

## **WHOLESALE MARKETS OBSERVATORY**

2<sup>nd</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 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 summarizes 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**

## Upward trend of commodity prices in the context of US sanctions against Iran

Brent prices reached 63 €/bbl on average during the second quarter of 2018, up by +16 % compared to the last quarter. Continuing the upward trend of the first quarter, prices reached in May a new high of 68 €/bbl as the American President announced to reinstate sanctions against Iran. These tensions concerning the Middle East were the main driver of this quarter's prices evolution. Production issues in Venezuela and trade tensions between China and the U.S. also contributed to the increase. Oil prices eventually went down at the end of the quarter with the announcement of the increase of the OPEC's production.

Coal prices rose during the second quarter to reach 71.8 €/t on average, up by +9 % compared to the first quarter of 2018. Prices followed the upward trend of oil markets and reached a 2018-high at 76.3 €/t at the end of June due to high power demand in Asia as heat waves hit.

## Electricity market prices rose in a context of low nuclear availability and rising commodity prices

Electricity consumption is slightly down compared to the same period in 2017 and amounted to 95.9 TWh compared to 97.8 TWh in the second quarter of 2017 (-2.0 %), mainly due to temperatures evolving above their seasonal norms.

Nuclear availability remained low, although it was higher than the same period a year earlier, with an availability rate of 75.5 %, i.e. 6.3 % above the historically low level of the second quarter of 2017. The nuclear production rate reached 66.5 %, up by 0.6 % compared to the second quarter a year earlier. After a year 2017 historically low for the hydraulic industry, hydropower production rose by 8.2 % on a yearly basis and offset the low availability of nuclear power. Fossil means of production also contributed to electricity supply during the second quarter of 2018. The generation rate for the coal and gas sectors was 12 % and 11 %, respectively, on average during the quarter (respectively 22 % and 24 % less than the same quarter in 2017 when hydro generation could not compensate as much).

Imports fell by 26.4 % and exports grew by 23.2 % compared to the second quarter of 2017, bringing the balance of cross-border trade to a net export balance of 20.8 TWh, a net increase of 47.5 % compared to the same period in 2017.

In this context of general rising in commodity prices, spot electricity prices have increased. Baseload prices reached an average of 36.9 €/MWh in the second quarter of 2018, compared to 33.9 €/MWh in the same quarter of 2017 (Figure 9), showing an increase of 9 %. For Peakload prices, compared to the second quarter of 2017, prices rose by 14.3 % from an average of 38.7 to 44.2 €/MWh.

Calendar product prices for delivery the following year show a clear progression compared to the previous quarter, rising from 39.9 €/MWh on average to more than 45.1 €/MWh (+13.3 %) strongly correlated with the evolution of fossil fuels (Figure below). The price of the France Base Calendar 2019 product ends the quarter up to 48.2 €/MWh (Figure 11).

Regarding trading in the futures market, quarterly and monthly products traded volumes are down from the previous quarter (-15 %) as compared to the previous year (-7 %) (Figure 6 and Figure 7). Conversely, the volumes traded on yearly products increased compared to the same period a year earlier (+8 %).

## Tight gas markets due to high demand for injections and important seasonal maintenances, despite low end-use demand

During the second quarter of 2018, gas consumption fell by 13 % (-10 TWh) compared to the previous year at the same period. Spring temperatures hit a record high of 1.9 °C above normal temperatures<sup>1</sup>. After the winter cold snap, storages reached critical levels and the demand for injection was consequently high with 56 TWh during the quarter, up by 50 % compared to last year. Pipeline imports were similar to the last quarter while LNG imports increased by 4 % to 32 TWh.

Day-ahead prices reached 21 €/MWh on average on the PEG Nord, up by 35 % compared to the second quarter of 2018. The market remained tight due to high injection demand and significant maintenance in North Europe. Other European gas markets experienced similar volatility trends, the TTF-PEG Nord spread settled on average at 0,2 €/MWh.

<sup>1</sup> Météo France

On the TRS zone, *day-ahead* prices reached 22.8 €/MWh on average, i.e. a relatively large spread of 1.8 €/MWh with the PEG Nord and which widened to a maximum of 5.7 €/MWh at the end of the quarter. A low availability of the North/South link (70 %) and storages levels still low in the south zone contributed to this spread. FOS send-outs were in the bottom historical range (-28 % compared to the second 2017 quarter) and also weighed on the spread, especially at the end of the quarter.

Calendar prices rose through the quarter to settle on average at 19.8 €/MWh, up by 19 % compared to the second 2017 quarter. This upward trend followed the trail of commodity prices.

**Carbon Market: the price of allowances has reached a new record despite a bearish month of June**

The price of allowances has reached a new record this trimester: at its highest, in the beginning of June, it was 16.4 €/tCO<sub>2</sub>. The price has then decreased, following an announcement made by the American president about taxes on the import of European steel and aluminum, before it rebounded. At the end of June, the price went below 15 €/tCO<sub>2</sub> after the European Union declared the renewable energy target in the final energy consumption will be increased up to 32 % in 2030. Such a target could limit the demand for emission allowances in the long-term. The traded volume of allowances has increased by 13 % compared to the previous trimester.

