

## **WHOLESALE MARKETS OBSERVATORY**

1<sup>st</sup> quarter of 2018

Wholesale electricity and natural gas markets



## **INTRODUCTION**

The wholesale markets observatory aims to provide general monitoring indicators of electricity and natural gas markets in France.

This observatory is updated on a quarterly basis and published on CRE's website ([www.cre.fr](http://www.cre.fr)). A French version is also available.

The first part of the report summarises the highlights of the quarter. The indicators (main dates, key figures and figures) are detailed in the second part.

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# **QUARTERLY HIGHLIGHTS**

### An upward trend of commodity prices except for coal

Oil prices reached 54.5 €/bbl on average during the first quarter of 2018 up by +4.5 % compared to the previous quarter. In line with the upward trend of December 2017, a four-year high of 58 €/MWh was reached mid-January. Previsions of higher U.S. domestic production then drove the price down but the Brent rallied back to 56 €/bbl by the end of March due to geopolitical risks in Iran and Venezuela.

Coal prices fell to 65.8 €/t on average during the first quarter of 2018 down by -9 % compared to the previous quarter. This level remains however higher than the first quarter of 2017 (+6 %). Low demand from China and growth of the country's domestic production contributed to the decline.

### A supply-demand balance of electricity less tight than the previous year despite a cold snap at the end of February.

Electricity consumption increased by an average of 10 %, mainly due to seasonality, in the first quarter of 2018 compared with the previous quarter. Compared to the first quarter of 2017, consumption shows a slight increase of 2 %. One can note that this increase is mainly from mid-February until the end of March corresponding to the arrival of the cold snap after a historically mild January (Figure 14). Consumption stood at around 136 TWh, compared to 133 TWh in the same period of 2017. This development took place against a backdrop marked by a low level of nuclear availability, although rising compared to the year 2017, which had reached historic lows. The balance of demand has been achieved through the production of thermal electricity. The utilization rate of the coal generation was thus 32 % on average during the quarter (42 % in March). For gas, the generation rate of the sector has reached 45 % (61 % for the same period in 2017). Imports surged by 9.5 % and exports by 29.1 % compared to the first quarter of 2017, bringing the balance of the cross-border trade to a net export balance of 13.7 TWh.

Spot electricity prices settled on average to 46.2 €/MWh during the first quarter of 2018, a decrease of 14% compared to the same period in 2017. This downward trend is even more pronounced on the peak where prices reached an average of 53.2 €/MWh, a decrease of -18.9 % compared to the previous year.

On Calendar products, the price of the Calendar French Baseload 2019 product fell by 5.9 % compared to the previous quarter, and its German equivalent fell by 4.9 %. Prices reached 39.9 €/MWh and 34.9 €/MWh, respectively. Prices for M+1 products fell by an average of 30.5% compared to the fourth quarter of 2017, and stood at 44.0 €/MWh, or a decrease of about -4.5 % compared to the first quarter 2017 (Table 2).

For futures trading, quarterly Q + 1 volumes rose by 11 % compared to the fourth quarter of 2017 and fell by 29 % compared with the previous quarter. Monthly products (M + 1) traded volumes rose by 28 % in comparison with the first quarter of 2017 and rose by 15 % compared to the fourth quarter of 2017. Finally, for the annual product (Y + 1), traded volumes rose by 27 % compared to the same period in 2017 and fell by 72 % in comparison with the previous quarter (Table 3).

### Gas prices soared to record high owing to the cold snap in Europe

During the first quarter of 2018, gas consumption was similar to the previous year at the same period (187 TWh, up by 1 %). The first half of the quarter started with above average temperatures but demand surged afterward as freezing temperatures hit Europe. Storage levels were already well below historic average by the 1<sup>st</sup> January and continued to be depleted with withdrawals up by 7 % (+5 TWh) compared to the first quarter of 2017. Storage reached their lowest levels since 2010. Pipeline imports settled at a similar level to the first quarter of 2017 while LNG imports fell by 5 % due to higher Asian demand, especially from China.

Prices for the *day-ahead* contract rose to 21.17 €/MWh on average, up by 12 % compared to the first quarter of 2017. The underlying trends of this average is first bearish prices in the beginning of the quarter followed by a volatility period where PEG Nord *day-ahead* climbed on the 1<sup>st</sup> March to a record high of 50.99 €/MWh. Other market hubs also experienced similar variations with however higher price spikes (85 €/MWh on the TTF). The event was set off by the cold snap in the context of a market already tight due to both low stocks and low LNG imports.

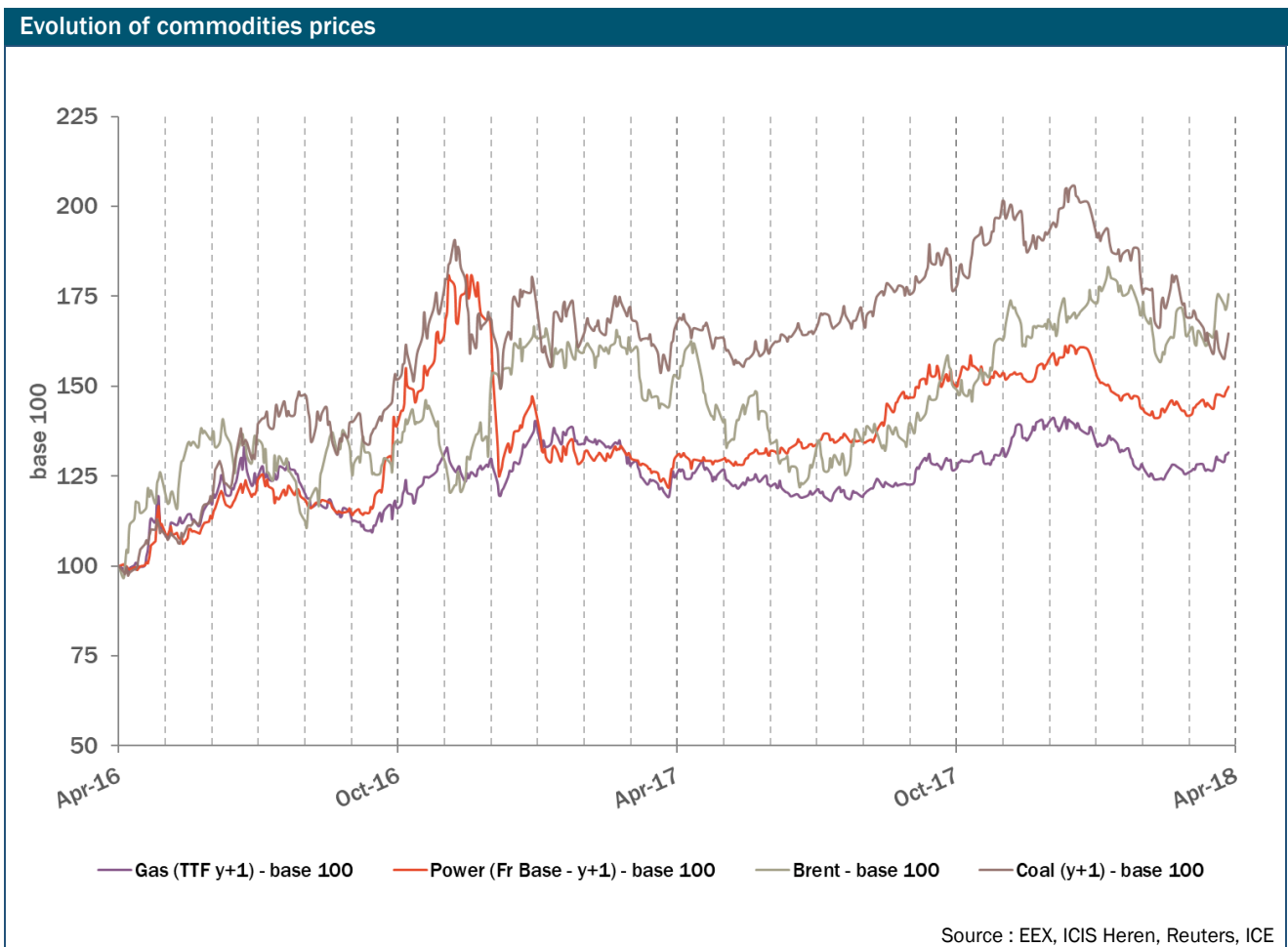
On the TRS zone, *day-ahead* prices settled on average to 21.22 €/MWh, very close to the PEG Nord price with an average spread of 0.05 €/MWh which however reached a maximum of 2 €/MWh at the end of the quarter. In spite of the low LNG imports, the North/South link remained available and partially used (average utilization of 78 %).

Calendar prices settled on average to 17.4 €/MWh following the same trends as other commodity prices, down in January then increasing until the end of the quarter.

The new auction mechanism for the allocation of storage capacities was also launched during the first quarter 2018.<sup>1</sup>

**Carbon Market: Prices keep on increasing, surpassing 10 €/tCO<sub>2</sub>**

Carbon price has kept on increasing this quarter: whereas it was 8.2 €/tCO<sub>2</sub> at the end of the year 2017, it is 13.3 €/tCO<sub>2</sub> at the end of the first 2018 quarter. This is the highest level reached since the beginning of the third phase of the EU ETS, in 2013. On 31 March 2017, the carbon price was 4.7 €/tCO<sub>2</sub>, meaning it has almost tripled over one year. The traded volume of European allowances has increased by 40 % compared to the previous quarter, closed to the Market Stability Reserve (MSR) start in 2019.



<sup>1</sup> See the deliberation of the French Commission for Energy Regulation of 22 February 2018 (No 2018-039) on the decision about the methods for marketing storage capacities in the framework of implementation of regulated third-party access to underground natural gas storage facilities in France.



# **MARKET INDICATORS**



## **PART 1:** **WHOLESALE ELECTRICITY MARKET**

### **1. KEY DATES**

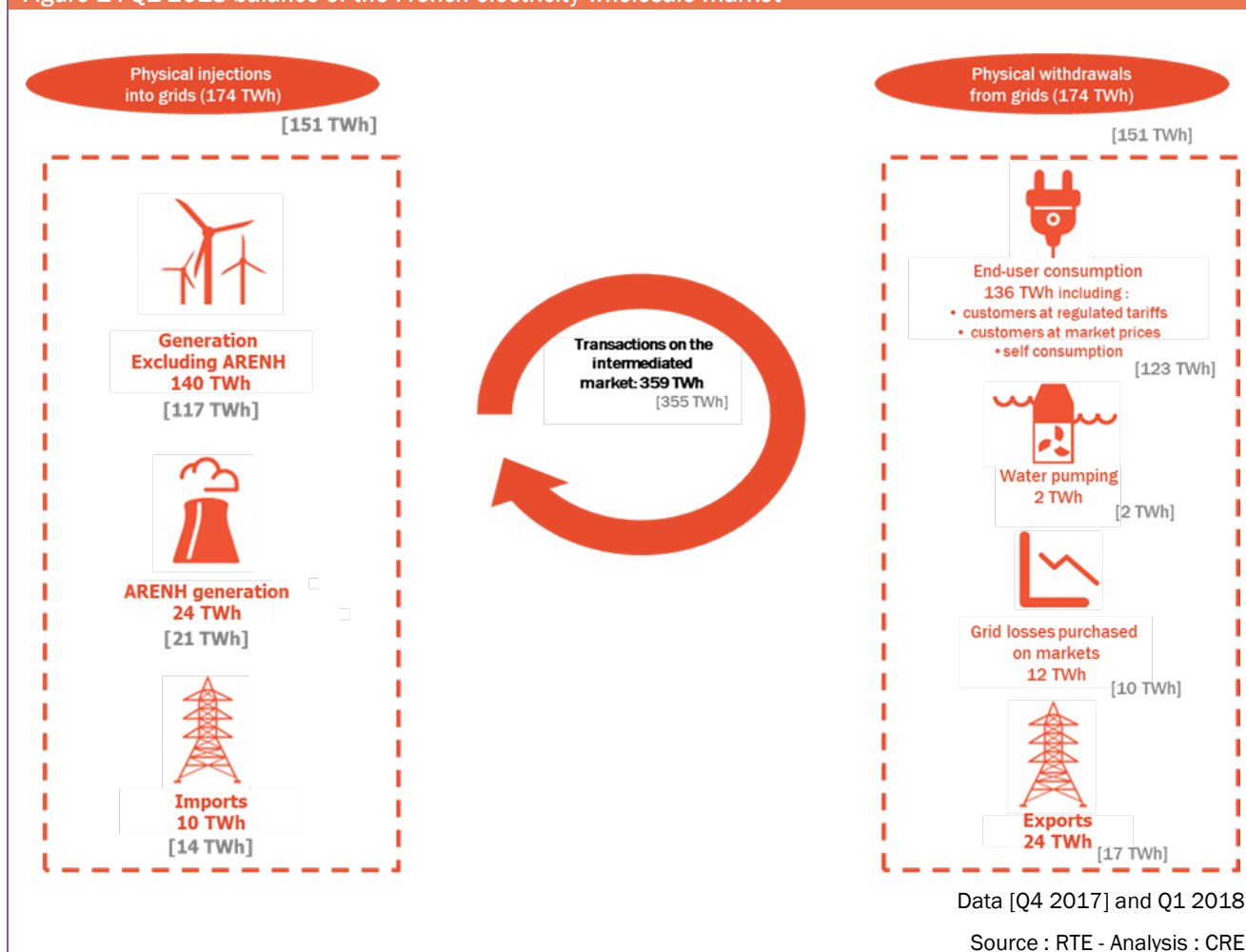
November 2000	CRE validated the initial version of the Balancing Responsible Entity (BR) contract
Early 2001	First purchases of losses on the market by RTE
May 2001	First OTC quotations published regarding the French electricity market
September 2001	First virtual power plant auctions set up by EDF (VPP)
November 2001	Launch of the Powernext Day-ahead market
June 2004	Launch of the Powernext Futures market
July 2004	First purchases of losses on the market by the distribution system operator (ERDF)
January 2006	Implementation of explicit capacity auctions on interconnections (except for Switzerland)
November 2006	Launch of the market coupling between France, Belgium and the Netherlands
July 2007	Launch of Powernext Intraday and Continuous markets
March 2009	A sixth broker active on the French electricity wholesale market
April 2009	Merger of Powernext and EEX markets - launch of EPEX SPOT and EPD for futures contracts
November 2010	Day-ahead market coupling with France, Belgium, Netherlands, Luxembourg and Germany
December 2010	Start of the intraday market coupling between Germany and France
July 2011	First ARENH subscription
November 2011	Futures products traded on EPD France become cash-settled
November 2011	End of VPP auctions <sup>2</sup>
January 2012	Beginning of explicit auctions for long-term cross-border transmission capacity allocations between France and Switzerland.
January 2012	Beginning of explicit intraday cross-border transmission capacity allocations between France and Switzerland
June 2012	Beginning of explicit intraday cross-border transmission capacity allocations between France and Italy
June 2013	Launch of the Swiss intraday market, and intraday market coupling with Germany and France
February 2014	Coupling of the NWE zone
April 2014	Coupling of the SWE zone
May 2014	Coupling of NWE and SWE zones
September 2014	New EEX transparency platform ( <a href="http://www.eex-transparency.com">www.eex-transparency.com</a> )

<sup>2</sup> [http://encherescapacites.edf.com/fichiers/fckeditor/File/Encheres/DecisionCE\\_Fin\\_VPP\\_301111.pdf](http://encherescapacites.edf.com/fichiers/fckeditor/File/Encheres/DecisionCE_Fin_VPP_301111.pdf)

December 2014	New RTE transparency platform in order to comply with the transparency rules CE 543/2013
February 2015	Extension of market coupling to France-Spain border and Austria-Slovenia border
May 2015	Flow-based methodology for CWE market coupling successfully launched
December 2015	Transition to half-hourly products in the intraday market for the France-Switzerland and France-Germany interconnections
March 2016	Transition to explicit continuous capacity allocations for France-Belgium in the intraday market
October 2016	Intraday market coupling of Belgium and the Netherlands. The France-Belgium interconnection capacity is only implicitly available.
December 2016	Launch of the first auction of capacity guarantee
March 2017	Launch of 30 minutes products on Intraday market in France, Germany and Switzerland

**2. BALANCE OF THE WHOLESALE ELECTRICITY MARKET**

Figure 1 : Q1 2018 balance of the French electricity wholesale market



**3. KEY DATA**

Table 1 : Physical flows on the wholesale electricity market

	Quarterly values					Quarterly variation Q1 2018 / Q4 2017		Yearly variation Q1 2018 / Q1 2017	
	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	In percentage	In values	In percentage	In values
<b>Injections, in TWh</b>									
Production (excluding ARENH and VPP), in TWh	135	101	94	117	140	19%	22,79	4%	5,08
ARENH, in TWh	20	20	21	21	23	-	2,62	15%	3,08
Imports, in TWh	9,6	6,9	7,4	14,6	10,5	-28%	-4,10	10%	0,91
<b>Withdrawals, in TWh</b>									
Consumption, in TWh	133	98	93	126	136	8%	9,94	2%	2,93
Water pumping, in TWh	1,9	1,8	1,5	2,0	1,9	-3%	-0,05	3%	0,05
Exports, in TWh	19	22	21	9	24	184%	15,70	29%	5,46
Grid losses, in TWh	10,9	7,0	6,7	6,9	11,5	67%	4,62	6%	0,63

Source : RTE – Analysis : CRE

**Table 2 : Wholesale electricity market prices during the quarter**

	Quarterly values					Quarterly variation Q1 2018 / Q4 2017		Yearly variation Q1 2018 / Q1 2017	
	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	In percentage	In values	In percentage	In values
<b>Spot Market prices</b>									
Intraday Price France, in €/MWh	54,0	33,9	34,6	57,7	46,2	-20%	-11,47	-14%	-7,81
Day-Ahead Base Price France, in €/MWh	55,0	33,9	34,5	56,6	44,8	-21%	-11,74	-18%	-10,16
Day-Ahead Peak Price France, in €/MWh	65,6	38,7	40,3	70,0	53,2	-24%	-16,75	-19%	-12,41
Spread Base Day-Ahead France-Germany, in €/MWh	13,7	4,1	1,8	23,1	8,8	-62%	-14,33	-36%	-4,86
Spread Peak Day-Ahead France-Germany, in €/MWh	12,5	5,1	2,6	23,5	8,4	-64%	-15,14	-33%	-4,12
France-Germany Day-Ahead prices convergence rate	25%	46%	62%	7%	31%	343%	0,24	24%	0,06
<b>Futures Market Prices</b>									
M+1 Price France, in €/MWh	46,0	33,8	37,8	63,2	44,0	-30%	-19,26	-4%	-2,06
Spread M+1 France-Germany, in €/MWh	9,9	2,0	3,3	22,5	6,9	-69%	-15,59	-30%	-3,00
Q+1 Price France, in €/MWh	33,0	34,2	47,5	55,4	34,0	-39%	-21,40	3%	0,98
Spread Q+1 France-Germany, in €/MWh	1,9	1,9	10,5	13,9	1,3	-91%	-12,59	-31%	-0,60
Y+1 Price France, in €/MWh	35,6	35,9	39,1	42,5	40,0	-6%	-2,55	12%	4,35
Spread Y+1 France-Germany, in €/MWh	5,8	5,8	6,1	5,9	5,0	-15%	-0,87	-13%	-0,75
<b>Ratios Y+1 Peakload/Baseload ratios</b>									
France	134%	130%	129%	129%	128%	-1%	-0,01	-4%	-0,05
Germany	127%	126%	124%	124%	125%	1%	0,01	-2%	-0,02

Source : EPEX SPOT, EEX Power Derivatives, Courtiers – Analysis : CRE

**Table 3 : Traded volumes during the quarter**

	Quarterly values					Quarterly variation Q1 2018 / Q4 2017		Yearly variation Q1 2018 / Q1 2017	
	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	In percentage	In values	In percentage	In values
<b>NEB</b>									
NEB volumes, in TWh	106,57	94,95	98,94	113,99	119,92	5%	5,93	13%	13,35
Ratio NEB/Consumption in France	80%	97%	106%	90%	88%	-	-0,02	-	0,08
<b>Spot Market, in TWh</b>									
Volumes on EPEX SPOT Intraday market, in TWh	1,5	1,5	1,6	1,8	2,0	14%	0,22	30%	0,46
Fr-De Cross-Border Intraday volumes market shares	66%	75%	80%	57%	65%	11%	0,09	-1%	-0,01
Volumes on EPEX SPOT Day-Ahead market, in TWh	25,2	27,9	28,0	24,7	29,8	18%	5,14	18%	4,60
Volumes on Brokers Day-Ahead market, in TWh	6,3	5,9	5,0	6,4	6,4	-1%	-0,03	1%	0,07
<b>Futures Market</b>									
<b>Volumes, in TWh</b>	<b>148,8</b>	<b>183,7</b>	<b>243,5</b>	<b>326,8</b>	<b>177,2</b>	<b>-46%</b>	<b>-149,6</b>	<b>19%</b>	<b>28,38</b>
Brokers market share	84,3%	87,7%	86,5%	86,1%	88,9%	-	2,7%	-	4,6%
EEX Power Derivatives market share	15,7%	12,3%	13,5%	13,9%	11,1%	-	-2,7%	-	-4,6%
<b>Number of Transactions</b>	<b>17 650</b>	<b>17 317</b>	<b>20 351</b>	<b>28 061</b>	<b>24 506</b>	<b>-13%</b>	<b>- 3 555</b>	<b>39%</b>	<b>6 856</b>
Brokers market share	80,2%	86,1%	85,3%	79,7%	85,6%	-	5,9%	-	5,4%
EEX Power Derivatives market share	19,8%	13,9%	14,7%	20,3%	14,4%	-	-5,9%	-	-5,4%
<b>Y+1 product</b>									
Volumes, in TWh	33,0	55,2	101,2	149,2	41,8	-72%	-107,41	27%	8,77
Number of Transactions	996	1483	2584	3465	1145	-67%	-2320	15%	149
<b>Q+1 product</b>									
Volumes, in TWh	24,1	33,1	26,6	38,0	26,8	-29%	-11,17	11%	2,77
Number of Transactions	1933	2461	2276	3485	2169	-38%	-1316	12%	236
<b>M+1 product</b>									
Volumes, in TWh	26,0	29,0	24,9	29,0	33,3	15%	4,25	28%	7,30
Number of Transactions	4863	5140	4300	6873	7673	12%	800	58%	2810

Source : RTE – Analysis : CRE

**Table 4 : Availability of electricity generating plants**

	Quarterly values					Quarterly variation Q1 2018 / Q4 2017		Yearly variation Q1 2018 / Q1 2017	
	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	In percentage	Variation	In percentage	Variation
<b>Nuclear power plants</b>									
Average nuclear generation rate (%)	80,2	65,9	60,3	65,7	80,2	14,5		0,0	
Availability rate of nuclear power plants (%)	82,1	69,2	65,1	70,4	86,7	16,3		4,6	
<b>Hydraulic storage capacity rate</b>									
Hydro storage level (end of quarter) (%)	21,25415761	28,9	29,6	21,3	37,9	16,6		16,6	

Source : RTE- Analysis : CRE

**Table 5 : Cross-border flows**

	Quarterly values					Quarterly variation Q1 2018 / Q4 2017		Yearly variation Q1 2018 / Q1 2017	
	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	In percentage	Variation	In percentage	Variation
<b>Imports (TWh)</b>									
Peakload imports (TWh)	9,6	6,9	7,5	14,6	10,5	-28,2%	-4,1	9,5%	0,9
Offpeak imports (TWh)	3,6	2,7	2,9	5,5	4,0	-27,5%	-1,5	12,4%	0,4
Net imports (TWh)	6,0	4,2	4,6	9,1	6,5	-28,6%	-2,6	7,8%	0,5
<b>Exports (TWh)</b>									
Peak exports (TWh)	18,3	21,0	20,5	16,6	23,4	40,7%	6,8	27,6%	5,1
Offpeak exports (TWh)	6,7	7,5	6,9	5,2	8,7	67,7%	3,5	30,3%	2,0
Net exports (TWh)	11,6	13,5	13,6	11,4	14,6	28,3%	3,2	26,0%	3,0
<b>Net balance (TWh)</b>	<b>8,7</b>	<b>14,1</b>	<b>13,0</b>	<b>2,0</b>	<b>12,9</b>	<b>543,0%</b>	<b>10,9</b>	<b>47,5%</b>	<b>4,1</b>

Source : RTE- Analysis : CRE

**Table 6 : French balancing responsible entities**

	Quarterly values					Quarterly variation Q1 2018 / Q4 2017		Yearly variation Q1 2018 / Q1 2017	
	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	In percentage	Variation	In percentage	Variation
<b>Balancing responsible</b>									
Active in electricity generation	19	20	18	19	20	5,3%	1	5,3%	1
Holder of rights of regulated access to ARENH	18	18	16	16	18	0,0%	2	0,0%	0
Final customers provider	31	30	28	27	28	3,7%	1	-9,7%	-3
Active on imports/exports	50	48	47	47	49	4,3%	2	-2,0%	-1
Active on block exchange	94	86	85	87	82	-5,7%	-5	-12,8%	-12

Source : RTE- Analysis : CRE

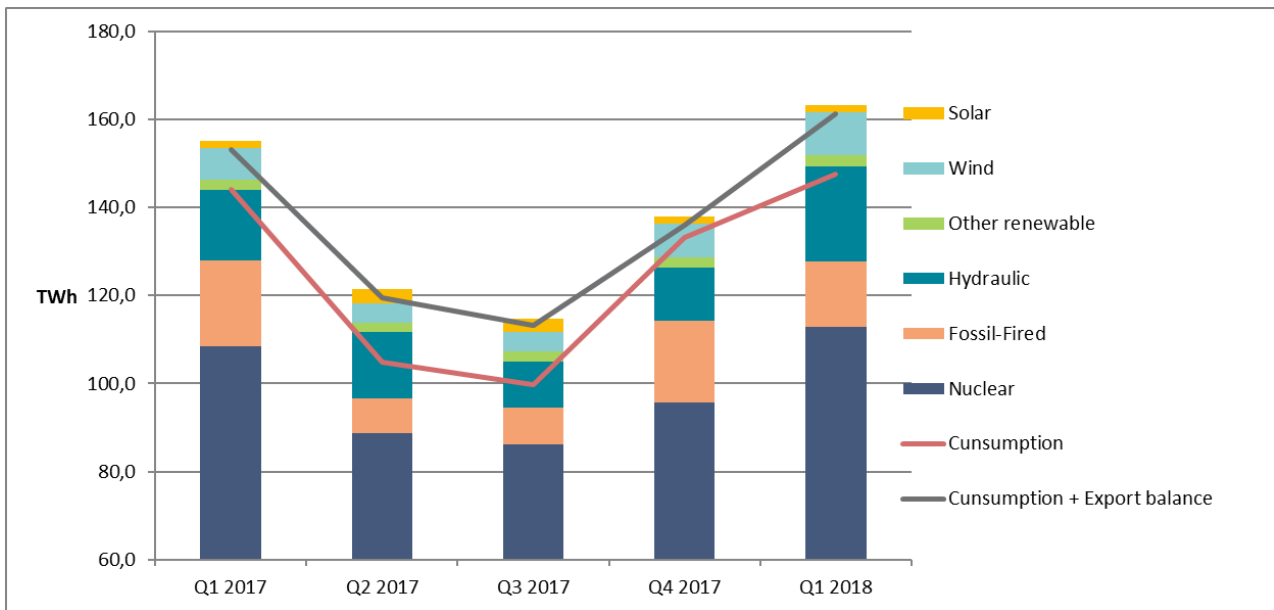
**Table 7 : Index of market concentration**

	HHI - Concentration indices					
	Q1 2017		Q4 2017		Q1 2018	
		EDF included		EDF included		EDF included
<b>Wholesale energy market</b>						
OTC - block purchases	879	382	496	700	616	959
OTC - block sales	582	616	596	614	814	738
EPEX - purchases	516	529	559	1058	448	784
<b>Injections</b>						
Generation	7056	3112	3334	6583	4152	6687
Imports	1079	1319	2155	1619	1809	1373
<b>Deliveries</b>						
End-consumer consumption	5380	1948	1898	5078	1821	4927
Grid losses	1542	1709	1602	1495	2048	1718
Exports	2991	1188	959	3449	1428	3372

