



Investigation on system imbalances in Germany in June 2019

Report from November 19th, 2019
(analysis from August 2019)

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1. Executive summary

On 06/06/2019, 12/06/2019 and 25+26/06/2019, there significant system imbalances occurred in the German power system. Resulting from a shortfall in generation relative to total system load, these imbalances reached a maximum of more than 6,000 MW on 06/06/2019 and 25/06/2019 and nearly 10,000 MW on 12/06/2019. Apart from peak values, significant imbalances persisted for several hours on these days. The German transmission system operators (TSOs) fully activated all balancing reserves (aFRR and mFRR)¹ and, additionally, activated additional reserves from other sources, e. g. requesting the activation of emergency reserves from foreign TSOs.

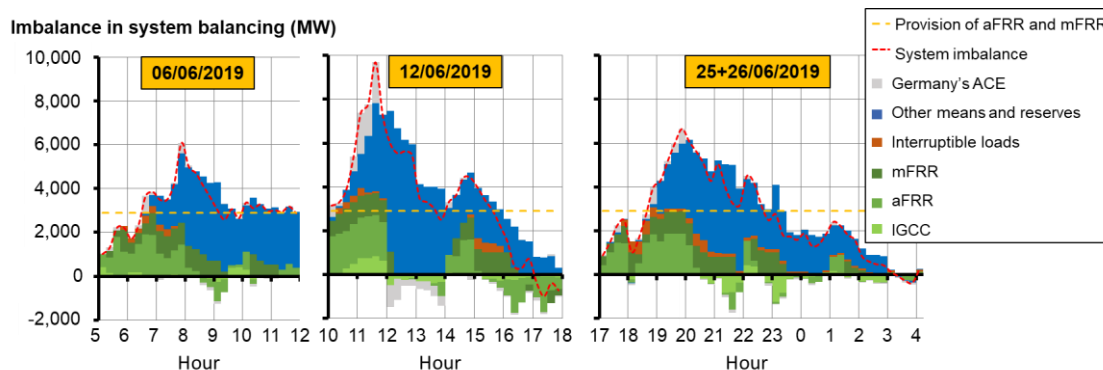


Figure 1: Time course of the imbalance in system balancing and measures implemented on 06/06/2019, 12/06/2019 and 25/06/2019 (source: analysis by German TSOs)

On 06/06/2019 and 12/06/2019, complex weather conditions provided for difficulties to predict the generation by renewable energies (RE), in particular wind generation. In addition, balance responsible parties (BRPs) responded to high prices at the intraday (ID) market for scheduled energy of the power exchange (PX) (time correlation between high ID prices and BRP deviations).

On 25/06/2019, no significant RE forecast errors were observed, but once again high ID market prices triggered market reactions by BRPs.

For all three days, low imbalance prices (IP)² – partially below the maximum ID market prices (> 500 €/MWh) – provided for limited incentives to BRPs to keep a balanced portfolio. This is identified to be a key reason for the BRPs imbalances and the system imbalance observed, in addition to RE generation forecast inaccuracies.

The evaluation of schedule notifications by BRPs suggests, on the one hand, that a few BRPs experienced high imbalances and had a significant share in the system's total imbalance. For instance, on 25/06/2019, the five BRP with the largest imbalances contributed to the system imbalance (approx. 6,000 MW) by about 2,000 MW. As another example, the imbalances of the twenty most imbalanced BRPs corresponded to approx. 4,000 MW.

On the other hand, the analysis carried out by the German TSOs shows that BRPs managed their balancing groups properly, as far as schedule notifications and transactions on the previous day are concerned. But some of them switched to an improper balancing group management and schedule notifications intraday and caused high imbalances in this timeframe. They adjusted considerably their schedule notifications shortly before the start of delivery. The BRP adjustments correlate with the high prices in the continuous ID

¹ Automatic and manual frequency restoration reserve

² Due to small balancing energy prices (< 100 €/MWh), partially a result of the mixed-price rule for the procurement of balancing reserves in force at that time

market for scheduled energy and low IP (incentives to BRPs), while they may be justified by renewable generation forecast errors only to a limited extent.

Based on that, the German TSOs deepened the analysis of BRP imbalances to investigate the suspicion of improper BRP management, breach of forecast duty and short selling. Amongst others, the TSOs solicited feedback by BRPs regarding the approach they applied during the critical days in June. On this basis, the TSOs informed the German Federal Network Agency about the results of the investigation by the end of September 2019³ and handed out a list of BRPs conspicuous in this regard and supportive data. These results might support further procedures against the concerned BRPs by the TSOs and the German Federal Network Agency.

As a consequence of these events and the available preliminary results, various measures were implemented or scheduled. Inter alia, more mFRR was contracted.

Apart from that, the TSOs recommend some regulatory adjustments to increase the incentives to BRPs to remain balanced, such as:

- Obligation for BRPs to remain balanced at all times, including intraday,
- Adjustment of the 80%-criterion⁴ and consideration of ID market prices of quarter-hour products for determining the IP
- Provision of meter data for large consumers⁵ to the TSO on D+1

Some of the measures listed above have been disclosed for public consultation.

In addition, the TSOs returned, as of 31/07/2019, to the balancing reserve procurement rule that was in force before 12/07/2018, i. e. procurement based on the balancing capacity price only, based on a court's judgement to abolish the mixed-price procurement rule.⁶

³ The German TSOs do not have sufficient data for enhanced analysis of BRPs' trading transactions (quantities, prices).