Evolution of commodities prices



# **MARKET INDICATORS**



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

### **1. KEY DATES**

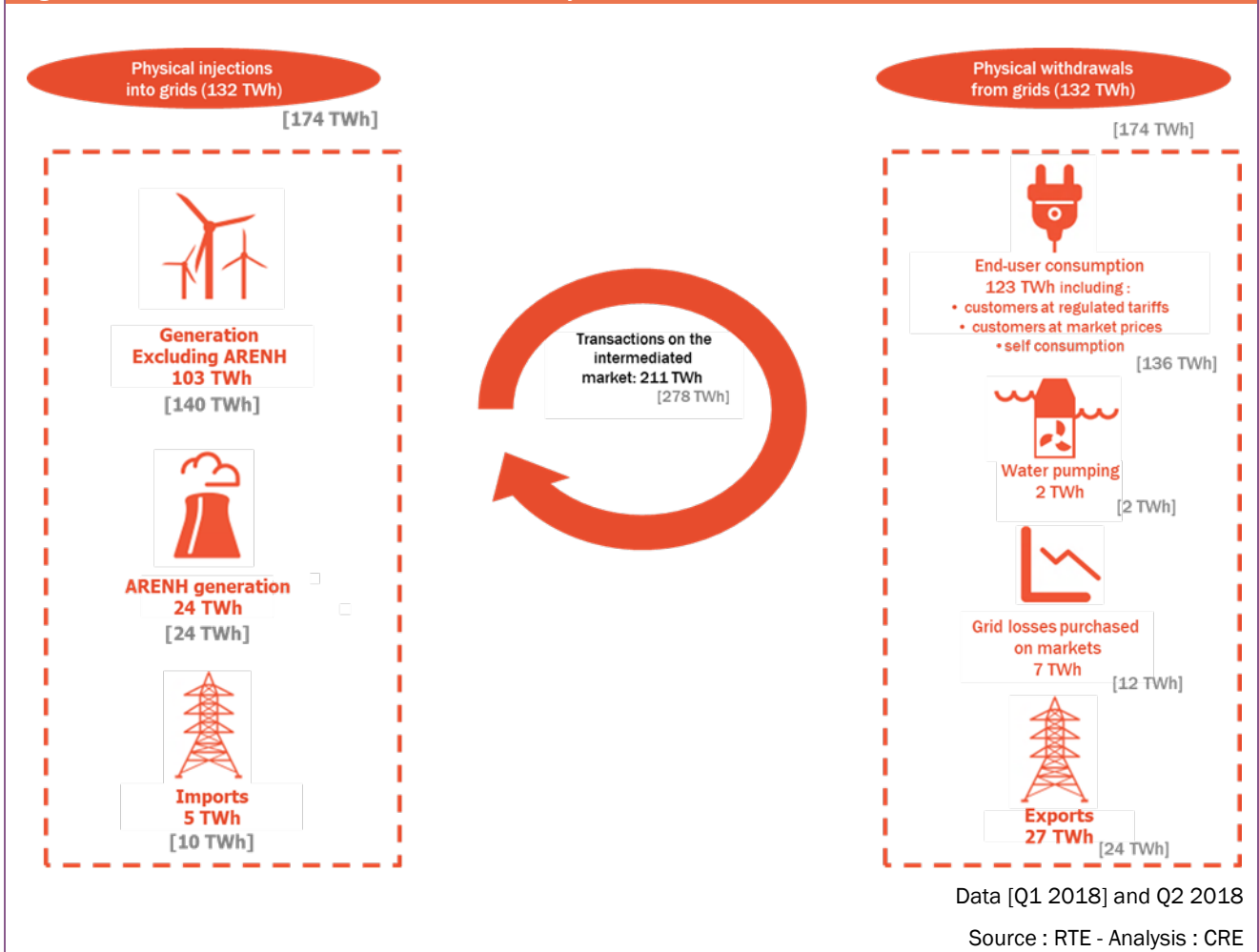
November 2000	CRE validated the initial version of the Balancing Responsible Entity (BR) contract
Early 2001	First purchases of losses on the market by RTE
May 2001	First OTC quotations published regarding the French electricity market
September 2001	First virtual power plant auctions set up by EDF (VPP)
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 : Q2 2018 balance of the French electricity wholesale market