Source : RTE, EPEX SPOT, EEX Power Derivatives, Courtiers - Analysis : CRE

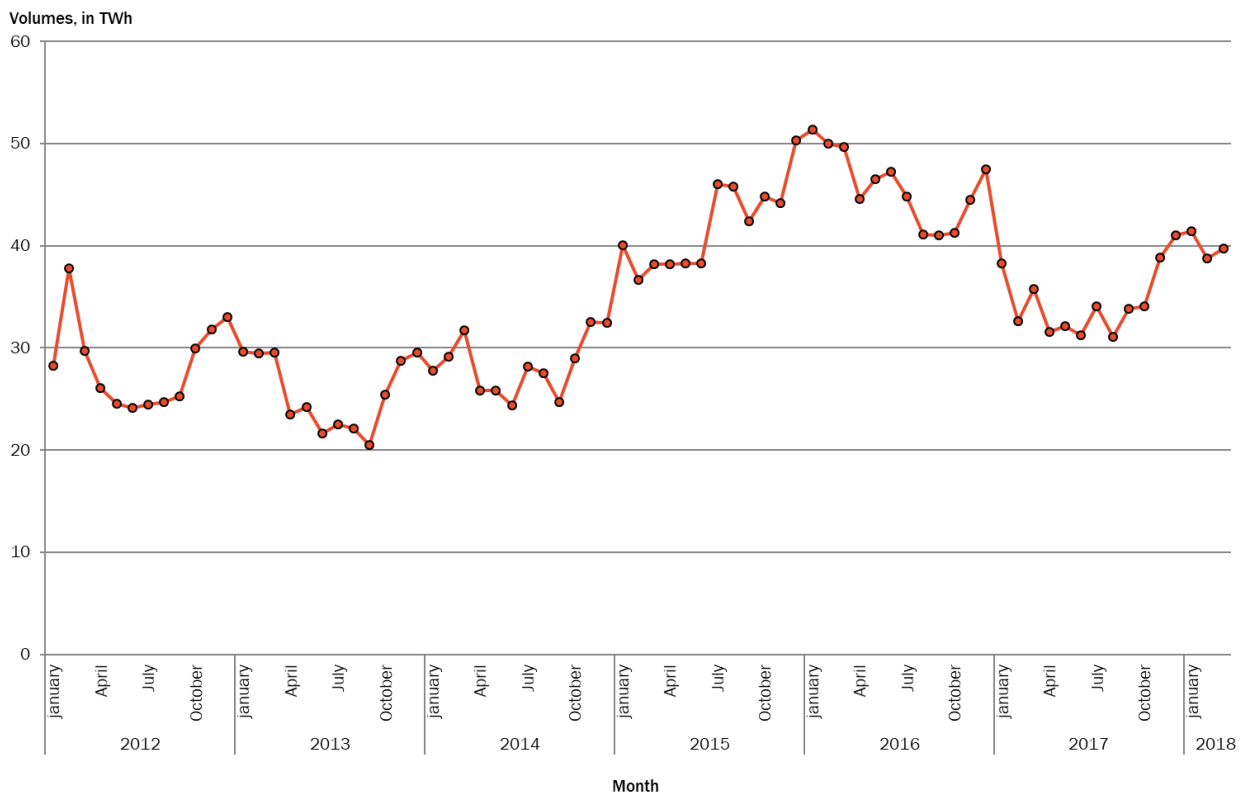
**4. FIGURES**

**Figure 2 : Generation per technology and quarterly consumption**



Source : RTE – Analysis : CRE

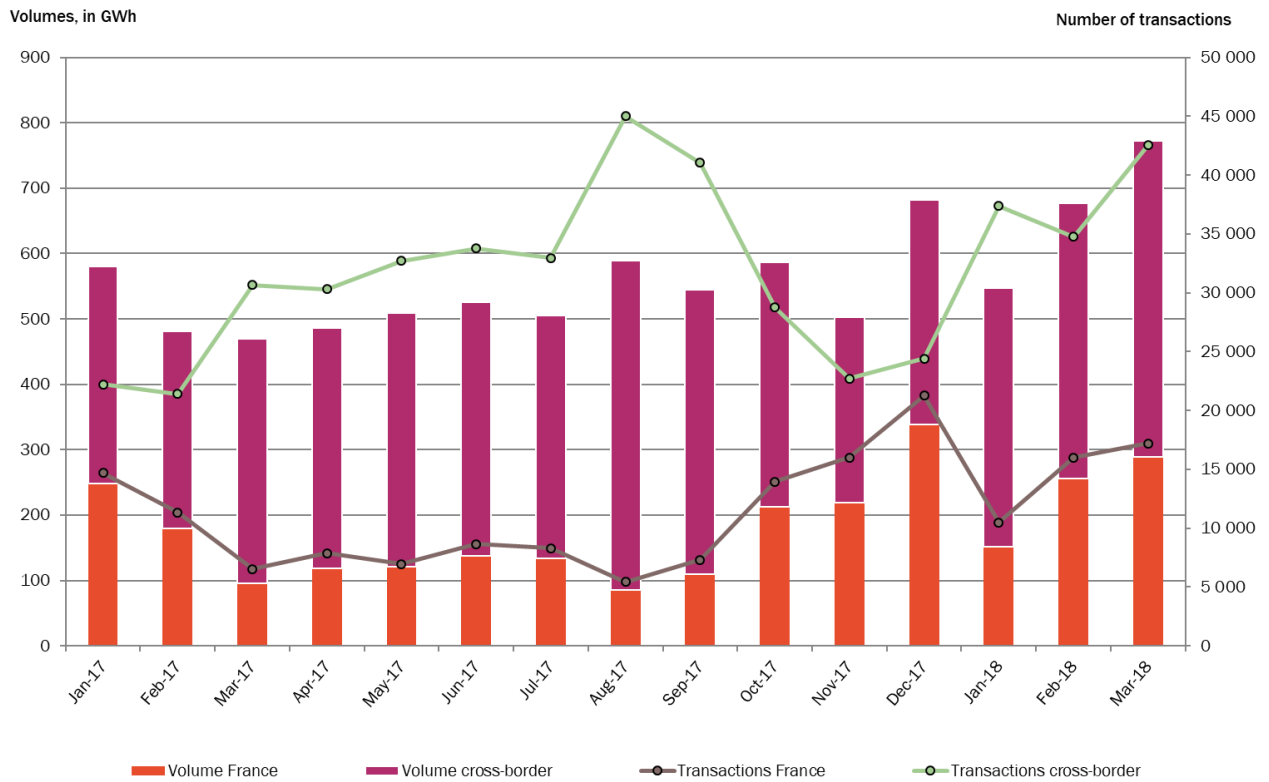
**Figure 3 : Volume of net deliveries resulting from OTC transactions (excluding ARENH)**



Source : RTE – Analysis : CRE

**Figure 4 : Volumes and amount of intraday transactions on the EPEX SPOT exchange**

// SUMS ON A MONTHLY BASIS //



Source : EPEX SPOT, Courtiers - Analysis : CRE

**Figure 5 : Volumes and amount of day-ahead transactions on the OTC intermediated market and the EPEX SPOT exchange**

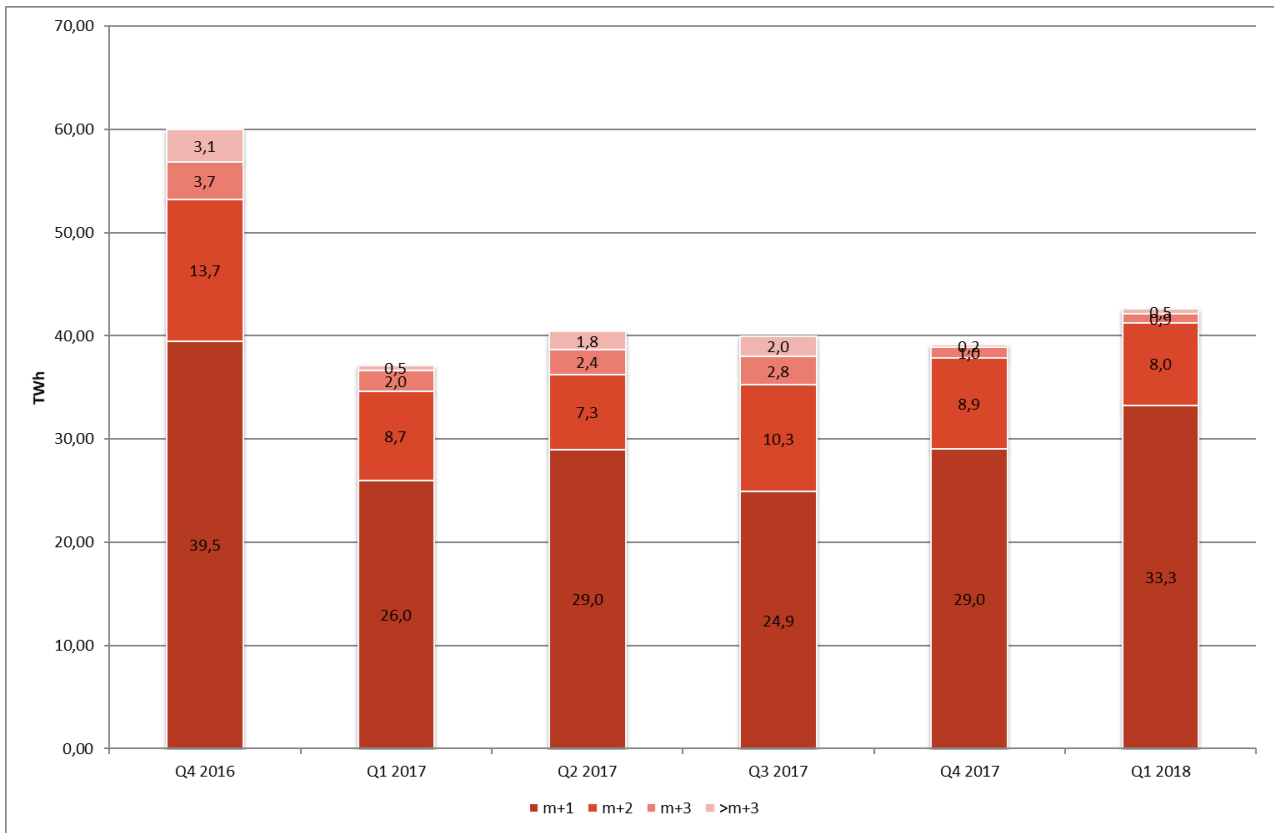


Source : EPEX SPOT, Courtiers – Analysis : CRE



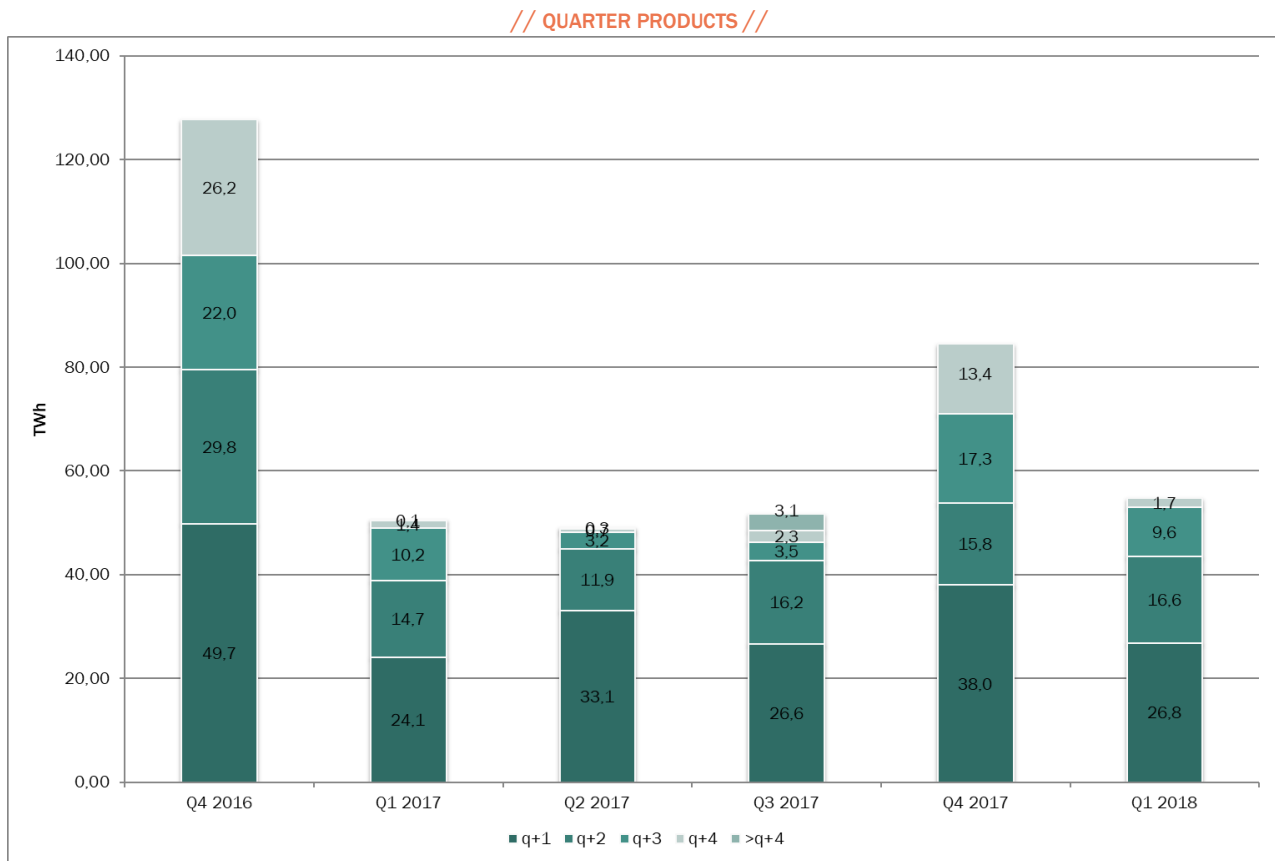
**Figure 6 : Quarterly traded volumes on the intermediated wholesale market**

// MONTH PRODUCTS //



Source : Courtiers, EPD France – Analysis : CRE

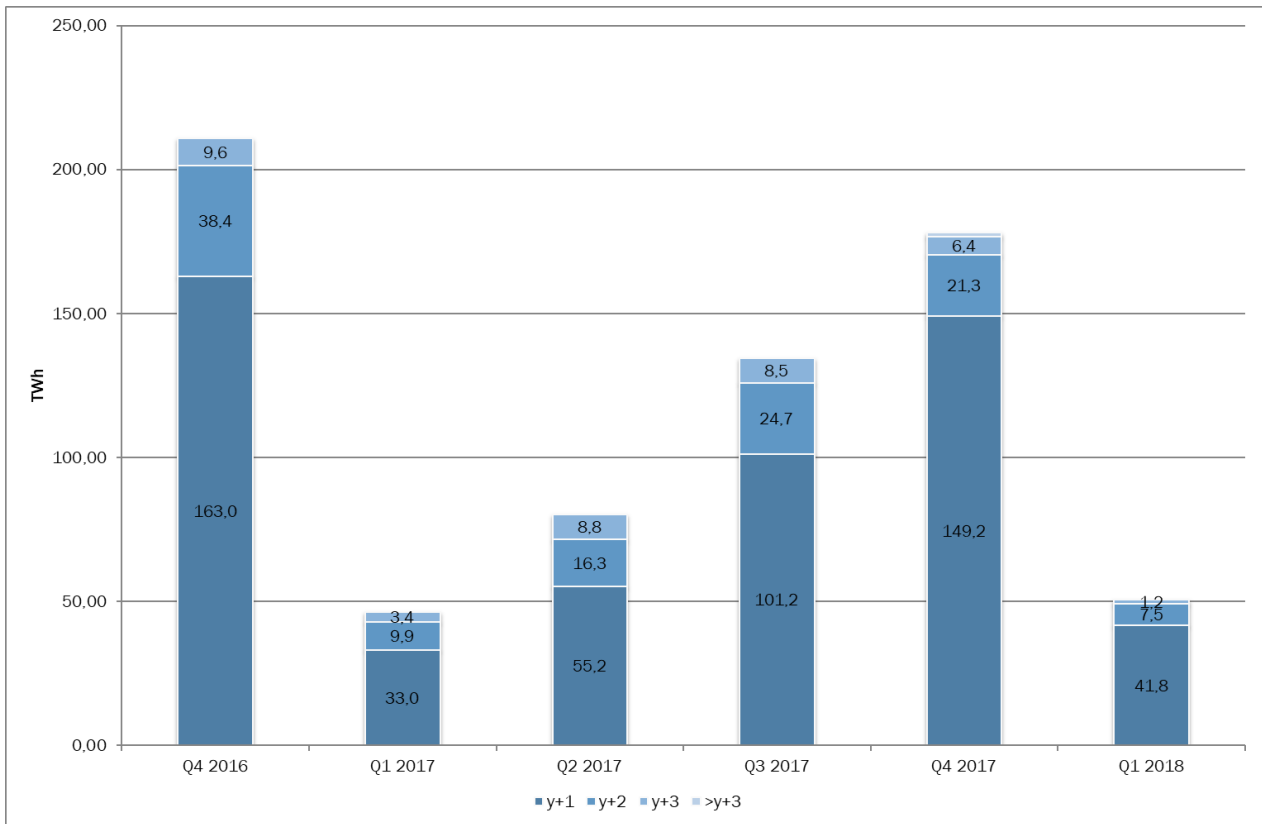
**Figure 7 : Quarterly traded volumes on the intermediated wholesale market**



Source : Courtiers, EPD France – Analysis : CRE

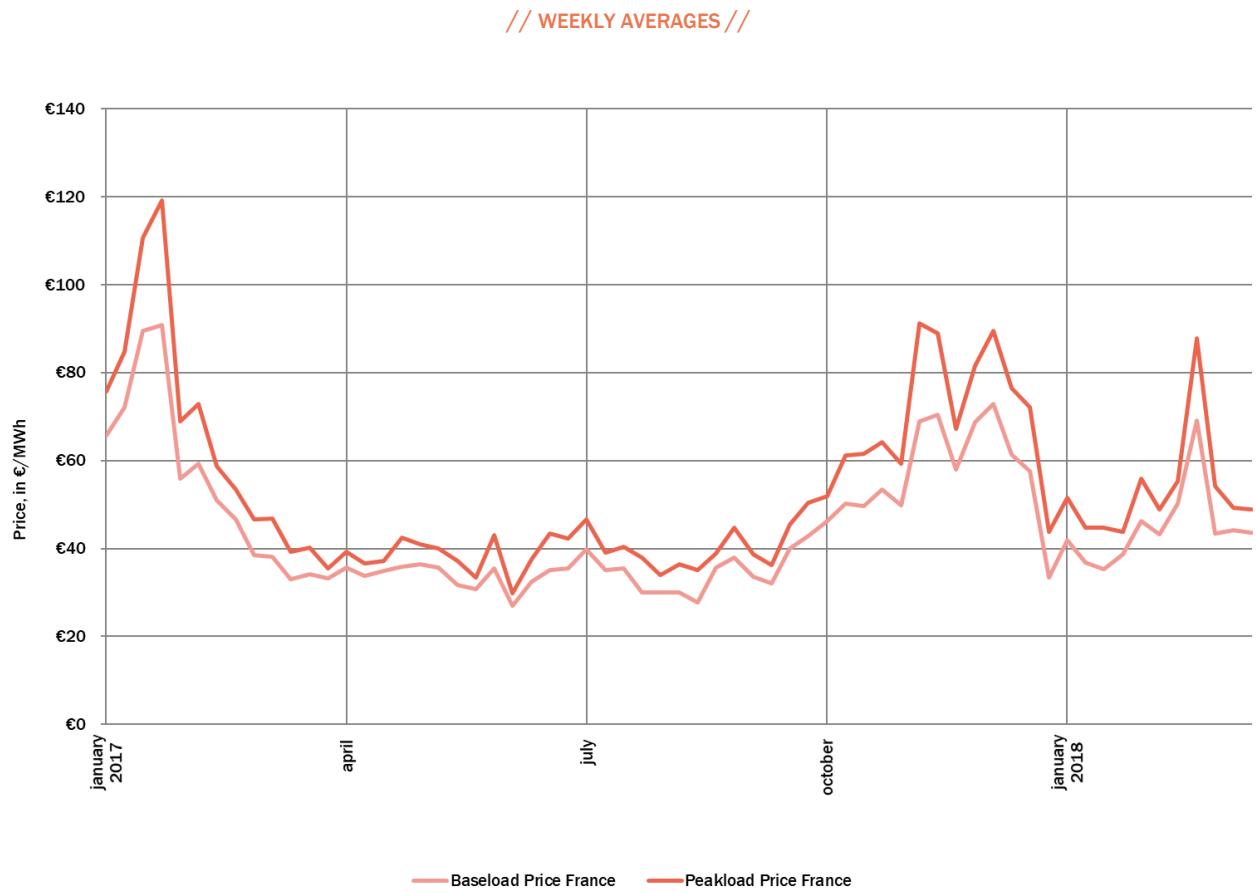
**Figure 8 : Quarterly traded volumes on the intermediated wholesale market**

// CALENDAR PRODUCTS //



Source : Courtiers, EPD France – Analysis : CRE

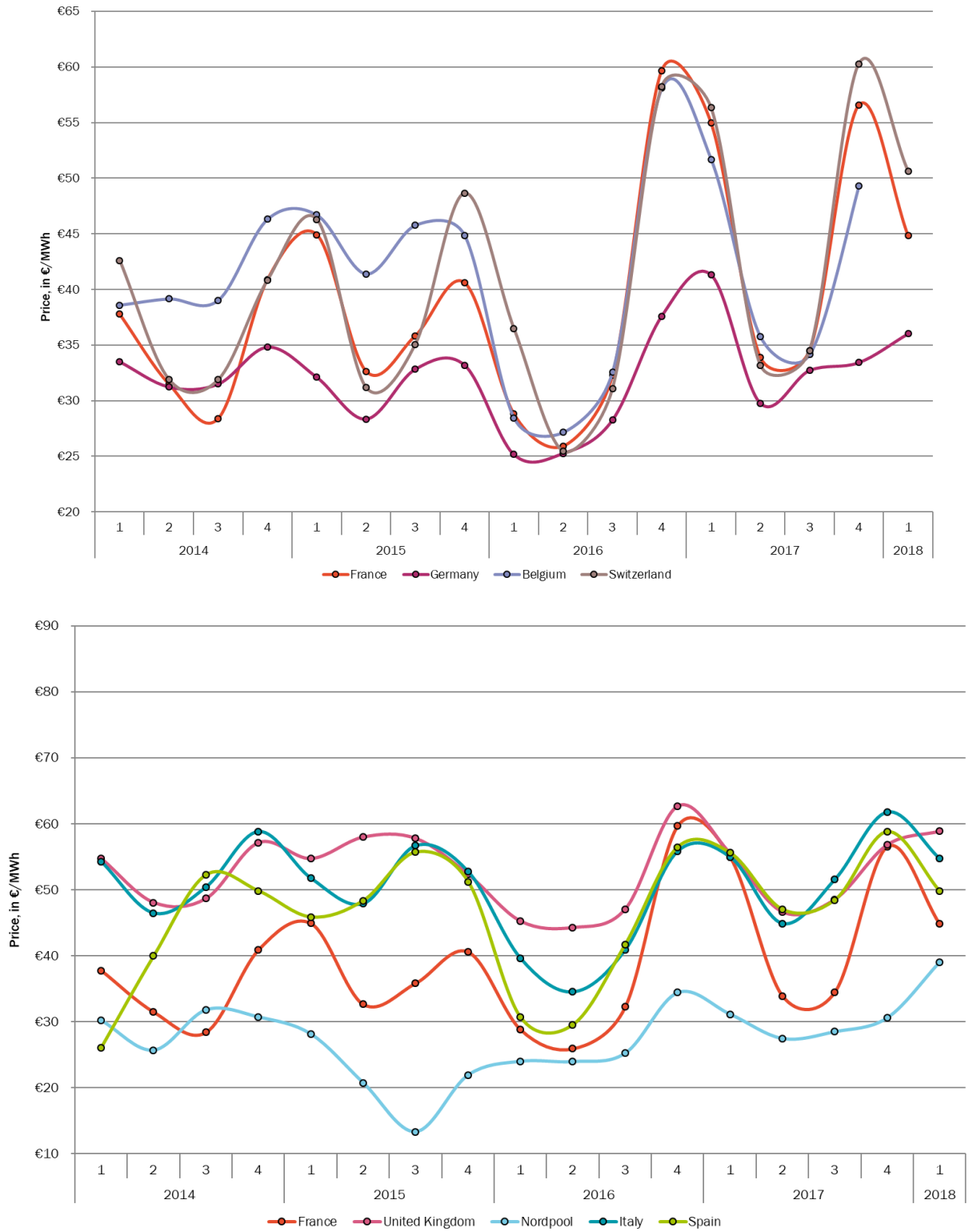
**Figure 9 : French Day-ahead prices on EPEX SPOT (baseload and peakload)**



Source : EPEX SPOT – Analysis : CRE

**Figure 10 : Day-Ahead Baseload prices on the main European electricity markets**

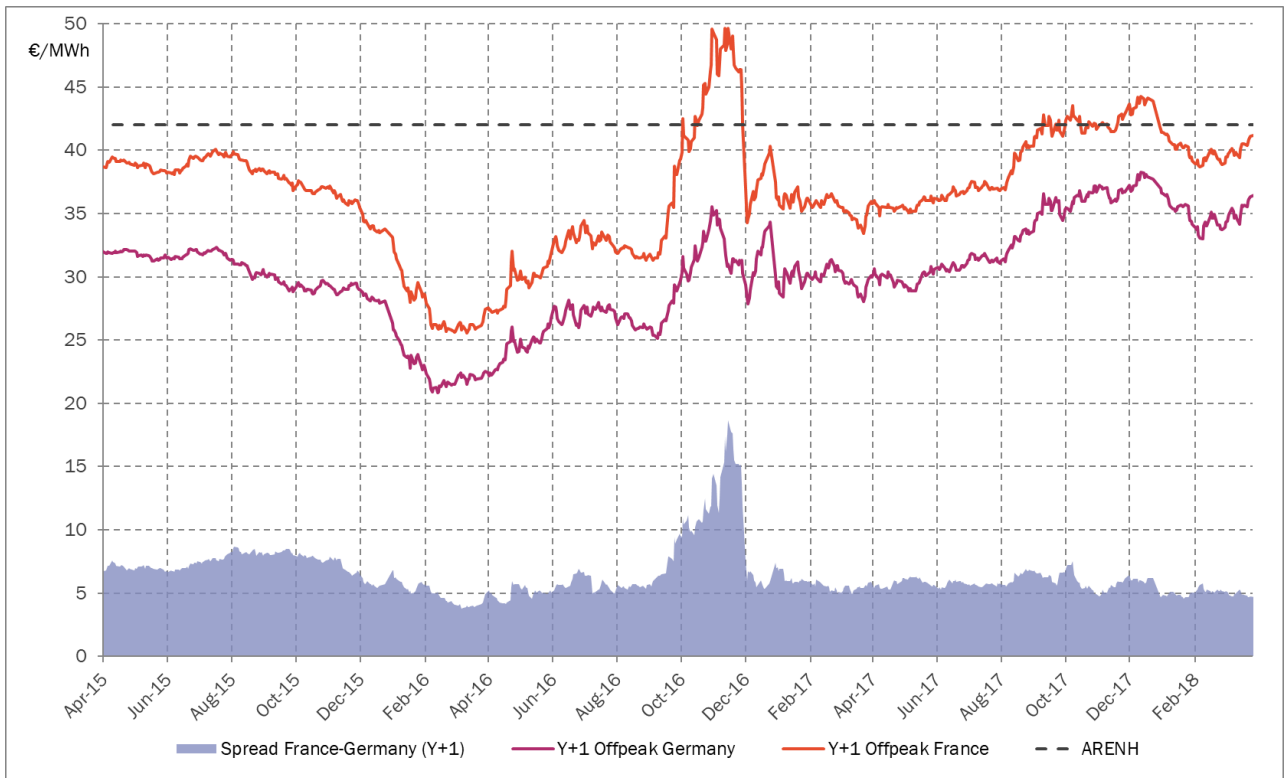
// QUARTERLY AVERAGES //



Source : EPEX SPOT, Nordpool, N2EX, GME, OMEL, BELPEX – Analysis : CRE

**Figure 11 : Baseload Y+1 calendar prices in France and Germany**

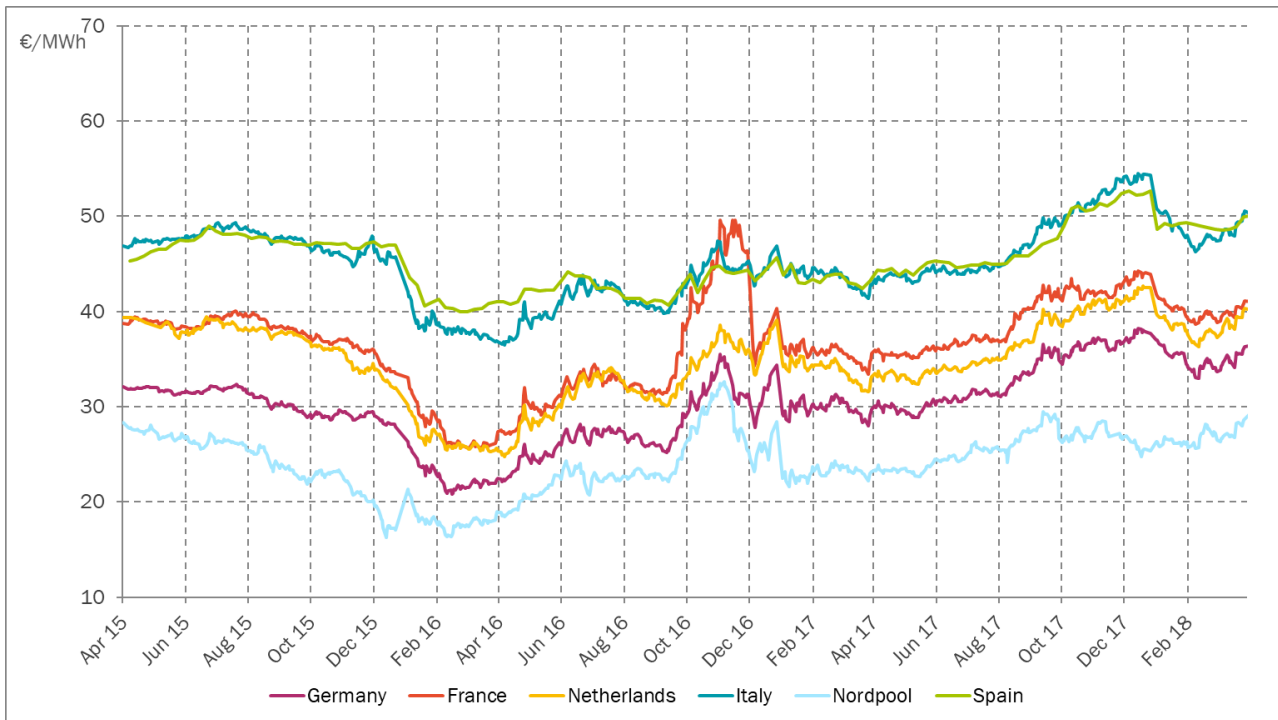
// DAILY VALUES //



Source : EEX Power Derivatives - Analysis : CRE

**Figure 12 : Baselaod Y+1 calendar prices in Europe**

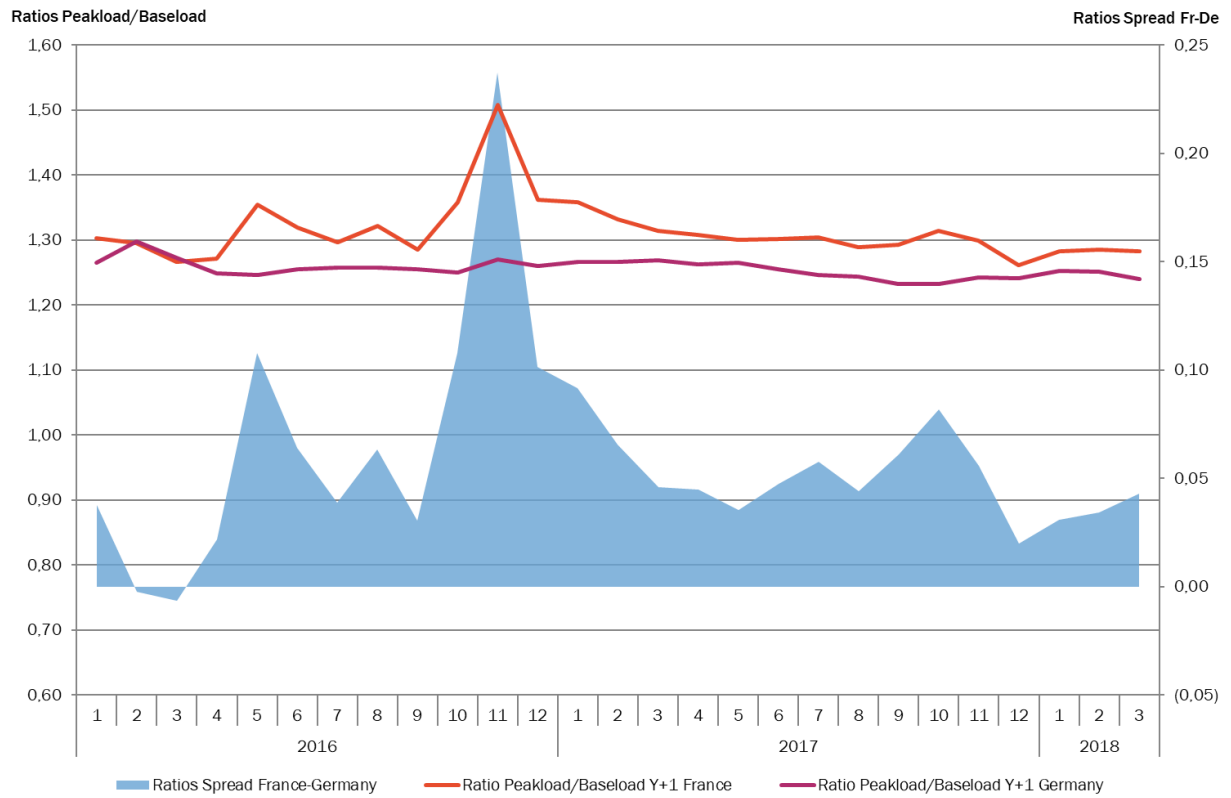
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Source : EEX Power Derivatives, Courtiers - Analysis : CRE

