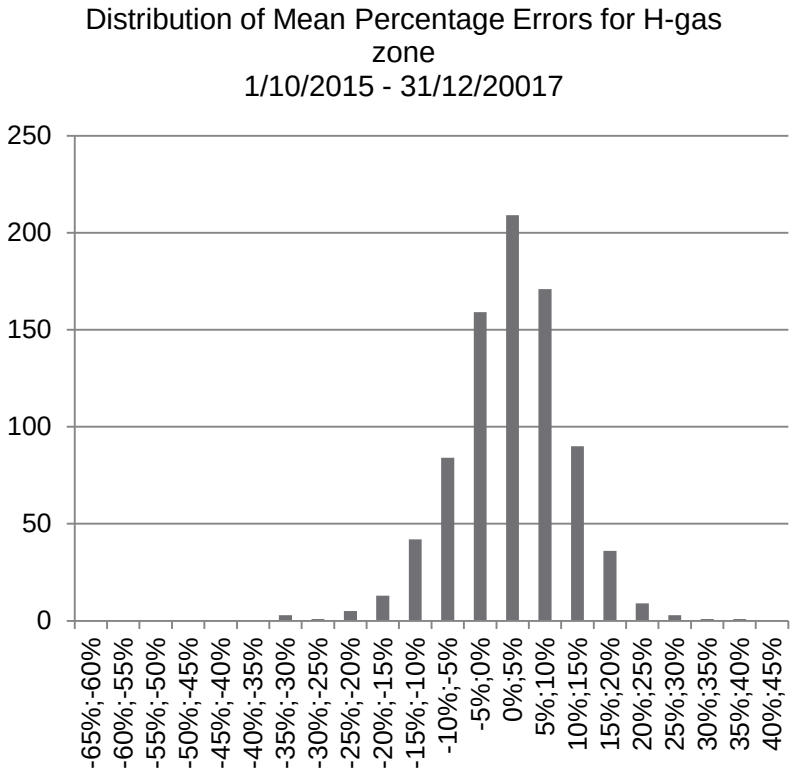


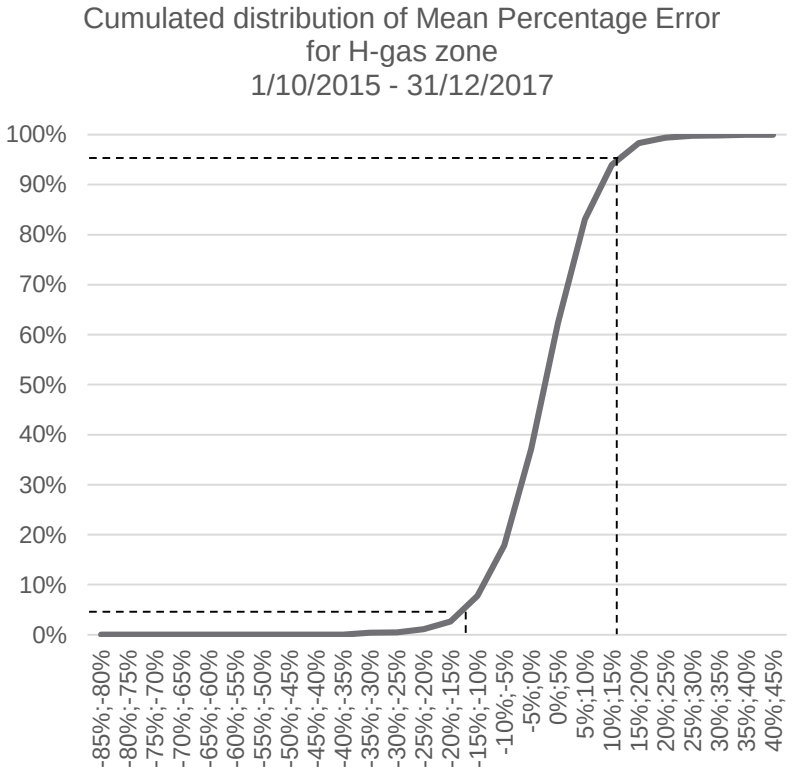
Average MPE	Std Deviation	90% Interval
1,44%	9,51%	[-15% ; 15%]

Average MAPE	Mean Forecasting Accuracy
7,31%	92,69%

FLUXYS

Results for H-gas zone





Average MPE	Std Deviation	90% Interval
2,24%	8,65%	[-12% ; 15%]

Average MAPE	Mean Forecasting Accuracy
6,97%	93,03%

FLUXYS

Analysis of results

- With Mean Percentage Errors of respectively 1,44% for L-gas zone and 2,24% for H-gas zone, we can conclude that we on average tend to underestimate the NDM consumption,
- However, on both zones the Mean Percentage Error is well balanced around 0

- We can conclude that generally forecasts are reliable estimates of the NDM consumption on both H-gas and L-gas zones