**3. KEY DATA**

Table 1 : Physical flows on the wholesale electricity market

	Quarterly values					Quarterly variation		Yearly variation	
	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	In percentage	In values	In percentage	In values
<b>Injections, in TWh</b>									
Production (excluding ARENH and VPP), in TWh	101	94	117	140	103	-27%	-37,44	2%	1,64
ARENH, in TWh	20	21	21	23	24	-	0,25	15%	3,09
Imports, in TWh	6,9	7,4	14,6	10,5	5,1	-52%	-5,42	-26%	-1,80
<b>Withdrawals, in TWh</b>									
Consumption, in TWh	98	93	123	141	96	-32%	-44,82	-2%	-1,95
Water pumping, in TWh	1,8	1,5	2,0	1,9	1,8	-3%	-0,06	3%	0,05
Exports, in TWh	22	21	17	19	27	37%	7,14	23%	5,01
Grid losses, in TWh	7,0	6,7	10,1	6,9	6,8	-1%	-0,09	-3%	-0,18

Source : RTE – Analysis : CRE

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

	Quarterly values					Quarterly variation Q2 2018 / Q1 2018		Yearly variation Q2 2018 / Q2 2017	
	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	In percentage	In values	In percentage	In values
<b>Spot Market prices</b>									
Intraday Price France, in €/MWh	33,9	34,6	57,7	46,2	37,1	-20%	-9,14	9%	3,18
Day-Ahead Base Price France, in €/MWh	33,9	34,5	56,6	43,8	36,8	-16%	-7,06	8%	2,85
Day-Ahead Peak Price France, in €/MWh	38,7	40,3	70,0	52,1	44,2	-15%	-7,88	14%	5,51
Spread Base Day-Ahead France-Germany, in €/MWh	4,1	1,8	23,1	8,3	0,8	-91%	-7,54	-81%	-3,35
Spread Peak Day-Ahead France-Germany, in €/MWh	5,1	2,6	23,5	8,1	3,6	-55%	-4,45	-29%	-1,46
France-Germany Day-Ahead prices convergence rate	46%	62%	7%	31%	28%	-10%	-0,03	-39%	-0,18
<b>Futures Market Prices</b>									
M+1 Price France, in €/MWh	33,8	37,8	63,2	44,0	39,3	-11%	-4,68	16%	5,45
Spread M+1 France-Germany, in €/MWh	2,0	3,3	22,5	6,9	0,9	-87%	-6,01	-58%	-1,17
Q+1 Price France, in €/MWh	34,2	47,5	55,4	34,0	41,4	22%	7,43	21%	7,23
Spread Q+1 France-Germany, in €/MWh	1,9	10,5	13,9	1,3	0,6	-54%	-0,71	-68%	-1,29
Y+1 Price France, in €/MWh	35,9	39,1	42,5	40,0	45,0	13%	5,05	25%	9,14
Spread Y+1 France-Germany, in €/MWh	5,8	6,1	5,9	5,0	4,7	-6%	-0,32	-19%	-1,13
<b>Ratios Y+1 Peakload/Baseload ratios</b>									
France	130%	129%	129%	128%	127%	-1%	-0,02	-3%	-0,04
Germany	126%	124%	124%	125%	124%	-1%	-0,01	-2%	-0,03

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

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

	Quarterly values					Quarterly variation Q2 2018 / Q1 2018		Yearly variation Q2 2018 / Q2 2017	
	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	In percentage	In values	In percentage	In values
<b>NEB</b>									
NEB volumes, in TWh	94,97	98,96	114,00	119,92	102,17	-15%	-17,75	8%	7,20
Ratio NEB/Consumption in France	97%	106%	93%	85%	107%	-	0,21	-	0,09
<b>Spot Market, in TWh</b>									
Volumes on EPEX SPOT Intraday market, in TWh	1,5	1,6	1,8	2,0	1,9	-3%	-0,06	27%	0,42
Fr-De Cross-Border Intraday volumes market shares	75%	80%	57%	65%	72%	12%	0,07	-5%	-0,04
Volumes on EPEX SPOT Day-Ahead market, in TWh	27,9	28,0	24,7	29,8	31,4	7%	1,63	13%	3,58
Volumes on Brokers Day-Ahead market, in TWh	5,9	5,0	6,4	7,8	5,8	-26%	-2,05	-2%	-0,12
<b>Futures Market</b>									
<b>Volumes, in TWh</b>	<b>183,7</b>	<b>243,5</b>	<b>326,8</b>	<b>238,7</b>	<b>171,7</b>	<b>-28%</b>	<b>-67,0</b>	<b>-7%</b>	<b>-12,02</b>
Brokers market share	87,7%	86,5%	86,1%	87,1%	83,3%	-	-3,9%	-	-4,4%
EEX Power Derivatives market share	12,3%	13,5%	13,9%	12,9%	16,7%	-	3,9%	-	4,4%
<b>Number of Transactions</b>	<b>17 317</b>	<b>20 351</b>	<b>28 061</b>	<b>32 098</b>	<b>16 873</b>	<b>-47%</b>	<b>- 15 225</b>	<b>-3%</b>	<b>- 444</b>
Brokers market share	86,1%	85,3%	79,7%	84,8%	83,8%	-	-1,0%	-	-2,4%
EEX Power Derivatives market share	13,9%	14,7%	20,3%	15,2%	16,2%	-	1,0%	-	2,4%
<b>Y+1 product</b>									
Volumes, in TWh	55,2	101,2	149,2	58,9	59,6	1%	0,72	8%	4,38
Number of Transactions	1483	2584	3465	1593	1667	5%	74	12%	184
<b>Q+1 product</b>									
Volumes, in TWh	33,1	26,6	38,0	35,7	19,7	-45%	-16,00	-40%	-13,37
Number of Transactions	2461	2276	3485	2972	1371	-54%	-1601	-44%	-1090
<b>M+1 product</b>									
Volumes, in TWh	29,0	24,9	29,0	42,9	21,5	-50%	-21,41	-26%	-7,46
Number of Transactions	5140	4300	6873	9771	4391	-55%	-5380	-15%	-749

