

Note

(Z)1803
19 July 2018

Network balancing in the BeLux natural gas market during the cold spell end of February start of March 2018

Article 15/14, §2, 5°,12° en 24° of the law of 12 April 1965 on the transport of gaseous product and other through pipes.

Non confidential version

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EXECUTIVE SUMMARY

In the period from the end of February to the beginning of March 2018, NW Europe was hit by a cold spell described in the specialised press as the “The Beast from the East”. The impact on the natural gas market was felt most severely in the United Kingdom, principally as this cold spell coincided with several temporary problems in the offshore gas network in the North Sea. On the one hand, this involved a suspension of supplies of natural gas from the Kollsnes field in Norway to the United Kingdom and, on the other hand, it concerned technical problems on the SEGAL supply pipes to the Saint Fergus terminal in combination with a limitation of the output capacity from the South Hook LNG terminal. The definitive closure of the Rough storage site and its impact on the available storage capacity implies the United Kingdom, in terms of supply security and seasonal flexibility, is largely dependent upon LNG, natural gas from the North Sea and the storage capacity in NW Europe. When the cold spell hit, the quantities of stored natural gas in NW Europe were very low and the Dutch Bergermeer storage site was also affected by limitations in output capacity. Finally, the limitation of gas production from Groningen increased pressure on the gas market not only in the Netherlands, but across the whole of Europe.

In this report, CREG takes note that the market-driven balancing system worked effectively during this sudden cold spell. Fluxys Belgium only intervened in the *intraday market* a few times (principally on March 1 and March 2) and bought natural gas on the traded market at market prices that were slightly higher than the ZTP *day-ahead gas price* in order to keep the aggregated market balancing position within predefined market thresholds. The price signal thus reflected adequately the pattern of supply and demand.

Network users who were out of balance were invoiced the cost of the imbalance via the imbalance charge. This is in accordance with the balancing rules set out in the Transmission Access Code. The imbalance charges resulted in extra income causing a surplus of the *Balancing Neutrality Account* up to + 3 million Euros. Fluxys Belgium proposes to return this sum to the network users community by means of a negative Neutrality Charge, actually set to zero.¹

An analysis of the use of the capacity at the interconnection points (auction data Prisma *day-ahead* and *within-day*) shows that, during the period from 27 February to 2 March, there was available capacity. It was also booked but not always fully nominated. It is clear that occasionally capacity was booked from a commercial viewpoint. Some network users were even prepared to pay a premium with a view to a possibly favourable commercial transaction. This activity is part of normal market balancing.

Both the *day-ahead spread* between TTF and ZTP (data ICE Heren) and the *within-day spread* between TTF and ZTP (data Pegas) were limited. Only during the cold spell from 27 February to 2 March we see a *within-day spread* that varies significantly: between +15 and -32 EUR/MWh.

Based on its analysis CREG concludes that the BeLux day balancing system is robust in delicate and even exceptional circumstances, e.g. a sudden cold spell combined with temporary production interruptions and technical problems in the NW European gas network. Network users also find the system to be extremely effective and transparent. Consequently, the market-driven balancing system ensures that the natural gas market works effectively and efficiently. This results in competitive prices for natural gas in the wholesale market.

¹ See public consultation from July 9 2018 to August 3 2018:

https://www.fluxys.com/belgium/en/Services/Transmission/MarketConsultations/~/_media/Files/Services/Transmission/ConsultationPlatform/Consultation%2028/Consultation%20document%20on%20balancing%20tariffs%202019.ashx

1 INTRODUCTION

The market-driven daily balancing system was implemented in October 2012, at the start of the Entry/Exit market model. In 2015, it was expanded into the integrated Belgium-Luxembourg natural gas market for H-gas.

The market-driven day balancing system is based on the following basic principles:

- the role of the TSO is limited to maintaining system integrity and residual balancing;
- the network user is responsible for the balancing of incoming and outgoing gas flows;
- there are no hourly limitations during the day;
- offer of flexibility by the TSO during the day is limited by market balancing thresholds;
- there is daily balancing with cash-out at the end of the day;
- one single balancing zone for H-gas and one for L-gas with identical rules;
- the system of market balancing sets within day obligations for the entire system whereby the manager of network balance only intervenes if the within day market balancing limits are breached;
- the TSO has adequate resources for accommodating within day imbalances;
- the TSO offers some of the available flexibility to the market parties that supply profile customers;
- the manager of the network balance provides hourly information about the individual positions of each network user and the position of the global system;
- on the basis of the nominations, the manager of the network balance also provides forecasts on an hourly basis for day D+1 of the individual positions of each network user and also of the global system;
- the network users have access to a natural gas market platform (anonymous market and/or OTC) and can easily adjust an imbalance by buying or selling natural gas;
- the manager of the network balance buys and sells gas for balancing purposes on the natural gas market;
- the manager of the network balance's balancing activities are cost-neutral;
- a transparent system of stimuli encourages the network user to avoid imbalances.

Below is an analysis of the functioning of the market-driven day balancing system during the cold spell from February to March 2018, based on tables and figures requested from Fluxys Belgium.

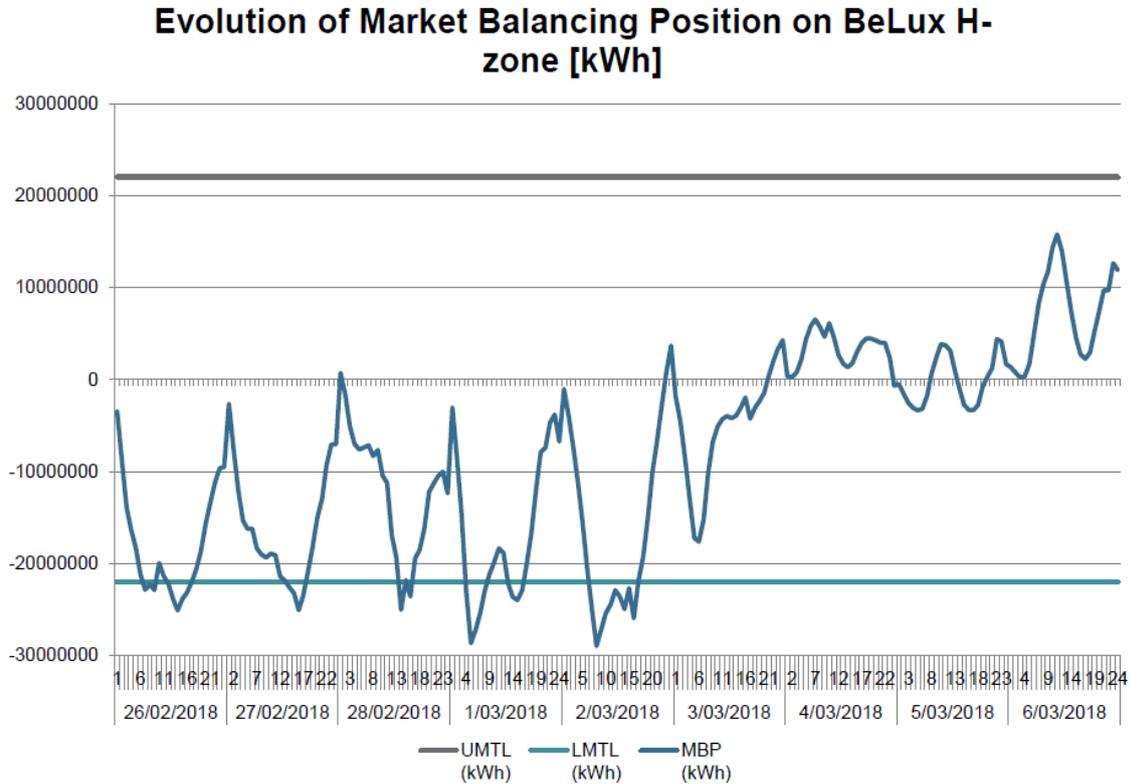
The following topics will be covered consecutively:

- Network balance on the H-gas market
- Network balance on the L-gas market
- Impact on the balancing neutrality account
- Impact on network users
- Use of entry and exit capacity at interconnection points
- Spreads ZTP - TTF
- Electricity production during cold spell
- Conclusion

For information: the graphs given below use the gas day as unit of time. One gas day starts and ends at 06h00, i.e. gas day D hour 1 = calendar day D - 06h00, gas day D hour 12 = calendar day D - 18h00 and gas day D hour 24 = calendar day D+1 - 06h00.

2 NETWORK BALANCE ON THE H-GAS MARKET

Volumes



From 26 February until 2 March inclusive, the lower market limit (-22GWh) was exceeded several times within the day (**WD shortfall**). Fluxys Belgium had to intervene a few times to restore and maintain the aggregate market position (MBP) in the so-called green zone (zone between UMTL and LMTL) through purchases and settlements. For the sake of clarity, this phenomenon is part of market design and does not necessarily point to any risk in relation to achieving market balance in the natural gas market (security of supply).

The market actors succeeded in guaranteeing the balance on a daily basis. The aggregate market position (MBP) was adequately settled to its null position at the end of the day (**EoD Market Position**). The EoD interventions of Fluxys Belgium were substantial but did not lead to structural problems: in other words, sufficient gas was available on the gas market. There was no indication of emergency whereby Fluxys Belgium would have to rely on physical products or on extra operational resources.

Table 1 below shows an overview of the number of WD actions, the WD volumes shortfall and the EoD market position.

Table 1: WD and EoD actions H-zone

Gas Day	# WD events	WD shortfall settlement volumes [MWh]	EoD Market Position* [MWh]
26/02/2018	9	10.700	-9.510
27/02/2018	4	6.600	-7.038
28/02/2018	2	4.800	-12.382
01/03/2018	9	22.500	-6.741
02/03/2018	10	31.700	3.707
03/03/2018	0		4.277
04/03/2018	0		-693
05/03/2018	0		1.682
06/03/2018	0		11.887
07/03/2018	0		3.703

* A negative value reflects a shortfall, a positive one a market excess

Prices

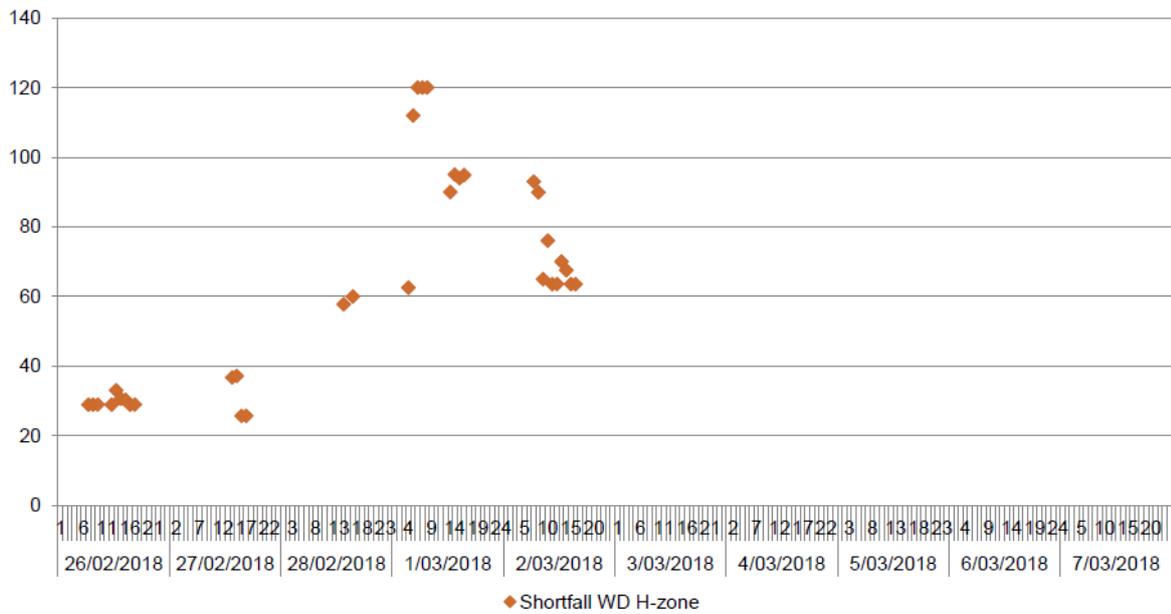
The WD and EoD settlement prices came about based on the actions taken by Fluxys Belgium WD and EoD (in this case purchasing) on the gas market according to rules stipulated in the Transmission Access Code (part of the transport contract and approved by CREG).