⁴ According to the current regulation, the IP is increased by 50 % (at least 100 €/MWh) whenever at least 80 % of the procured aFRR/mFRR is activated (80%-criterion). However, the 80%-criterion has been applied, so far, in a few quarter hours only, i. e. with high system imbalances. This is due to the reduction of the actual demand for activating balancing energy due to imbalance netting and the replacement of balancing energy from (automatic) frequency restoration reserves by other measures, e. g. interruptible loads. The limited application of this IP 'escalation' factor is one of the reasons why the IP is often close to the maximum or volume-weighted average ID market prices. On 06/06/2019, 12/06/2019 and 25/06/2019, the IP fell even below the ID market prices in some balancing periods (15-minute-periods).

⁵ continuous/intraday consumption metering

⁶ According to the judgement of the Higher Regional Court of Düsseldorf dated 22/07/2019

2. Introduction: Extent and time course of system imbalances

On 06/06/2019, 12/06/2019 and 25+26/06/2019, extraordinarily high imbalances occurred in the German power system for several consecutive hours. In general, a system imbalance refers to a mismatch between total system load and total generation at a specific point in time. On those days, a significant deficit of generation in comparison to load (negative imbalance, deficit) transferred into exceptionally high system imbalances.

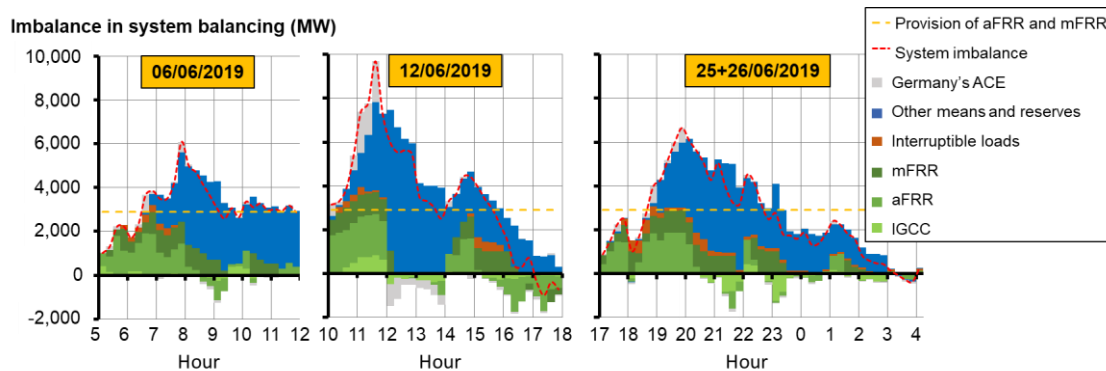


Figure 2: Time course of the system imbalance and balancing measures activated on 06/06/2019, 12/06/2019 and 25/06/2019 (source: analysis by German TSOs)

Figure 2 shows how the system imbalances evolved on these days and which reserves and complementary instruments the TSOs activated:

- Complementary measures and reserves include purchases of scheduled energy on the PX's continuous ID market and emergency reserves delivered by several foreign TSOs.
- The quantities with regard to International Grid Control Cooperation (IGCC) do not correspond to balancing reserves additionally activated but to the degree of avoided counter-activation of balancing energy in different countries by (partial) netting of system imbalances in the German power system with load frequency control blocks outside the German load frequency control block.
- The area control error (ACE) denotes the control error averaged per quarter hour. It is calculated from the difference between the measured and scheduled values for the cross-border exchange of electricity with neighboring countries, minus the activation of frequency containment reserves (FCR). The ACE corresponds to the need for activation of restoration reserves (FRR) and/or complementary measures with the goal of restoring the system balance.⁷
- The system imbalance is calculated from the sum of all adopted measures, the ACE (remaining control error) and the reduction of the balancing energy requirement by netting system imbalances with other load frequency control blocks (shown as IGCC quantities). This number can be interpreted as a hypothetical maximum system imbalance or gross demand for system balancing, provided the German load frequency control block would have been unable to reduce its system imbalance by imbalance netting with other load frequency control blocks.

In summary, the actions taken by the German TSOs on 06/06/2019 totaled almost 5,500 MW at the peak (i. e., at a specific 15-minute-interval during the day); on 12/06/2019, actions were taken to the extent of

⁷ Due to the dynamic behavior of the ACE and the continuous use of balancing energy (and probably also other measures), the illustrated ACE value can also be interpreted as a remaining (net) control error after/despite the use of balancing measures.

7,000 MW, and, on 25/06/2019, more than 6,500 MW were temporarily activated. In fact, the system imbalance was even higher and the need for system balancing would have been more pronounced if the remaining control error/ACE is taken into account and the imbalances could not have been partially offset by opposite imbalances elsewhere via IGCC netting. Apart from the peak values, high negative imbalances (power deficit) persisted for several hours on each of these days.⁸

As a result, there was a significant risk to system stability and security of supply in Germany during these hours. The German TSOs had to activate all available balancing reserves comprising of aFRR, mFRR and interruptible loads.⁹ In addition, the TSOs bought electricity at the ID of the PX and requested the activation of emergency reserves from foreign TSOs. System stability could only be restored through the massive and coordinated deployment of these measures for several hours.¹⁰

Based on a quantitative analysis carried out by the German TSOs, this brief report examines the circumstances and the causes of the system imbalances. Moreover, this report cites several adaptations to the market design. Some of the measures are proposed by the TSOs, while some others have been implemented or are pending implementation.

⁸ The numbers shown are average values per quarter hour, while higher peak values were observed during some quarter hours.