Source : RTE – Analysis : CRE

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

	Quarterly values					Quarterly variation Q2 2018 / Q1 2018		Yearly variation Q2 2018 / Q2 2017	
	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	In percentage	Variation	In percentage	Variation
<b>Nuclear power plants</b>									
Average nuclear generation rate (%)	65,9	60,3	65,7	80,2	66,5	-13,7		0,6	
Availability rate of nuclear power plants (%)	69,2	65,1	70,4	86,7	75,5	-11,2		6,3	
<b>Hydraulic storage capacity rate</b>									
Hydro storage level (end of quarter) (%)	28,86948778	29,6	21,3	37,9	37,1	-0,8		8,2	

Source : RTE- Analysis : CRE

**Table 5 : Cross-border flows**

	Quarterly values					Quarterly variation Q2 2018 / Q1 2018		Yearly variation Q2 2018 / Q2 2017	
	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	In percentage	Variation	In percentage	Variation
<b>Imports (TWh)</b>									
Peakload imports (TWh)	2,7	2,9	5,5	4,0	2,2	-45,9%	-1,8	-20,0%	-0,5
Offpeak imports (TWh)	4,2	4,6	9,1	6,5	2,9	-55,1%	-3,6	-30,5%	-1,3
<b>Exports (TWh)</b>	<b>21,0</b>	<b>20,5</b>	<b>16,6</b>	<b>23,4</b>	<b>25,9</b>	<b>10,8%</b>	<b>2,5</b>	<b>23,2%</b>	<b>4,9</b>
Peak exports (TWh)	7,5	6,9	5,2	8,7	9,1	4,0%	0,4	20,9%	1,6
Offpeak exports (TWh)	13,5	13,6	11,4	14,6	16,8	14,9%	2,2	24,5%	3,3
<b>Net balance (TWh)</b>	<b>14,1</b>	<b>13,0</b>	<b>2,0</b>	<b>12,9</b>	<b>20,8</b>	<b>61,7%</b>	<b>7,9</b>	<b>47,5%</b>	<b>6,7</b>

Source : RTE- Analysis : CRE

**Table 6 : French balancing responsible entities**

	Quarterly values					Quarterly variation Q2 2018 / Q1 2018		Yearly variation Q2 2018 / Q2 2017	
	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	In percentage	Variation	In percentage	Variation
<b>Balancing responsible</b>									
Active in electricity generation	20	18	19	20	19	-5,0%	-1	-5,0%	-1
Holder of rights of regulated access to ARENH	18	16	16	18	17	0,0%	-1	0,0%	-1
Final customers provider	30	28	27	28	27	-3,6%	-1	-10,0%	-3
Active on imports/exports	48	47	47	49	46	-6,1%	-3	-4,2%	-2
Active on block exchange	86	85	87	82	82	0,0%	0	-4,7%	-4

Source : RTE- Analysis : CRE

**Table 7 : Index of market concentration**

	HHI - Concentration indices					
	Q2 2017		Q1 2018		Q2 2018	
	EDF included		EDF included		EDF included	
<b>Wholesale energy market</b>						
OTC - block purchases	353	964	616	959	402	1084
OTC - block sales	576	754	814	738	652	863
EPEX - purchases	511	1138	448	784	450	731
EPEX - sales	408	2455	730	3303	523	2110
<b>Injections</b>						
Generation	3859	7300	4152	6687	4217	4201
Imports	1747	1399	1809	1373	1580	1234
<b>Deliveries</b>						
End-consumer consumption	1755	4813	1821	4927	1298	3996
Grid losses	1476	1633	2048	1718	2178	1926
Exports	2135	1734	1428	3372	1416	1999