Regarding the WD settlement price, in case of shortfall this is the maximum price for all WD purchase transactions taken by Fluxys Belgium on the gas market to purchase the required gas volumes in order to keep the MBP within the green zone. When the gas price (ZTP DA index <https://www.powernext.com/pegas-trading>) increased by 3% is higher than this maximum, the gas price + 3% is used as settlement price.

Regarding the EoD settlement price several cases are possible depending whether the MBP shows a shortfall or a surplus at the end of the gas day (06h00). In the case of a shortfall, MBP finishes below zero, the shipper who supplied more gas than taken off (helper) is compensated at the price (ZTP DA index <https://www.powernext.com/pegas-trading>). The shipper who has delivered less gas than has taken off (causer) pays for the shortage of delivered gas at the price which is the maximum for all EoD purchase actions taken by Fluxys Belgium on the gas market to purchase the required gas volumes in order to bring the MBP back to zero. When the gas price (ZTP DA index <https://www.powernext.com/pegas-trading>) increased by 3% is higher than this maximum, the gas price + 3% is used as settlement price.

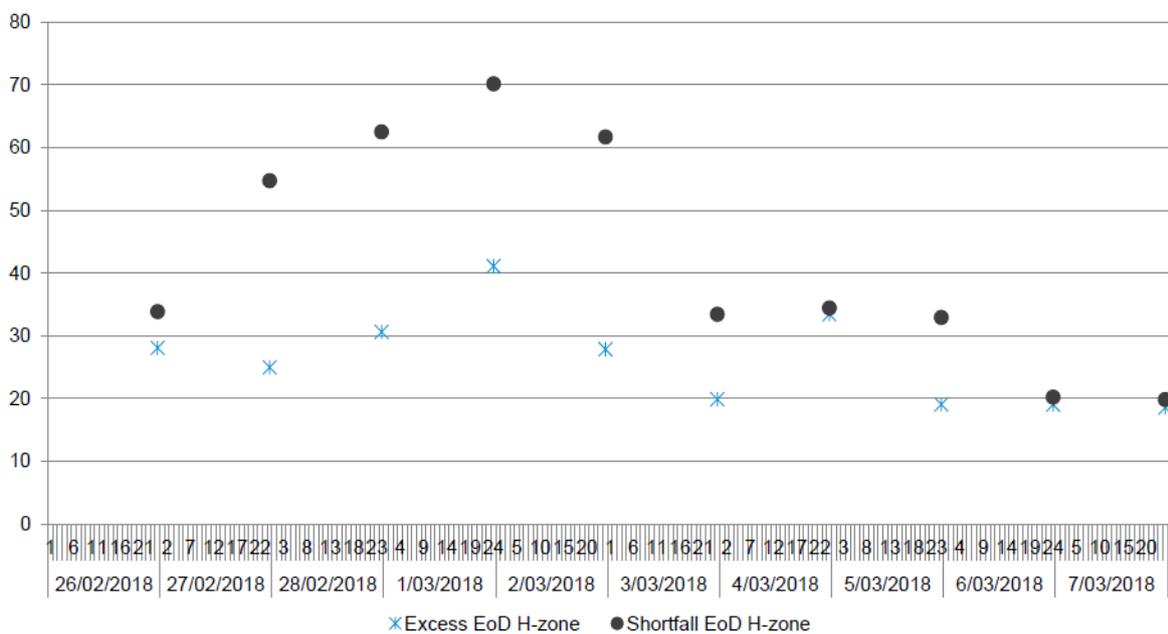
[CONFIDENTIAL]

Evolution of WD settlement price on H-zone [€/MWh]



The highest WD settlement price in de H-zone was 120 EUR/MWh

Evolution of EoD settlement price on H-zone [€/MWh]



The highest EoD settlement price (Shortfall EoD) for the shippers who were at the basis of the shortfall at the end of the day was 70 EUR/MWh. From 7 March, the Shortfall EoD again coincides with the Excess EoD which in reality is equal to the gas price ZTP DA index.

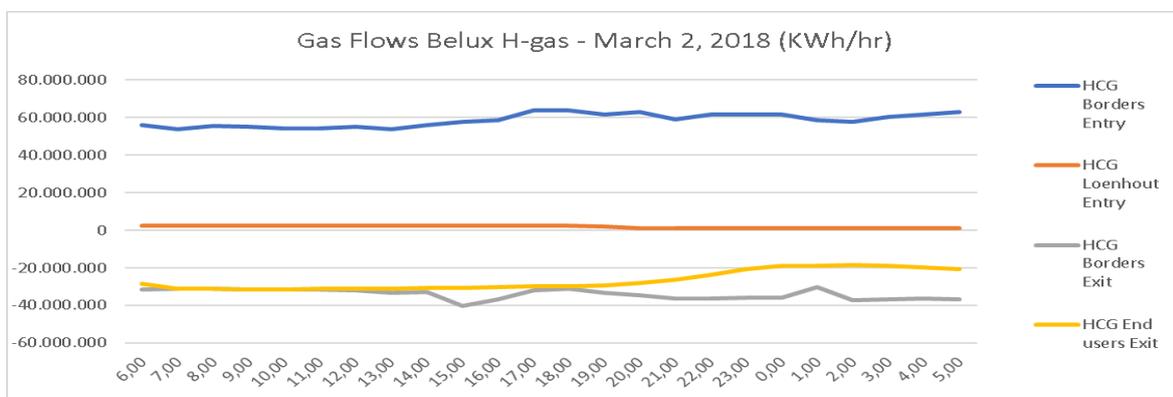
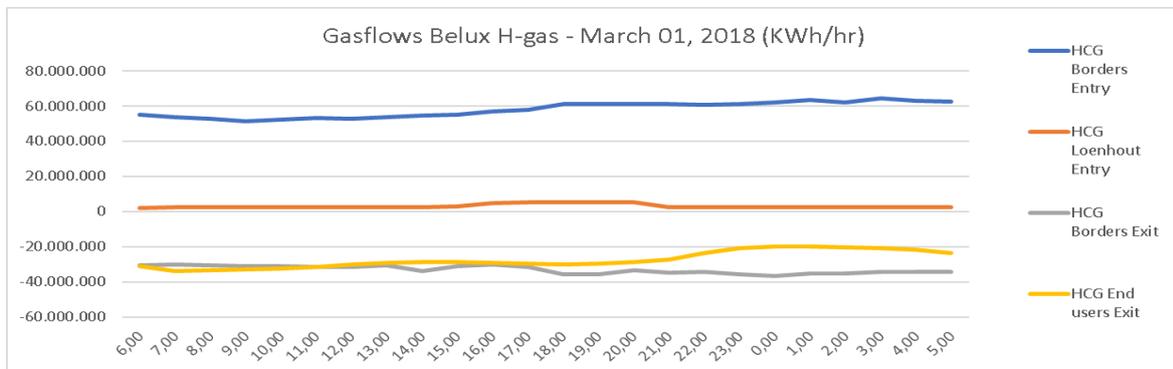
The prices varied between 99 and 141 EUR/MWh at National Grid (UK). Balancing prices between 11 and 545 EUR/MWh have been observed at GTS (NL). Here it should be noted that GTS applies TTF NextHour while Fluxys Belgium applies ZTP EoD product (see table 2 below).

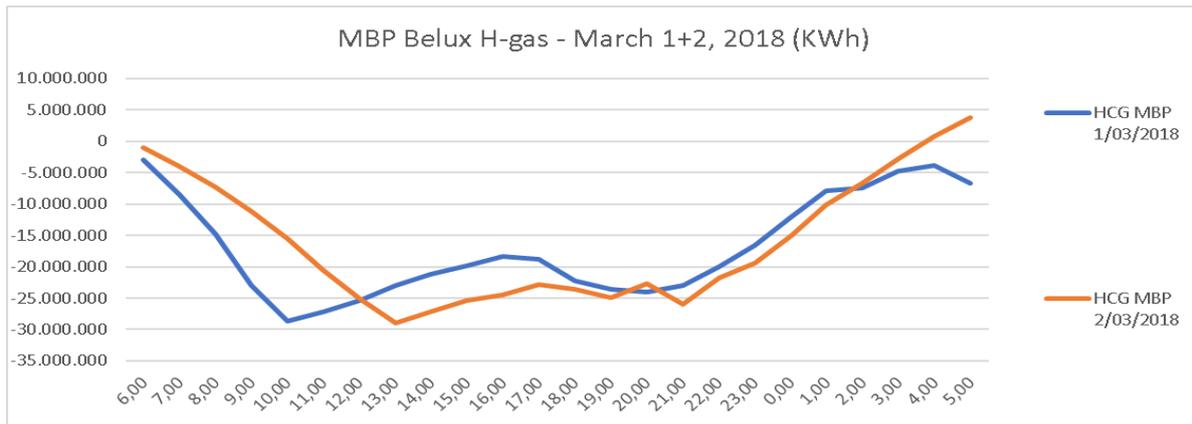
Table 2: Balancing actions GTS

Date	Time (LET)	Hour of Delivery (LET)	ProductType	Total volume (MWh)	Transaction price (EUR/MWh)
27/02/2018	21:20	22:00 - 23:00	TTF NextHour	14240	EUR 42.961
27/02/2018	20:20	22:00 - 23:00	TTF NextHour	14370	EUR 44.599
27/02/2018	19:20	23:00 - 06:00	TTF WD	3346	EUR 37.553
28/02/2018	10:20	11:00 - 12:00	TTF NextHour	17814	EUR 223.103
28/02/2018	09:20	10:00 - 11:00	TTF NextHour	18781	EUR 330.433
28/02/2018	08:20	09:00 - 10:00	TTF NextHour	12866	EUR 545.528
1/03/2018	03:20	04:00 - 05:00	TTF NextHour	15897	EUR 45.763
1/03/2018	02:20	03:00 - 04:00	TTF NextHour	15761	EUR 43.650
1/03/2018	01:20	02:00 - 03:00	TTF NextHour	10731	EUR 46.901
1/03/2018	00:20	04:00 - 06:00	TTF WD	1034	EUR 50.480
2/03/2018	06:20	07:00 - 08:00	TTF NextHour	13403	EUR 35.211
2/03/2018	05:20	06:00 - 07:00	TTF NextHour	15355	EUR 36.863
2/03/2018	04:20	08:00 - 06:00	TTF WD	5654	EUR 65.549
2/03/2018	03:20	07:00 - 06:00	TTF WD	1748	EUR 67.570
3/03/2018	05:20	06:00 - 07:00	TTF NextHour	17143	EUR 19.115
3/03/2018	04:20	05:00 - 06:00	TTF NextHour	20525	EUR 11.783
3/03/2018	03:20	04:00 - 05:00	TTF NextHour	19670	EUR 11.643
3/03/2018	02:20	03:00 - 04:00	TTF NextHour	11342	EUR 23.424

Gas flows

Below are three graphs which deal more specifically with the days 01 and 02 March 2018 and show a picture of the incoming and outgoing gas flows.



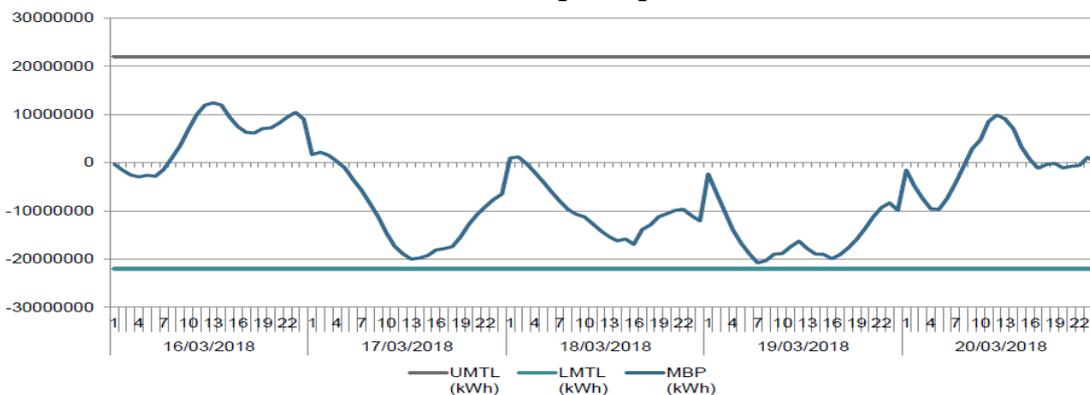


The entry and exit gas flows are +/- 60 GWh on an hourly basis. At the end of day 01/03, there was a balance shortfall of just below 7 GWh representing about 0.5 % of the total daily quantity. ***This shows that the network users guarantee the network balance on a day basis in a nearly perfect manner even in extreme circumstances.***

Second cold spell

Below are two graphs for information regarding the period of 16 to 20 March (second cold spell). No WD actions and no divergent EoD actions. In other words the market guaranteed the network balance without the intervention of Fluxys Belgium during this second cold spell.