⁹ According to the German Interruptible Loads Ordinance (Verordnung zu abschaltbaren Lasten (AbLaV))

¹⁰ Figure 2 also shows the massive deployment of balancing reserves and complementary measures reduces the system imbalance and Germany's ACE turns negative in some hours. The reason is that the additional measures (e. g., emergency reserves from foreign TSOs, additional reserves via ID power exchange transactions, ...) may have significantly longer lead times for activation compared to aFRR and mFRR and the activation cannot be perfectly tailored to the needs of continuous system operation (e. g. (multi-) hourly activation scheme). They serve to replace, release and complement the TSO's balancing reserves (in particular aFRR) in case of large system imbalances. Due to the aforementioned constraints, the use of complementary measures and balancing reserves can result in opposing activations and volumes.

3. Analysis of BRP imbalances

An imbalance in the power system in real-time measures an imbalance between generation and load at that point in time. The imbalance is directly related to the actions of market participants/BRPs who are organized in balancing groups (BG). BGs are the market role and a sort of portfolio-type vehicle to plan and inform the system operator – via schedules (including, among other things, the load and generation they expect in their portfolio) – about market participants' activities. Operated by a BRP, a balancing group also serves to net the energy imbalances of the market participants organized in the same balancing group and to financially settle the balancing group's net imbalance (resulting mismatch in real-time between all schedule(s) and actual values e. g. consumption and RE generation) between the BRP and the system operator.

Hereafter, it will be analyzed, which BRPs produced the highest imbalances and, thus, most contributed to the system imbalance on the days in June that are under investigation. The essential causes for BRP imbalances and total system imbalance will be examined, including renewable electricity (RE) generation forecast errors, short selling of electricity and incorrect/missing economic incentives for BRPs to remain balanced in real-time.

Moreover, BRP data is analyzed, including the schedules provided the day before and on the same day, as well as actual values (measurement values). In addition, the link between intraday trading notifications by selected BRPs and market prices (ID market prices, IP) is examined, to quantify the economic incentives to BRPs.

To start with, Figure 3 depicts the 5, 10 and 20 BRPs with the highest imbalances and the sum of all BRP imbalances. To identify the most imbalanced BRPs, BRP imbalances were summed up for all quarter hours of the same day.¹¹ This gives the following result:

- The 20 BRPs with the highest imbalance reflect quite well the structure and the extent of the total system imbalance. For instance, during the very critical time period beginning early in the morning till noon on 06/06/2019, the system imbalance was almost completely caused by the Top20 BRPs, i. e. the 20 BRPs with the largest imbalances. On the other two days, the Top20 BRPs also contributed heavily to the system imbalances, while the sum of the remaining BRPs was responsible for approximately 1,000 – 1,500 MW depending on the hour looked at.
- The role of the Top5 BRPs is also significant. On 06/06/2019, they caused imbalances to the extent of approx. 2,000 MW, or 40 % of all imbalances (5,000 MW) at the peak. In other hours, their share was even higher since their total imbalance remained similarly high, while the sum of all BRP imbalances dropped. On 12/06/2019 and on 25/06/2019, the share of the Top5 BRPs was of a similar order of magnitude as on 06/06/2019.

Thus, it is fair to conclude the imbalances of a few balancing groups only were responsible to a large extent for the system imbalance on all three days in June.

¹¹ Considering only those imbalances of a BRP that increased the system imbalance.

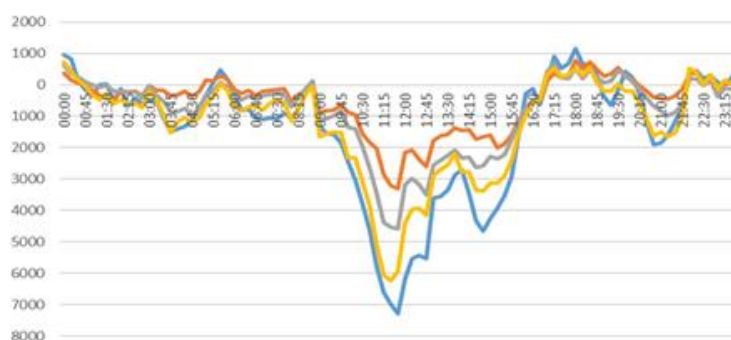
06/06/2019

MW



12/06/2019

MW



25/06/2019

MW

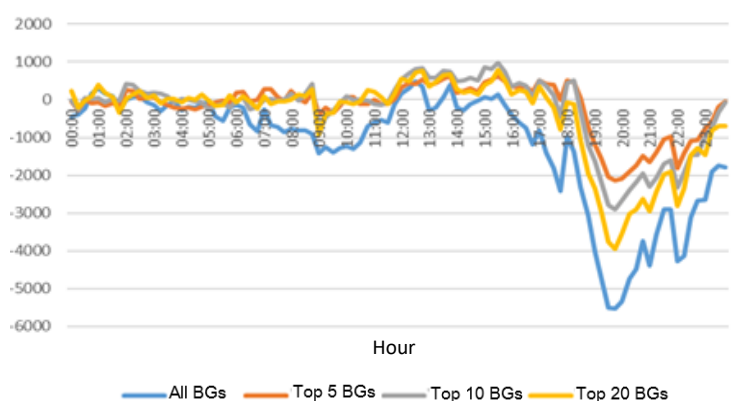


Figure 3: Weight of BRPs with high imbalances in total system imbalance (source: analysis by German TSOs)

A further analysis of BRP imbalances (without TSOs' balancing groups) reveals there were no noteworthy BRPs imbalances, that stabilized the system, i. e. that reduced the system imbalance. The analysis points also to balancing groups, whose approach and imbalances may be considered unobtrusively (e. g. usual forecast inaccuracies).

So, it remains uncertain which are the drivers for BRP imbalances and whether forecast inaccuracies may sufficiently well explain them.