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

**4. FIGURES**

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

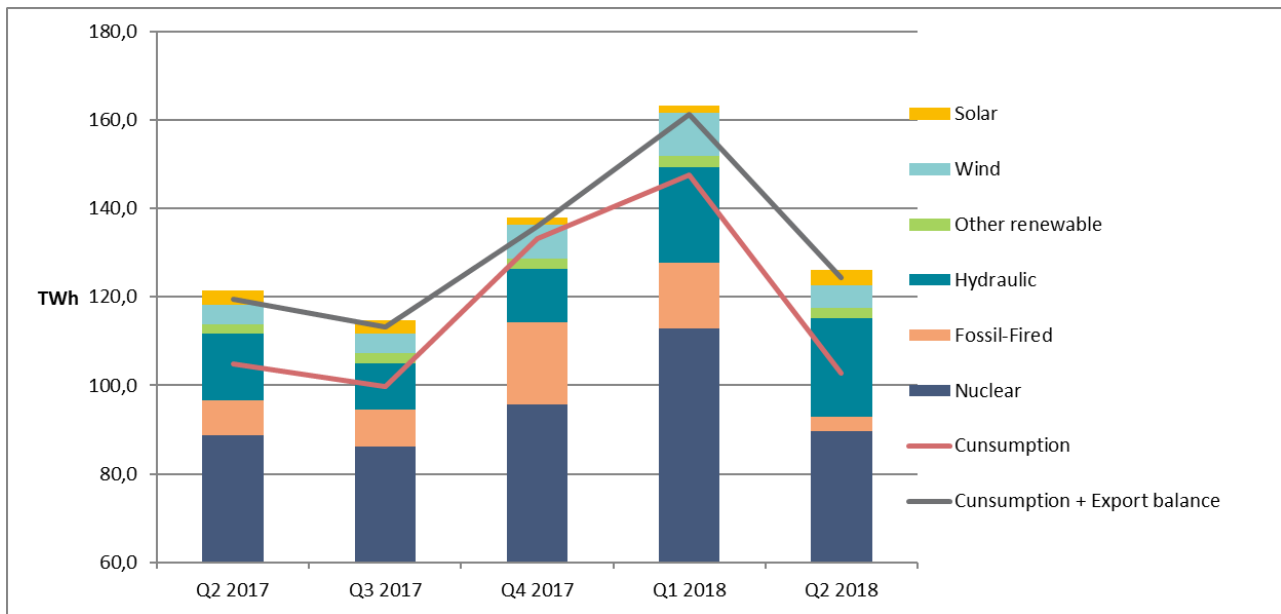
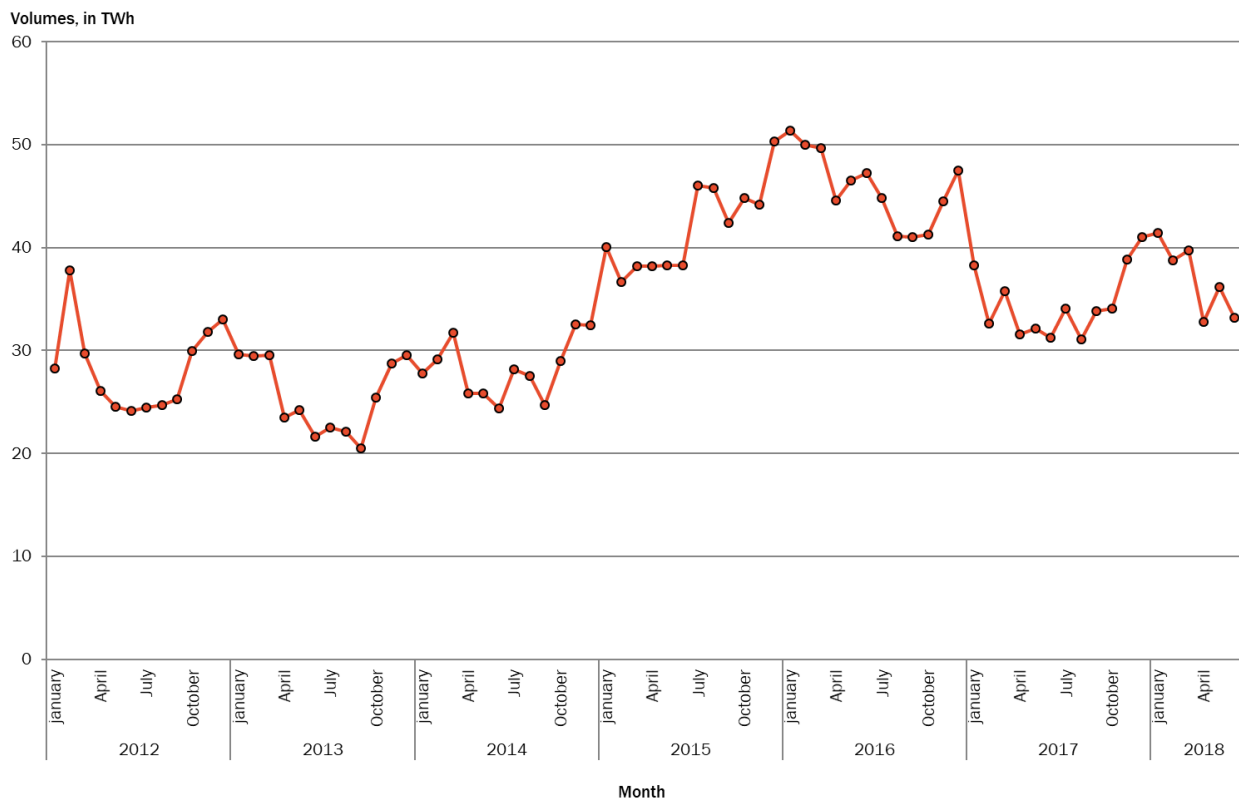


Figure 2 published in the French version of observatory of the second quarter of 2018 concerning generation per technology and quarterly consumption was erroneous not being updated compared to the first quarter. The corrected data is shown in Figure 2 above.