Evolution of Market Balancing Position on BeLux H-zone [kWh]

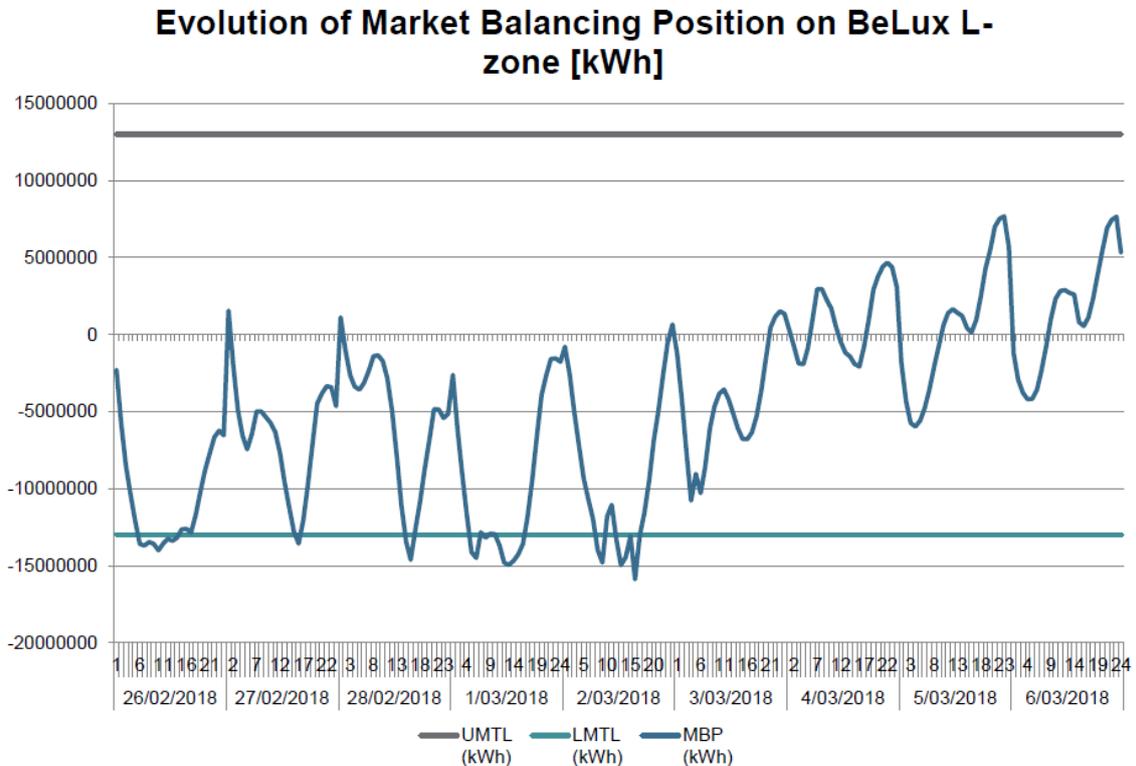


Evolution of EoD settlement prices on BeLux H-zone [€/MWh]



3 NETWORK BALANCE ON THE L-GAS MARKET

Volumes



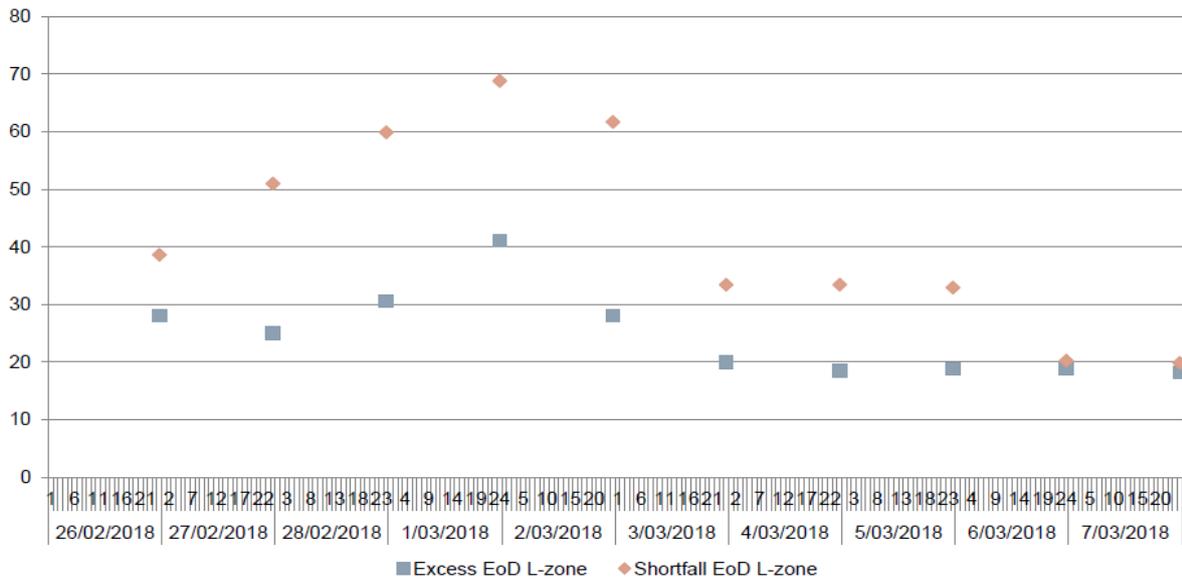
For the L-gas market (Belgium), the story is very similar to the H-gas market (BeLux):

From 26 February until 02 March inclusive, the lower market limit (-13 GWh) was exceeded several times within the day (**WD shortfall**). Fluxys Belgium had to intervene a few times to restore and maintain the aggregate market position (MBP) in the green zone (zone between UMTL and LMTL) through purchases and settlements. The market actors succeeded in guaranteeing the balance on a daily basis. The aggregate market position (MBP) was settled to its null position at the end of the day. The EoD interventions of Fluxys Belgium (to bring the **EoD Market Position** back to null) were substantial but did not lead to structural problems: in other words sufficient gas could be found on the gas market and Fluxys Belgium did not have to rely on physical products or on extra operational resources.

On 1 March Fluxys Belgium adopted a number of preventive operational measures to guarantee the system integrity for the L-gas network: the flex in the OBA contracts with Netherlands (2 GWh) and France (2 GWh) was invoked, the transfo Lillo (3.5 GWh) was started and pressure reductions were implemented at certain points of the gas transport network within the limits of the connection contract. These preventive measures have been taken from a precautionary point of view. As L-gas supplies from the Netherlands were maintained in line with contract terms, system integrity was permanently guaranteed

Table 3 below shows an overview of the number of WD actions, the WD volumes shortfall and the EoD market position.

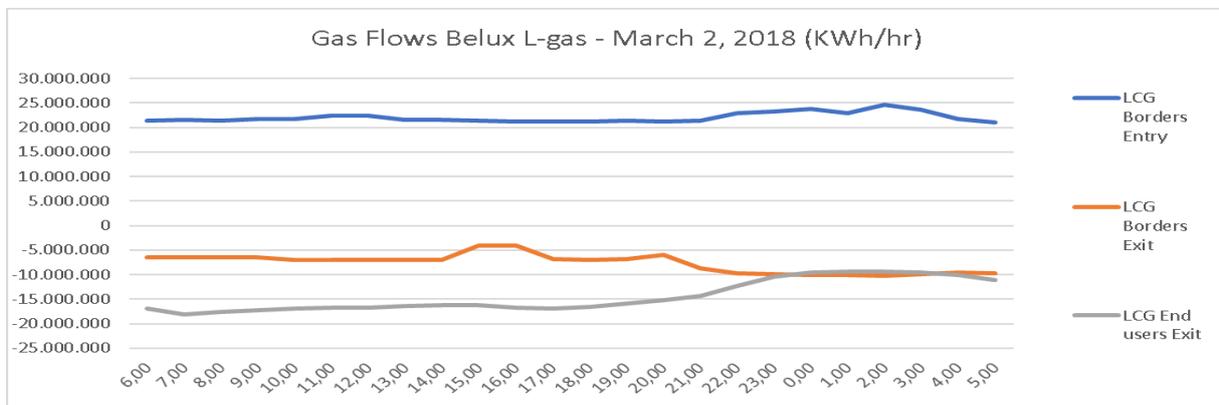
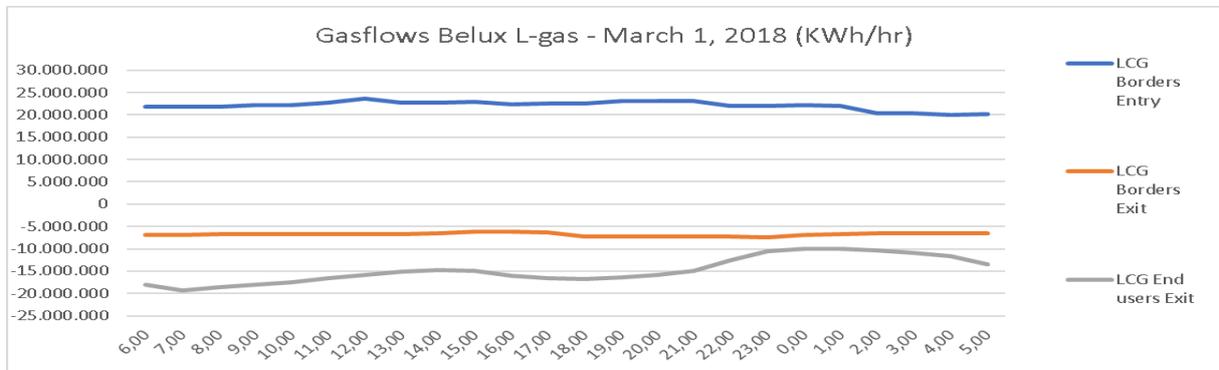
Evolution of EoD settlement price L-zone [€/MWh]

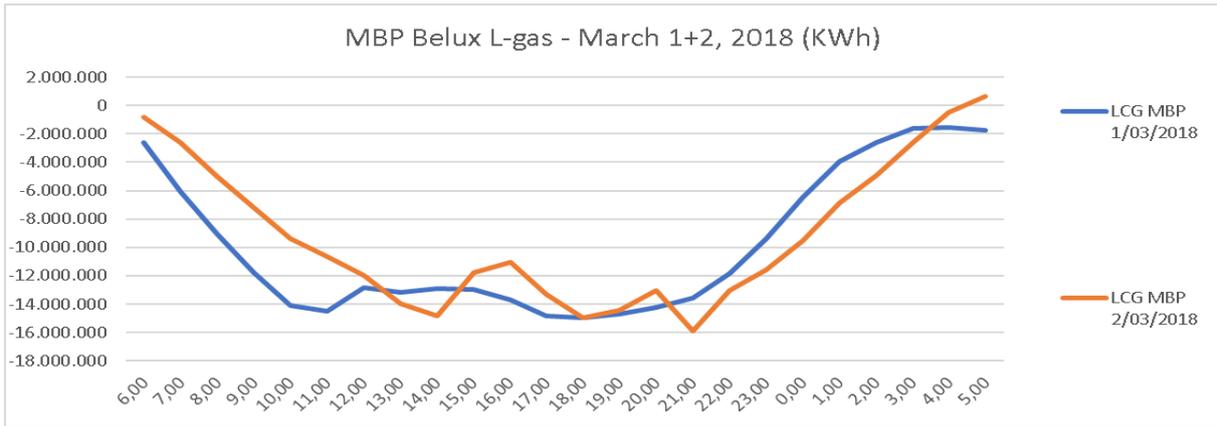


The highest EoD settlement price (Shortfall EoD) for the shippers causing the shortfall at the end of the day was 69 EUR/MWh. From 7 March, the shortfall EoD again coincides with the Excess EoD which in reality is equal to the gas price ZTP DA index.