4. Possible causes

4.1. Renewable energies generation forecast inaccuracy

Hereafter, the forecast (error) of the electricity generation from RE¹² is analyzed as a potential explanation for why some BRPs experienced significant imbalances and exceptionally high system imbalances occurred on 06/06/2019, 12/06/2019 and 25/06/2019. This is to clarify whether a complex weather situation, weaknesses in the weather or RE generation prediction models or other technical or methodological factors may have caused a low forecast quality. Our findings are as follows:

- **Analysis for 06/06/2019**

On this day, a low-pressure area moved in from Western Europe and traversed the German load frequency control areas of TenneT and 50Hertz, leading to some shadowing effects on RE generation facilities. The weather prediction models commonly used produced inconsistent forecasts in particular with respect to the direction of movement and the speed of the depression.

As a result, there was an exceptionally high day-ahead forecast error of electricity generation from wind. This manifested in a high supply of wind energy occurring earlier (namely at about 04:00 am) than what was predicted on the day before and even two hours before real-time. Then, wind generation decreased faster and more significantly than assumed before.

The forecast error was significantly reduced as soon as (short-term) forecasts closer to real-time became available, but it was still relatively high at the time when high system imbalances were observed. Due to the inaccurate estimate of the wind generation in terms of the time and power curve, there was an oversupply by wind generation and a positive system imbalance requiring the activation of downward balancing energy. The decrease in wind generation, which was faster than anticipated, then, led to a shortfall in generation in the morning hours and to a considerable need for upward balancing energy.

As a result, the wind forecast error may not be discarded as an initial driver or trigger for the system imbalances observed (uniform course). Yet, it is insufficient to explain the magnitude and the duration of the system imbalance on 06/06/2019.

- **Analysis for 12/06/2019**

For this day, a depression crossing Northern Germany and thunderstorms were expected. Forecasts predicted a volatile but gradually increasing supply from wind generation. However, in particular the short-term forecasts strongly overestimated the actual supply. For example, the short-term forecast exceeded the actual supply by approx. 1,500 MW at 4:00 pm.

Despite the deficiencies observed in the wind generation forecasts, it cannot fully explain the actual demand for balancing capacity. Although erroneous forecasts are considered an important driver for the system imbalances observed, it is clear that the magnitude and persistence of system imbalances were rather driven by other factors.

- **Analysis for 25/06/2019**

On 25/06/2019, the RE generation forecasts were rather normal and the forecast errors were insignificant. To some extent deviations from the standard load profile occurred due to high air temperatures. Yet, RE forecast errors cannot fully explain the system imbalances observed.

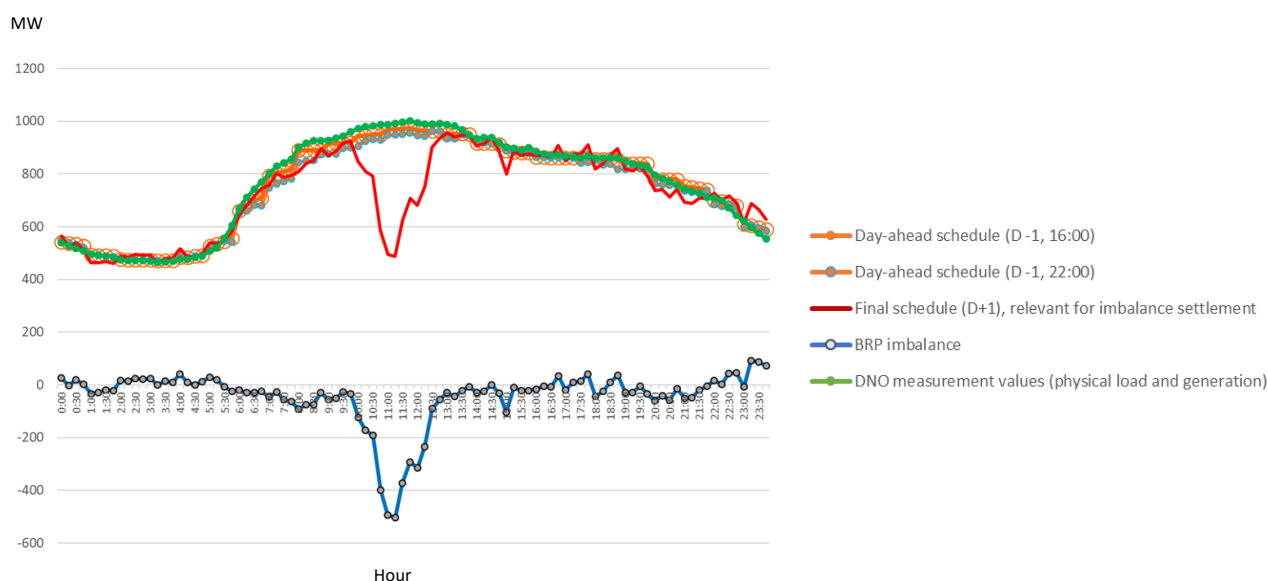
¹² Including volumes sold in the wholesale market directly by generators and agents incl. large utilities and TSOs in accordance with EEG (Erneuerbare-Energien-Gesetz [German Renewable Energy Act])

In summary, the background analysis of the German TSOs suggests difficult weather conditions led to forecast errors on 06/06/2019 and in part also on 12/06/2019. Nonetheless, the RE prediction error do not justify the magnitude of system imbalances observed and the balancing energy deployed on the three days.

4.2. Improper balancing group management and suspicion of short selling

Bearing in mind the limited impact of the RE generation forecast error on system imbalances on the three days in June, the analysis hereafter looks into the market signals and economic incentives that prevailed as another possible explanation for the high BG imbalances.