**Figure 13 : Ratio Peakload/Baseload of Y+1 calendar prices in France and Germany**

// MONTHLY AVERAGES //

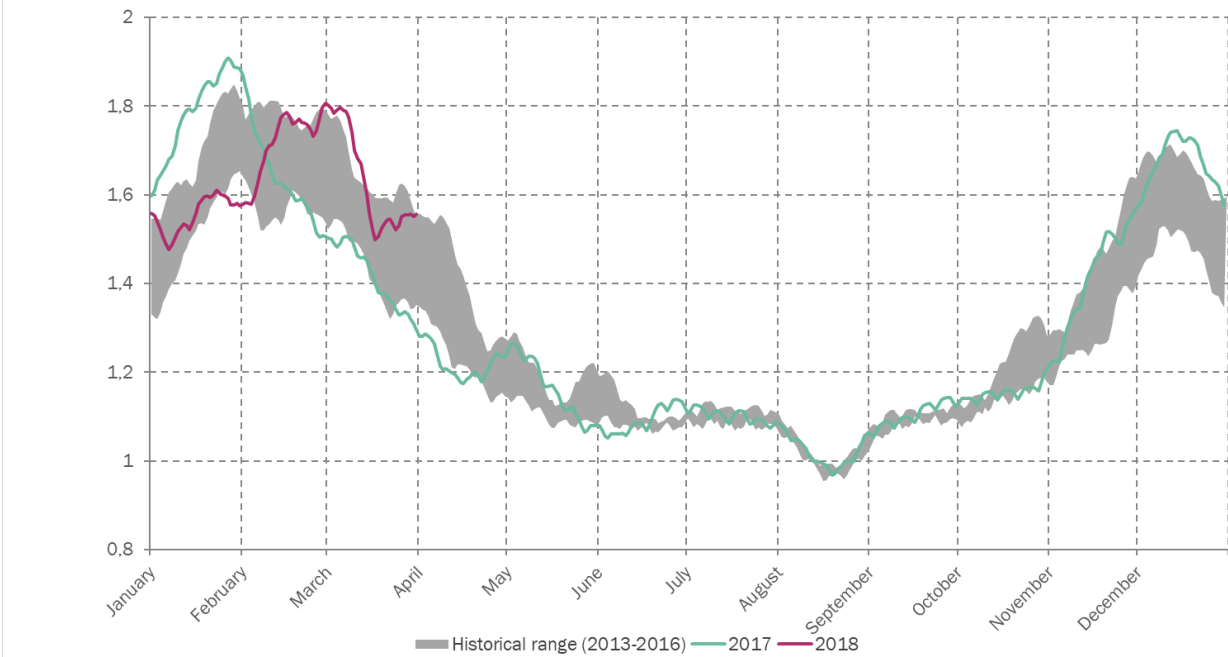


Source : EEX Power Derivatives – Analysis : CRE



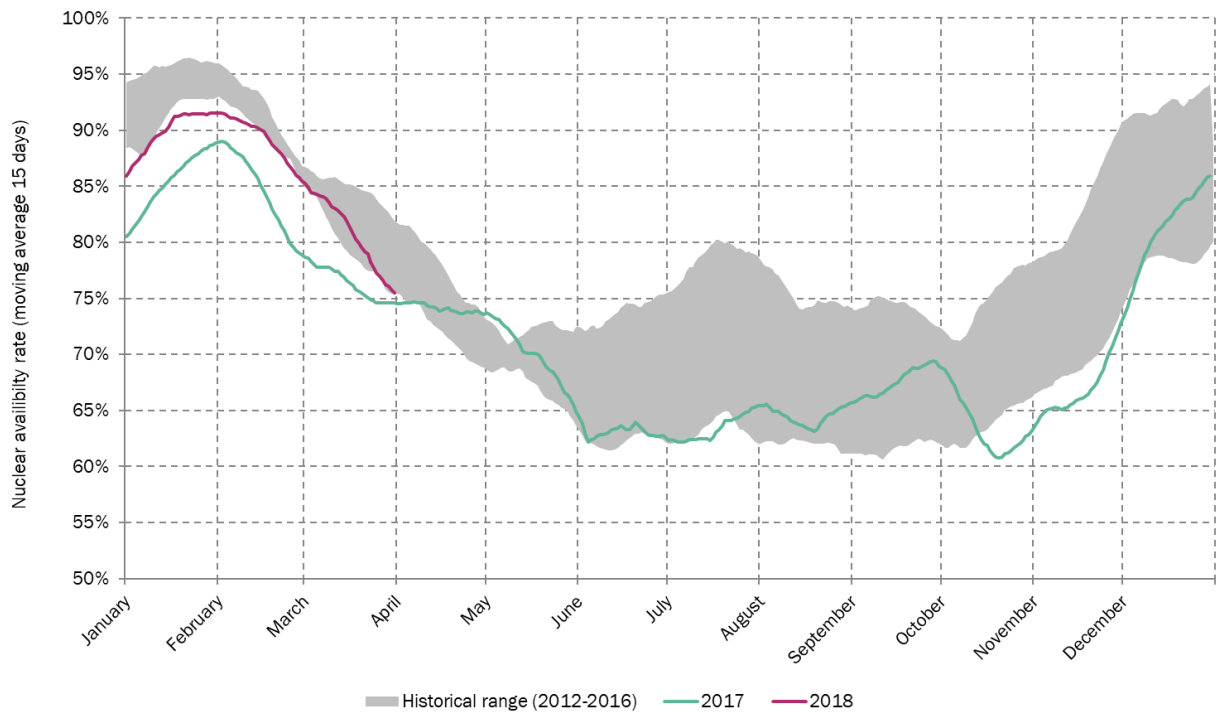
**Figure 14 : French electricity consumption**

Daily consumption (TWh) - moving average 15 days



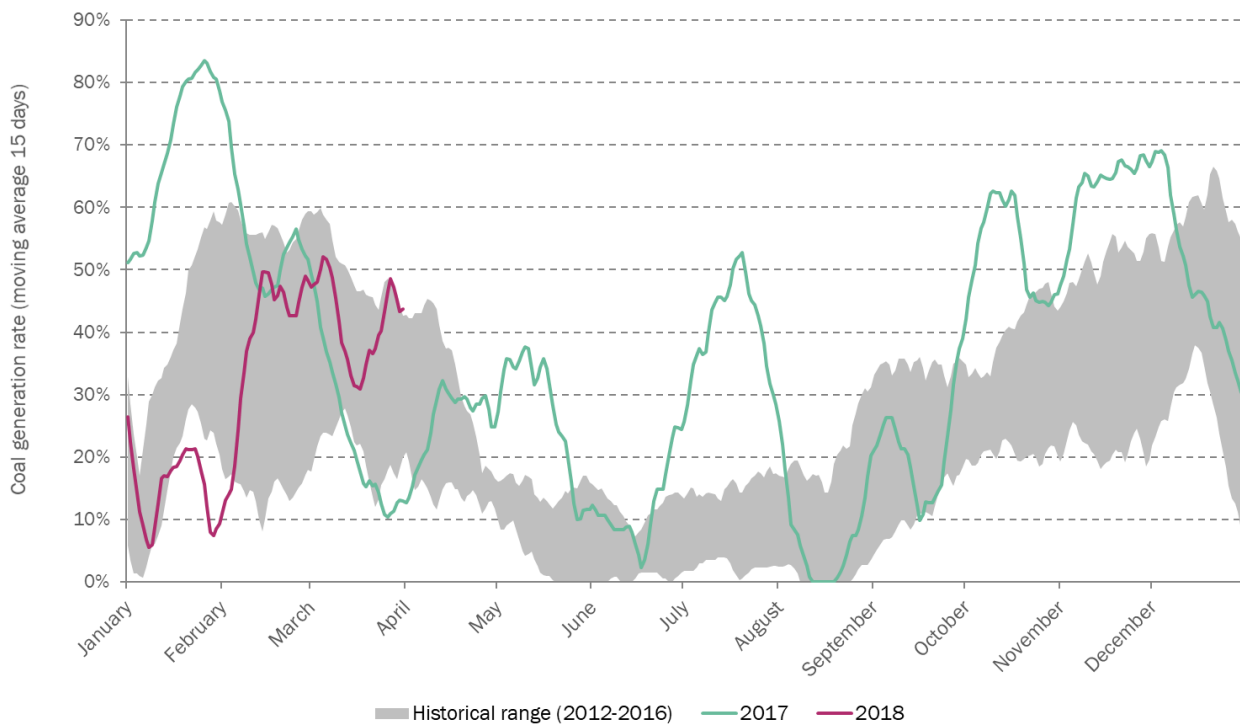
Source : RTE - Analysis : CRE

**Figure 15 : Availability of nuclear generating capacity**



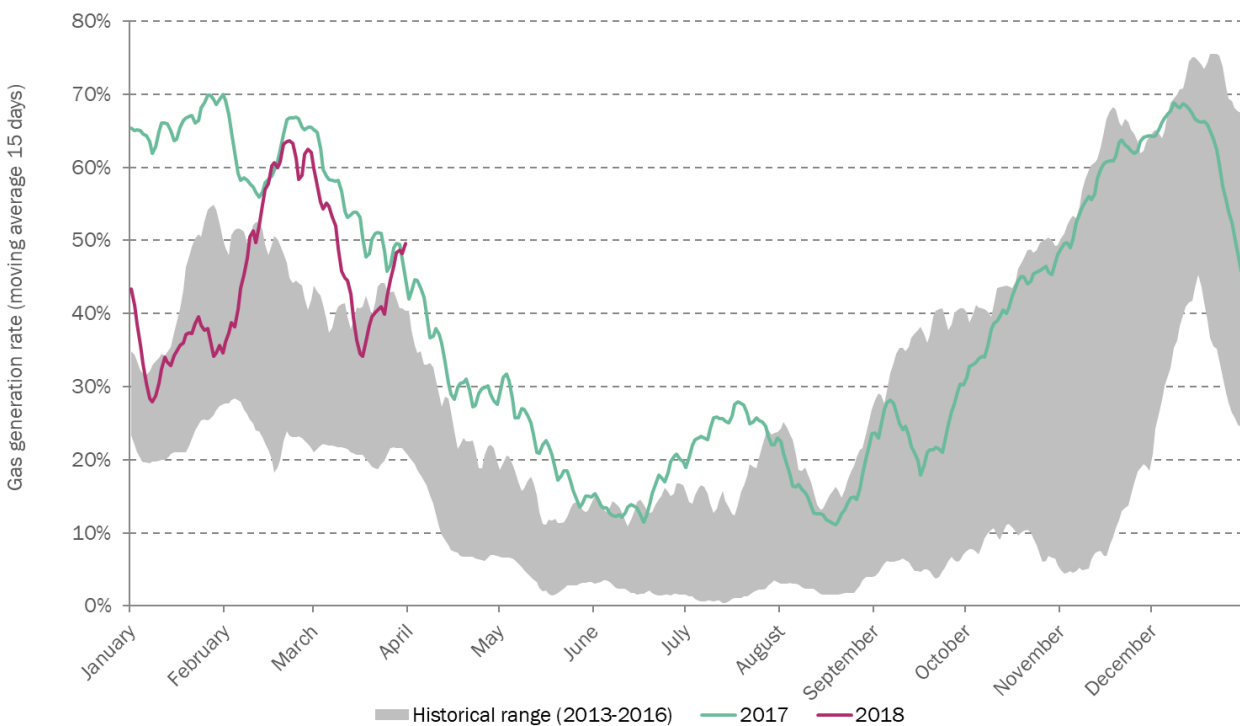
Source : RTE - Analysis : CRE

**Figure 16 : Average coal generation rate**



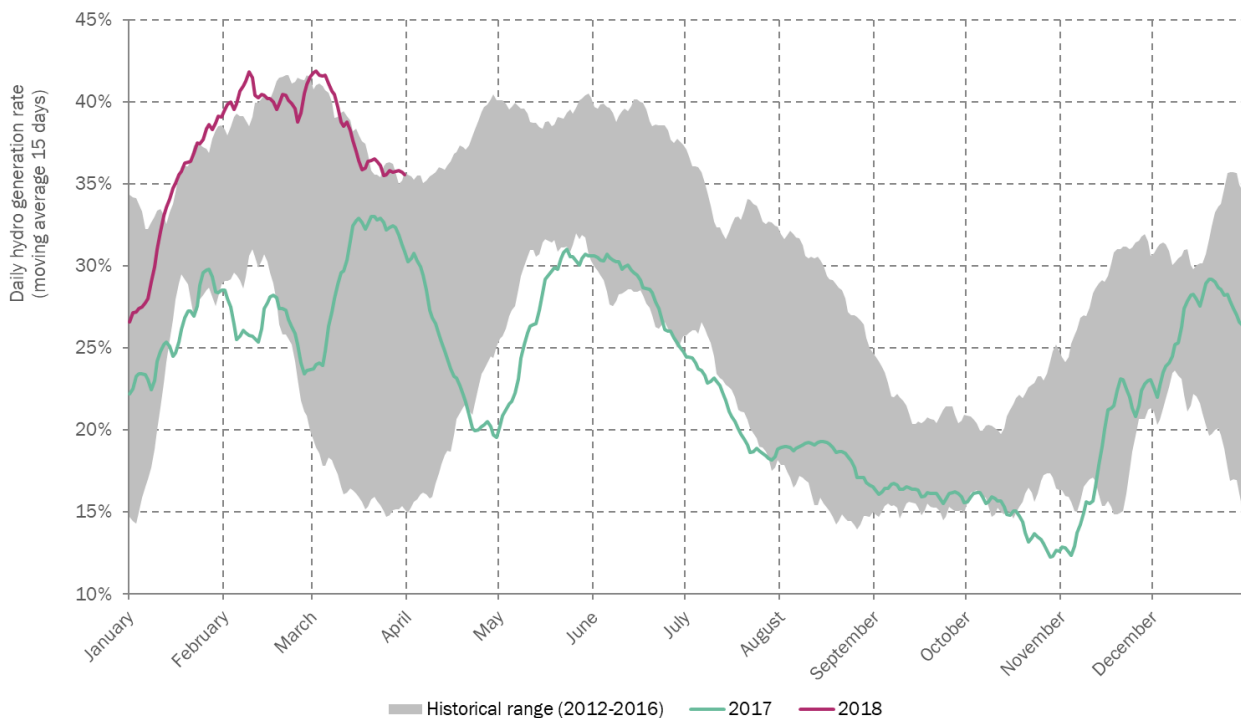
Source : RTE – Analysis : CRE

**Figure 17 : Average gas generation rate**



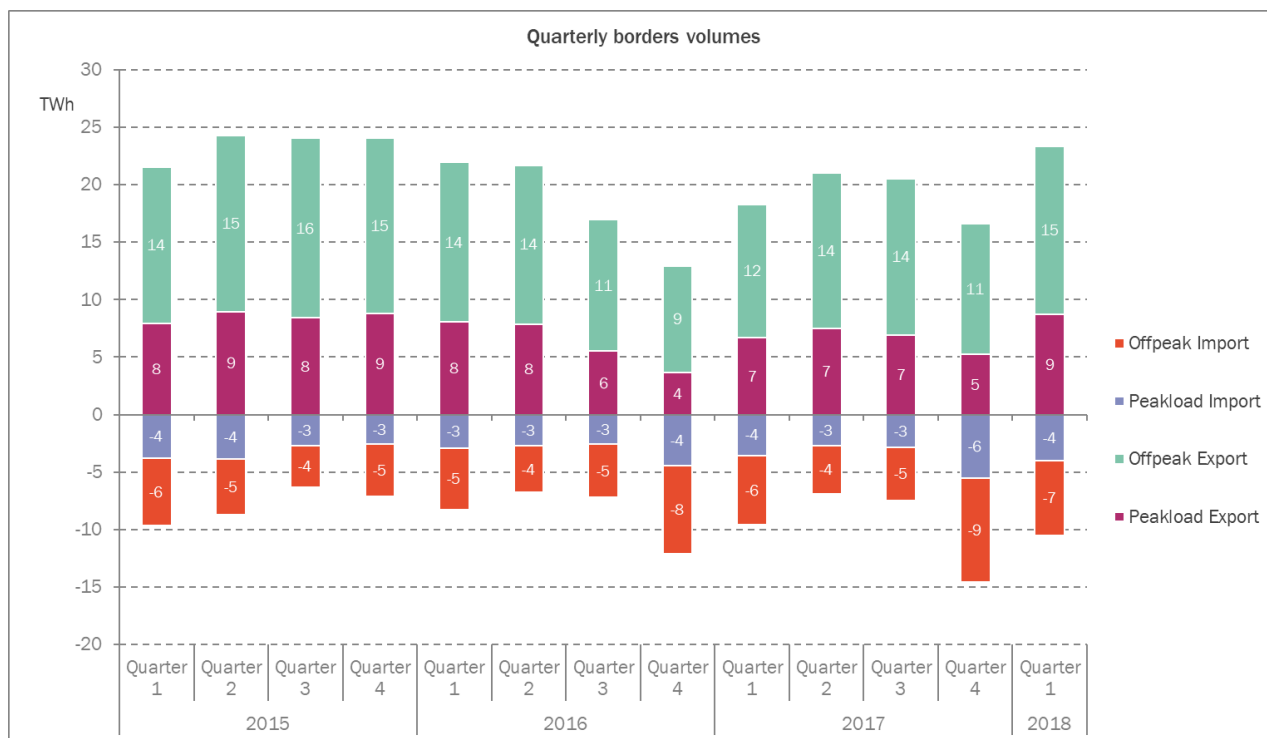
Source : RTE – Analysis : CRE

**Figure 18 : Hydraulic generation rate**



Source : RTE – Analysis : CRE

**Figure 19 : Imports and exports (peak/Off-peak)**

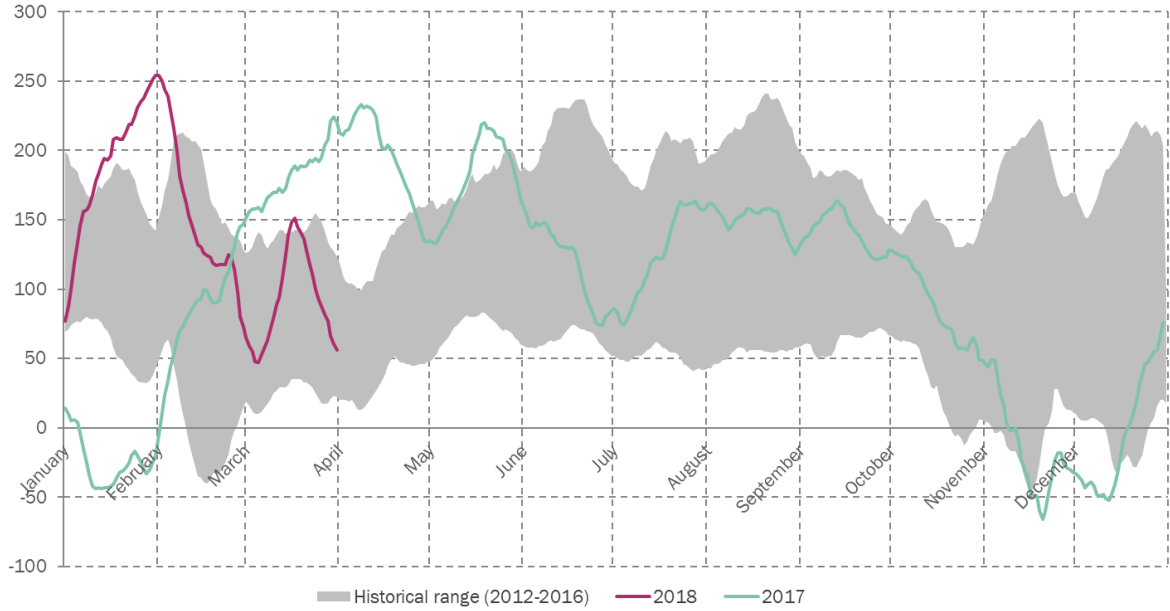


Source : RTE – Analysis : CRE



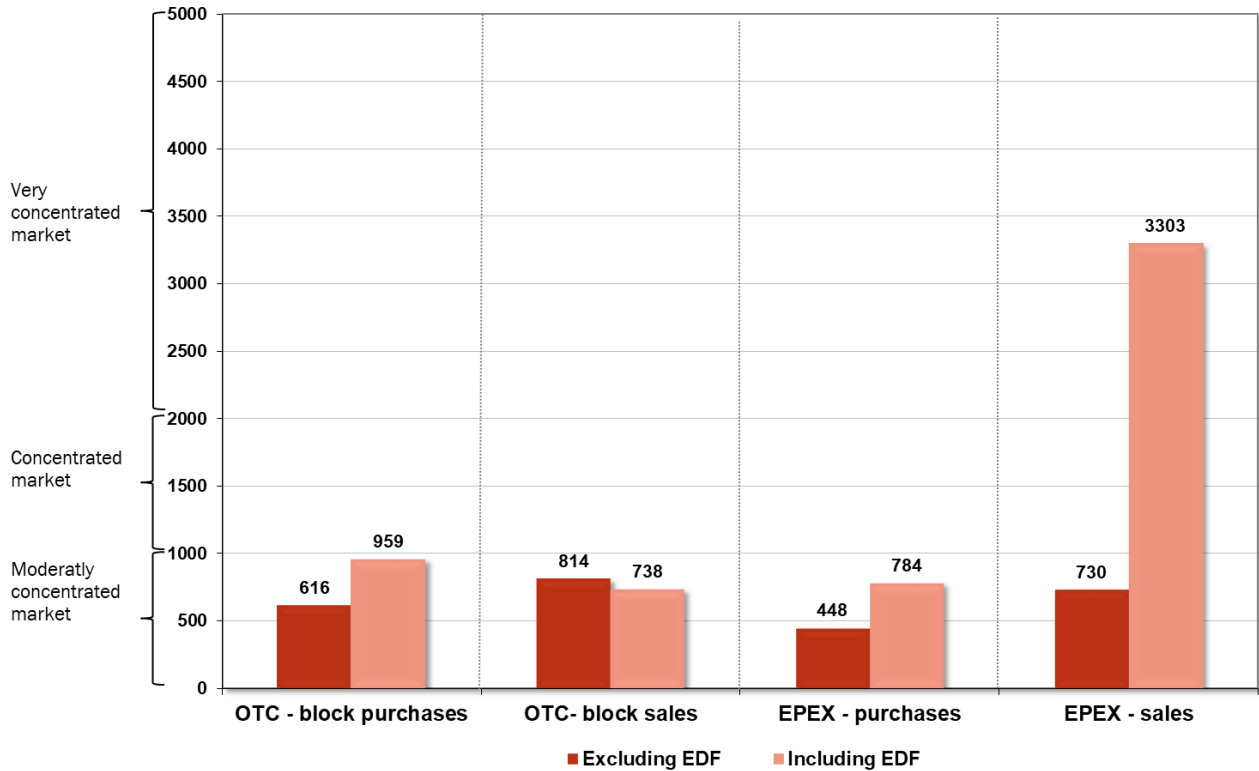
**Figure 20 : Export balance**

Daily net exports (GWh)  
moving average 15 days



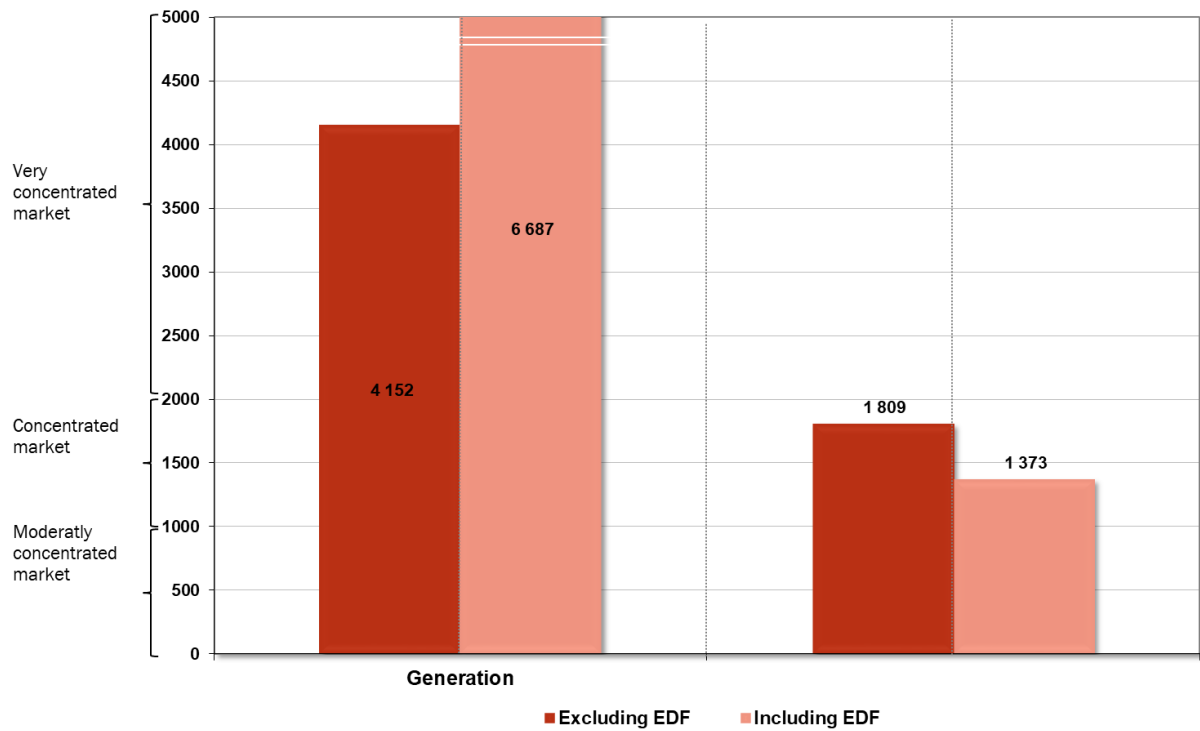
Source : RTE - Analysis : CRE

**Figure 21 : HHI concentration index - Energy wholesale market in Q1 2018**



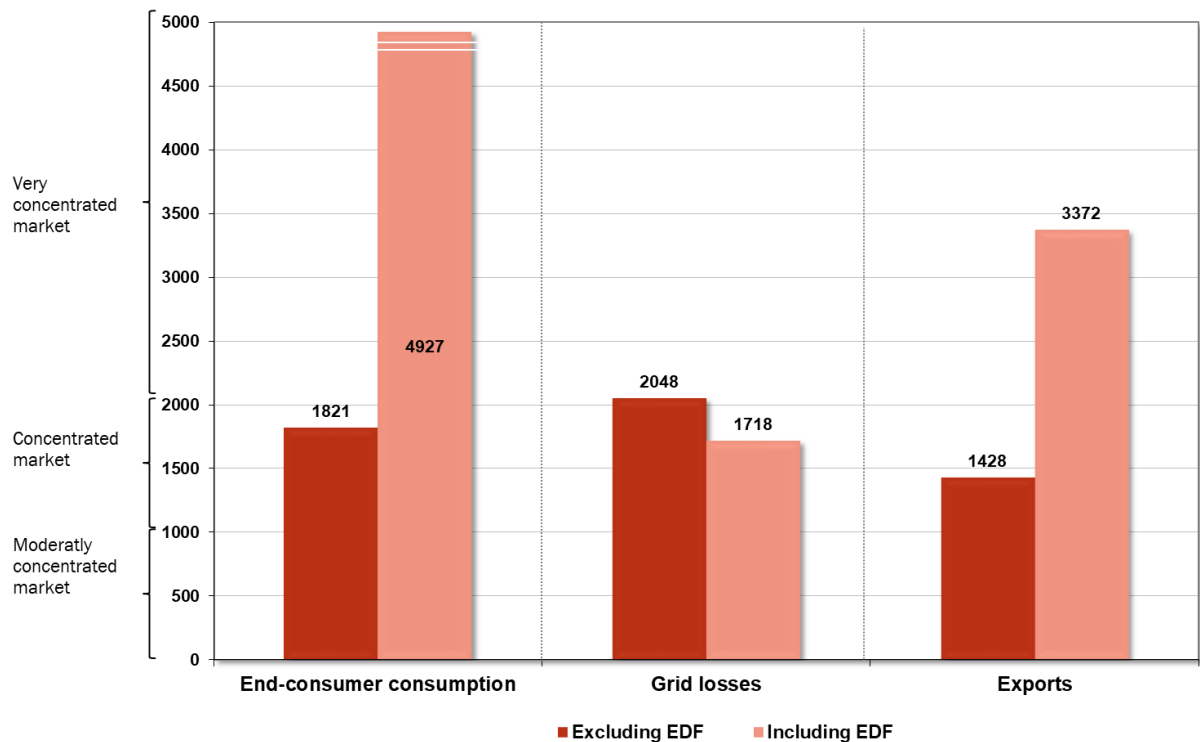
Source : EPEX SPOT, EEX Power Derivatives, Courtiers - Analysis : CRE