Gas flows

Below are three graphs dealing more specifically with the days 01 and 02 March 2018 and show a picture of the incoming and outgoing gas flows.



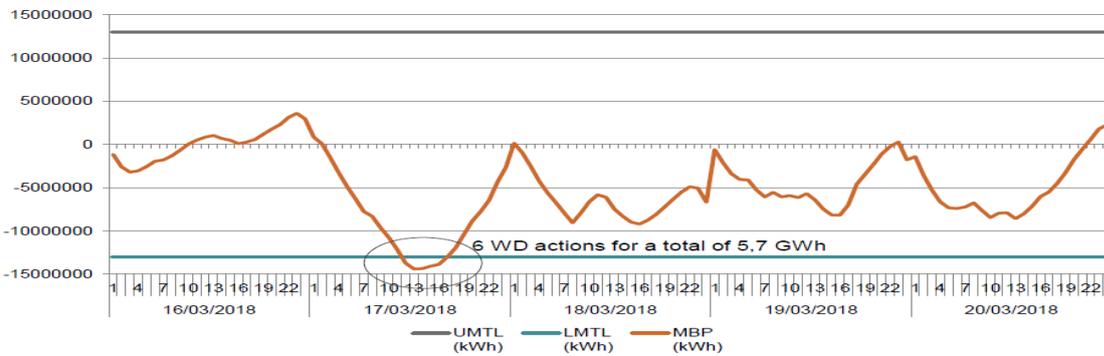


The entry and exit gas flows are on an hourly basis +/- 23 GWh. At the end of day 01/03, there was a shortfall of 1.7 GWh representing about 0.3 % of the total daily quantity. **This shows that the network users guarantee the network balance on a daily basis in a nearly perfect manner even in extreme circumstances.**

Second cold spell

Below are two graphs for information regarding the period of 16 to 20 March (second cold spell). In total 6 WD actions for a total of 5.7 GWh on Saturday 17 March and all EoD actions are normal. In other words, with the exception of 17 March the market handled the network balance without intervention of Fluxys Belgium.

Evolution of Market Balancing Position on BeLux L-zone [kWh]



Evolution of EoD & WD settlement prices on BeLux L-zone [€/MWh]



4 SETTLEMENTS WD AND EOD: IMPACT ON BALANCING NEUTRALITY ACCOUNT

Rules

The WD and EoD settlement prices resulted from the actions taken by Fluxys Belgium WD and EoD (in this case purchasing) on the gas market according to rules stipulated in the Transmission Access Code (part of the transport contract and approved by Creg).

Regarding the WD settlement price, in case of shortfall this is the maximum price for all WD purchase transactions taken by Fluxys Belgium on the gas market to purchase the required gas volumes in order to keep the MBP within the green zone. When the gas price (ZTP DA index <https://www.powernext.com/pegas-trading>) increased by 3% is higher than this maximum, the gas price + 3% is used as settlement price.

Regarding the EoD settlement price several cases are possible depending whether the MBP shows a shortfall or a surplus at the end of the gas day (06h00). In the case of a shortfall, MBP finishes under null, the shipper who supplied more gas than has been taken (helper) is compensated at the price (ZTP DA index <https://www.powernext.com/pegas-trading>). The shipper who has supplied less gas to the system than it has taken from the system (causer) pays for the shortage of delivered gas at the price which is the maximum for all EoD purchase actions taken by Fluxys Belgium on the gas market to purchase the required gas volumes in order to bring the MBP back to zero. When the gas price (ZTP DA index <https://www.powernext.com/pegas-trading>) increased by 3% is higher than this maximum, the gas price + 3% is used as settlement price.

As a result, the entire process of WD and EoD settlements is not a neutral operation for Fluxys Belgium and results in nearly all cases in a positive balance. Here below for illustration the result of one WD and one EoD settlement.

Table 4: WD settlement

	Gas Day	Gas Hour	Shortfall Settlement volume [MWh]	Buy actions [MWh]	Buy price [€/MWh]	Settlement price [€/MWh]	Net settlement - buy actions [€]
H-zone WD	2/03/2018	13-14h	7000	1.800,000	61,50	89,9	97.664,60
				720,000	61,50		
				1.320,000	79,975		
				600,000	80,00		
				1.440,000	85,25		
				1.116,000	89,90		
L-zone WD	1/03/2018	19-20h	1700	900,000	100,00	142	63.284,00
				600,000	100,00		
				198,000	142,00		

To absorb the WD shortfall of 7,000 MWh in the H-zone (02 March – 13:00) and to bring the MBP back in the green zone Fluxys Belgium makes six purchase actions. In total, Fluxys Belgium buys 6,996 MWh for a total amount of EUR 531,635. These volumes are passed through to the shippers who caused the shortfall within the day at a prorata of their share in this shortfall. Fluxys Belgium invoices in total 7,000 MWh at 89.9 EUR/MWh. Positive balance of this WD action is EUR 97,664.6.

Table 5: EoD settlement:

	Gas Day	Gas Hour	Market Balancing Position [MWh]	Excess Settlement volume [MWh]	Shortfall Settlement volume [MWh]	Excess Settlement price [€/MWh]	Shortfall Settlement price [€/MWh]	Buy actions [MWh]	Buy price [€/MWh]	Sell actions [MWh]	Sell price [€/MWh]	Net settlement - balancing actions [€]
H-zone EoD	1/03/2018	EoD	-6741	9632	16372	41,083	70,150	960,000	60,00			293.659,20
								800,000	68,875			
								1.600,000	68,90			
								1.600,000	68,90			
								1.600,000	68,925			
								224,000	70,15			
L-zone EoD	2/03/2018	EoD	+ 652	4501	3849	28,025	61,680			464	28,025	124.264,83

On 1 March the gas day ends with a market shortfall (MBP) of 6.741 MWh. This shortfall is the result of the difference between shippers who delivered insufficient gas (16,372 MWh) and shippers who delivered too much gas (9,632 MWh). The market shortfall is purchased by Fluxys Belgium on the gas market via six purchases representing 6,784 MWh and a cost equal to EUR 459,173.6. The Shortfall Settlement price is the maximum price of these six purchases = 70.15 EUR/MWh.

The shippers who supplied insufficient gas are invoiced at the Shortfall Settlement price of 70.15 EUR/MWh. The shippers who supplied too much gas are reimbursed at the Excess Settlement price being the gas price ZTP DA (without penalties because they help the system) = 41.083 EUR/MWh. Result for Fluxys Belgium:

$$16,372.399\text{MWh} \times 70.15\text{EUR/MWh} - 9,632.50\text{MWh} \times 41.083\text{EUR/MWh} - 459,173.60 \text{ Euros} = 293,659.20 \text{ Euros}$$

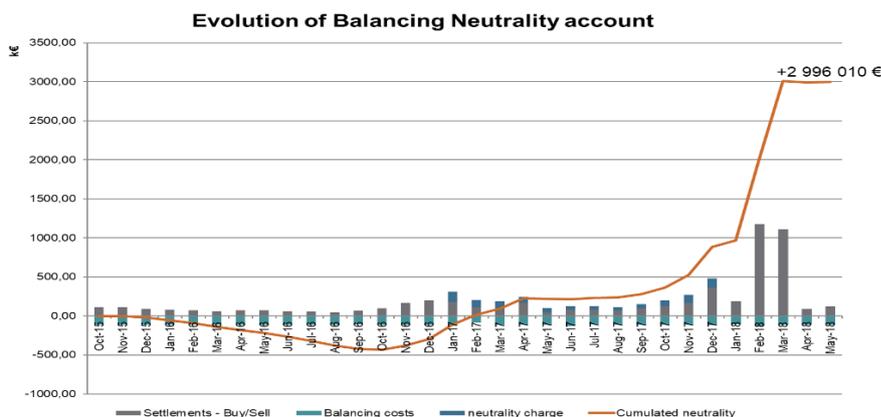
(to receive from the shippers) (to pay to the shippers) (cost purchase gas) (balance)

Between 27 February and 02 March all WD and EoD balancing actions have generated, a cumulative surplus on the Balancing Neutrality Account of 1,723,157 EUR split up in 1,375,859 EUR for the H-gas zone and 347,297 EUR for the L-gas zone.

Balancing Neutrality Account

At the end of March 2018, the Balancing Neutrality Account had a surplus of around 3 million Euros (http://www.balansys.eu/wp-content/uploads/2018/04/Neutrality-account_03_2018.pdf).

Fluxys Belgium proposes a negative neutrality charge in order to respect the neutrality principle².



² See public consultation from July 9 2018 to August 3 2018: <https://www.fluxys.com/belgium/en/Services/Transmission/MarketConsultations/~//media/Files/Services/Transmission/ConsultationPlatform/Consultation%2028/Consultation%20document%20on%20balancing%20tariffs%202019.ashx>

5 SETTLEMENTS WD: IMPACT ON NETWORK USERS

5.1 H-GAS

Volumes

Total 65,600,280 kWh

[CONFIDENTIAL]

Amounts

Total 5,297,281 Euros

[CONFIDENTIAL]

5.2 L-GAS

Volumes

Total 23,900,152 kWh

[CONFIDENTIAL]

Amounts

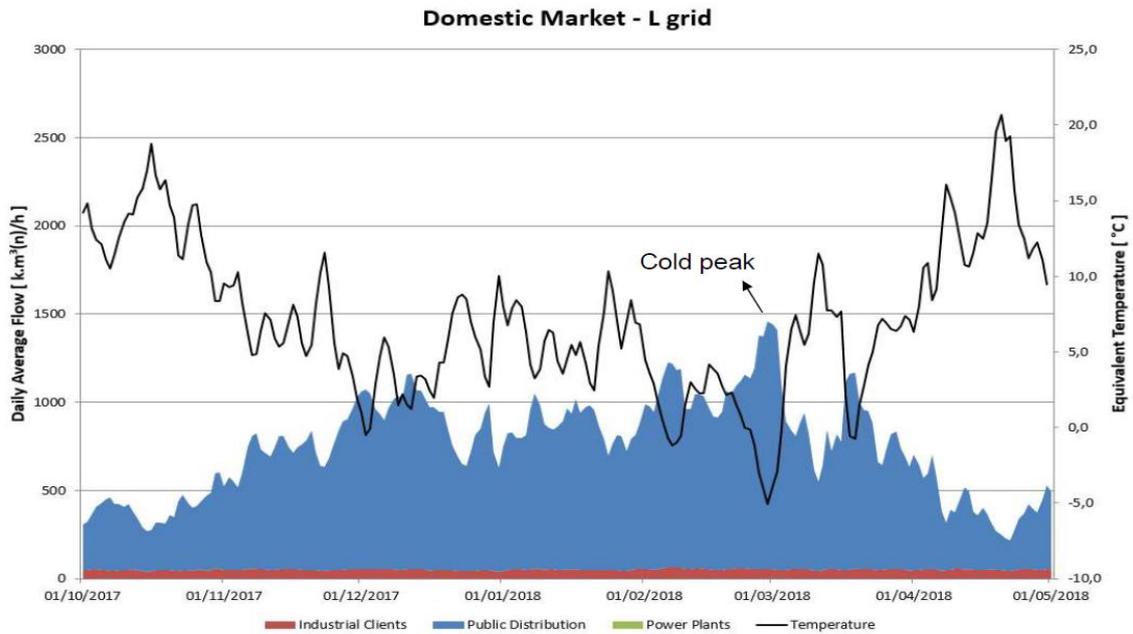
Total 2,168,051 Euros

[CONFIDENTIAL]

6 USE OF ENTRY AND EXIT CAPACITY AT INTERCONNECTION POINTS

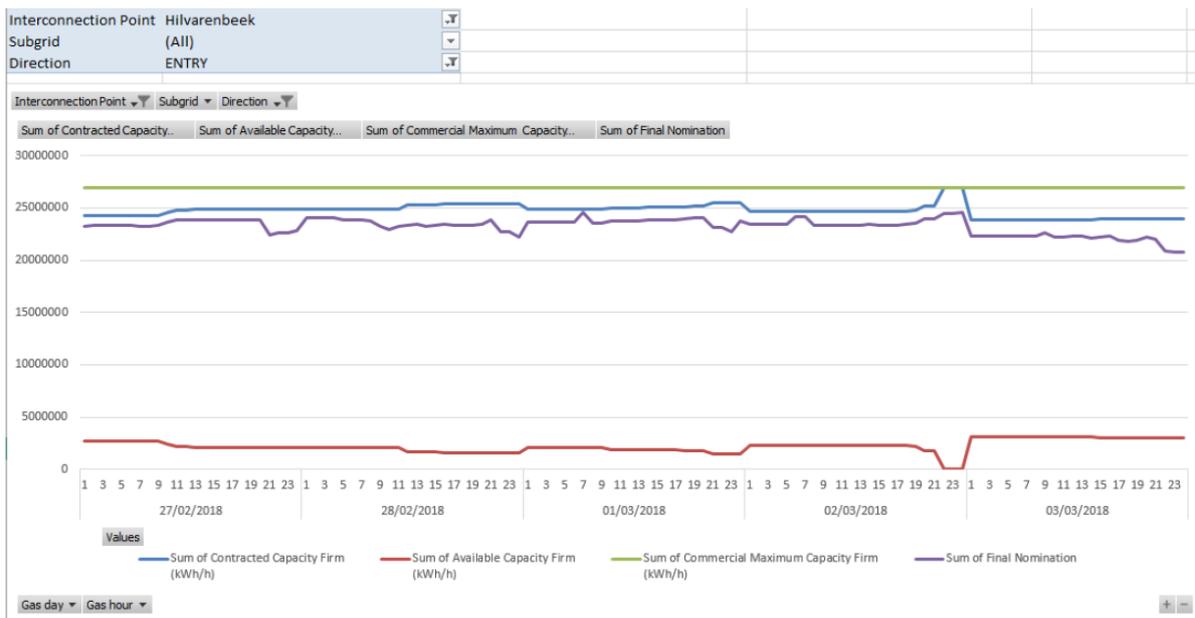
6.1 L-GAS

Gas flows



The L-gas market is primarily driven by purchases on the distribution network and, as a result, is extremely temperature dependent.