Figure 4 illustrates for a selected BRP the course of its schedule notifications and imbalances for 12/06/2019.



DNO – Distribution network operator

Figure 4: Example of improper BRP management and scheduling (source: analysis by German TSOs)

Apparently, the BRP's total load was very well anticipated at the day-ahead stage (orange lines), as the comparison with final volumes/allocations relevant for imbalance settlement (green line) shows. However, the BRP generated significant imbalances within the same day (blue line), when comparing the final schedule (day after; red line) with actual values from measurements. Interestingly, the BRP's imbalances coincide with the system imbalance shown in Figure 3.

According to an additional analysis done by the German TSOs, the strategy found for the exemplary BRP was found at several other BRPs and all on three days. This suggests an improper balancing group management by the corresponding BRPs, as it violates BRPs' obligation for proper forecasting and scheduling. And, one may conclude that the improper management of balancing groups by these BRPs is the cause of their imbalances on all three days in June 2019.

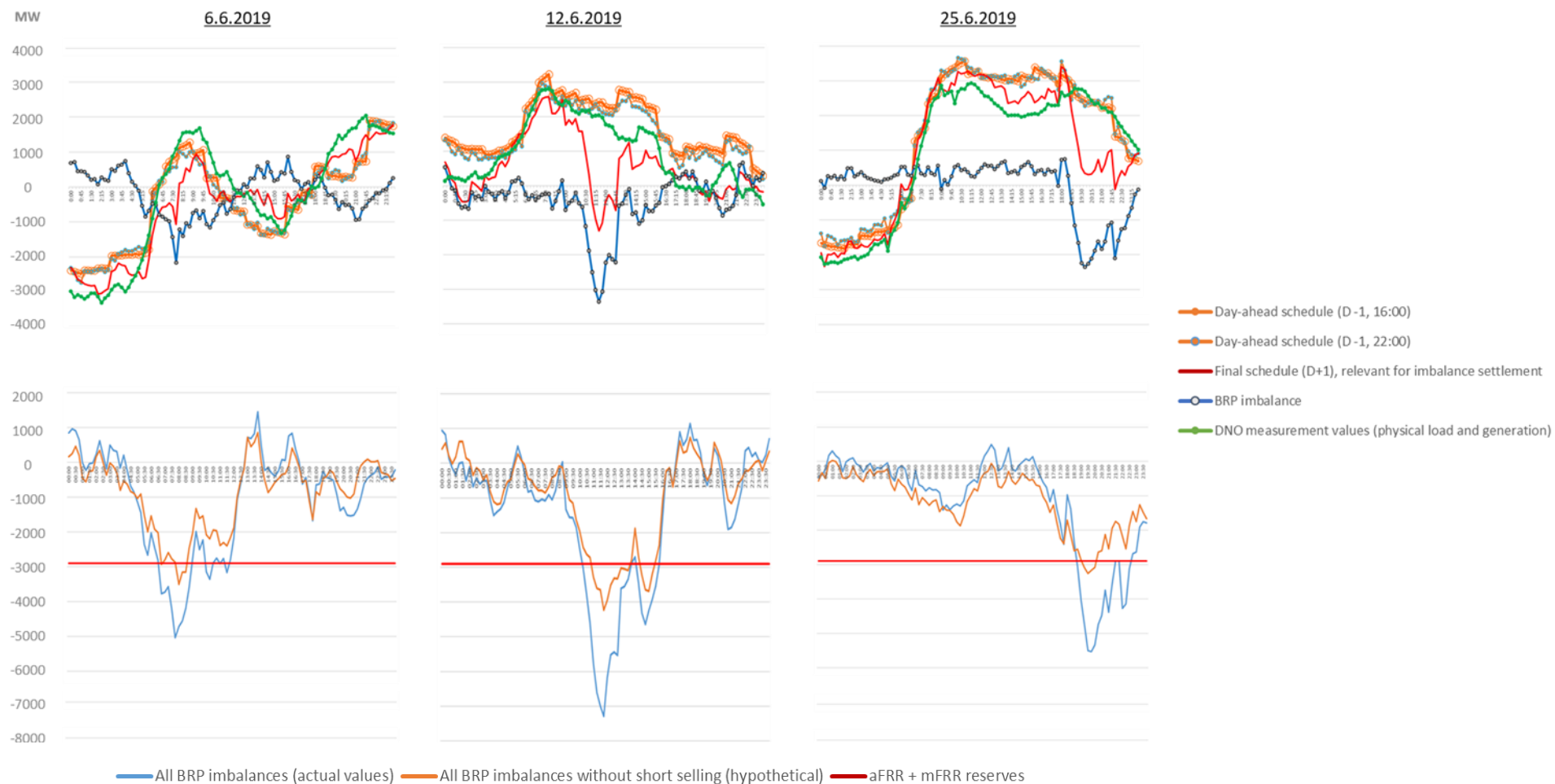
Additionally, these BRPs are also under suspicion of short selling of electricity, provided they feigned a decrease of the (forecasted) load in their balancing group and sold electricity that was thought to meet the demand of their customers (according to day-ahead schedules).

Figure 5 below illustrates the hypothetical system imbalance if ten selected BGs, for which the aforementioned conspicuous intraday BG management was found, had prepared 'proper' schedule notifications that reflected their true expectations of load and generation.

- The respective upper diagram shows what influence these BGs had on the system's balancing energy demand on all three days.