**Figure 22 : HHI concentration index – Injections in Q1 2018**



Source : RTE – Analysis : CRE

**Figure 23 : HHI concentration index – Withdrawals in Q1 2018**



## PART 2: WHOLESALE NATURAL GAS MARKET

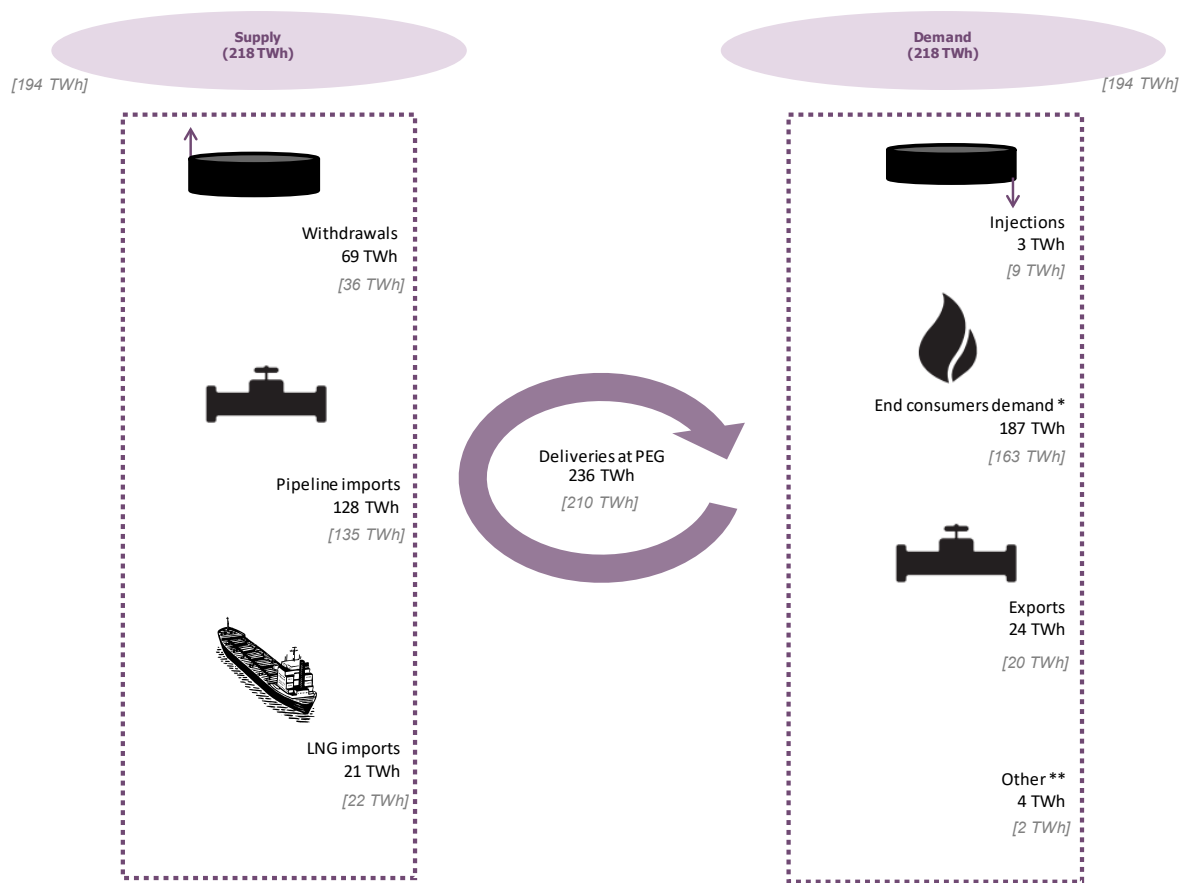
### 1. KEY DATES

2004	First publication of price references for the French gas markets
January 2005	Launch of the French Gas Release program on a volume of 16.3 TWh/yr during 3 years
April 2007	Launch of the platform Powernext Balancing GRTgaz designed as a market access for the TSO in order to cover its daily balancing needs
2008	Accessibility to the wholesale market for consumers directly connected to GRTgaz transmission system
November 2008	Launch of Powernext Gas Spot and Powernext Gas Futures
January 2009	Merger of the 3 balancing zones of GRTgaz in the North of France (Nord-H, East and West)
December 2009	GRTgaz starts covering part of its balancing needs on the Powernext Gas Spot platform (Powernext Balancing GRTgaz platform is abandoned)
November 2010	Commissioning of the Fos Cavaou LNG terminal at 100% of its capacity
December 2010	Commercialization of daily and monthly interconnection capacity between Zeebrugge and PEG Nord
January 2011	GRTgaz and Luxembourgish CREOS launch a market consultation for the development of firm interconnection capacity from France to Luxembourg
May 2011	Powernext launches a spread PEG Nord / PEG Sud contract on its platform Powernext Gas Spot
July 2011	GRTgaz and Powernext Gas Spot launch the first market coupling initiative in the European gas markets
December 2011	TIGF becomes a member of Powernext Gas Spot and starts covering a part of its daily balancing needs at PEG TIGF
February 2012	Elengy launches a reloading service at Montoir-de-Bretagne LNG terminal
February 2013	Powernext Gas Futures launches the TTF and spread PEG Nord/TTF contracts
April 2013	Launch of PRISMA, a joint capacity booking platform of major European Transmission System Operators Merger of the Nord-H and Nord-B balancing zones New capacities at the border between France and Spain. Total available capacities at Larrau interconnection passed from 70 to 165 GWh/d for entry and from 100 to 165 GWh/d for exit
May 2013	Powernext and EEX launch PEGAS, a natural gas trading cooperation allowing market participants to trade both exchanges' contracts on a common trading platform
June 2013	Launch of the auction Joint Transport Storage (JTS) mechanism for commercializing additional daily capacities at GRTgaz north-to-south link
October 2013	Powernext launches both a new Front Month contract at PEG Sud and its spread contract with PEG Nord's Front Month

March 2014	Decree N° 2014-328 modifying the rules for accessing French storages in order to improve the security of supply
July 2014	Powernext launches a 24/7 service on its spot platform
October 2014	Launch of an auction mechanism through the PRISMA platform for the capacity allocations at GRTgaz north/south link
April 2015	Creation of TRS (Trading Region South) resulting from the merging of PEG South and PEG TIGF
January 2017	Commissioning of the Dunkirk LNG terminal
July 2017	Decree of 31 July 2017 on the modalities for taking into account other modulation instruments for the application of the reporting and holding obligation and storage capacity of natural gas suppliers
November 2017	Early implementation of the locational spread mechanism (locational products involving the purchase or the sale of gas at a precise point of the network)
December 2017	The Taisnières H and Alveringhem network interconnection points (PIRs) became the Virtualys virtual interconnection point (PIV Virtualys): a single point for the transmission of gas between France and Belgium
February 2018	Launch of an auction mechanism for the allocation of storage capacities

**2. BALANCE OF THE WHOLESALE GAS MARKET**

**Figure 24: Quarterly supply and demand of natural gas in France**



\* Consumption includes clients at both regulated and market based prices

\*\* 'Others' includes TSOs and DSOs consumptions, metering errors and losses

Data [Q4 2017] and Q1 2018

Source: GRTgaz, Teréga



## 3. KEY DATA

Table 8: Fundamentals

Market fundamentals	Quarterly values					Quarterly variation		Yearly variation	
	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q1 2018 / Q4 2017		Q1 2018 / Q1 2017	
						In percentage	In value	In percentage	In value
<b>Entry and exit flows</b>									
Supply (TWh)	216	154	142	194	218	12%	24	0	2
Storages withdrawals	64	6	4	36	69	88%	32	7%	5
Imports	152	148	138	157	149	-5%	-8	-2%	-3
Pipeline	129	117	111	135	128	-6%	-8	-1%	-2
LNG	22	31	27	22	21	-3%	-1	-5%	-1
Demand (TWh)	216	154	142	194	218	12%	24	1%	2
Storages injections	8	37	46	9	3		-6	-63%	-5
End consumer demand	185	80	62	163	187	15%	24	1%	2
Distribution consumers	128	43	24	102	135	32%	33	5%	6
Consumers connected to the transmission system	57	37	38	61	53	-14%	-9	-8%	-4
Exports	22	35	33	20	24	18%	4	8%	2
Other	1	2	2	2	4	93%	2	261%	3
Deliveries at PEG (TWh)	222	186	195	210	236	12%	26	6%	14
PEG Nord	179	152	160	179	198	11%	19	11%	19
TRS	44	34	35	32	38	22%	7	-12%	-5
<b>Infrastructure figures</b>									
North-to-South link	87%	89%	92%	97%	78%		-20%		-9%
Availability of the North-to-South link	84%	79%	81%	94%	92%		-2%		8%
Utilization of Virtualys (Entry)	61%	60%	57%	59%	45%		-14%		-17%
Utilization of Obergaibach interconnection (Entry)	46%	41%	64%	53%	56%		4%		11%
Stock levels (TWh as at the end of the Quarter)	27	59	98	69	4	-94%	-65	-85%	-23
Avg. Net variation of French stocks (GWh/j)	-626	348	447	-303	-732	141%	-429	17%	-106
Avg. LNG terminals emissions (GWh/j)	249	338	293	240	238	-1%	-3	-5%	-11
Avg. Exports from France to Spain (GWh/j)	106	123	135	118	125	6%	7	18%	19

\* Utilization of Taisnières H interconnection before 1<sup>st</sup> December 2017

Source: GRTgaz, Teréga – Analysis: CRE

Table 9: Prices

Prices	Quarterly values					Quarterly variation		Yearly variation	
	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q1 2018 / Q4 2017		Q1 2018 / Q1 2017	
						In percentage	In value	In percentage	In value
<b>Spot prices (€/MWh)</b>									
PEG Nord day-ahead (avg.)	18,9	15,6	16,0	19,6	21,2	8%	1,6	12%	2,3
TRS day-ahead (avg.)	23,5	15,9	16,2	22,2	21,2	-4%	-0,9	-10%	-2,3
Day-ahead PEG Nord/Sud spread (avg.)	4,6	0,3	0,3	2,6	0,0	-98%	-2,6	-99%	-4,6
Day-ahead PEG Nord/TTF Spread (avg.)	0,5	0,0	-0,1	0,4	-0,3	-169%	-0,7	-157%	-0,8
<b>Forward prices (€/MWh)</b>									
PEG Nord M+1 (avg.)	18,6	15,3	15,9	19,9	19,0	-5%	-0,9	2%	0,3
PEG Nord Y+1 (avg.)	17,7	16,6	16,6	18,2	17,4	-5%	-0,8	-2%	-0,3
M+1 PEG Nord/Sud spread (avg.)	3,0	0,8	0,8	4,0	0,6	-85%	-3,5	-80%	-2,4
M+1 PEG Nord/TTF spread (avg.)	0,3	0,2	0,2	0,3	0,3	-4%	0,0	-14%	0,0
Summer-ahead/Winter-ahead spread * (avg.)	1,2	1,8	1,4	1,5	1,3	-13%	-0,2	11%	0,1

\* During the winter season, this indicator corresponds to the spread between winter-ahead and summer-ahead prices. During the summer season, it corresponds to the spread between winter-ahead and Balance of summer prices (calculated from contracts delivering during the rest of the summer)

Source: Powernext, ICIS Heren – Analysis: CRE

**Table 10: Trading Activity**

Trading activity	Quarterly values					Quarterly variation		Yearly variation	
	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q1 2018 / Q4 2017	In value	Q1 2018 / Q1 2017	In value
<b>Activity in the French wholesale gas markets</b>									
Natural gas exchanged at PEG* (TWh)	186	129	144	150	175	17%	25	-6%	-11
% of national consumption	101%	162%	232%	92%	93%				
<b>Trading volumes in the French intermediated markets</b>									
<b>Spot market (TWh)</b>	<b>52</b>	<b>44</b>	<b>39</b>	<b>50</b>	<b>60</b>	<b>21%</b>	<b>10</b>	<b>15%</b>	<b>8</b>
Intraday	8	5	6	9	10	11%	0,9	28%	2,1
Day Ahead	30	25	23	28	31	13%	3,6	5%	1,6
Exchange (DA, WD, WE, other spot)	44	38	33	45	53	18%	7,9	19%	8,6
Brokers (DA, WD, WE, other spot)	8	6	6	5	7	47%	2,3	-9%	-0,7
<b>Forwards market (TWh)</b>	<b>108</b>	<b>126</b>	<b>100</b>	<b>68</b>	<b>186</b>	<b>172%</b>	<b>117</b>	<b>71%</b>	<b>77</b>
M+1	32	32	31	21	24	18%	3,6	-24%	-7,8
Q+1	4	24	4	15	2	-86%	-12,7	-54%	-2,4
S+1	33	20	12	14	75	442%	60,9	126%	41,6
Y+1	3	10	9	4	10	171%	6,1	209%	6,5
Exchange (all maturities)	8	6	8	3	4	35%	1,1	-46%	-3,7
Brokers (all maturities)	100	120	92	65	181	179%	116,2	81%	80,9
<b>Number of transactions in the French intermediated markets</b>									
<b>Spot market</b>	<b>41241</b>	<b>35318</b>	<b>29541</b>	<b>41303</b>	<b>45148</b>	<b>9%</b>	<b>3845</b>	<b>9%</b>	<b>3907</b>
Intraday	8 212	6 273	6 864	8 618	9 319	8%	701	13%	1107
Day Ahead	26 841	23 237	18 628	26 877	28 584	6%	1707	6%	1743
Exchange (DA, WD, WE, other spot)	38 634	33 283	27 486	39 574	43 577	10%	4003	13%	4943
Brokers (DA, WD, WE, other spot)	2 607	2 035	2 055	1 729	1 571	-9%	-158	-40%	-1036
<b>Forwards market</b>	<b>1791</b>	<b>1647</b>	<b>1478</b>	<b>1040</b>	<b>1648</b>	<b>58%</b>	<b>608</b>	<b>-8%</b>	<b>-143</b>
M+1	1 089	924	960	605	811	34%	206	-26%	-278
Q+1	79	240	63	191	24	-87%	-167	-70%	-55
S+1	203	91	73	52	300	477%	248	48%	97
Y+1	19	50	44	15	39	160%	24	105%	20
Exchange (all forwards)	336	311	303	147	176	20%	29	-48%	-160
Brokers (all forwards)	1 455	1 336	1 175	893	1 472	65%	579	1%	17
<b>Concentration of the natural gas market in France</b>									
Number of shippers active in the market	101	95	98	107	103	-4%	-4	2%	2
Active in Powernext Gas Spot	59	53	56	56	58	4%	2	-2%	-1
Active in Powernext Gas Futures	37	36	31	28	31	11%	3	-16%	-6

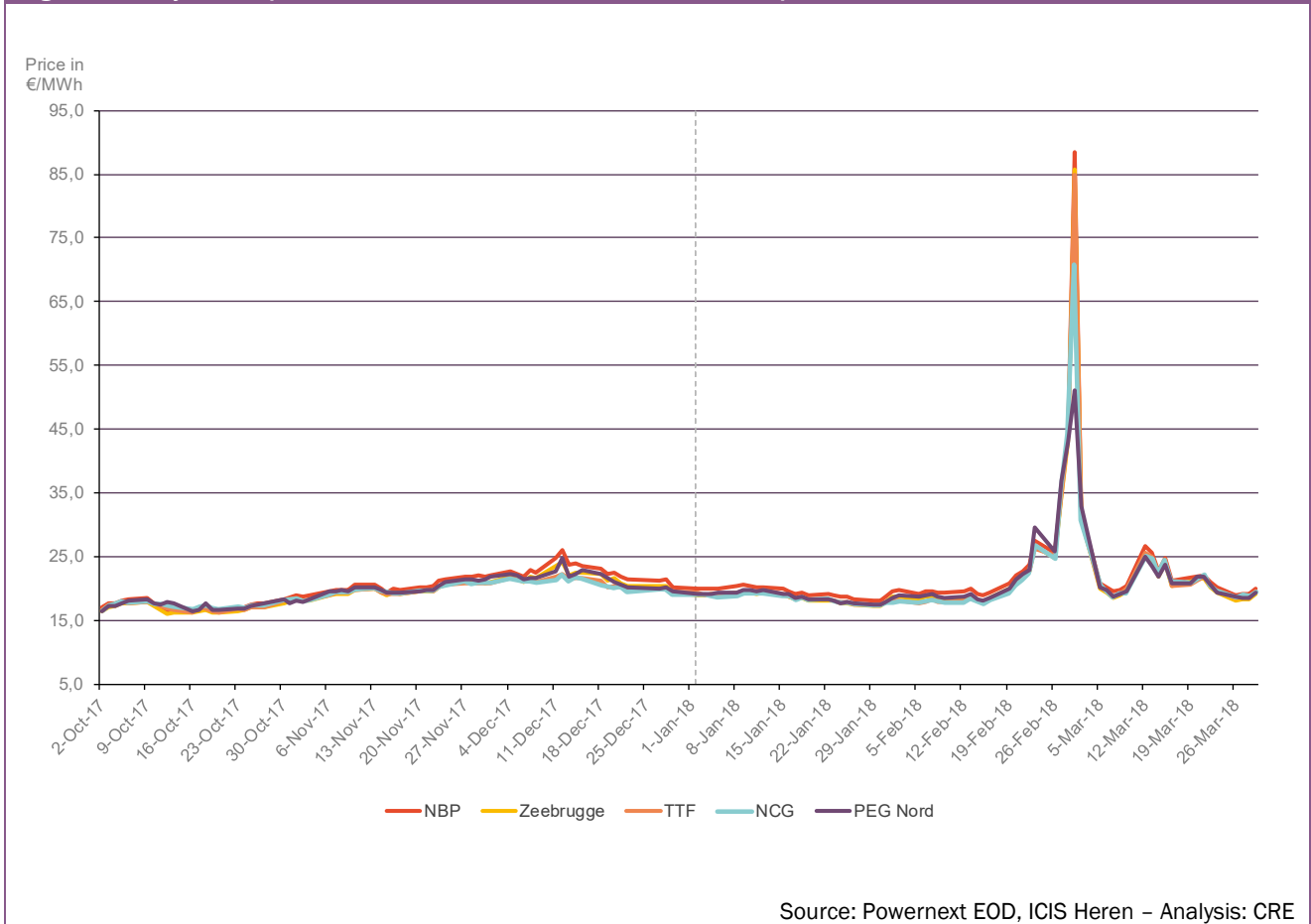
\* Deliveries resulting from exchanges in the intermediated markets in France

Source: GRTgaz, Teréga, Powernext, Brokers – Analysis: CRE

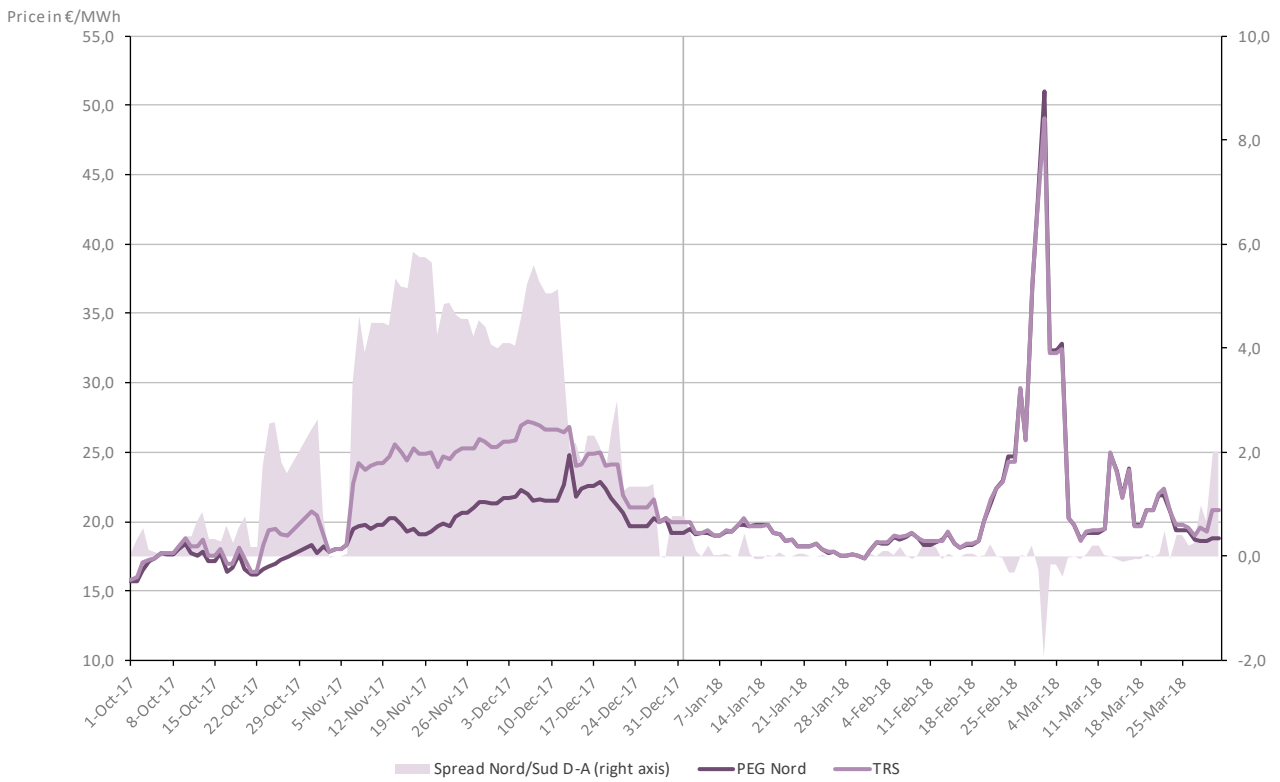
### 4. FIGURES

#### 4.1 Evolution of natural gas prices in France and Europe

Figure 25: Day-ahead prices in the main wholesale markets in Europe

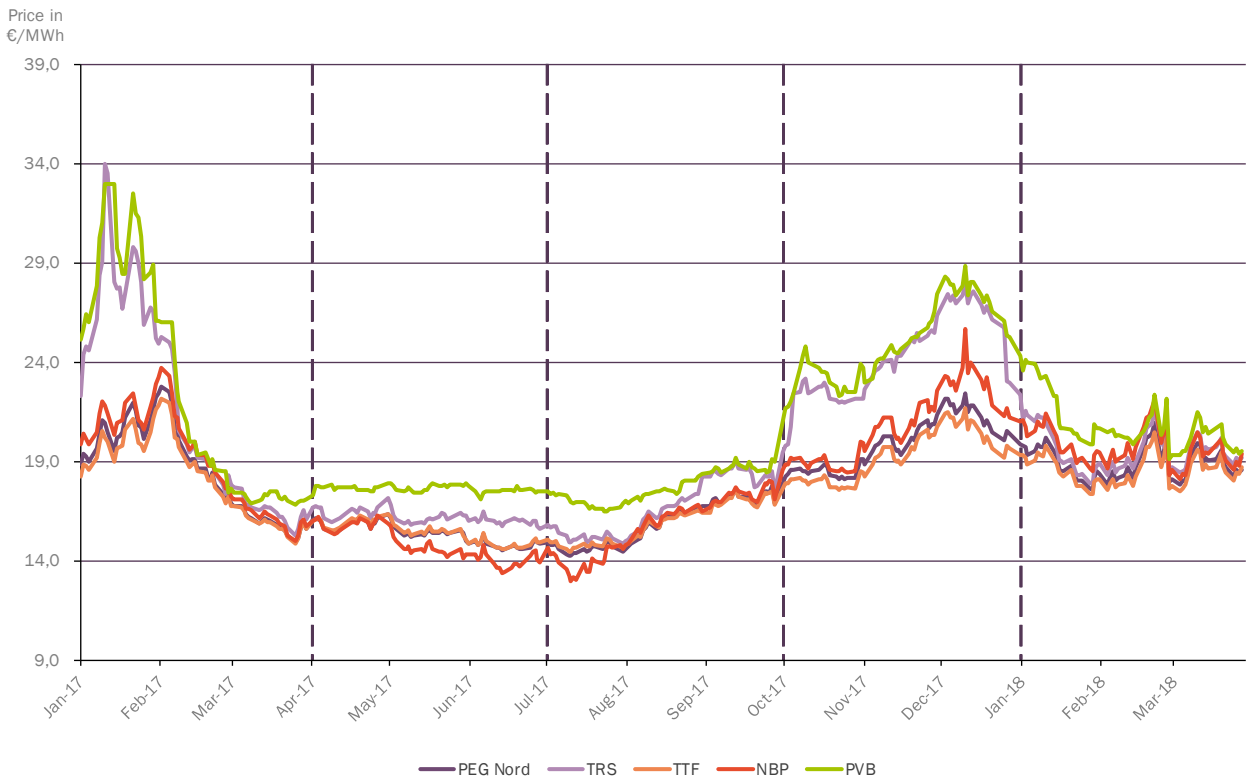


**Figure 26: Day-ahead prices in the wholesale market in France**



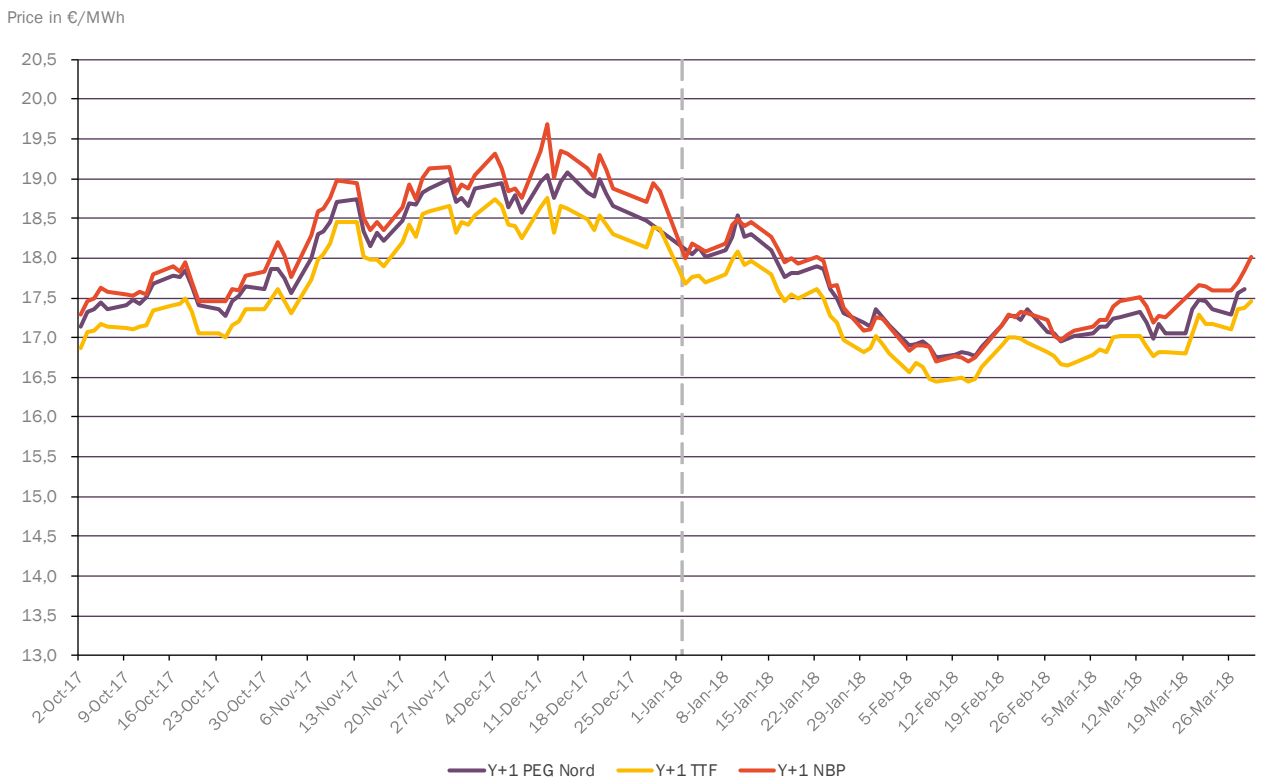
Source: Powernext EOD, ICIS Heren for TRS – Analysis: CRE