Hilvarenbeek Entry



At entry point Hilvarenbeek, bundled DA and WD fixed capacity is offered and booked via Prisma. Only the auction of WD capacity on gas day 02/03 (hour 22-24) recorded an auction premium of 0.26 cent kWh/h (all capacity offered was therefore booked). Not all capacity was used (nominated).

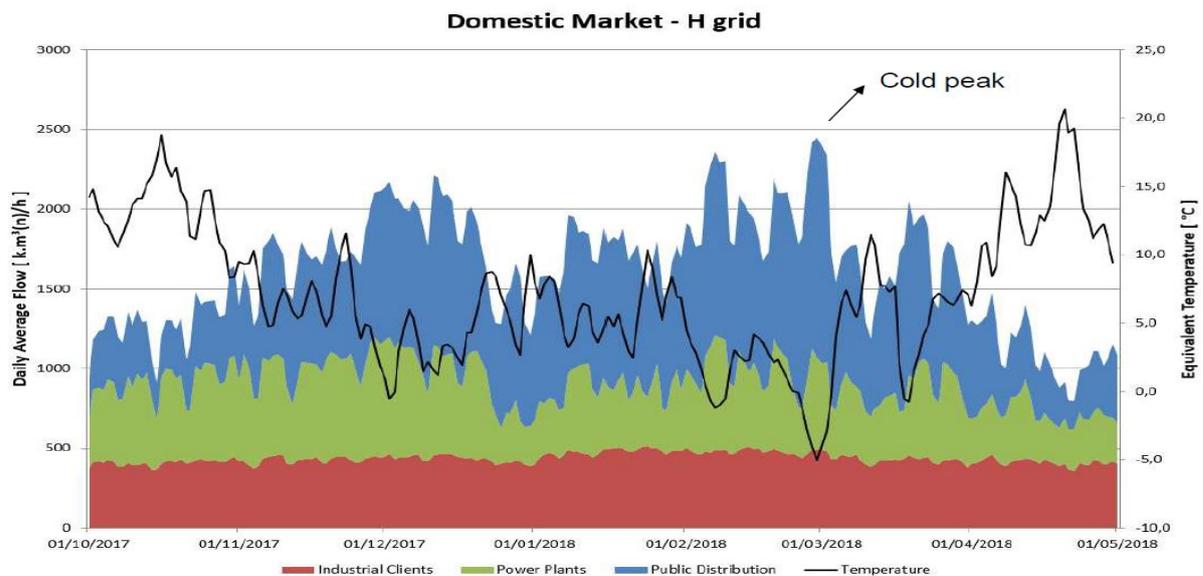
Blaregnies Exit



Across the entire period, DA and WD bundled capacity was offered for Blaregnies Exit via Prisma. There were no bookings. From hour 1 gas day 28/02 to hour 16 gas day 02/02, the nominations for exit to France were significantly lower than the days prior to and after that time. Extra L-gas was therefore supplied to the Belgian market (dumped) for commercial reasons (use of storage of L-gas in FR). After the cold spell, the transit of L-gas to France resumed at full capacity. These observations point to the market's flexibility to manage gas flows based on price signals.

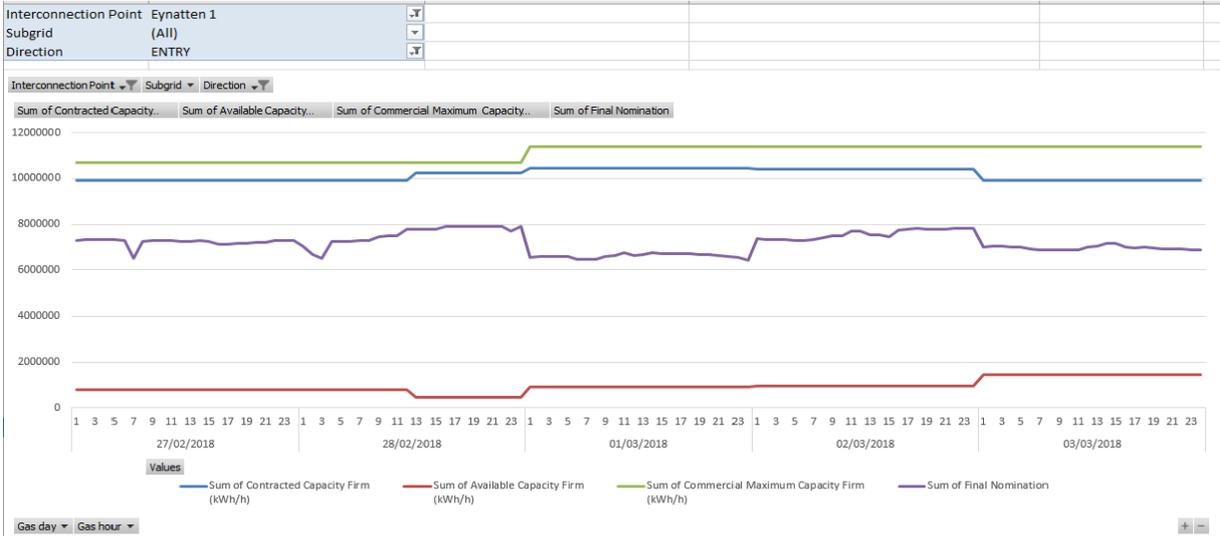
6.2 H-GAS

Gas flows



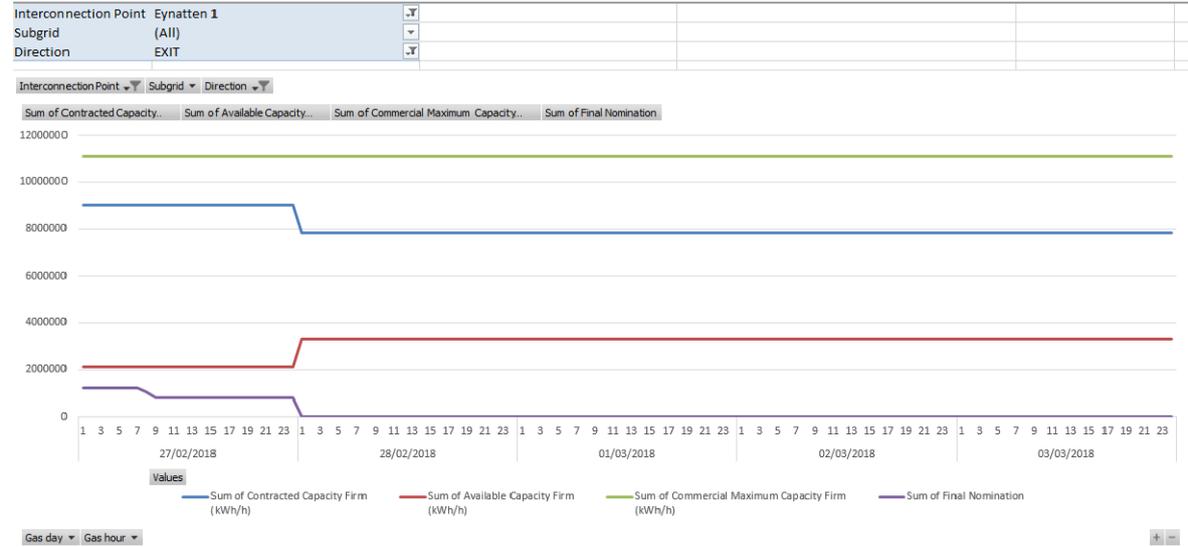
The majority of Belgian industrial customers are connected to the H-gas network with a stable and predictable consumption profile. The gas power stations are all connected to the H-gas network (see point 8 below). Consumption on the distribution network, as expected, is strongly dependent upon temperature.

Eynatten 1 Entry



Limited offer of bundled firm DA and WD capacity due to limitations of the offer of capacity from the neighbouring TSO Gascade. All WD capacity was booked on gas day 28/02 for gas hour 13 to 24 without premium. Afterwards, no bundled capacity available. Extra DA and WD bundled capacity was offered by Fluxys Belgium. This capacity was partially booked DA for gas days 01/03 and 02/03 and WD for gas day 28/02 hours 13 to 24 and for gas days 01/03 and 02/03 hours 1 to 24.

Eynatten 1 Exit



Bundled capacity was offered both DA and WD. Extra DA capacity was only booked for gas day 27/02. From gas day 28/02, there were no nominations and therefore no gas flow towards Gaspool (Gascade).

Eynatten 2 Entry



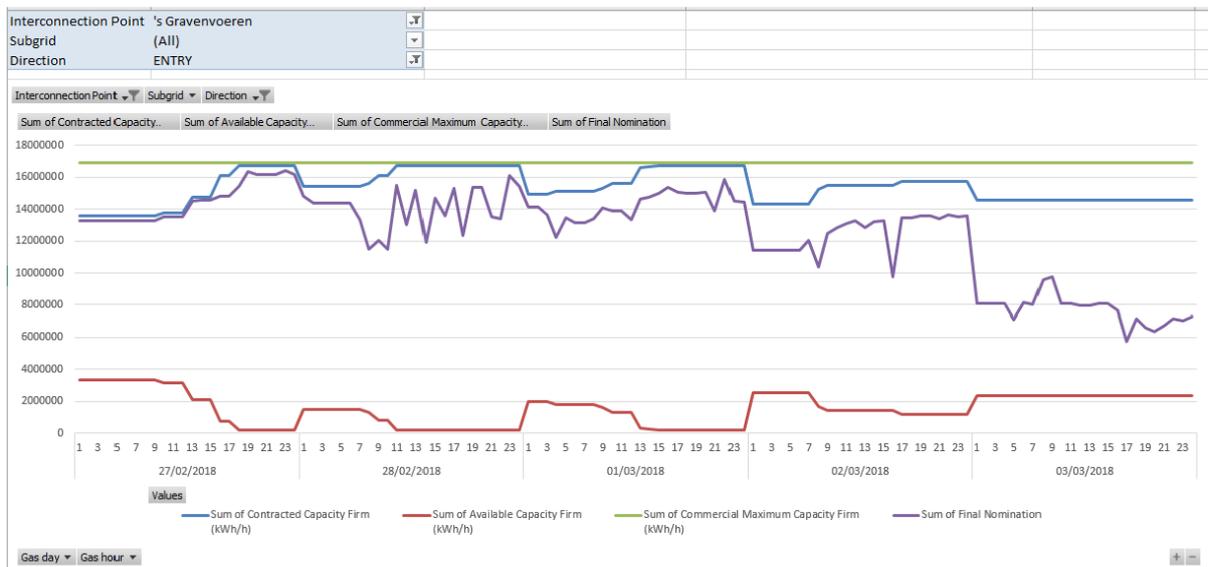
Bundled capacity was offered both DA and WD and this for both adjacent TSOs (Fluxys Tenp and Open Grid Europe). In terms of connection with Fluxys Tenp, DA was booked for gas day 27/02 and gas day 02/03. WD capacity was booked on gas day 27/02, 28/02 and 01/03. The auction of WD capacity on gas day 01/03 (hour 12-24) recorded an auction premium of 0.12 cent/kWh/h. In terms of connection with OGE, DA was booked for gas day 02/03. The auction recorded an auction premium of 4 cent/kWh/h. WD capacity was booked on gas day 28/02 (hour 10 to 24) and on gas day 01/03 (hour 10 to 24 and hour 11 to 24). The latter auction recorded an auction premium of 0.12 cent/kWh/h.