Source : RTE – Analysis : CRE

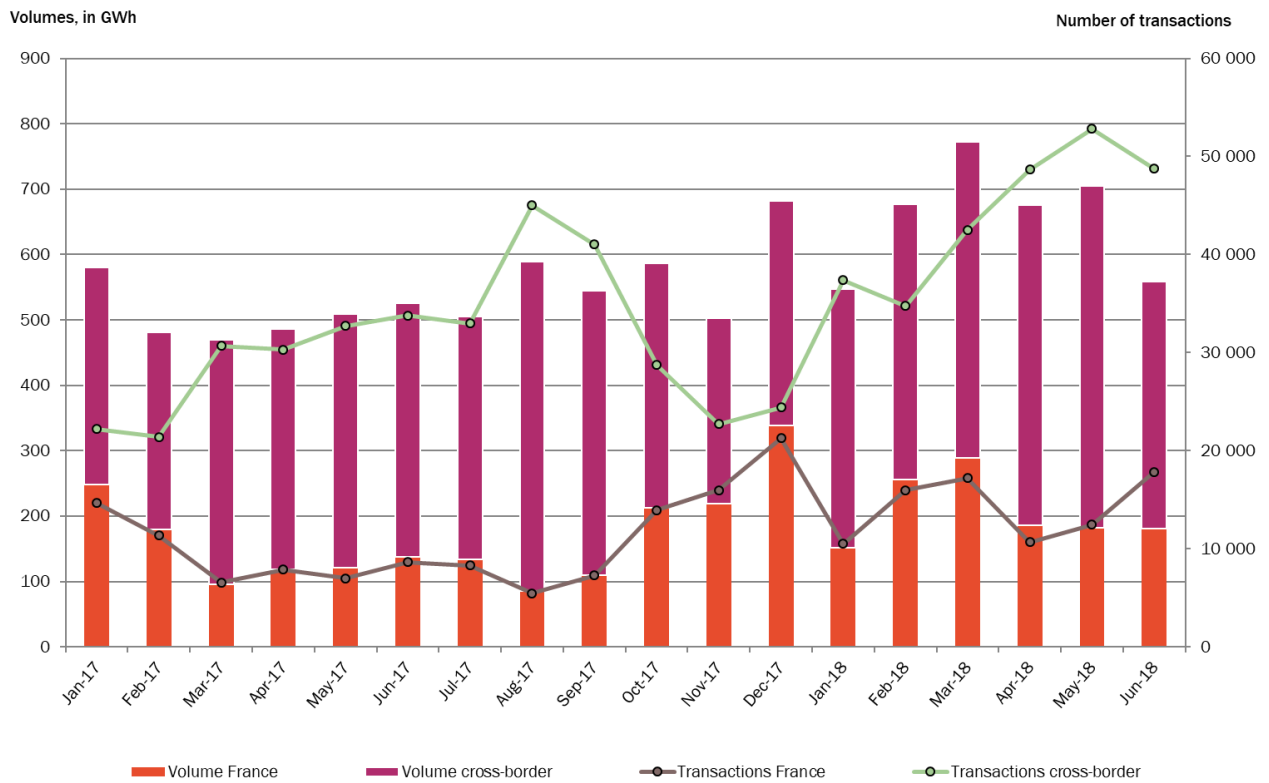
**Figure 3 : Volume of net deliveries resulting from OTC transactions (excluding ARENH)**