**Figure 27: Month-ahead prices in the main wholesale markets in Europe**



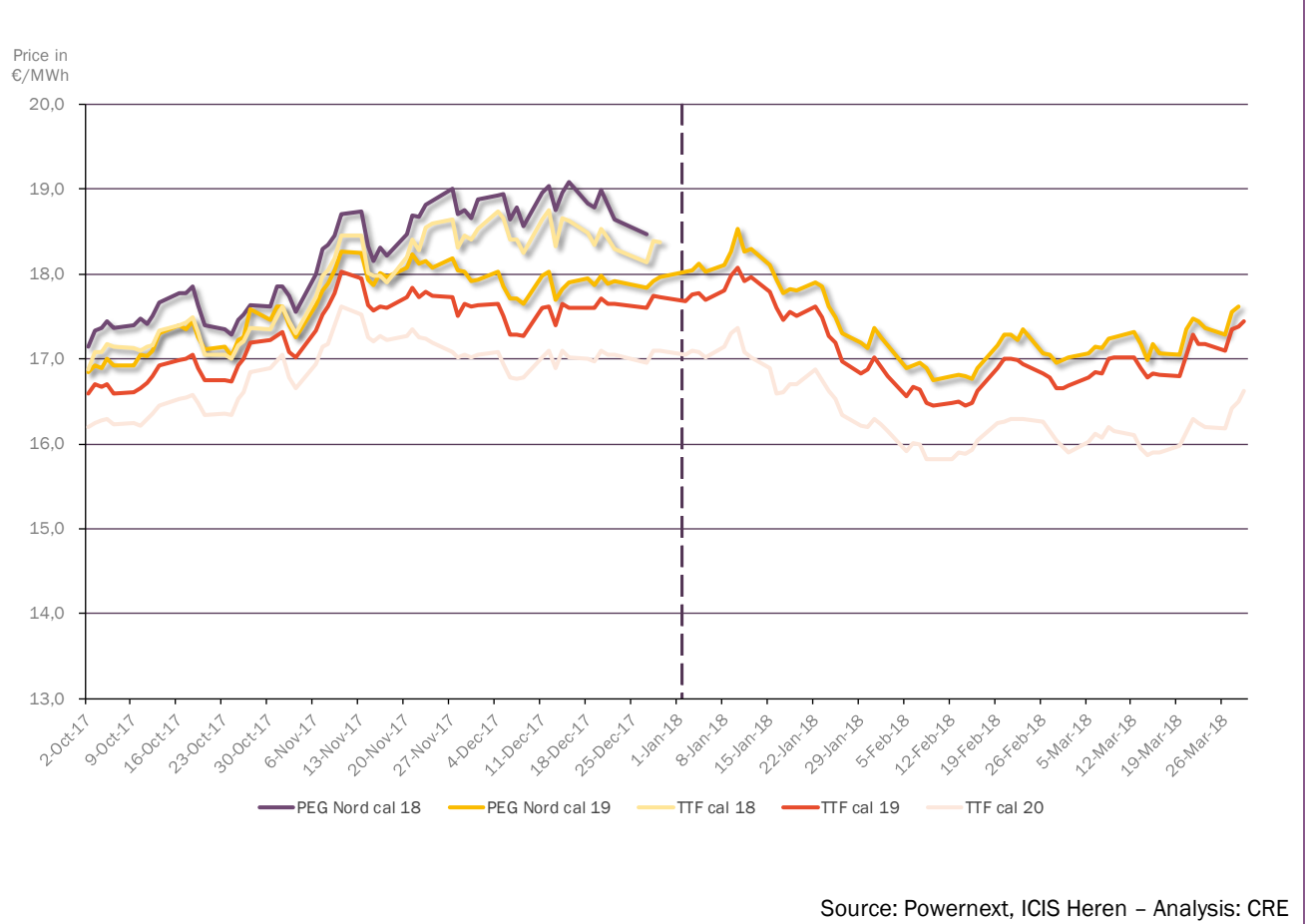
Source: Powernext, ICIS Heren – Analysis: CRE

**Figure 28: Year-ahead prices in the main wholesale markets in Europe**



Source: Powernext, ICIS Heren – Analysis: CRE

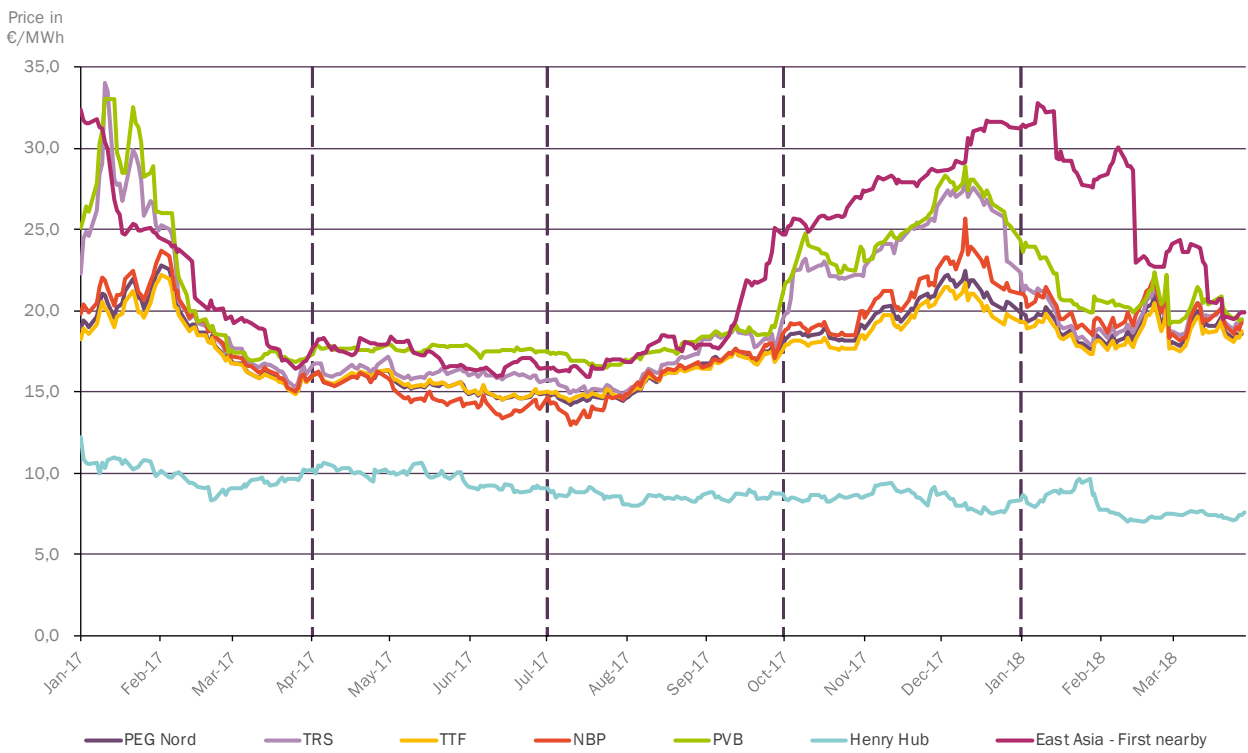
**Figure 29: Price of calendar-year contracts for PEG Nord and TTF**



Source: Powernext, ICIS Heren – Analysis: CRE

**4.2 Global markets**

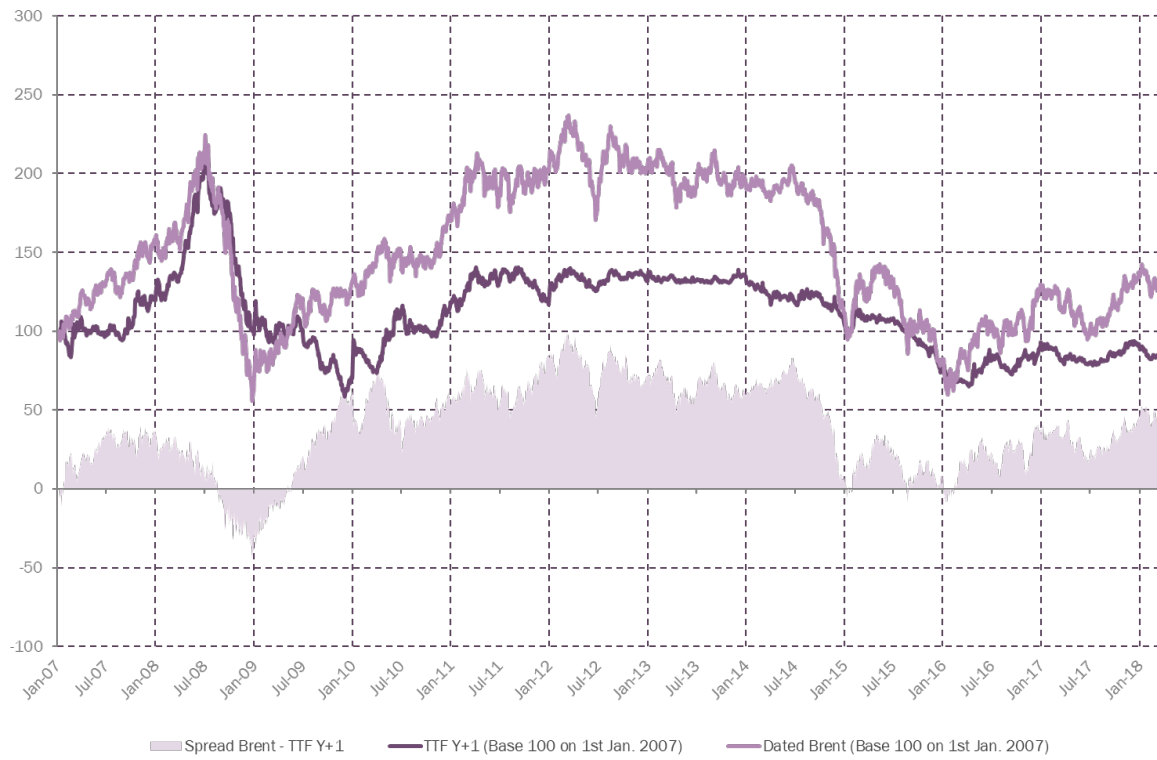
**Figure 30: International month-ahead natural gas prices**



Source: Powernext, ICIS Heren – Analysis: CRE



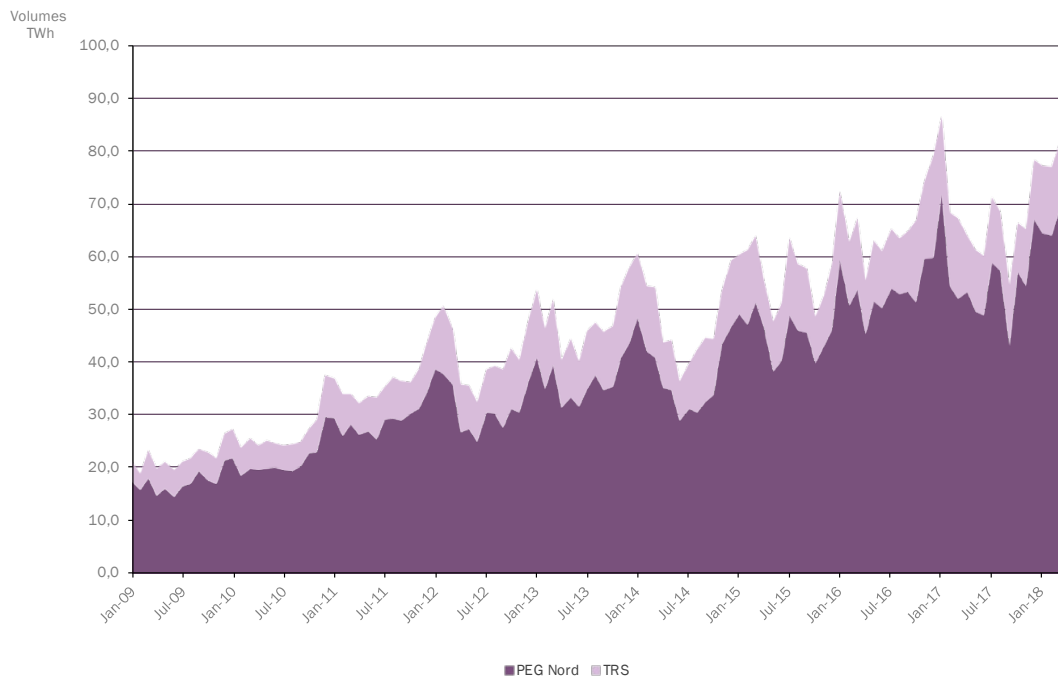
**Figure 31: Comparison between natural gas and oil prices**



Source: Powernext, ICIS Heren – Analysis: CRE

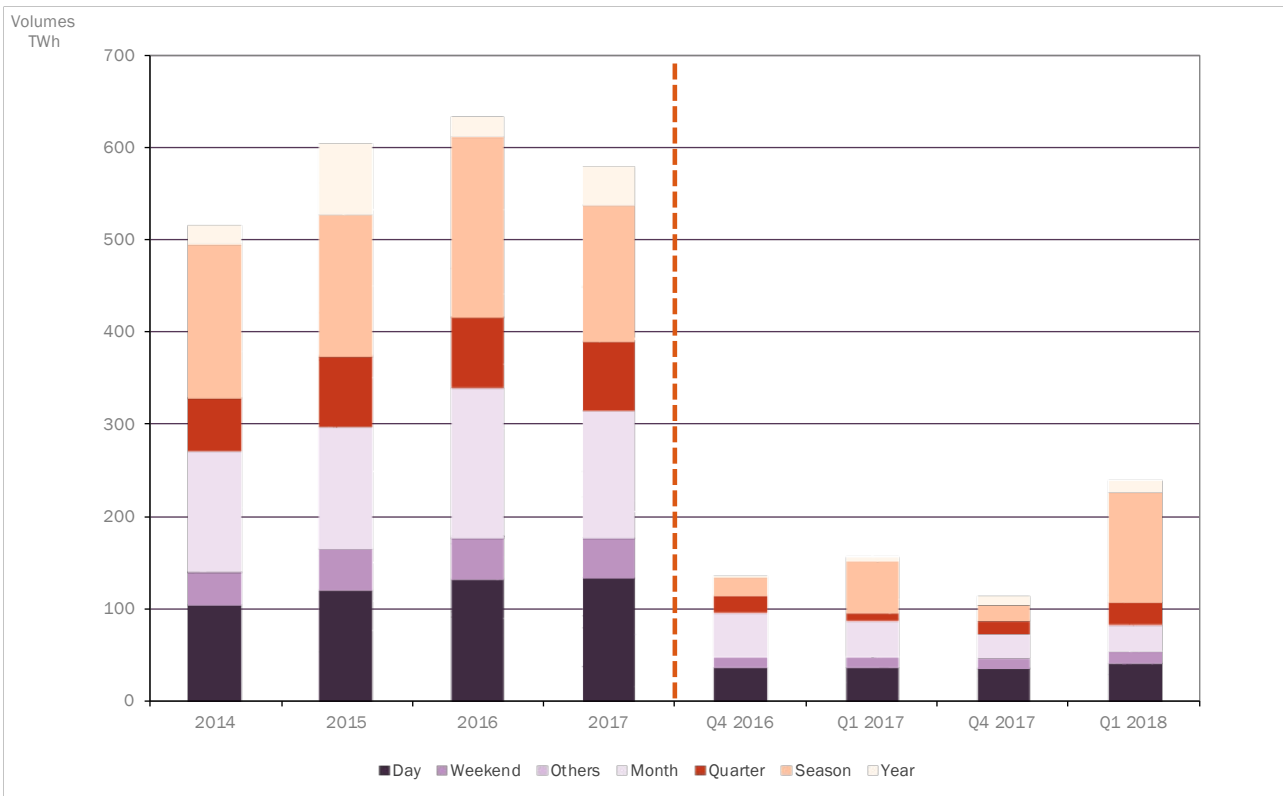
### 4.3 Development of the French natural gas markets

Figure 32: Deliveries at PEGs



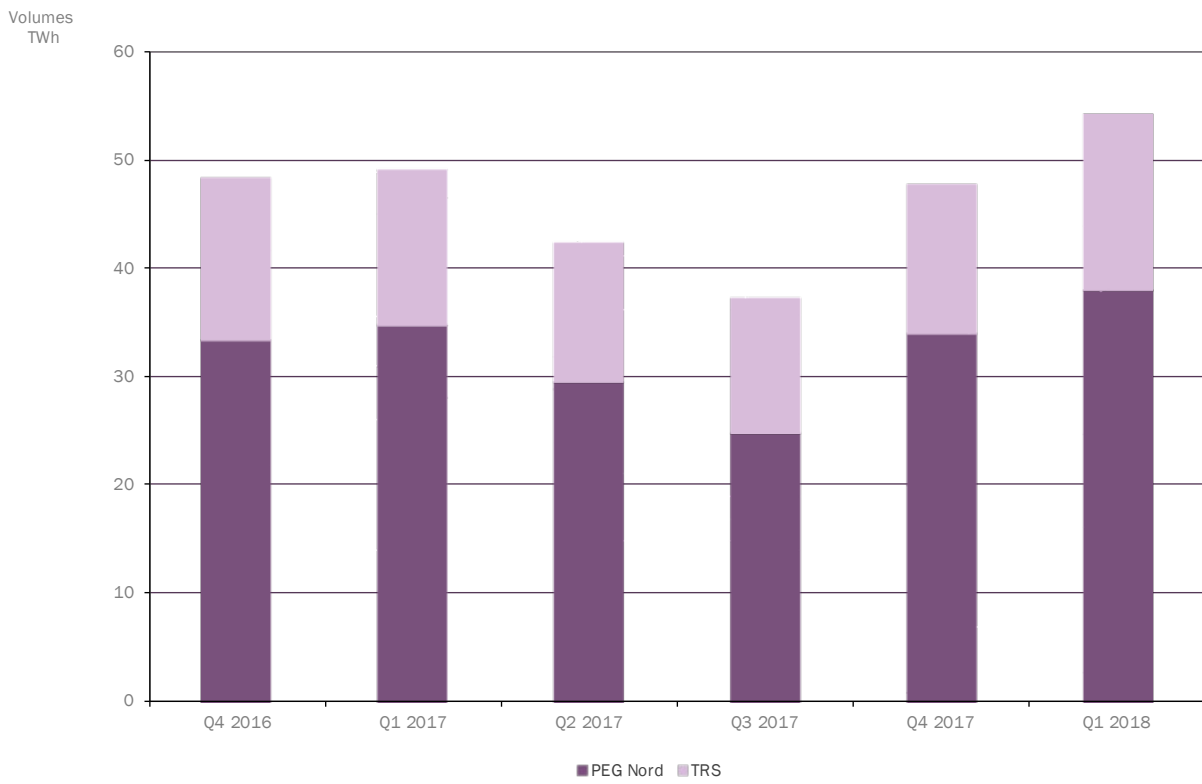
Source: GRTgaz, Teréga – Analysis: CRE

**Figure 33: Trading volumes in the intermediated markets by contract**



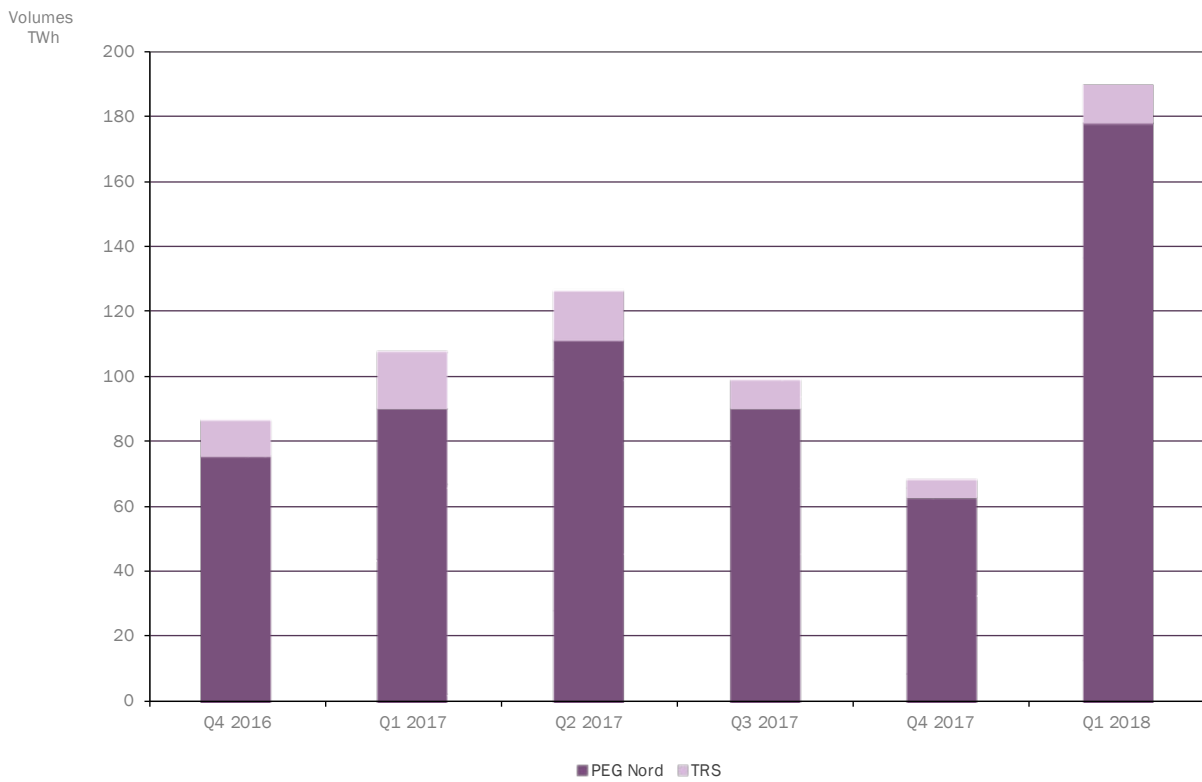
Source: Powernext, Brokers – Analysis: CRE

**Figure 34: Trading volumes in the spot markets by zone**



Source: Powernext, Brokers – Analysis: CRE

**Figure 35: Trading volumes in the forward markets by zone**

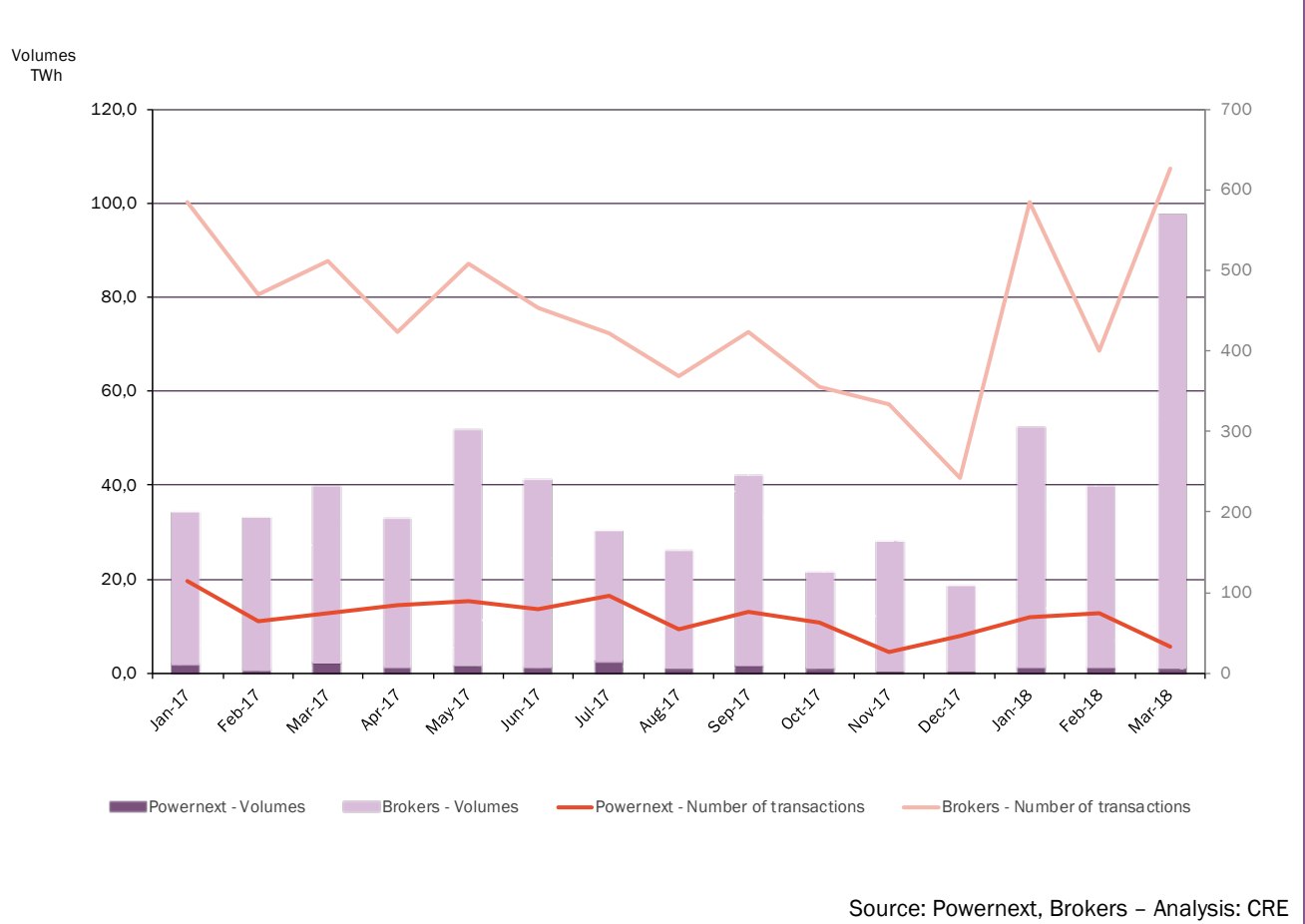


Source: Powernext, Brokers – Analysis: CRE

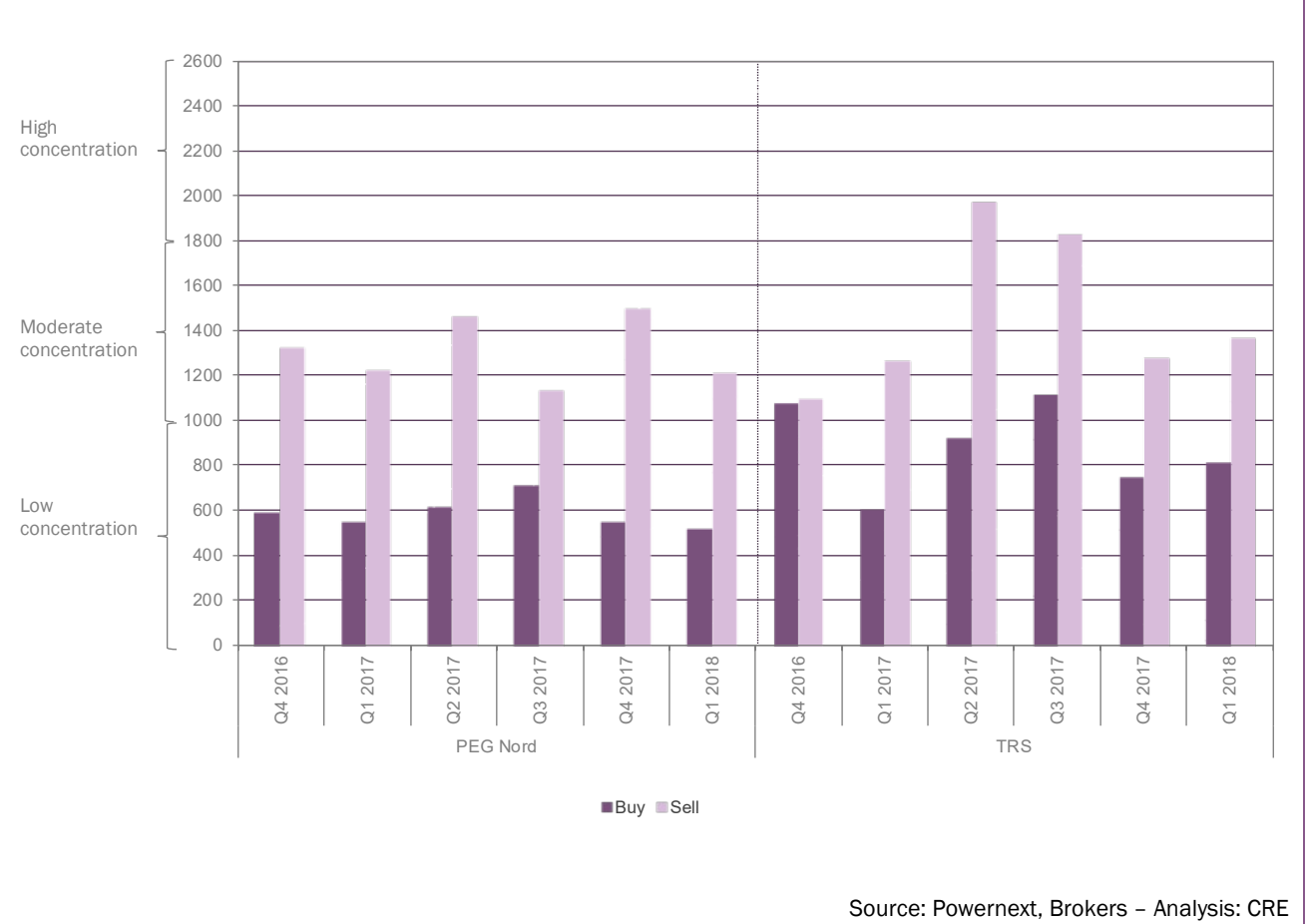
**Figure 36: Trading volumes in the spot markets by type of intermediation**