Eynatten 2 Exit



Bundled capacity was offered both DA and WD. No bookings. Very limited nominations and therefore no substantial gas flow towards NCG (Fluxys Tenp and OGE).

's Gravenvoeren Entry



Bundled capacity was offered both DA and WD and capacity was booked on 27 and 28/02 and on 01 and 02/03. The auction of WD capacity on gas day 28/02 (hour 11-24) recorded an auction premium of 0.015 cent/kWh/h. Bundled capacity was also offered but this was not booked. The nominations were below the level of the booked capacity.

Zandvliet H Entry



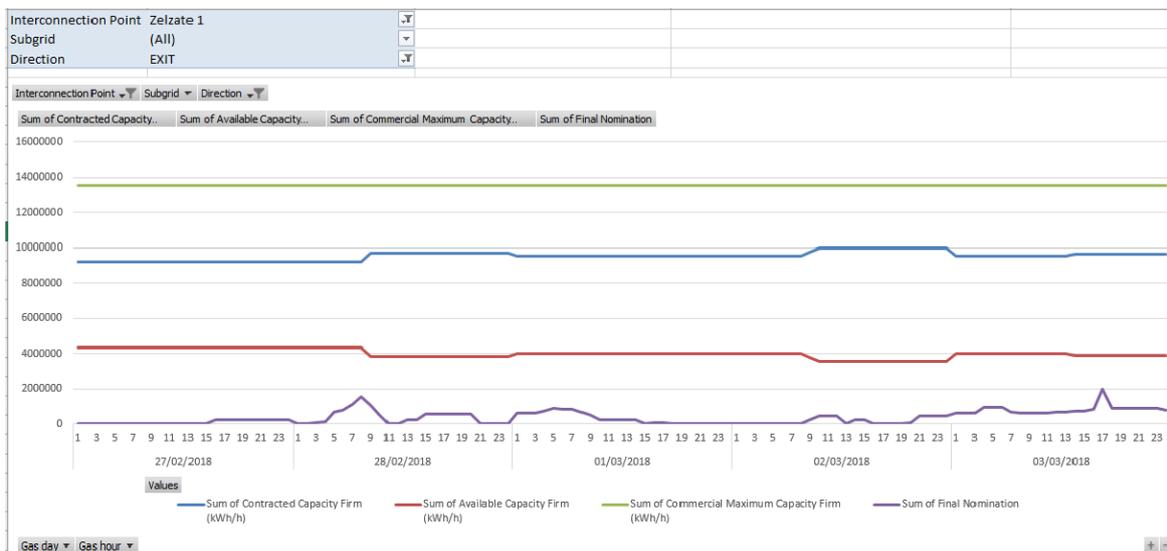
Bundled capacity was offered both DA and WD and capacity was booked WD for gas day 28/02 (hour 11 to 24) and 01/03 (hour 7 to 24). DA capacity was also booked for gas day 02/03. Bundled capacity was also offered on gas day 02/03 but there were no bookings.

Zelzate 1 Entry



Bundled capacity was offered both DA and WD and capacity was booked WD on gas day 27/02 (hour 17 to 24), gas day 28/02 (hour 10 to 24), gas day 01/03 (hour 20 to 24) and gas day 02/03 (hour 7 to 24). For gas day 02/03 and thereafter, the offered capacity was increased from 40,700 kWh/h to 1,170,704 kWh/h. The nominations were significantly lower than booked capacity.

Zelzate 1 Exit



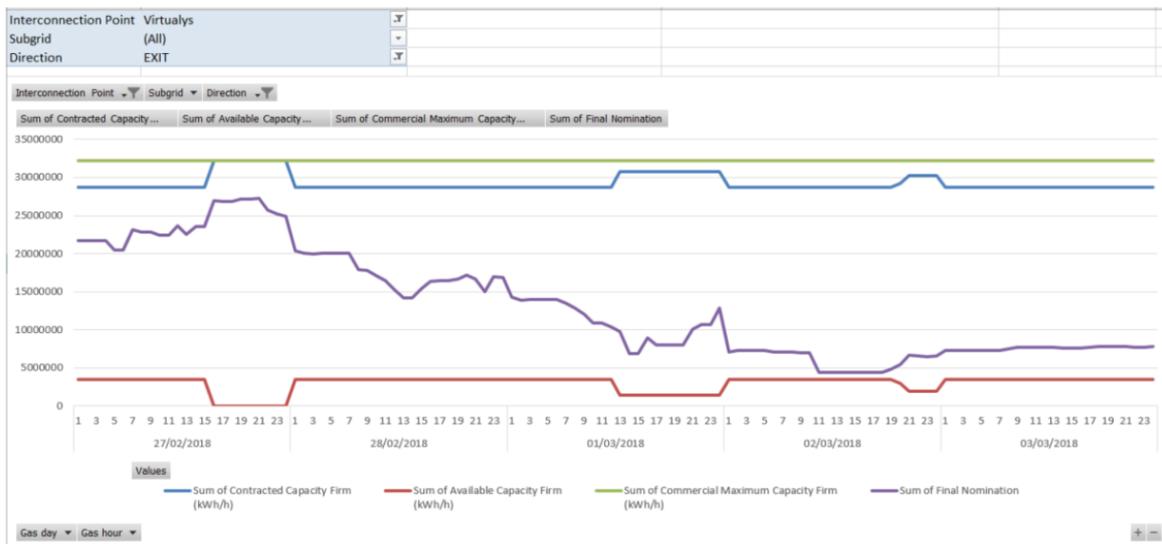
Bundled capacity was offered both DA and WD. There were WD bookings for gas day 28/02 (hour 8 to 24) and 02/03 (hour 8 to 24).

Virtualys Entry



No bundled capacity was offered. Bundled capacity was offered both DA and WD and capacity WD and DA was booked for gas day 01/03 and DA for 01 and 02/03.

Virtualys Exit



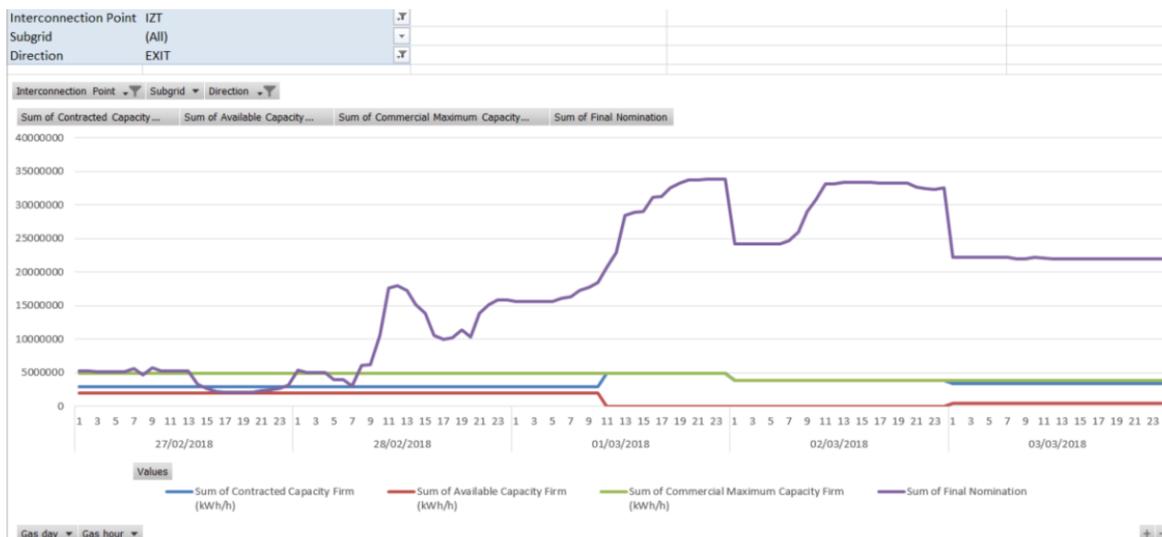
No bundled capacity was offered. Unbundled capacity was offered both DA and WD and DA was booked for gas day 28/02 with an auction premium of 0.06 cent/kWh/h. WD was booked on gas day 28/02 (hour 16 to 24), gas day 01/03 (hour 13 to 24) and gas day 02/03 (hour 20 to 24).

IZT Entry



Bundled DA capacity was offered from IZT to ZTP (N) and ZTP (P). No bookings. Unbundled DA capacity was offered and booked for gas day 27/02.

IZT Exit



Difference Nomination – Commercial Maximum Capacity is due to Zeeplatform. Technical capacity is ~34 GWh/h

Bundled DA capacity was offered and unbundled DA and WD capacity. Unbundled WD capacity was bought on gas day 01/03 (hour 11 to 24) and gas day 02/03 (hour 1 to 24).

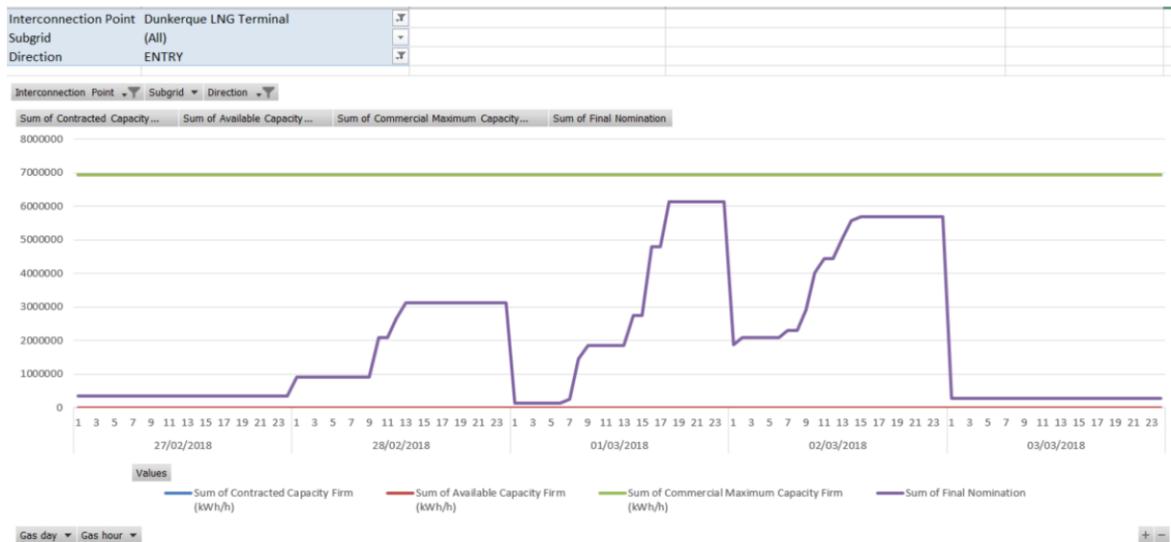
ZPT Entry



Difference Nomination – Commercial Maximum Capacity is due to Zeeplatform. Technical capacity is ~20 GWh/h