Source : RTE – Analysis : CRE

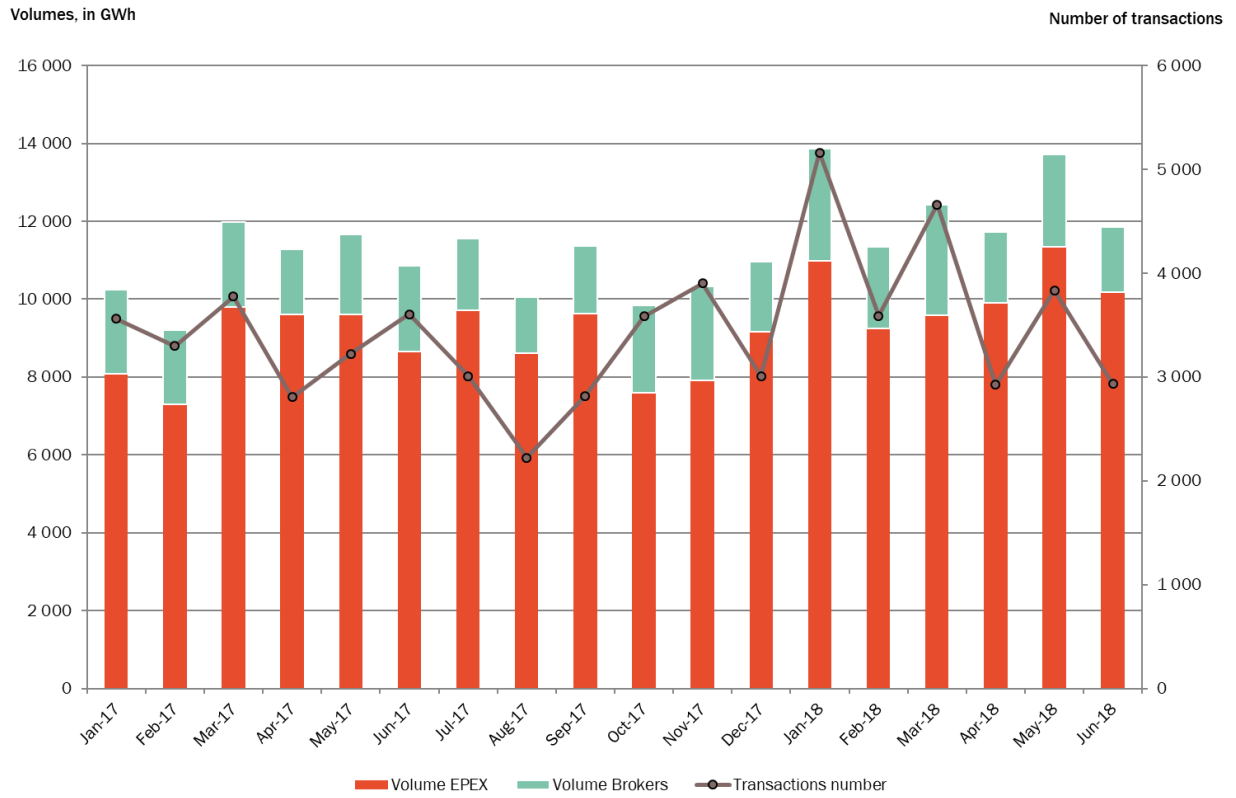
**Figure 4 : Volumes and amount of intraday transactions on the EPEX SPOT exchange**

// SUMS ON A MONTHLY BASIS //



Source : EPEX SPOT, Courtiers - Analysis : CRE

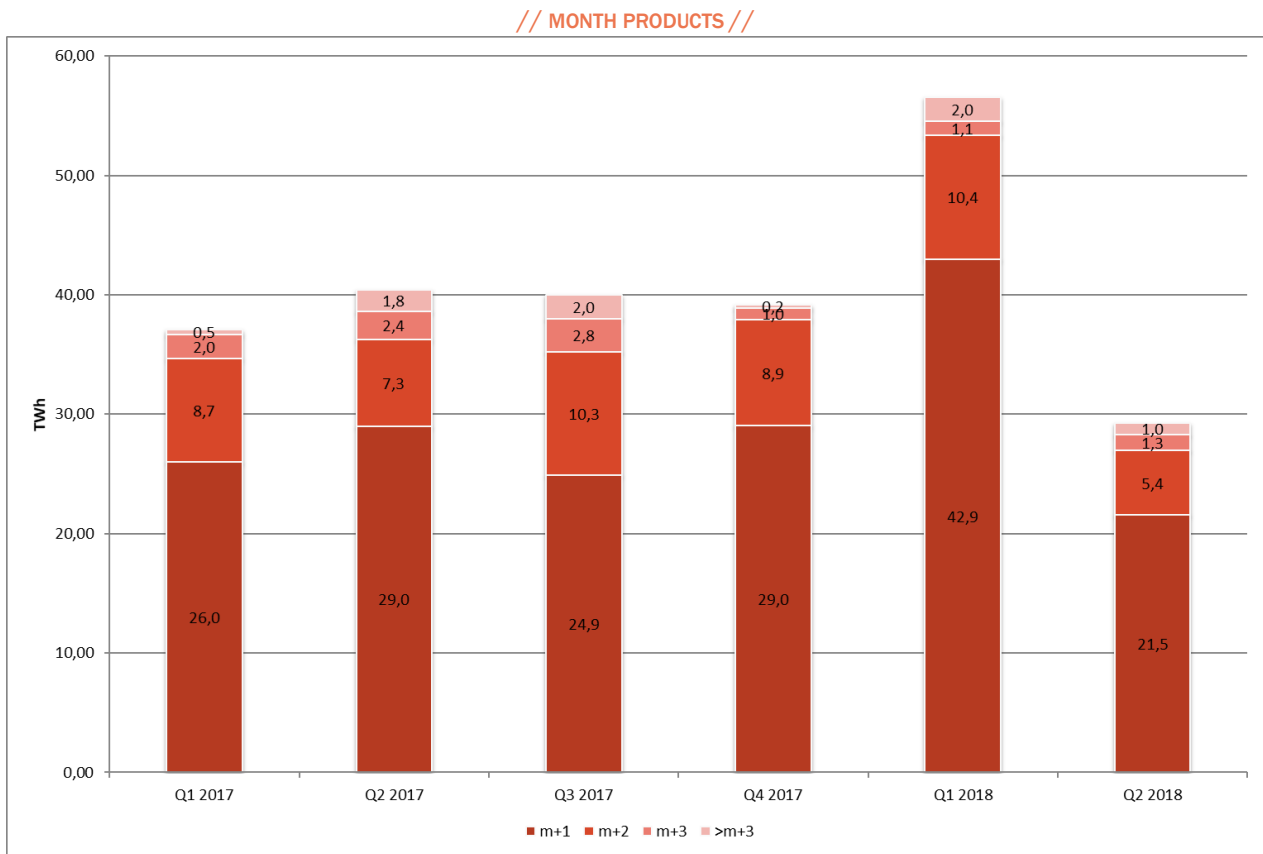
**Figure 5 : Volumes and amount of day-ahead transactions on the OTC intermediated market and the EPEX SPOT exchange**