**Figure 37: Trading volumes in the forward markets by type of intermediation**



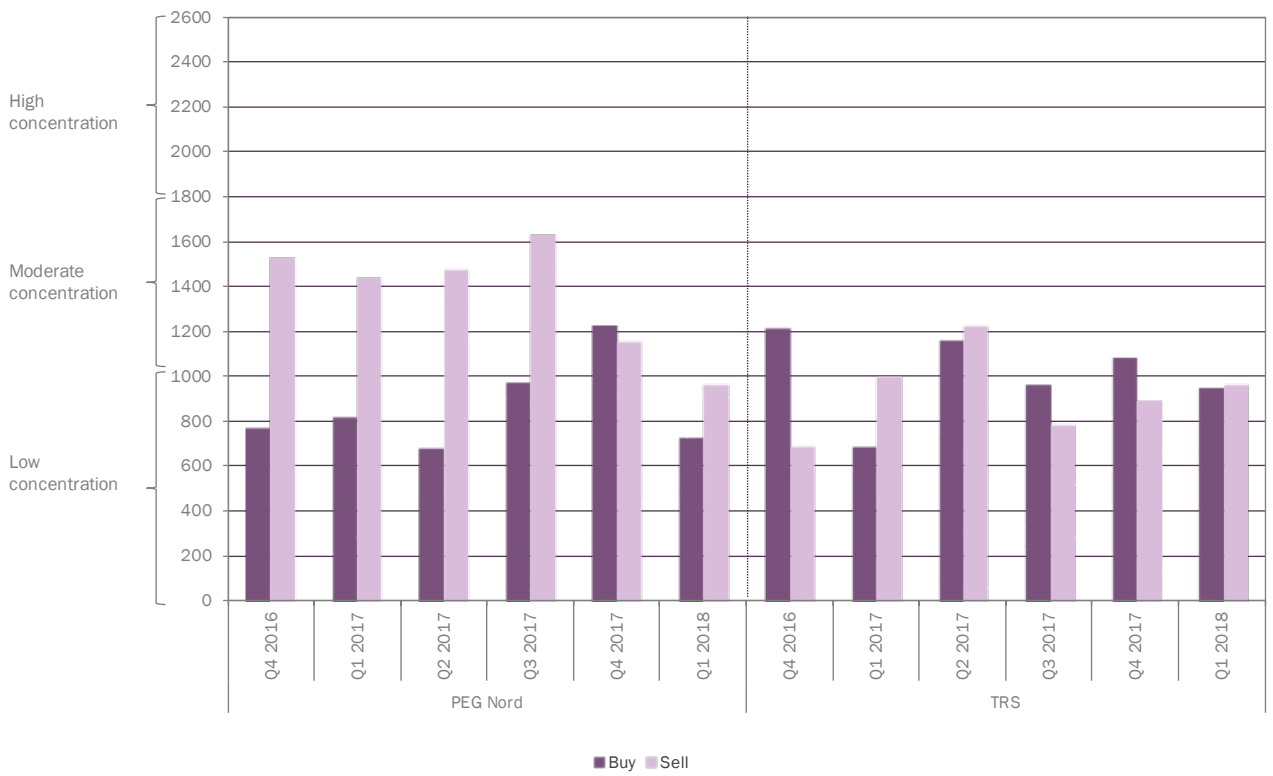
**Figure 38: Concentration indexes in France on the spot market, by zone**



Source: Pownertex, Brokers – Analysis: CRE



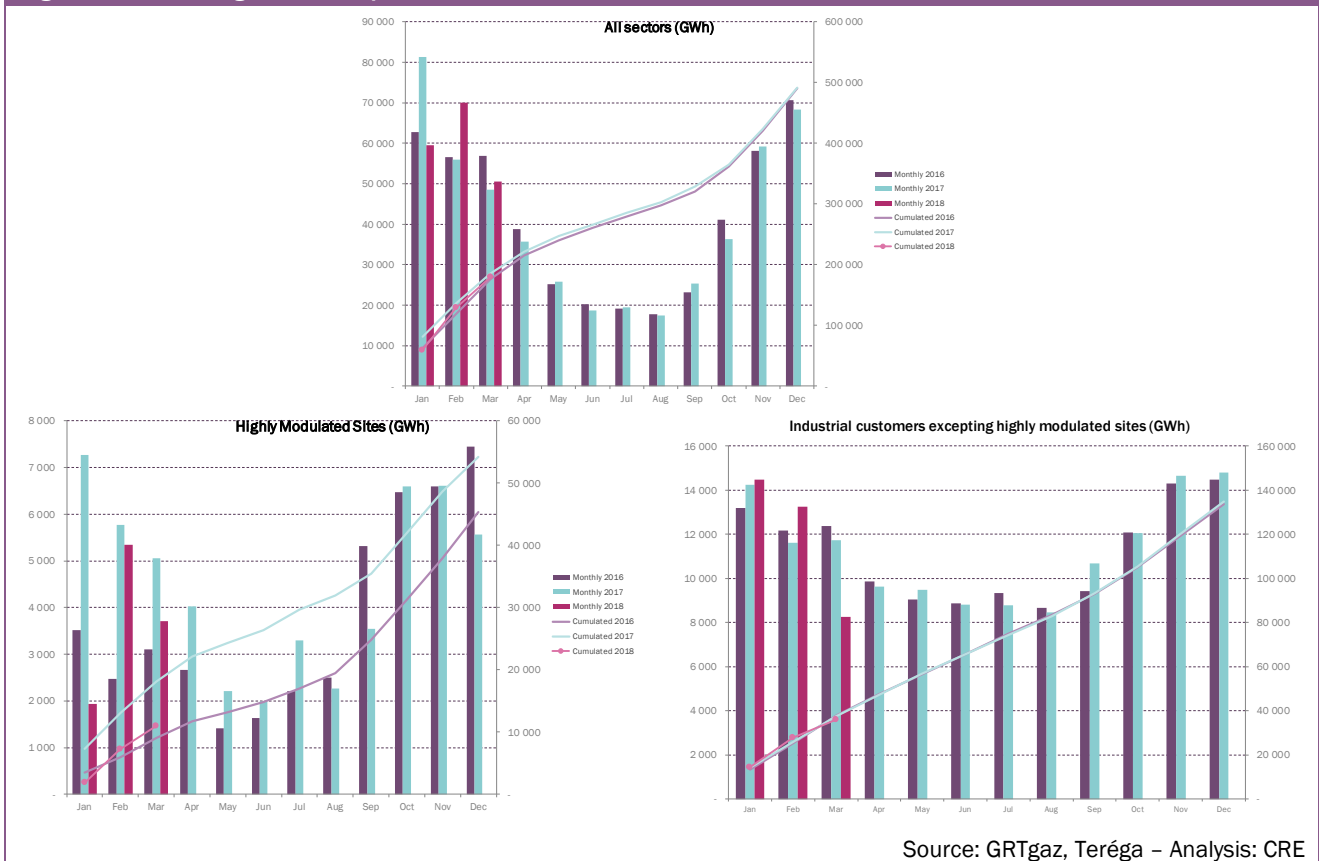
**Figure 39: Concentration indexes in France, by zone**



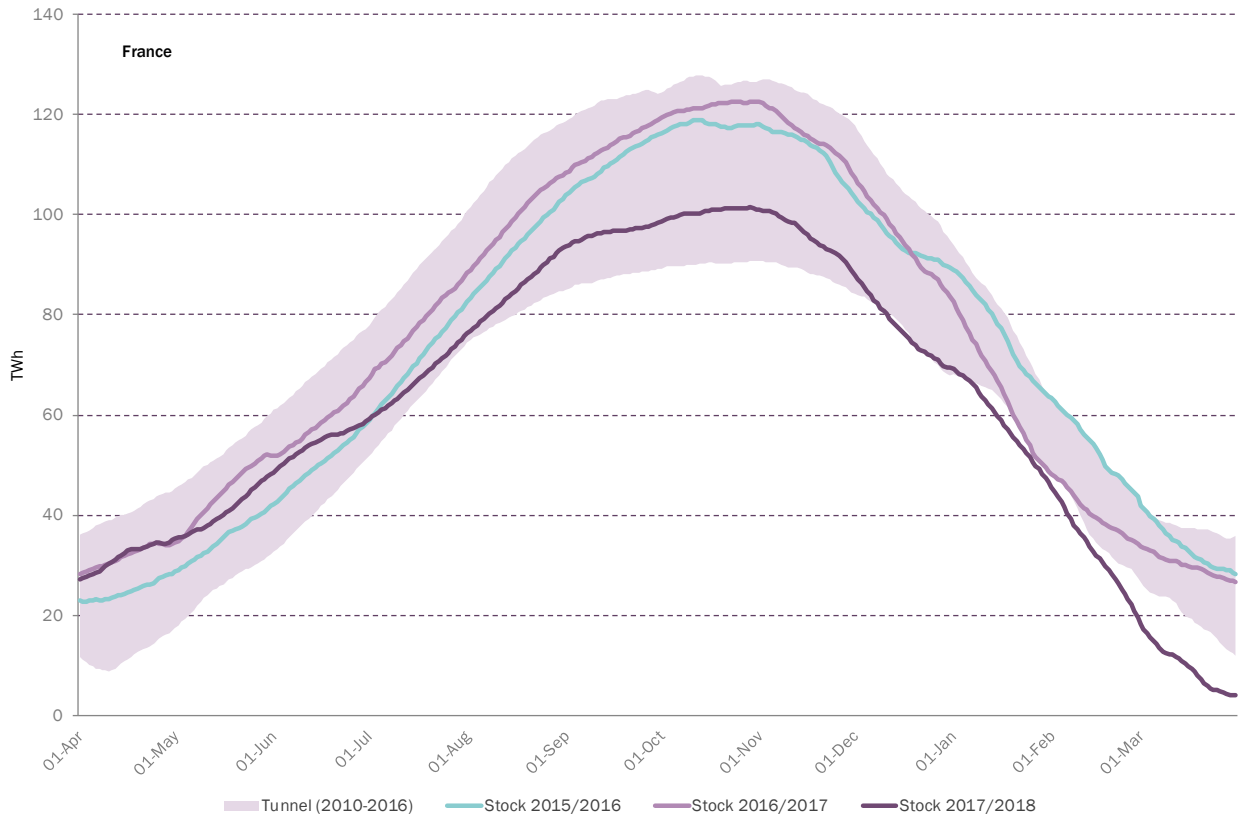
Source: Powernext, Brokers – Analysis: CRE

**4.4 Market fundamentals**

**Figure 40: Natural gas consumption in France**

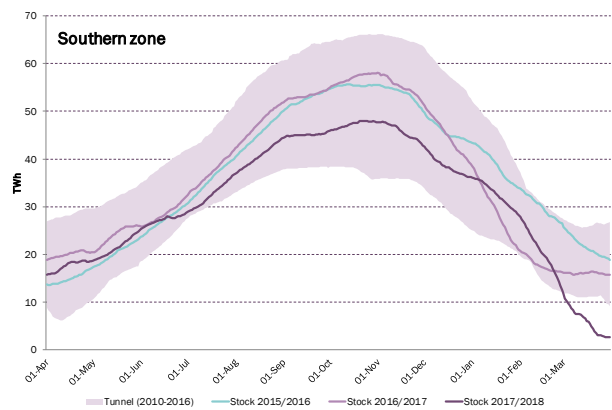
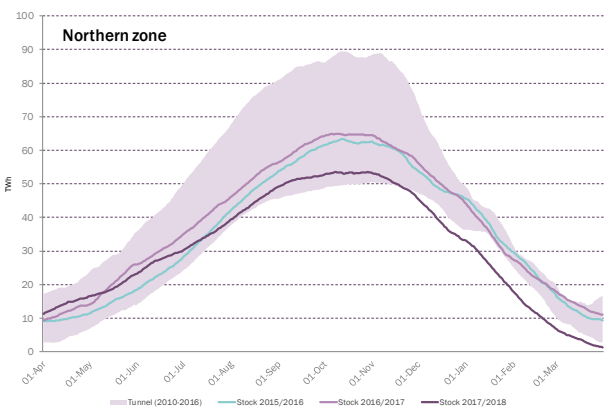


**Figure 41: French stocks**



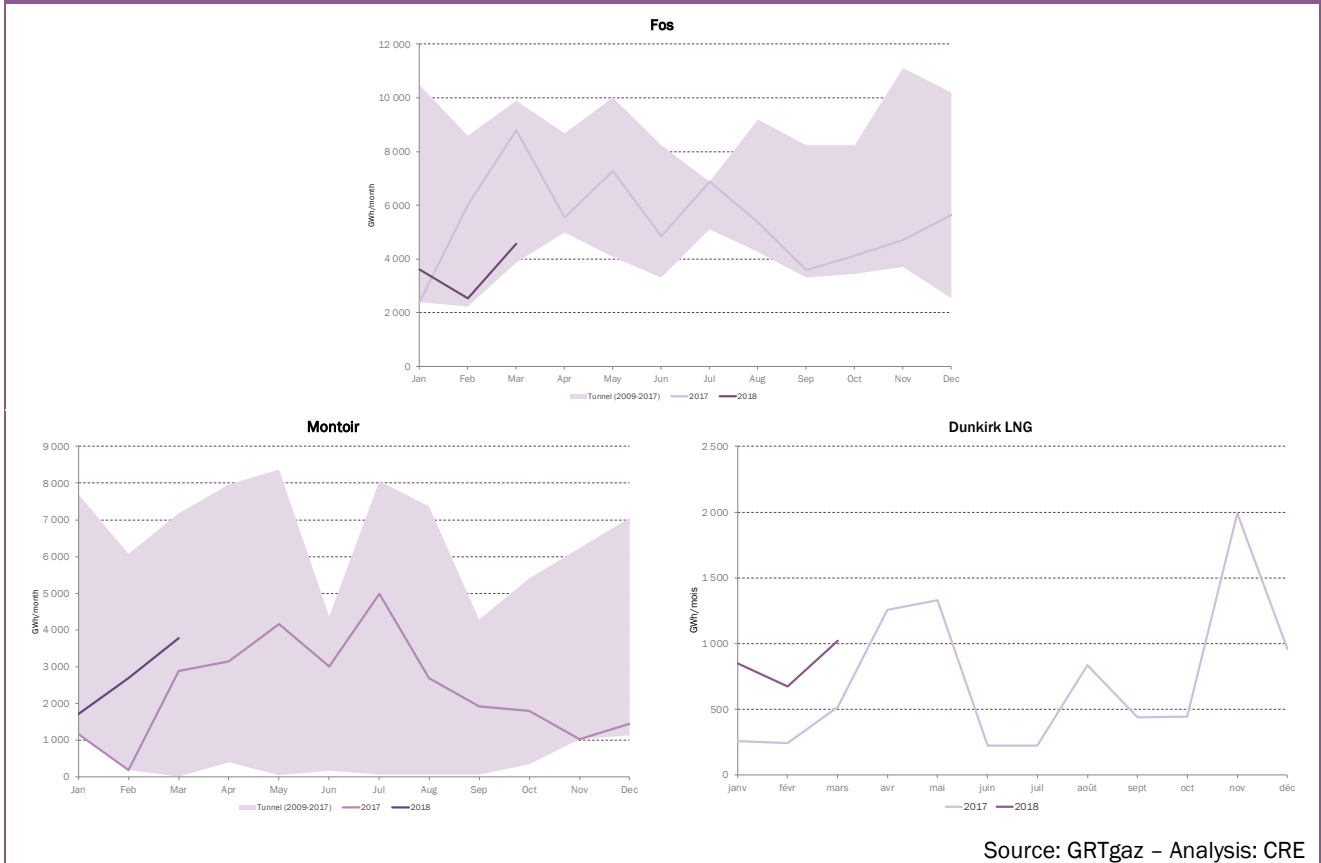
Source: Storengy, Teréga – Analysis: CRE

**Figure 42: French stocks by zone**



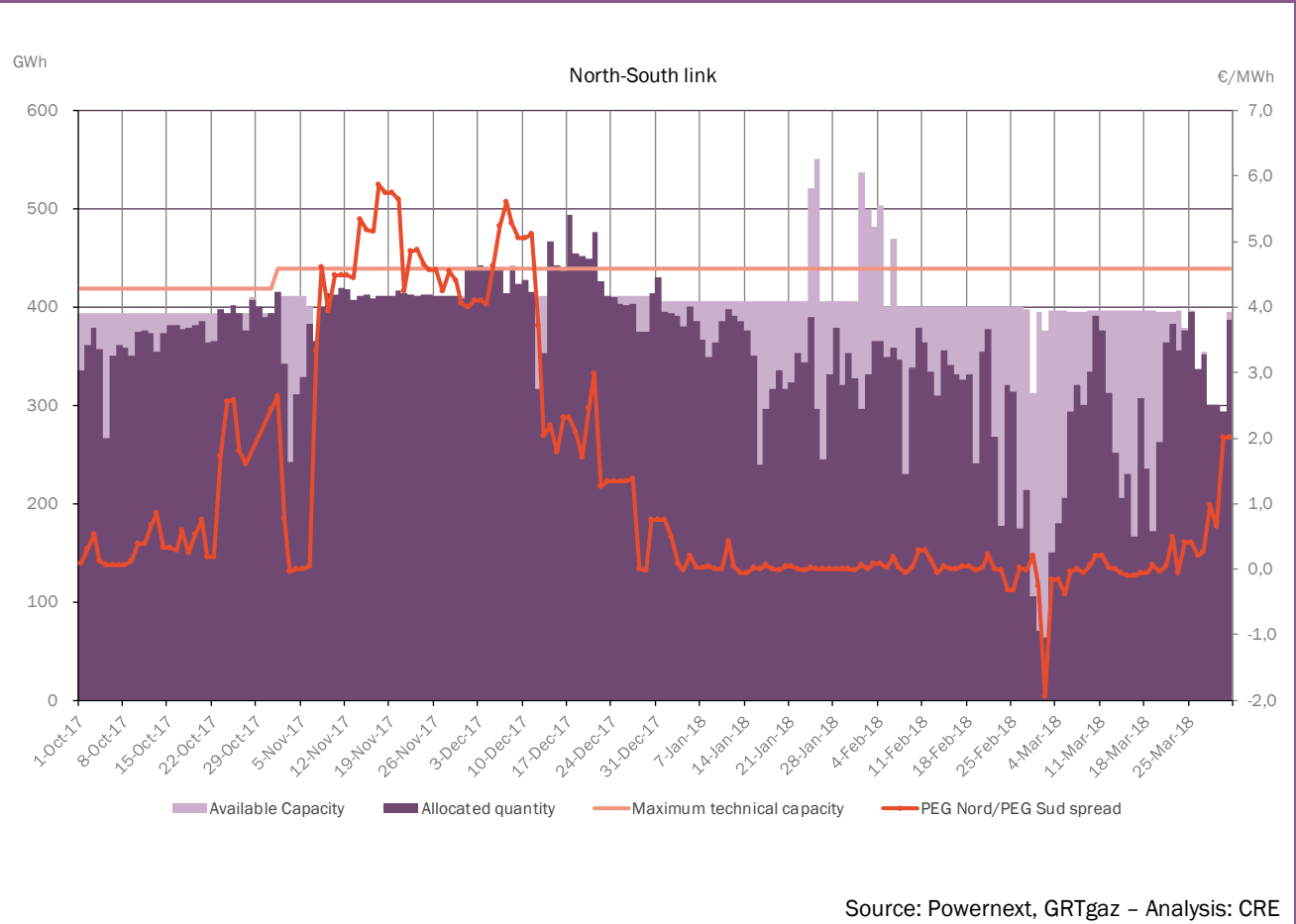
Source: GRTgaz, Teréga – Analysis: CRE

**Figure 43: Send-out of the French LNG terminals**

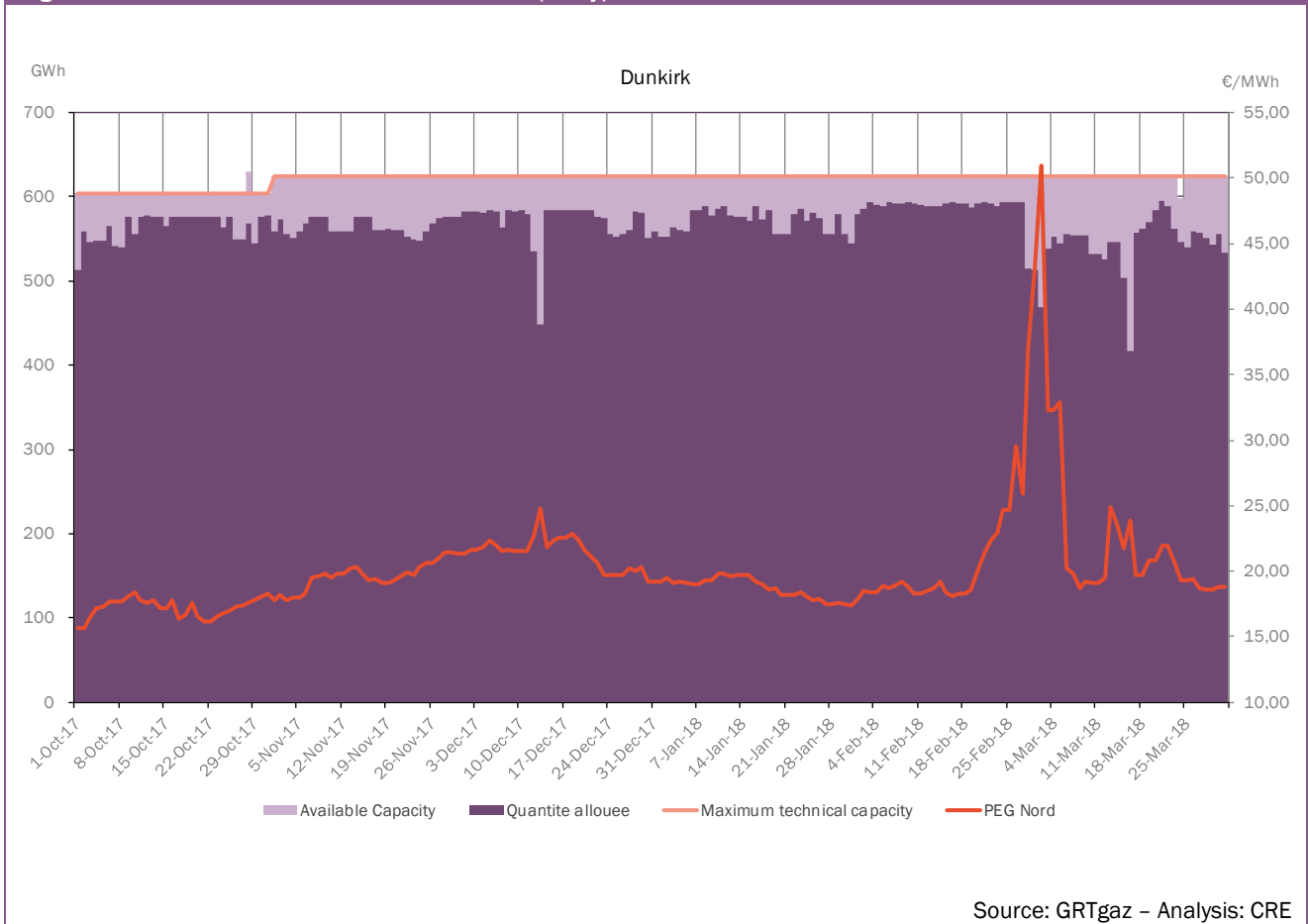


Source: GRTgaz – Analysis: CRE

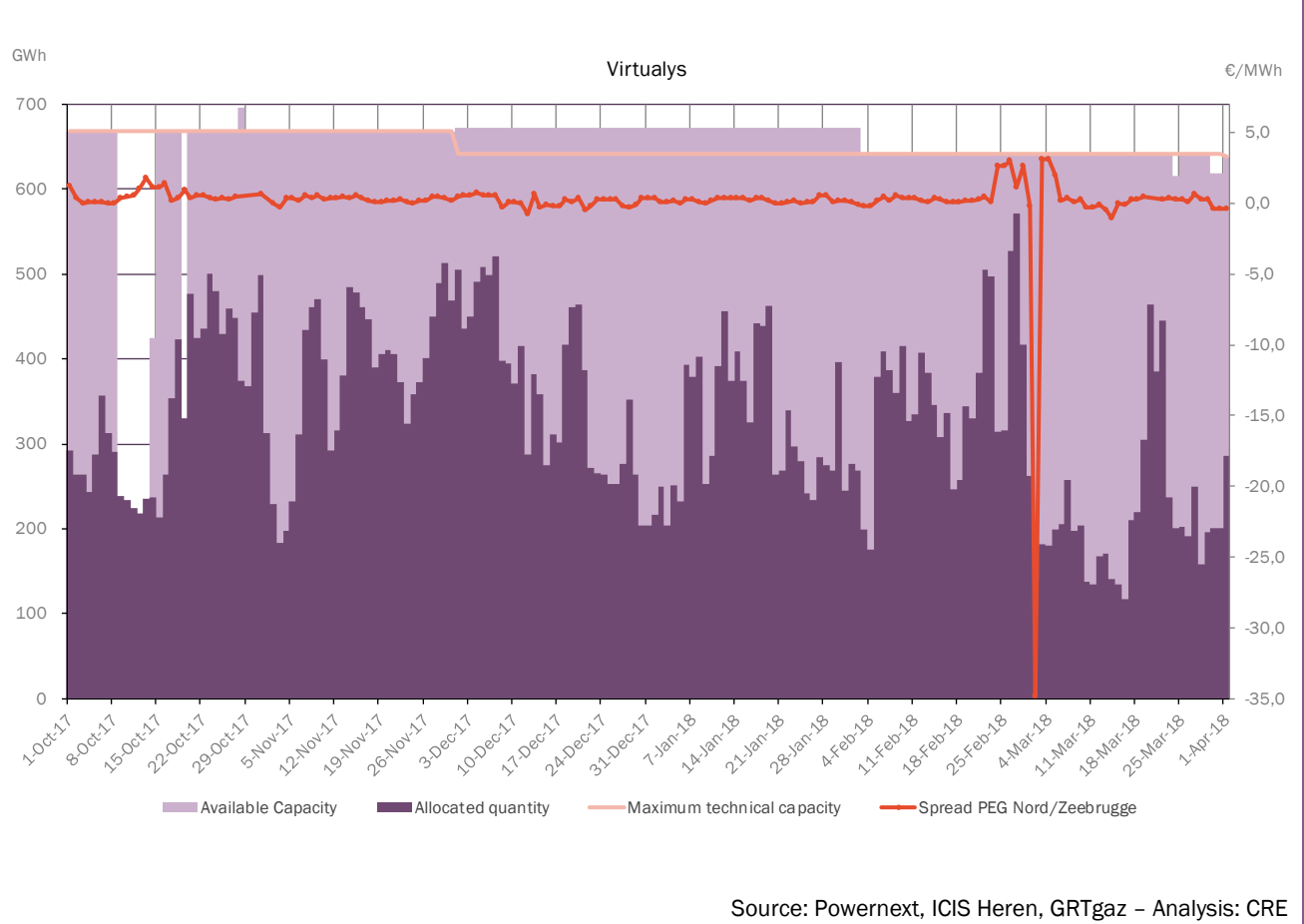
**Figure 44: North-South link utilization (North to south)**



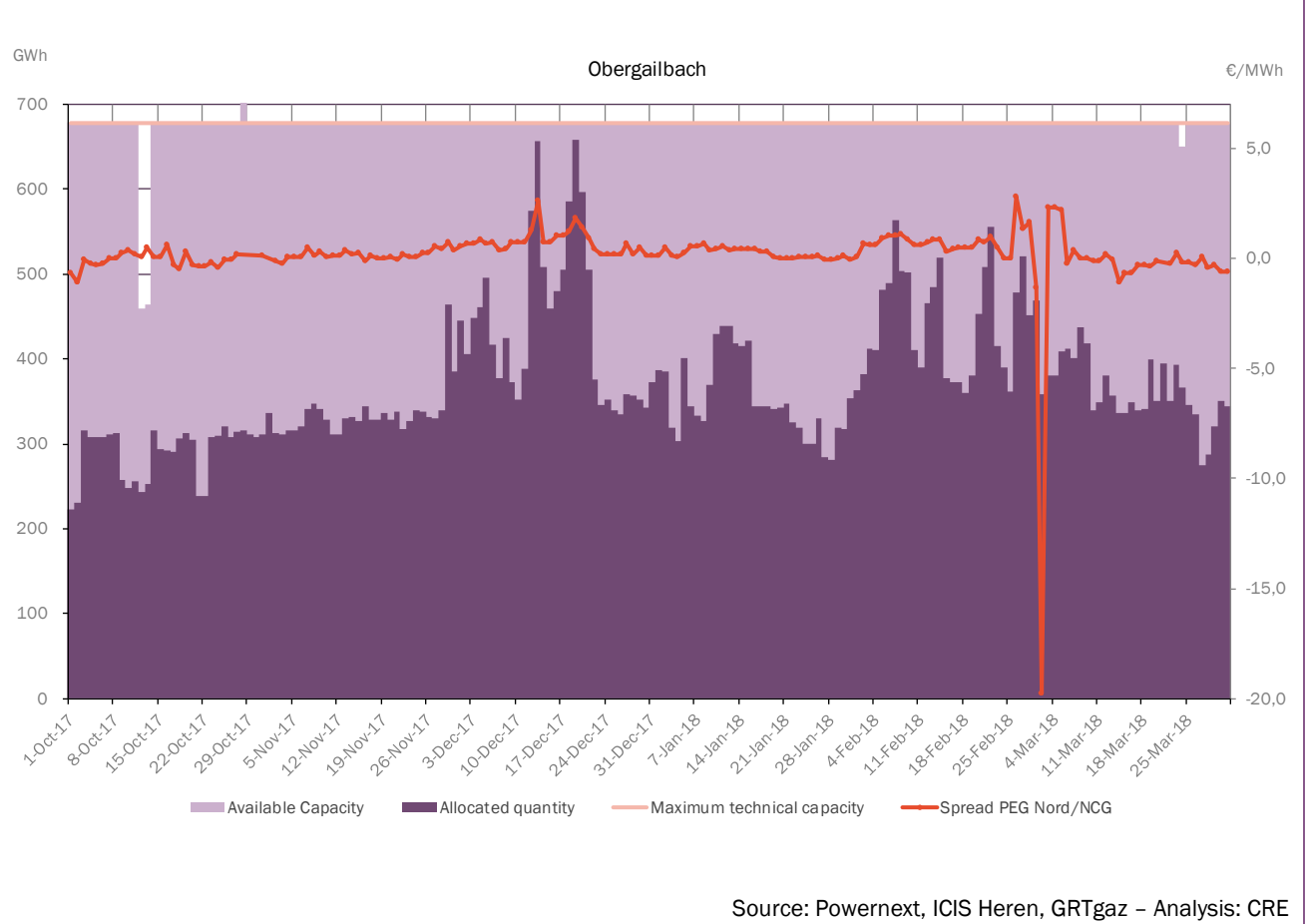
**Figure 45: Dunkirk interconnection utilization (Entry)**