- The lower chart depicts the hypothetical system imbalance, provided the BRPs had stuck to the schedules on the basis of the day-ahead forecast.
The system imbalance corresponds to the sum of the (net) system imbalances between generation and load of all four German load frequency control areas remaining after the activation of balancing energy in all four load frequency control areas.

According to Figure 5, the sum of all BRP imbalances would have been limited to the total balancing capacity (aFRR and mFRR) that was contracted by the TSOs or would have exceeded it only slightly. More precisely, on 06/06/2019 and 25/06/2019, the available balancing capacity would have been adequate to fully cope with the resulting system imbalances (at least, with 15-minute averages). And, the need for emergency reserves from foreign TSOs and emergency purchases at the PX would have been significantly reduced or completely avoided on all three days.



DNO – Distribution network operator

Figure 5: Estimated effect of BRP imbalances on system imbalances with and without proper scheduling and BRP management (source: analysis by German TSOs)

Our preliminary findings suggest that the economic incentives that prevailed in the energy market determined the strategy of BRPs rather than forecast errors. This suspicion is supported by an additional analysis of BRPs' trading activities in the ID market, on the one hand, and schedule notifications, on the other hand. This is illustrated in [Figure 6](#) based on the example of one BRP for 25/06/2019.

- The lower part of the graph shows the planned exits from the BG according to the BRP's schedule notifications for the four quarter hours between 8:00 pm and 9:00 pm. In addition, the actual load/supply (measured values) is depicted.
- The upper part of the graph shows all transactions of the hourly product with physical fulfilment from 8:00 – 9:00 pm traded at the ID market for scheduled energy from 3:00 pm to shortly before the time of fulfilment. The transactions made by market participants are colored differently to those made by the TSOs (for the purpose of system balancing). In addition, the figure shows the minimum and maximum (IP) of the four quarter hours, which market participants are/were able to anticipate to a considerable extent based on the information available on the system imbalance and balancing energy activation prices.

The schedule notifications of the BRP (lower graph) show that the BRP had a consistent expectation for the entire afternoon on 25/06/2019 on the outputs from the BG for all four quarter hours between 8.00 pm – 9.00 pm, namely approx. 850 – 925 MW.

Nonetheless, from about 6:30 pm electricity with delivery for the hour 8:00 pm – 9:00 pm was sold at increasing market prices. At about 7:30 pm, the TSOs began purchasing electricity as a complementary measure for system balancing.

At about 7:30 pm, the ID prices exceeded the maximum (expected) IP. It is also at that time when the BRP deviated significantly from its previous expectation of the BG export and adjusted its schedule notifications several times to about 650 MW for each quarter hour between 8:00 pm and 9:00 pm. This is noteworthy as the schedule notifications up to this time turned out to match with the actual load quite well. The BRP adjusted its schedule notifying to the system/TSOs the expectation of an excess of energy, either due to lower consumption or higher generation allocated to that BG. Interestingly, the reduction in the BRP's net figure (increase in sales volume or reduction of purchase quantity) took place shortly before the start of delivery and at the same time when ID market prices were rising considerably and were exceeding the maximum expected IP.

The difference between the actual load/generation values and the final schedule notification for the corresponding quarter hour suggests the BRP engaged in short selling of energy. That is, the BRP is suspected of having sold this alleged excess energy on the ID market at high prices without compensating the resulting deficit by additional generation, consuming less energy in real time or purchases.

Obviously, the IP (compared to quarter-hourly trading) in the relevant quarter hours provided no adequate incentive to prevent the BRP from ending up with a significant imbalance and high imbalance settlement costs. In other words, electricity was sold out from this BG at times of high ID market prices and the BRP accepted a negative imbalance which was financially settled at a IPs below the ID market price.

As this strategy may be observed on all three days, several BRPs, often affected by high imbalances, are under suspicion of (illicit) short selling and causing or aggravating the system imbalances. Without these short sales or improper BRP management, significantly lower system imbalances would have occurred. Moreover, it is fair to assume that some of the emergency purchases by the TSOs were not physically fulfilled but affected by short selling by market participants.