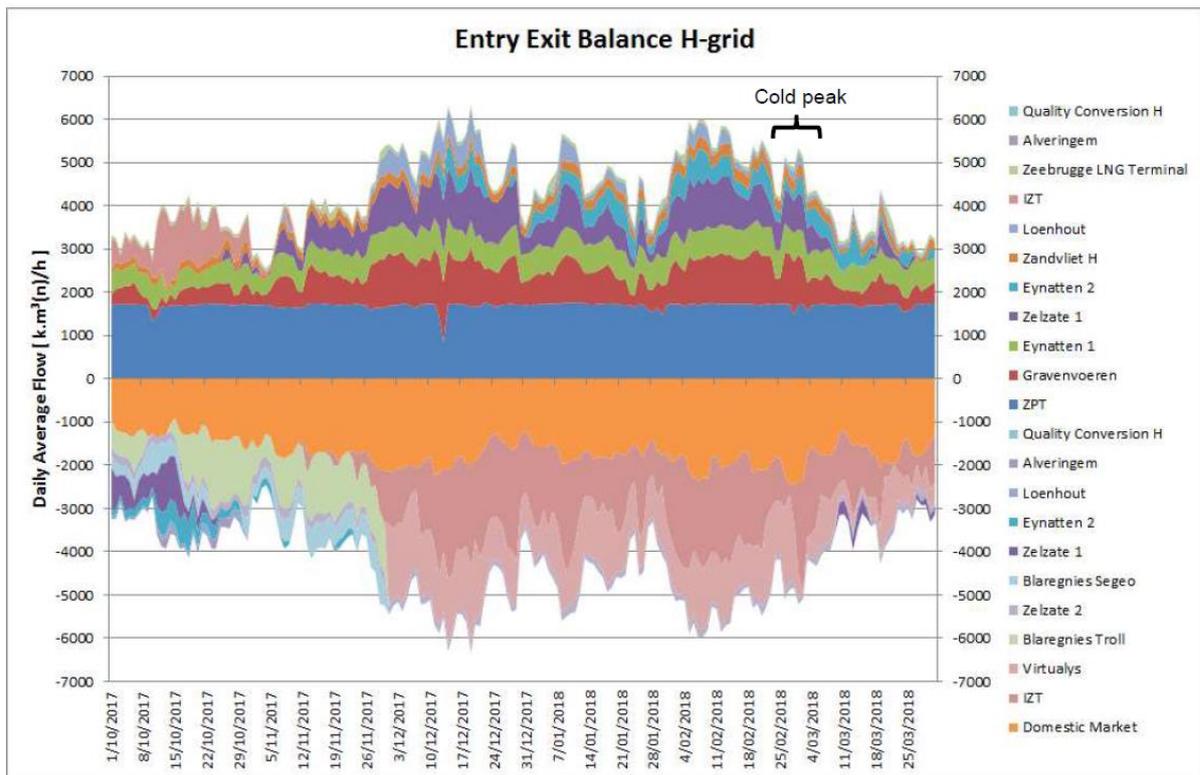
No offer of capacity on Prisma platform. Capacity available directly via EBS platform from Fluxys Belgium.

Dunkerque LNG T Entry



No offer on Prisma. Nominations indicate that on 28/02, 01/03 and 02/03, gas was transported from France through Zeebrugge to the UK.

Entry Exit Balance



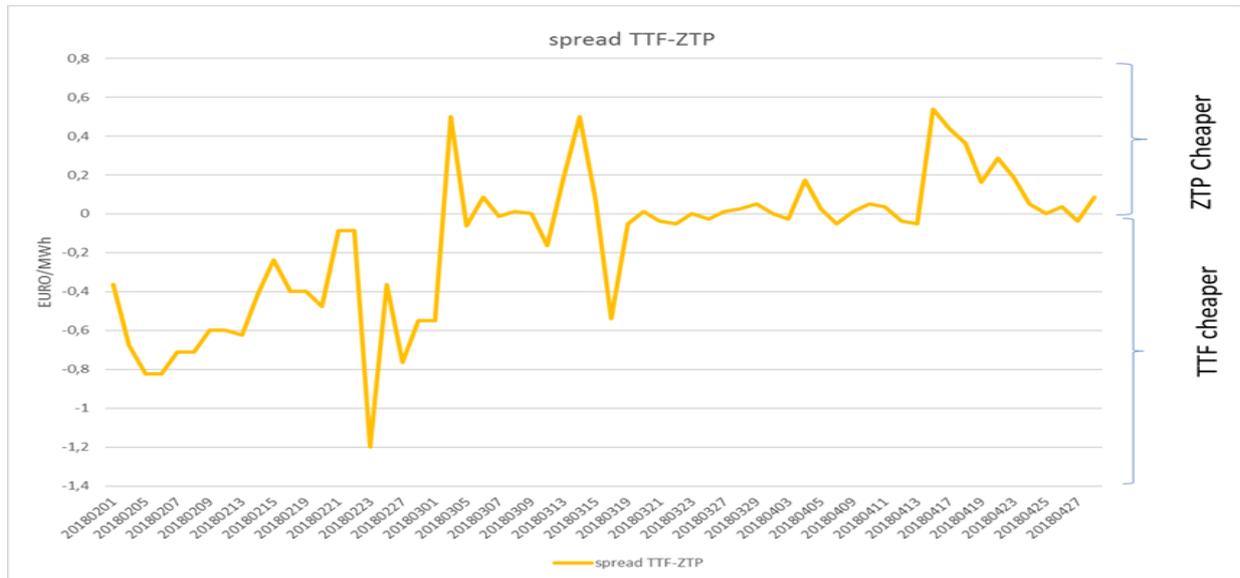
During the period from 27/02 to 02/03, the Fluxys Belgium transport network was heavily loaded with entry/exit gas flows up to 5.2 million m³(n)/h. During the period 01/03 to 03/03 the gas flow to France (Virtualys) fell back to a minimum and this gas was temporarily redirected to the UK (IZT). This winter, the highest gas flows occurred in the period between 10 and 20 December 2017 with gas flows above 6 million m³(n)/h with high exit gas flow to France and the UK.

On the basis of auction data from Prisma DA and WD, the analysis of capacity usage at the interconnection points shows that during the period from 27/02 to 02/03 bundled capacity exit TTF – entry ZTP for the H-gas market was offered, booked but not fully nominated via the interconnection points 's Gravenvoeren, Zandvliet H and Zelzate.

It is clear that occasionally capacity was booked from a commercial viewpoint. Some network users were even prepared to pay a premium with a view to a possibly favourable commercial transaction. The market situation led to impulse divergence capacity booking and actual physical need. This is also a sign of regular market functioning.

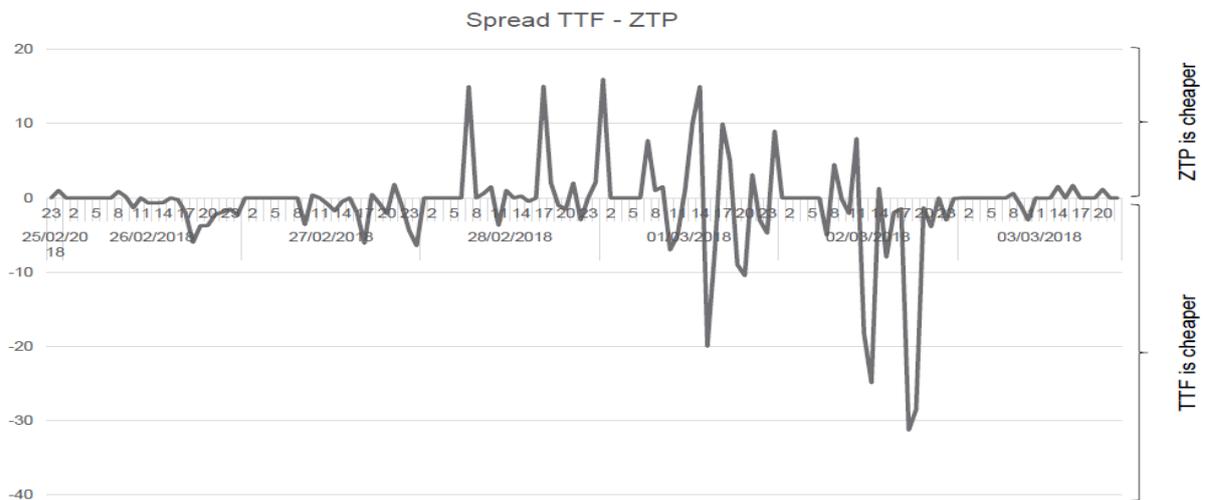
7 SPREADS TTF – ZTP(N)

Day Ahead (ICE) 01/02 – 28/04



DA Spread ZTP(N) and TTF fluctuates between -1.2 and $+0.5$ EUR/MWh. For the majority of the period, the spread lay between -0.2 and $+0.2$ EUR/MWh. Until just before the cold spell, natural gas was cheaper on TTF than on ZTP.

Within day (Pegas) 25/02 – 03/03

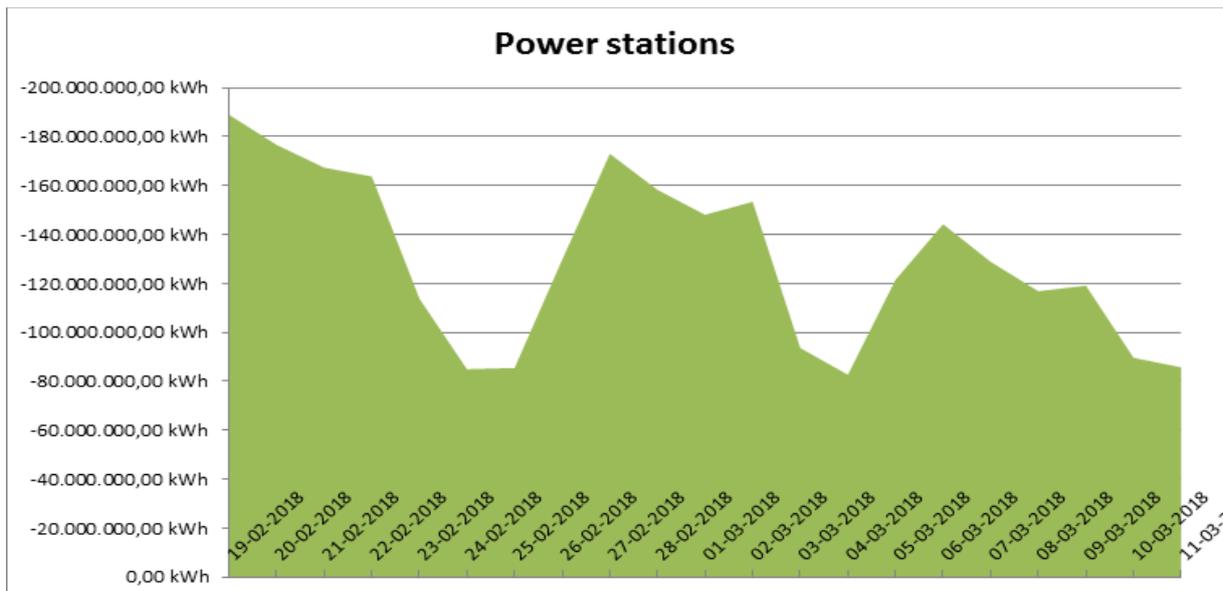
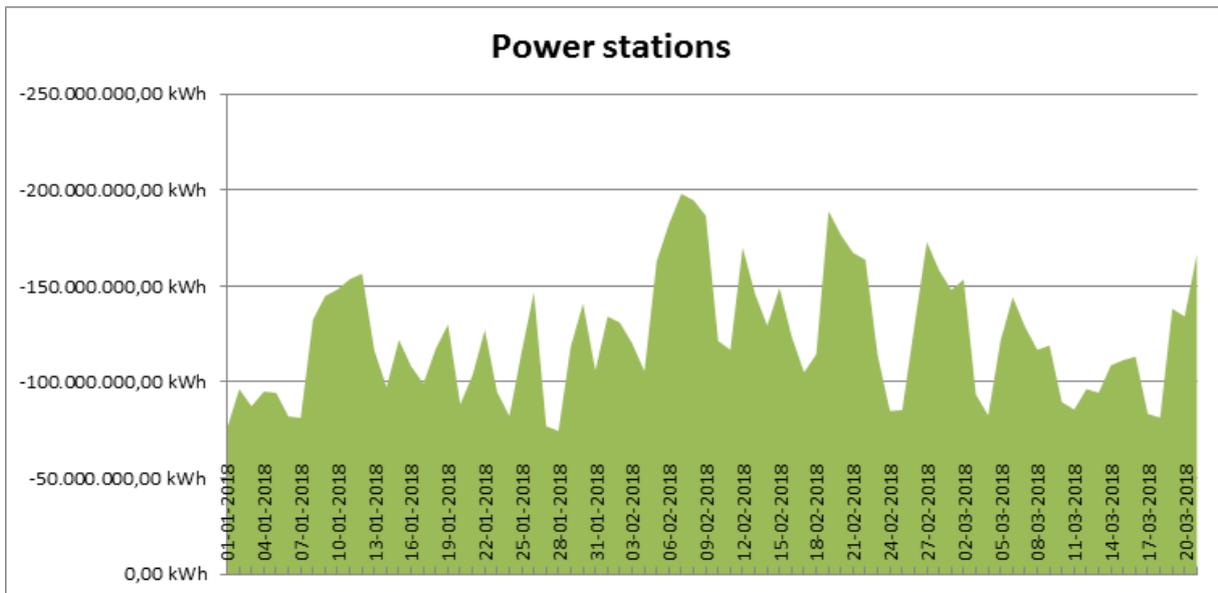


WD Spread ZTP(N) and TTF varies substantially for the period 27/02 to 02/03 from -32 to $+16$ EUR/MWh. The WD spread is limited before and after this period. Several market parties were contacted and provided a number of possible explanations including the sudden and unexpected fall in temperatures, choices being made under time-pressure which initially prioritised supplies to their customers, problems that had to be tackled on other markets where balancing regimes are less robust and priority being given to trading opportunities in neighbouring gas markets with a more substantial financial impact. Both the Fluxys Belgium and GTS balancing systems were found to be extremely effective, robust and transparent by the network users who were contacted.