**Figure 46: Taisnières-H interconnection utilization (Belgium to France)**

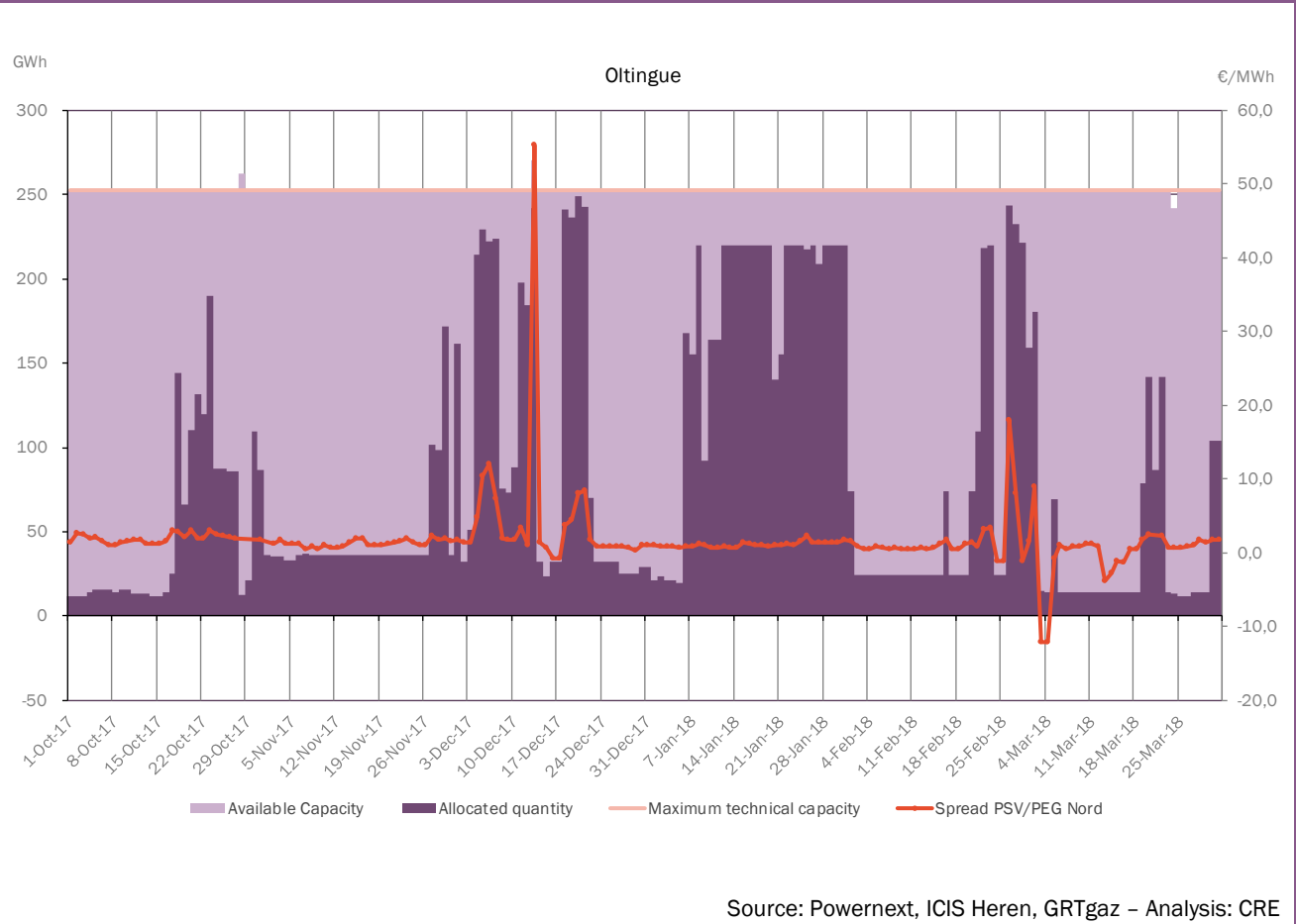


**Figure 47: Obergailbach interconnection utilization (Germany to France)**

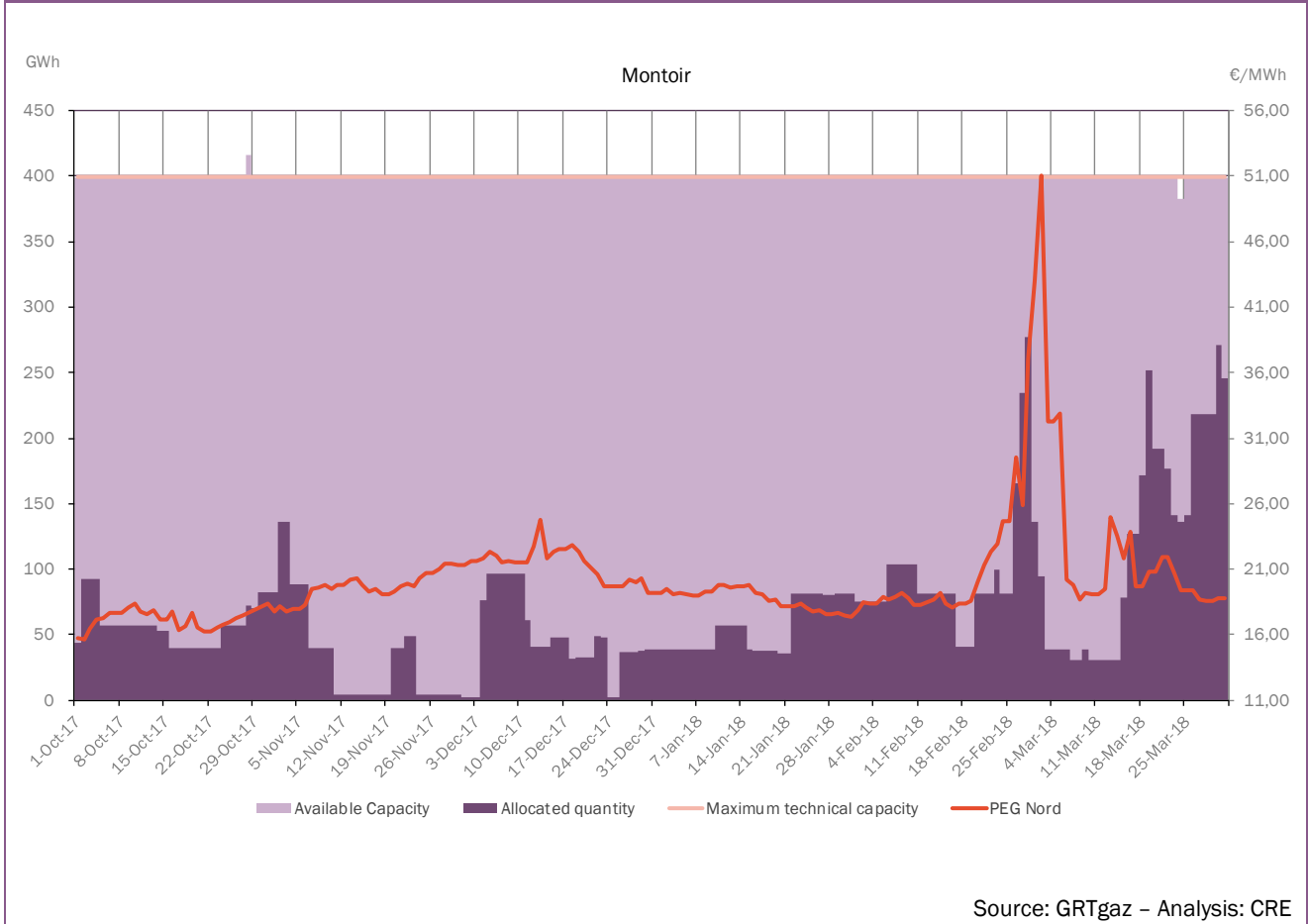




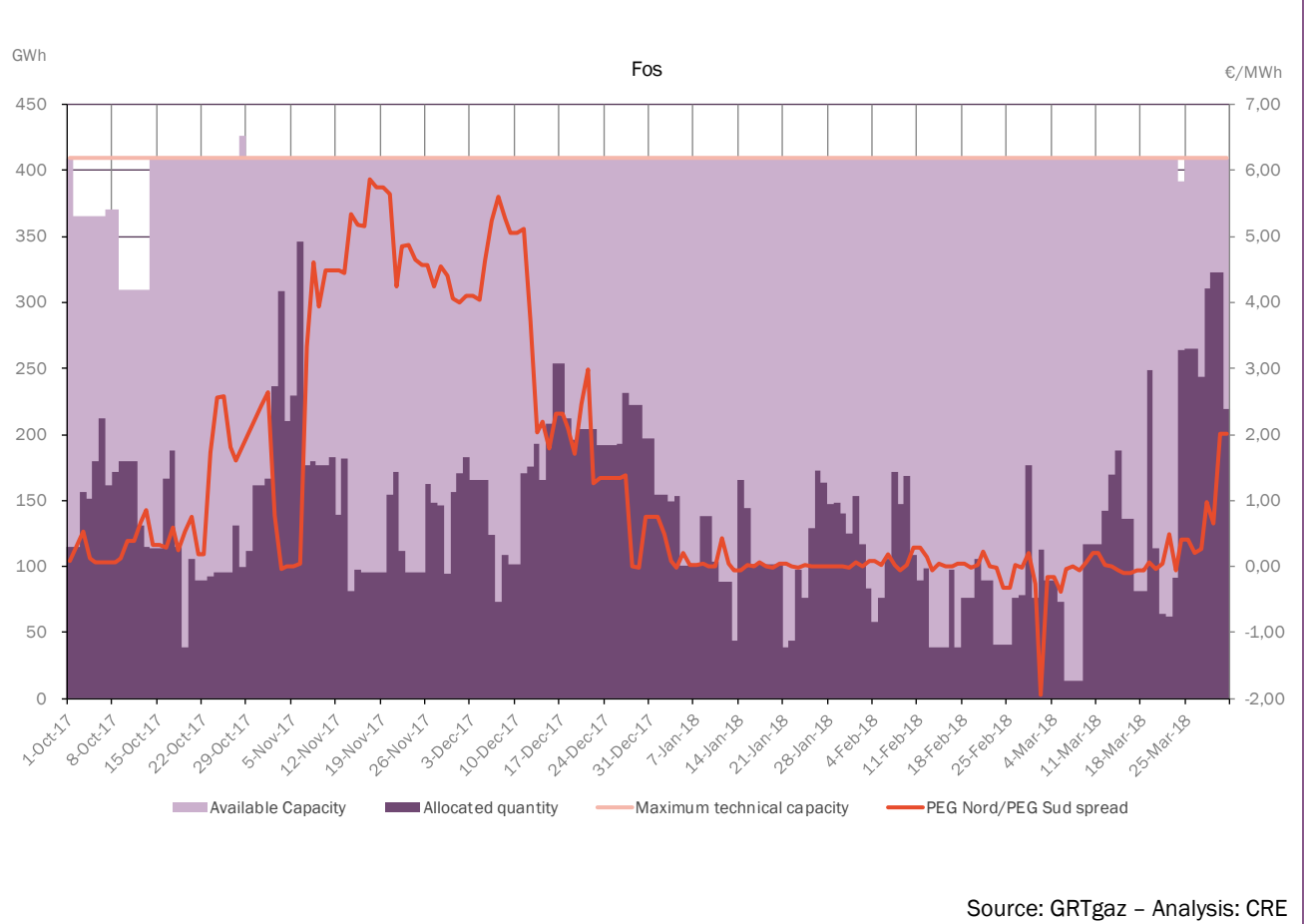
**Figure 48: Oltingue interconnection utilization (France to Switzerland)**



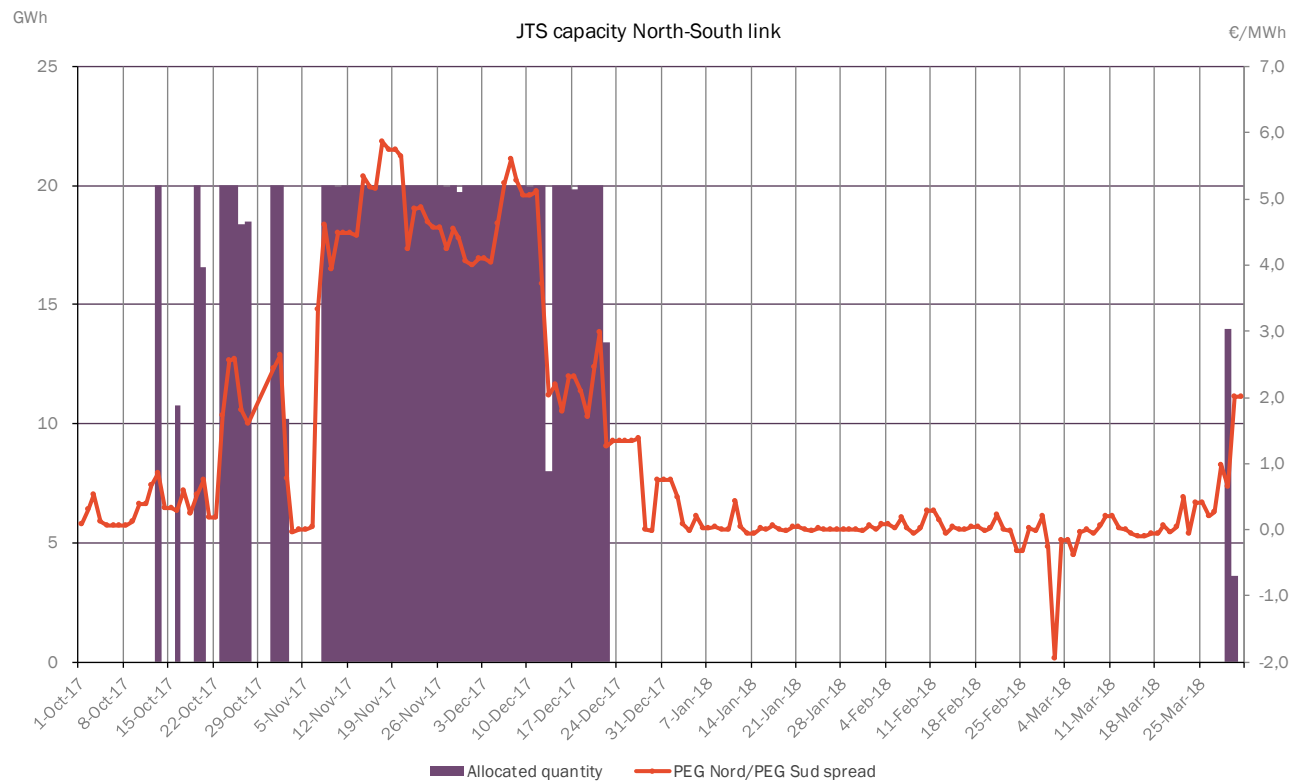
**Figure 49: Montoir entry point utilization (entry)**