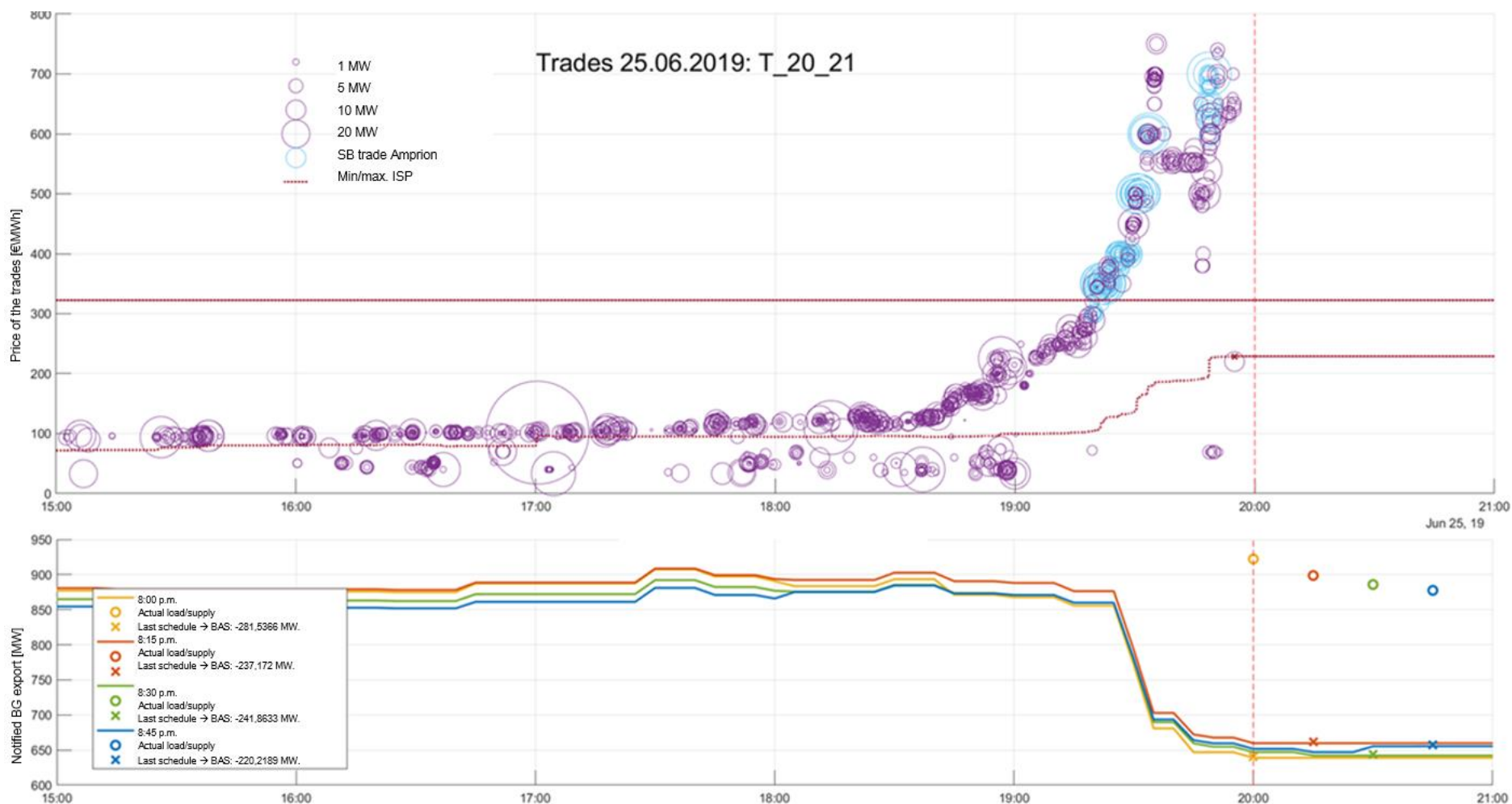


Figure 6: Classification for proof of short sales based on the comparison of the schedule notifications and the prices on the ID market (source: analysis by German TSOs)

Compared to the ID prices, the IP provided for a limited and ineffective incentive to BRPs. According to the German TSOs, one of the reasons for this flaw is the terms and conditions that were in force in June, specifying the procedures for selecting and activating balancing energy bids (aFRR and mFRR)¹³ and for determining the IP.^{14,15}

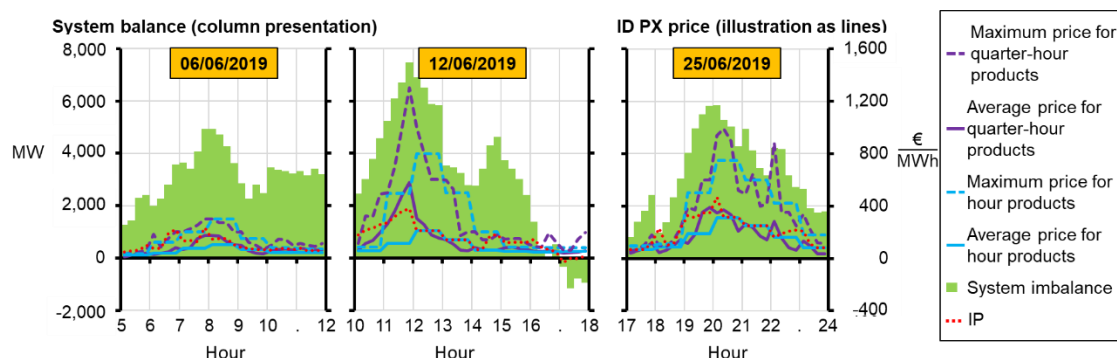


Figure 7: Correlation between imbalance and ID exchange price¹⁶ (source: German TSOs)

According to the TSOs' analysis, BRPs optimizing their schedule management and market transactions based on the IP and ID market prices for scheduled energy was the result of a conscious decision making process. Based on the uniform application of this strategy by various BRPs, system imbalances aggravated and piled up to an acute system threat.

This finding is also supported when comparing system imbalances with PX prices. Figure 7 **Fehler! Verweisquelle konnte nicht gefunden werden.** shows the system imbalance¹⁷, the maximum and average ID market prices as well as the IP, averaged per quarter-hour. In particular on 12/06 and 25/06, the ID market prices highly correlated with the system imbalance. And, on 12/06, the maximum ID price for the quarter-hour product exceeded the IP to be expected after 10:00 am.

Figure 7 **Fehler! Verweisquelle konnte nicht gefunden werden.** also shows that the ID market price rose in parallel to the purchases by the TSOs. Nonetheless, the system imbalance continued to increase, probably because

¹³ For the procurement of balancing reserve providers as of 12/07/2018, for each capacity and energy bid combination a uniform weighting factor was applied and a combined cost factor/score was calculated (see Bundesnetzagentur stipulations BK6-18-019 and BK6-18-020). Calculated from historic figures, the weighting factor represented the assumed average balancing energy activation volume. In comparison with the previous regulation, with bid selection on the basis of the offered capacity price only, balancing reserve providers changed their bidding strategy, resulting in higher balancing capacity and lower balancing energy prices, and, correspondingly, lower IP on average.