8 ELECTRICITY PRODUCTION DURING COLD SPELL

Gas consumption for electricity production

Below are two graphs that show the gas usage of the power plants coupled with the Fluxys Belgium gas network. Important observation: the offtake behaviour shows a week/weekend cycle that did not change significantly during the cold period of 27 February to 3 March 2018. There seems to be no additional reduction in natural gas demand as a result of high gas prices compared to normal natural gas demand reduction as a result of lower natural gas demands during the weekend.

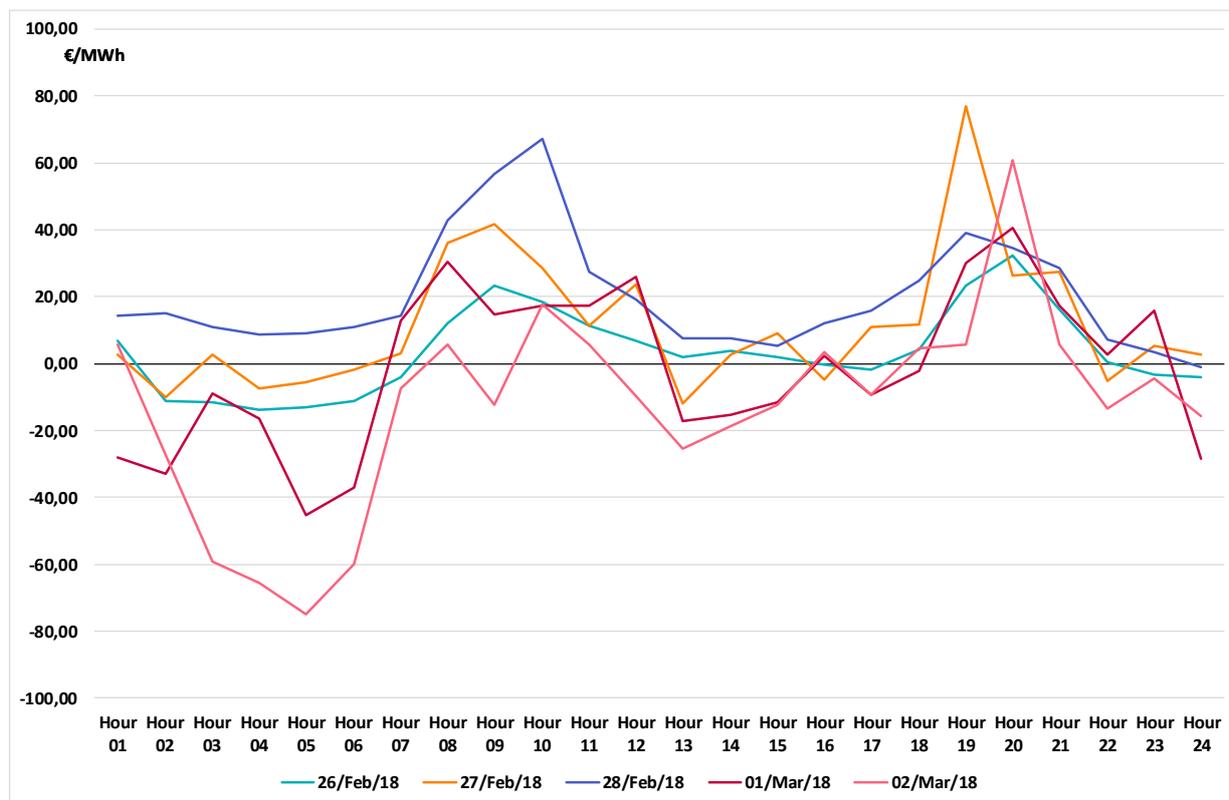


Clean Spark Spread

The *Clean Spark Spread* (CSS) is calculated for an average STEG-power station in Belgium³ in order to evaluate the extent to which STEG power stations have arbitrage opportunities between the natural gas market and electricity market in Belgium. The expected result of this calculation is an on average slightly positive CSS, which indicates that natural gas power stations are *on the money* in the electricity market, without deviating from the requirement that bids on the WD market for electricity must be cost-reflective.

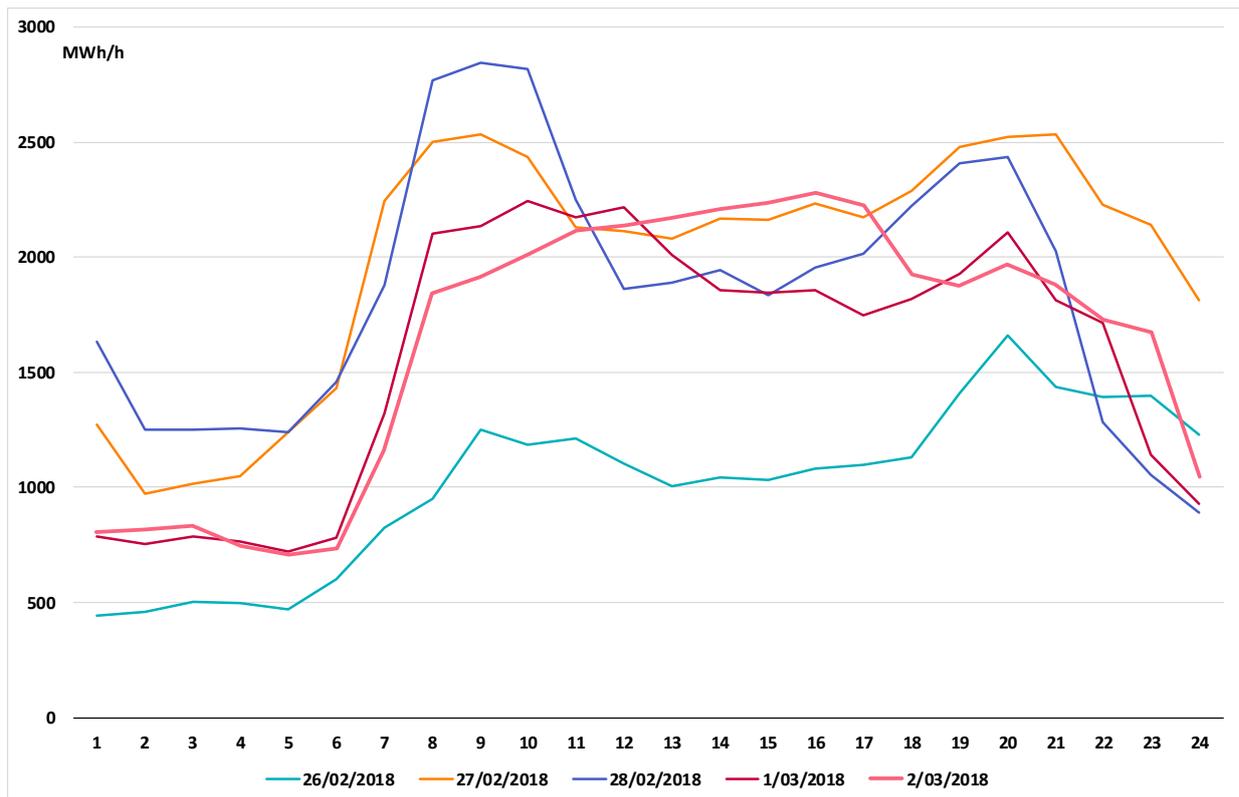
A market participant must put in its bids before 12.00 on the day before the day of the supply of electricity in the WD market for electricity. The WD market for trading in natural gas is organised as a continuous market during the day. Given the volatility of the gas price from 26 February 2018 to 2 March 2018, for the purposes of calculating the CSS on these days, the average natural gas prices during the quarter before 12.00 on the day prior to supply were used.

The following figure shows the evolution of the CSS for every day in the relevant period. During the off-peak periods and from 12.00 to 16.00, the CSS was around €0/MWh. During the other hours, it increased to very positive values, whereby the average CSS from 07.00 to 21.00 is positive for every day, even if it's only slightly positive for the supply of electricity on 02 March. In other words, arbitrage for STEG-power stations between day market prices for electricity and natural gas set the prices on the electricity market.



The same trend is observed in the generation data for STEG power stations, shown in the following figure: from 07.00, production from STEG power stations rose, only to drop past 21.00.

³ See section 2.2 in CREG-study 1628 : <https://www.creg.be/nl/publicaties/studie-f1628>



Higher natural gas prices did not reduce the natural gas demand from STEG power stations because the CSS was positive during the peak period of the day. A positive CSS points to net income generation by the STEG by supplying electricity to the electricity network. As, during the peak hours, the CSS was only slightly positive, it can be concluded that the STEG power stations were *in the money* and set the price of electricity.

9 CONCLUSION

The market-driven balancing system worked well during a sudden cold spell in NW Europe at the end of the winter. Fluxys Belgium had to intervene a few times within the day, especially on 01 and 02 March and purchase gas on the gas market in order to keep the network imbalance (aggregate market position MBP) within the market thresholds. This is part of normal market balancing.

To that effect, Fluxys Belgium purchased extra gas on the traded market. Transaction prices were much higher than the corresponding ZTP DA gas price. The price signal thus reflected the supply and demand discrepancy.

The network users who were out of balance and thus initiated the intra-day actions of Fluxys Belgium have been invoiced for the cost of the imbalance charges. This is fully in accordance with the prevailing contractual balancing rules.

The imbalance charges have led to extra income resulting in the increase of the Balancing Neutrality Account to + 3 million Euros.

On the basis of auction data from Prisma DA and WD, the analysis of capacity usage at the interconnection points shows that during the period from 27/02 to 02/03 bundled capacity exit TTF – entry ZTP for the L-gas market was offered, both DA and WD via the interconnection point Hilvarenbeek. Only on gas day 02/03 offered capacity has been sold WD (hour 22-24).

Regarding the H-gas market, all bundled capacity exit TTF - entry ZTP offered via the interconnection points 's Gravenvoeren, Zandvliet H en Zelzate 1 was booked but not fully nominated.

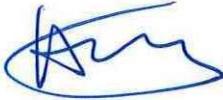
It is clear that occasionally capacity was booked from a commercial viewpoint. Some network users were even prepared to pay a premium with a view to a possibly favourable commercial transaction. The market situation led to impulse divergence capacity booking and actual physical need. This is also part of regular market functioning.

Both the DA spread TTF – ZTP (ICE heren) and the WD spread TTF - ZTP (Pegas) were limited. Only during the cold spell from 27/02 to 02/03 the WD spread varies significantly: between +15 and -32 EUR/MWh.

The market-driven balancing system facilitates the effective and efficient functioning of the natural gas market which translates into competitive prices for natural gas on the wholesale market. The analysis of this functioning under difficult/exceptional circumstances, particularly the sudden cold spell, temporary production interruptions and technical problems on the NW gas network has shown evidence the BeLux daily balancing system is robust.

The network users contacted in the context of this report had no specific comments. The market-driven balancing system was highly appreciated and its functioning is considered extremely transparent.

For the Commission of Electricity and Gas Regulation:



Andreas TIREZ
Director



Marie-Pierre FAUCONNIER
Chairwoman of the Board of Directors