**Figure 50: Fos entry point utilization (entry)**

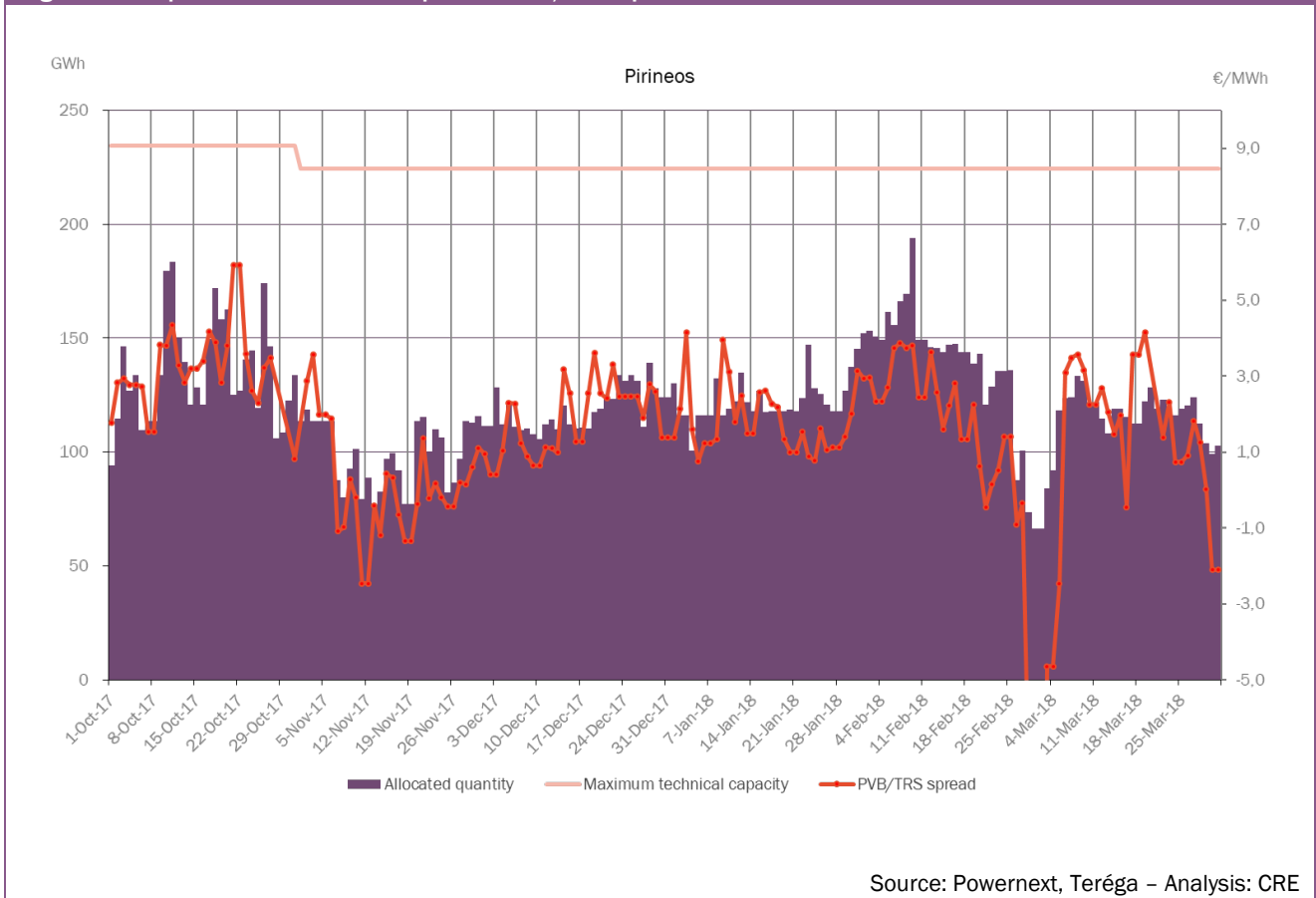


**Figure 51: JTS capacity utilization (North to South)**

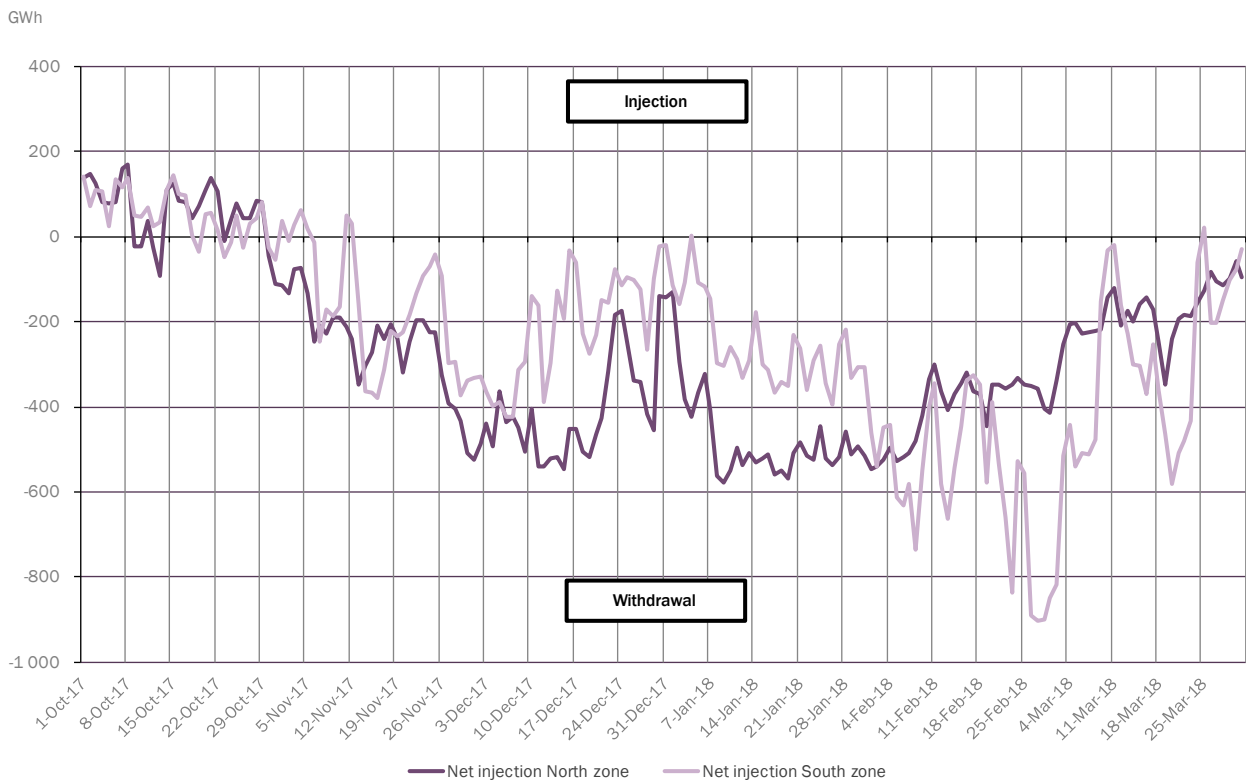


Source: Powernext, GRTgaz – Analysis: CRE

**Figure 52: Exports from France to Spain vs PVB/TRS spread**

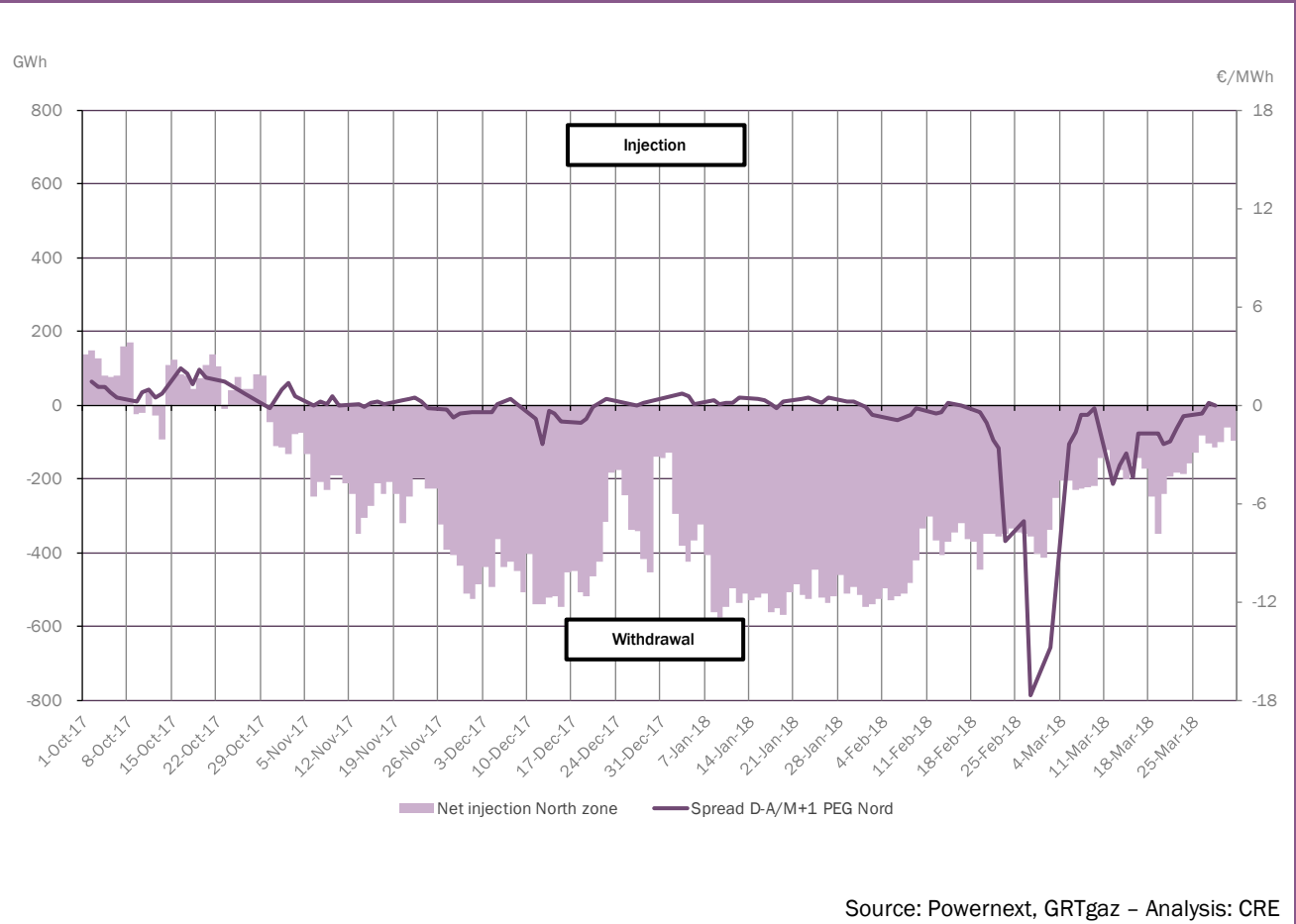


**Figure 53: Storages utilization**

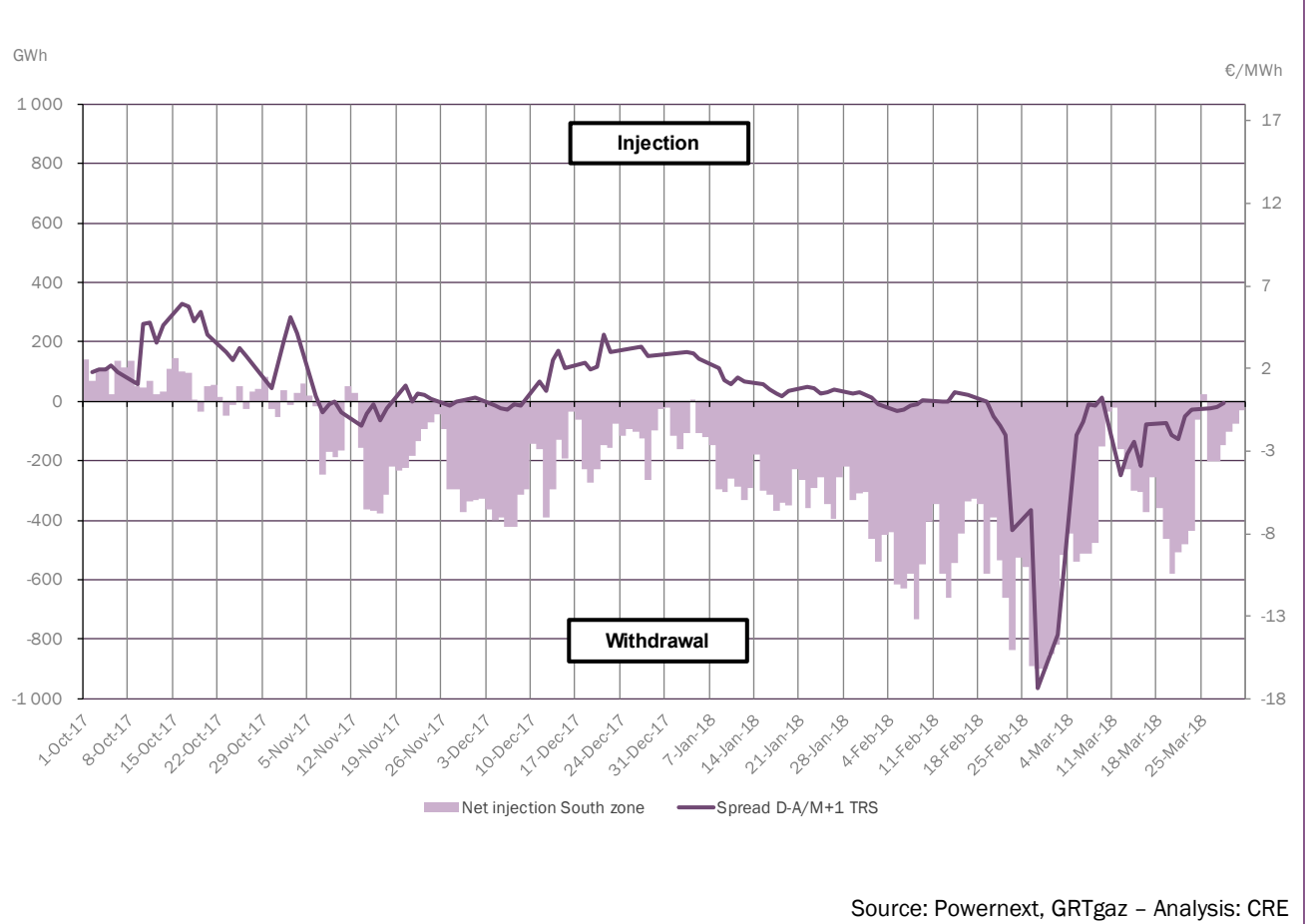


Source: GRTgaz, Teréga – Analysis: CRE

**Figure 54: Net stock variation in the North zone vs temporal spreads (same trading date)**

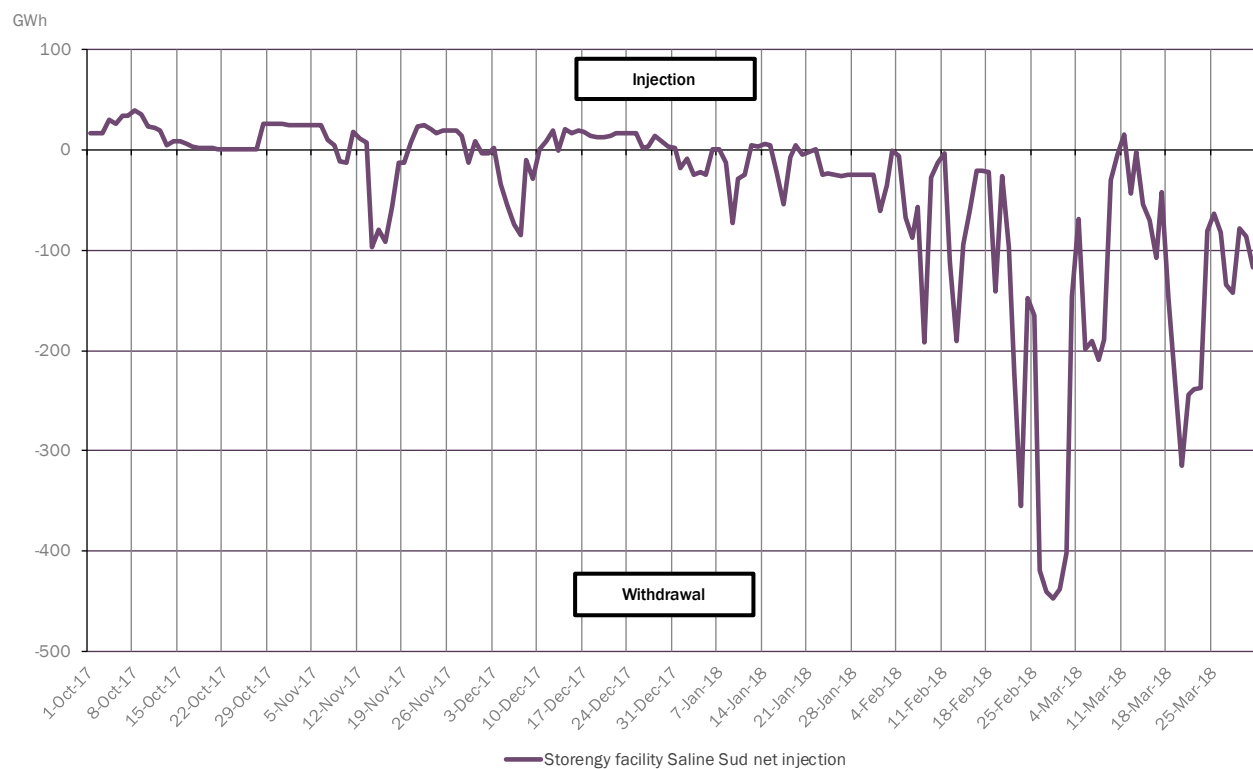


**Figure 55: Net stock variation in the South zone vs temporal spreads (same trading date)**





**Figure 56: Net stock variation of Salins storage in the South zone**

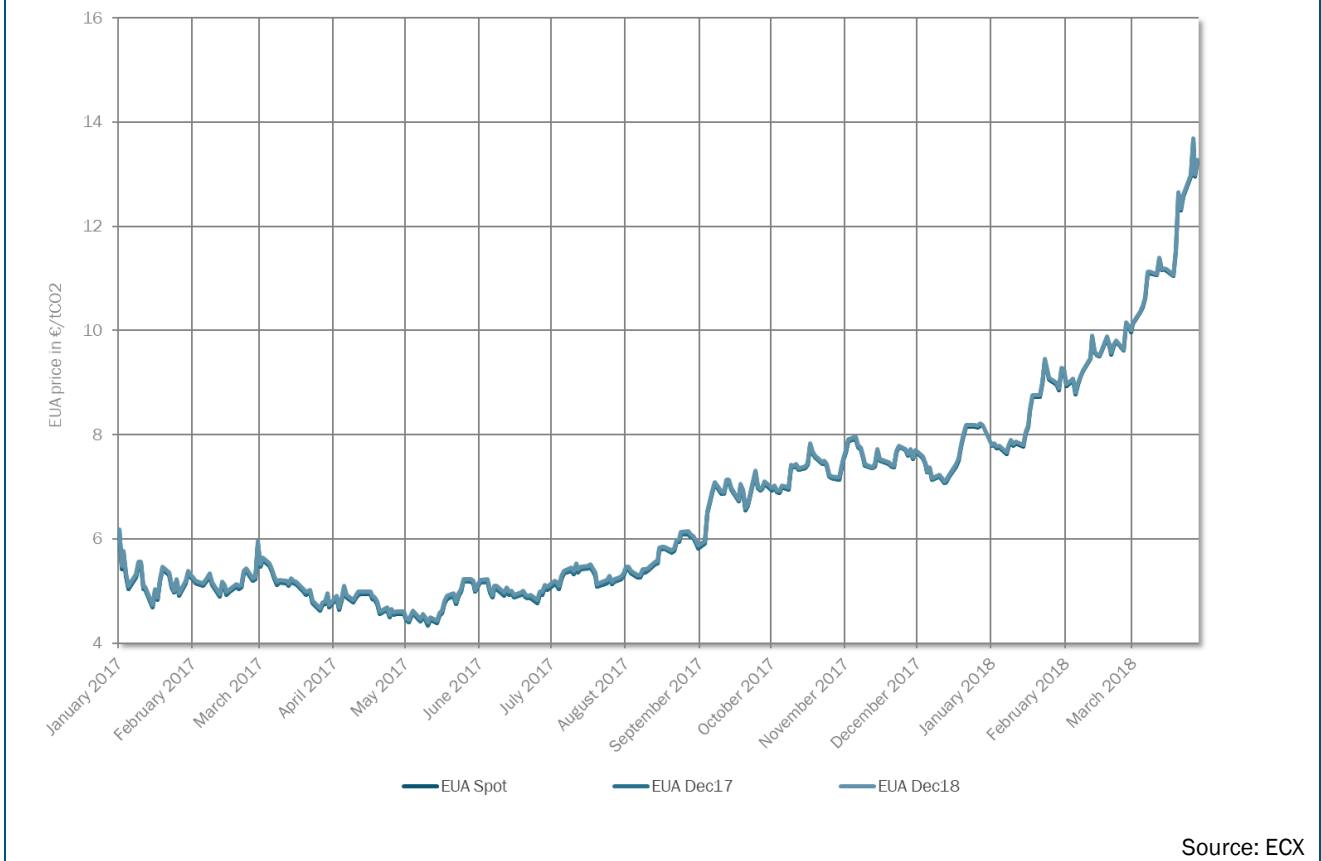


Source: GRTgaz, Teréga – Analysis: CRE

## PART 3: OTHER INDICATORS

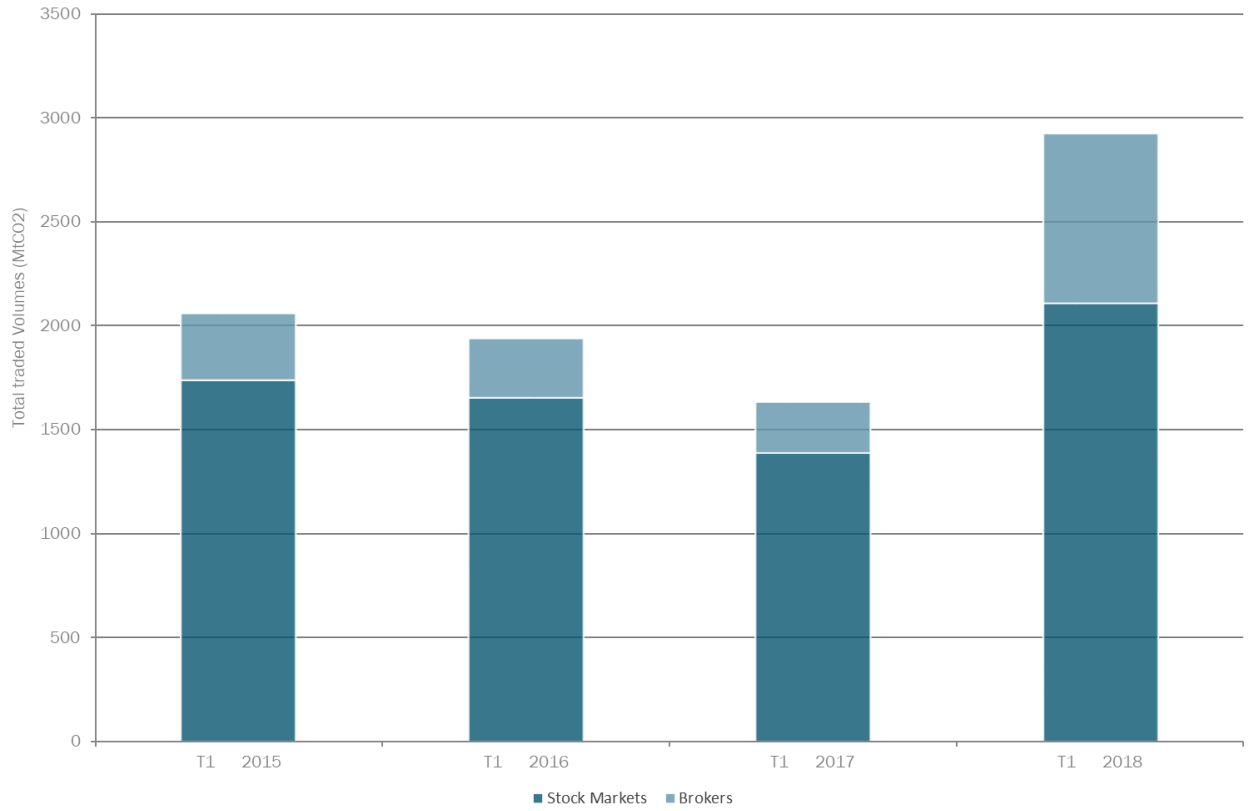
### 1. PRICE OF CO<sub>2</sub> ALLOWANCES

Figure 57: Evolution of EUA prices



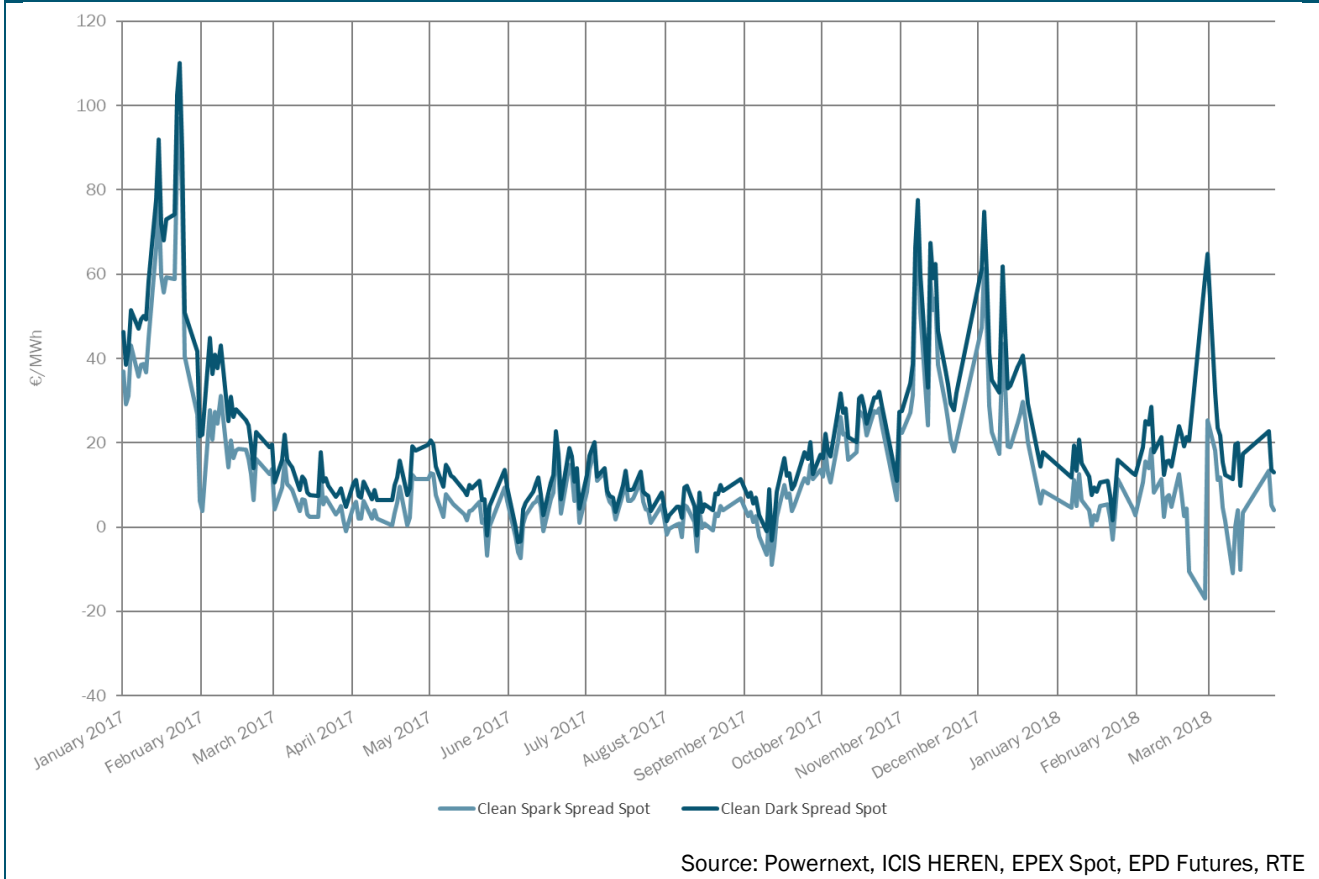
Source: ECX

**Figure 56: EUA quarterly volumes traded on exchanges and via brokers**



Source: EEX, ECX, LEBA

**Figure 57: Evolution of the Clean Dark Spread and Clean Spark Spread on spot peakload**



Clean Dark Spread (€/MWh) = $p_E - (\alpha p_C + \beta p_{CO_2})$	Clean Spark Spread (€/MWh) = $p_E - (\gamma p_G + \delta p_{CO_2})$
<ul style="list-style-type: none"> <li>• <math>p_E</math> spot or Y+1 peakload price in France (€/MWh)</li> <li>• <math>p_C</math> M+1 or Y+1 coal price (€/MWh)</li> <li>• <math>p_{CO_2}</math> spot or Y+1 CO<sub>2</sub> price(€/MWh)</li> <li>• <math>\alpha</math> includes the calorific power value and the coal yield*</li> <li>• <math>\beta</math> coal emission factor**</li> </ul>	<ul style="list-style-type: none"> <li>• <math>p_E</math> spot or Y+1 peakload price in France (€/MWh)</li> <li>• <math>p_G</math> M+1 or Y+1 gas price at PEG North (€/MWh)</li> <li>• <math>p_{CO_2}</math> spot or Y+1 CO<sub>2</sub> price(€/MWh)</li> <li>• <math>\gamma</math> gas yield***</li> <li>• <math>\delta</math> gas emission factor****</li> </ul>
<p>* Based on the assumption of a calorific power of 8.14 MWh/t for coal and a yield of 35% for coal-fired plants. It should be noted that these yields correspond to new reference installations and therefore may be quite different from the yields of existing installations and that other costs, including transportation, are not taken into account.</p> <p>** Based on an assumed emission factor of 0.96 t CO<sub>2</sub>/MWh for coal-fired plants.</p> <p>*** Based on an assumed yield of 49% for gas plants.</p> <p>**** Based on an assumed emission factor of 0.46 t CO<sub>2</sub>/MWh for gas plants.</p>	

## 2. GAS PRICE IN EUROPE AND IN AMERICA VERSUS COAL PRICE

Figure 58: Gas price in Europe (NBP) and in America (Henry Hub) versus coal price (base 100 in November 2012)



## **GLOSSARY**

### **GENERAL GLOSSARY**

**Delivery on the wholesale market:** Daily declaration of a market player to a system operator, of the gas or electricity exchanges taking place the following day with each of its counterparties. Each delivery can result from one or several transactions concluded beforehand on the wholesale market.

**Forward contract:** a standard contract agreement for delivery of a given quantity at a given price, for a given maturity (OTC markets).

**Future contract:** a standard contract agreement for delivery of a given quantity at a given price, for a given maturity (organized exchanges). Different maturities can be proposed depending on the exchange platform (week, half-year, quarter, month, year, etc.). The Y+1 contract correspond to the calendar year after the current year.

**Day-ahead:** a contract agreement signed for delivery the day after.

**Transaction on the wholesale market:** Conclusion of a contract between two wholesale market players, relative to the delivery of gas or electricity for a determined period of time, at a given price. The number of transactions in a market represents its level of activity, or its liquidity.

### **WHOLESALE ELECTRICITY MARKET GLOSSARY**

#### **Main electricity power exchanges in Europe:**

- **EPEX Spot:** French power exchanges, non-mandatory ([www.epexspot.com/fr](http://www.epexspot.com/fr)).
- **EEX Power Derivatives:** German European Energy Exchange power exchanges, non mandatory ([www.eex.de](http://www.eex.de)).
- **APX:** Dutch Amsterdam Power Exchange power exchanges, mandatory for imports and exports to the Netherlands ([www.apx.nl](http://www.apx.nl)).
- **Omel:** Spanish pool, almost mandatory ([www.omel.es](http://www.omel.es)).
- **NordPool:** Scandinavian power exchanges, non-mandatory (one of the power exchanges in Europe, [www.nordpool.no](http://www.nordpool.no)).

#### **Wholesale products:**

- **Intraday:** hourly contracts and intraday blocks for an undergoing day delivery.
- **Day-ahead :** contract negotiated the day before the delivery date.
- **Future:** standard contract for a given quantity, at a given price, at a given delivery date. The maturity of the contracts depends on the organized market place (week, month, quarter, season, year). The maturity Y+1 refers to the next calendar year following the on-going year.
- **Baseload:** 24 hours a day, 7 days a week.
- **Peak:** from 8 a.m. to 8 p.m. Monday to Friday.

#### **Wholesale market segments:**

- **Generation**
  - **ARENH:** stands for 'Regulated Access to Incumbent Nuclear Electricity'. It is a right that entitles suppliers to purchase electricity from EDF at a regulated price, in volumes determined by the French energy regulator.
  - **VPP:** "Virtual Power Plant" or capacity auction sales set up by EDF as a result of a decision made by the European Commission (<http://capacityauctions.edf.com/the-edf-group/capacityauctions/overview-114023.html>)

- **Wholesale purchases and sales (OTC, over the counter):** Block trading notifications, i.e, quantities selected by RTE the previous day for the day after, excluding trading via EPEX Spot.
- **Imports and exports:** [http://www.rte-france.com/htm/fr/offre/offre\\_inter\\_1.htm](http://www.rte-france.com/htm/fr/offre/offre_inter_1.htm).
- **Purchases and sales via EPEX Spot, the French electricity power exchange:** [www.epexspot.com](http://www.epexspot.com).
- **Final consumption:** sales to sites as a balancing responsible entity or under block trading.
- **Sales to network operators to compensate for their losses:** [http://www.rtefrance.com/htm/fr/offre/offre\\_perte.htm](http://www.rtefrance.com/htm/fr/offre/offre_perte.htm).
- **Ventes aux gestionnaires de réseaux pour la compensation de leurs pertes :** [http://www.rte-france.com/htm/fr/offre/offre\\_perte.htm](http://www.rte-france.com/htm/fr/offre/offre_perte.htm).
- **VPP - Products auctioned off by EDF:**
  - **VPPs baseload:** these are products which reflect a generator running in base mode. It runs on the principle that bidders pay a fixed premium (in Euros/MW) each month in order to reserve available capacity, and that they regularly send EDF a schedule for using these capacities. Then they pay an operating fee per MWh taken off, which is similar to the marginal cost of EDF's nuclear generators. The price structure is therefore "fixed cost + variable cost".
  - **VPPs peak:** these are products which reflect a generator running in peak mode. The principle is the same as for the VPPs baseload, but the price paid for each MWh taken off is an estimate of the marginal cost of EDF's peak generators. Given this high variable cost, the fixed premium paid by bidders is lower than for VPPs baseload.

### **WHOLESALE NATURAL GAS MARKET GLOSSARY**

**Bcm:** billion cubic meters.

**Balancing zone:** geographical zone of the natural gas transmission system within which entry and exit flows must be balanced by shippers.

**Day-ahead:** contract negotiated the day before the delivery date.

**ENTSO-G:** European Network of Transmission System Operators for Gas, association created by the European Commission to facilitate the cooperation between the network operators from European Member States and the creation of a European gas network.

**Forward:** contract with delivery at a given quantity, price and deadline.

**Future:** forward contract traded on an exchange (organized market).

**Gas release program:** in order to encourage competition in the South of France, a gas release program was set up in 2005 for a three-year period. During this program, Gaz de France released 15 TWh per year (i.e. 45 TWh for the entire program) at PEG South through calls for tenders and bilateral negotiations. Total released 1,1 TWh per year (i.e. 3,3 TWh during the program) at PEG TIGF.

**Herfindahl–Hirschman Index (HHI):** it is equal to the sum of the squares of the market shares of the companies and measures the market's concentration. It is higher for a concentrated market. It is normally assumed that a market is not concentrated when the HHI is lower than 1,000 and very concentrated if it is above 1,800.

**Market coupling:** mechanism that enables to bring together supply and demand of the coupled markets and to simultaneously and implicitly allocate the interconnection capacities between the balancing zones (North and South). Market coupling between North and South GRTgaz zones respects the specificities of the gas market: day-ahead prices are set continuously (each transaction is dealt at a particular price) and not by a fixing as it is for the electricity market (a unique auction operated by the exchange to set the price for each hour of the day).

**Liquefied Natural Gas (LNG):** LNG is natural gas condensed into liquid (by reducing its temperature to about -160 °C at atmospheric pressure), which has a volume decreased to about 1/600. It is mainly transported by sea in LNG tankers and unloaded in regasification terminals before being reinjected into the transport network.

**National Balancing Point (NBP):** gas hub of the United-Kingdom. Because of the large volumes exchanged on this hub, prices on that exchange are an important reference for gas wholesale exchanges in Europe.

**Nomination:** quantity of energy, expressed in kWh (PCS 25 °C) notified by the shipper to the TSO any day that the shipper asks the TSO to take off, transmit or deliver gas in the transport network. By extension, “to nominate” refers to the notification to the TSO of a nomination.

North H / North B balancing zones: the North B balancing zone is supplied by B-gas, which comes essentially from the Netherlands and is characterized by a higher level of nitrogen (B and H meaning low and high calorific value, respectively). Since 1st April 2013, the North-H and North-B balancing zones merged creating a unique balancing zone.

**PEG, Point d'échange de gaz:** Virtual point attached to each balancing zone in France in which players in the wholesale market can exchange physical quantities of gas.

**Spot market:** the spot market include Intraday, Day-ahead, Week-end, Week products and those with a maturity below one month.

**Take-or-Pay:** clause of a long term gas contract under which the seller (generally the producer) guarantees to supply a defined volume of gas to its client (generally an end consumer supplier) in exchange of its engagement to pay a minimal volume, whether or not the client decided to take this volume.

**Unconventional gas:** shale gases include three types of natural gas: shale gas, coal bed methane and tight gas. Unlike conventional gases, unconventional gases are found in low permeability rocks difficult to access. Their extraction is done thanks to two techniques: horizontal drilling and hydraulic fracturing.

## **WHOLESALE CARBON MARKET GLOSSARY**

**Backloading:** Short-term solution to limit the surplus of CO<sub>2</sub> allowances available on the market. It consists in removing 400 million of allowances in 2014, 300 million in 2015 and 200 million in 2016. Instead of selling it back in 2019 or 2020, these allowances will finally be put in the Market Stability Reserve in 2019

**Banking:** possibility for registrants to use an allowance issued at the beginning of a previous compliance period for compliance purposes.

**Borrowing:** the borrowing of an allowance for compliance purposes, giving registrants the option to use an allowance granted at the beginning of the following compliance period (allowances for Year N are entered on the registers before 28 February, while on 30 April in Year N, allowances must be returned in respect of emissions for Year N-1).

**Carbon dioxide (CO<sub>2</sub>):** main greenhouse gas, produced primarily from the combustion of fossil energies.

**CITL:** Community Independent Transaction Log, a central transaction log run by the European Commission which records the information provided by national registers.

**CDM:** Clean Development Mechanism. This is one of the flexibility mechanisms under the Kyoto Protocol, which enables developed countries to finance emissions reduction or greenhouse gas sequestration projects in developing countries and to claim Certified Emissions Reduction units (CERs), which they can accrue to fulfil their own emissions reduction obligations. CDM projects aim to encourage the transfer of environmentally-friendly technologies and to promote sustainable development in developing countries.

**CER:** Certified Emissions Reduction units from projects deployed under the Clean Development Mechanism (CDM) of the Kyoto Protocol. Some countries and companies make use of credits from CDM projects and joint application projects to comply with their Kyoto objectives. These units can be used in a limited way for the EU ETS compliance purpose until the end of the third phase, meaning 2020.

**ECX:** European Climate Exchange, carbon exchange based in London ([www.theice.com](http://www.theice.com))

**Emission allowance (or emissions permit):** unit of account under the EU Emission Trading Scheme. The allowance is a quantity of GHG emissions (expressed in tonnes of CO<sub>2</sub> equivalent) that cannot be exceeded over a given period, which is granted to a country or an economic agent by an administrative authority (intergovernmental organization or government agency).

**Energy - climate package:** a set of EU laws adopted late 2008, relating to energy and climate change.

**ERU:** Emission Reduction Unit, carbon credits generated by Joint Implementation (JI) projects, in accordance with the rules defined by the Kyoto Protocol. Companies falling within the scope of the European Union Emission Trading Scheme (EUETS) can use these credits to meet their greenhouse gas emission reduction obligations. These units can be used in a limited way for the EU ETS compliance purpose until the end of the third phase, meaning 2020.

**EUA:** European Union Allowance, European emission allowance which authorizes the holder to emit the equivalent of one ton of carbon dioxide in greenhouse gases.



**EU ETS:** the European Union Emission Trading Scheme is an EU mechanism that aims to reduce the global emission of CO<sub>2</sub> and achieve the European Union's objectives under the Kyoto Protocol. It is the largest greenhouse gas emission trading scheme in the world.

**GHG:** greenhouse gas. Gas contributing to the greenhouse effect (see Greenhouse effect). Not all GHGs make the same contribution to the greenhouse effect. In order to compare the different greenhouse gas emissions, their effects are expressed in terms of tonnes of carbon dioxide.

**Greenhouse effect:** effect causing a natural process, which maintains the lower atmosphere at an average temperature of 15°C. It is linked to the presence of certain gases in the atmosphere, such as carbon dioxide and methane, which trap the radiation emitted by the Earth and reflect some of it in the direction of the sun. As the quantity of greenhouse gases produced by humans is too high, temperatures are increasing significantly.

**Kyoto Protocol:** international treaty aiming to reduce greenhouse gas emissions. The Protocol sets out detailed commitments for the industrialized countries concerned, for reducing or limiting greenhouse gas (GHG) emissions during the first, so-called commitment period, i.e. 2008-2012 (-5.2% in relation to 1990). To achieve this, these countries are obliged to define policies and national measures to fight climate change.

**Market Stability Reserve:** Long-term solution to limit the surplus of CO<sub>2</sub> allowances available on the market. This mechanism will start in 2019 and will absorb 12 % of the market surplus when it is above 833 MtCO<sub>2</sub> and release 100 MtCO<sub>2</sub> when it is below 400 MtCO<sub>2</sub>. From 2019 to 2023, the absorption rate will be doubled. Finally, the volume of the reserved is capped by the amount of allowances that were auctioned the previous year: if the reserve volume is above this amount, the surplus of allowances will be cancelled.

**Phase IV:** the fourth phase of the EU ETS for the period 2021-2030, whom reform, adopted in November 2017 by the European Commission, aims to better address the risk of carbon leakage, and limit the surplus on the carbon market.

**Set aside:** option of setting aside a share of the allowances for Phase III proposed by the European institutions, in order to curb the surplus of allowances of EU ETS.

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