¹⁴ In the case of negative/positive system imbalances, the IP has an upper/lower cap, calculated from the volume-weighted average ID spot market price of the hour product on the ID market of EPEX spot. In turn, the ID market prices for quarter-hour products, which are often significantly higher/lower than the price of the corresponding hour-product, are not considered for the IP (see stipulation BK6-12-024).

¹⁵ According to the current regulation, the IP is increased by 50 % (at least 100 €/MWh) whenever at least 80 % of the procured aFRR/mFRR is activated (80%-criterion). However, the 80%-criterion has been applied, so far, in a few quarter hours only, i. e. with high system imbalances. This is due to the reduction of the actual need for activating balancing energy due to imbalance netting and the replacement of balancing energy from (automatic) frequency restoration reserves by other measures, e. g. interruptible loads. The limited application of this IP 'escalation' factor is one of the reasons why the IP is often close to the maximum or volume-weighted average ID market prices. On 06/06/2019, 12/06/2019 and 25/06/2019, the IP fell even below the ID market prices in some balancing periods (15-minute-periods).

¹⁶ The graph shows the (provisional) operating values, which can deviate from the quality-assured values.

¹⁷ Note the difference in the notion of the term 'system imbalance' depicted in Figure 7 and Figure 2. Known under the term 'NRV imbalance' (Netzregelverbund-Saldo, i. e. Grid Control Cooperation (GCC) imbalance), the system imbalance corresponds to the values shown in Figure 7 and measures the imbalance in the GCC of the German TSOs. It is calculated as the sum of all imbalances from the four load frequency control areas summing up all balancing measures activated by the TSOs (see also "Explanations on the publications on the joint Internet platform www.regelleistung.net", www.regelleistung.net, dated 01/09/2017).



(some of) the energy purchases by the TSOs remained physically unfulfilled (short selling). Otherwise, the emergency purchases of the TSOs would have immediately alleviated the system imbalance.

5. Adaptive measures and changes to the market design

The German TSOs propose various short-term and medium-term measures, that will avoid that system stability will be endangered again as it happened in June 2019. At the same time, additional supporting steps are planned in the area of regulation and market design (Table 1 below).

Table 1: Overview of relevant measures linked to the events in June 2019 (source: German TSOs)

Responsible party	Implemented or planned	Type	Date of implementation
TSOs	Already implemented measures	Reminder to BRPs about their obligation to remain balanced	26/06/2019
		Increase of procured mFRR capacity	29/06/2019
		From 30/07/2019: Replacement of the mixed-price rule for the procurement of balancing service providers by selection of bids exclusively on the basis of the balancing <i>capacity</i> bid*	22/07/2019
	Pending/planned measures	BRPs with conspicuous imbalances - TSOs soliciting clarification by BRPs on their work approach during the June 2019 events (written request for statement) - If appropriate, report to German Federal Network Agency - In the event of further breach of BRP obligations¹⁸ (subject to determination by the German Federal Network Agency): potential termination of BRP contracts	
German Federal Network Agency	Already implemented measures	Approval for exchange of BRP data between TSOs	19/07/2019
	Pending/planned measures	Various measures to enforce BRP obligations - Obliging BRPs to maintain a balanced portfolio, also intraday - Adjusting the 80-%-criterion and the link to quarter-hourly ID market prices when calculating the IP - Provision of meter reading data of large consumers to the TSOs on D-1	
		Possible procedure with respect to BRPs: - If necessary, official disclosure of BRP's breach of forecast duty by the German Federal Network Agency after notification by the TSOs - Where appropriate, option for criminal prosecution of BRPs affected	
Power exchange	Pending/planned measures	Potential sanctioning of BRPs with unlawful conduct	

*Judgement of the Higher Regional Court of Düsseldorf

In the short term, the German TSOs increased the tendered mFRR capacity as of 29/06/2019 and procured higher mFRR capacity throughout Q3/2019. Compared to Q2/2019, the balancing capacity contracted increased from

¹⁸ Proper forecasting and scheduling, no arbitrage trading with regards the IP, no actions endangering system stability, and the like

-938/+1,094 MW by approx. 150 MW downward mFRR and by approx. 950 MW upward mFRR to -1,006/+1,952 MW. The aFRR capacity was changed insignificantly (-1,770/+1,892 MW). In addition, the TSOs returned, as of 31/07/2019, to the procurement mechanism that was in force before 12/07/2018, i. e. selection based on the capacity price only, based on a court's judgement to abolish the mixed-price procurement rule.¹⁹ This said, effects on the prices for the provision and activation of aFRR and mFRR are to be expected in the medium term.

In addition, the TSOs deepened the analysis of BRP imbalances to investigate the suspicion of improper BG management, breach of forecast duty and short selling. Amongst others, they solicited feedback by BRPs regarding the approach they applied during the critical days in June. On this basis, the TSOs informed the German Federal Network Agency about the results of the investigation by the end of September 2019²⁰ and handed out a list of BRPs conspicuous in this regard and supportive data. These results might support further procedures against the concerned BRPs by the TSOs and the German Federal Network Agency.

Apart from that, the TSOs recommend some regulatory adjustments to increase the incentives to BRPs to remain balanced, such as:

- Obligation for BRPs to remain always balanced including intraday,
- Adjustment of the 80%-criterion and consideration of ID market prices of quarter-hour products for determining the IP
- Provision of meter data for large consumers²¹ to the TSO on D+1

Some of the measures listed above have been disclosed for public consultation.

¹⁹According to the judgement of the Higher Regional Court of Düsseldorf dated 22/07/2019

²⁰ The TSOs do not have sufficient data for deeper analysis of BRP's trading transactions (quantities, prices and times).

²¹ Continuous/intraday consumption metering