Source : EPEX SPOT, Courtiers – Analysis : CRE

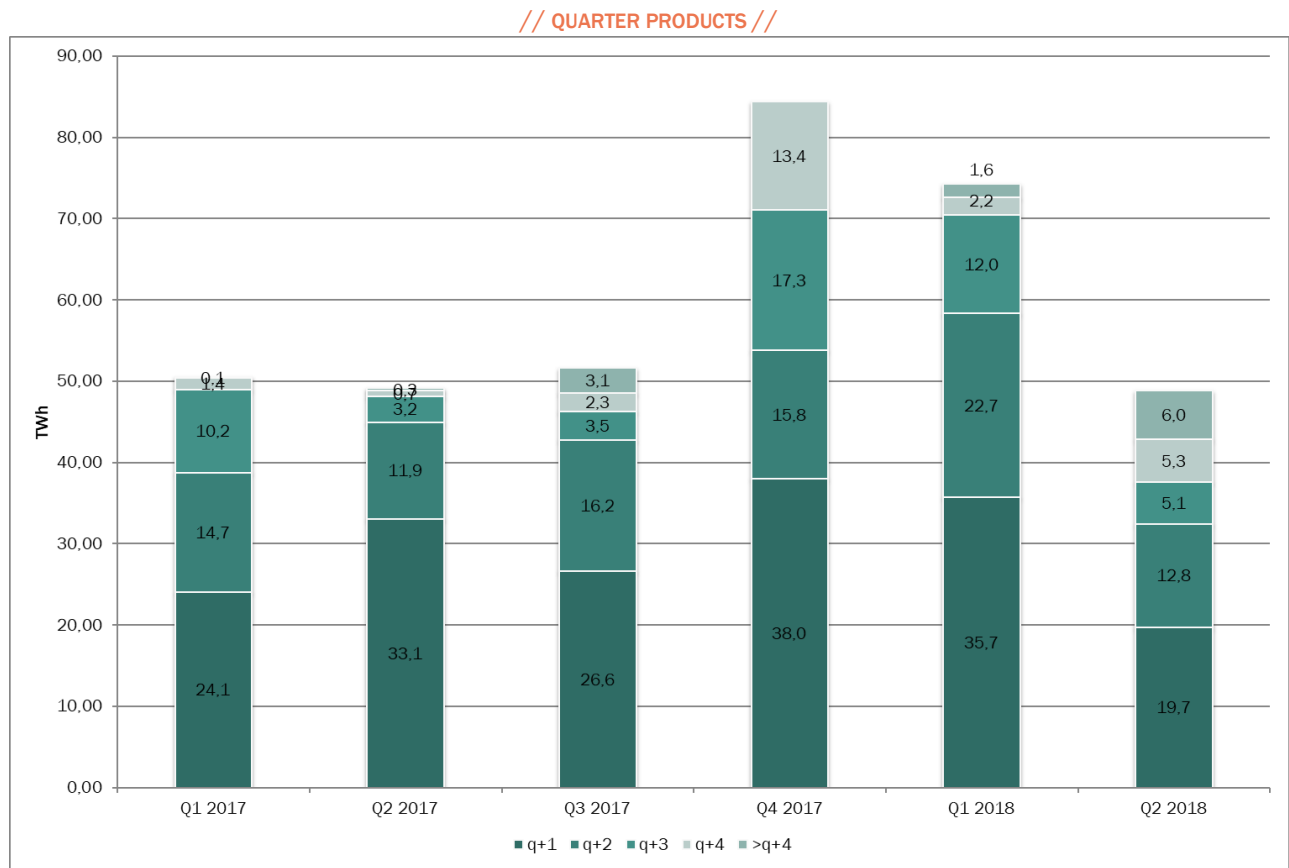


**Figure 6 : Quarterly traded volumes on the intermediated wholesale market**



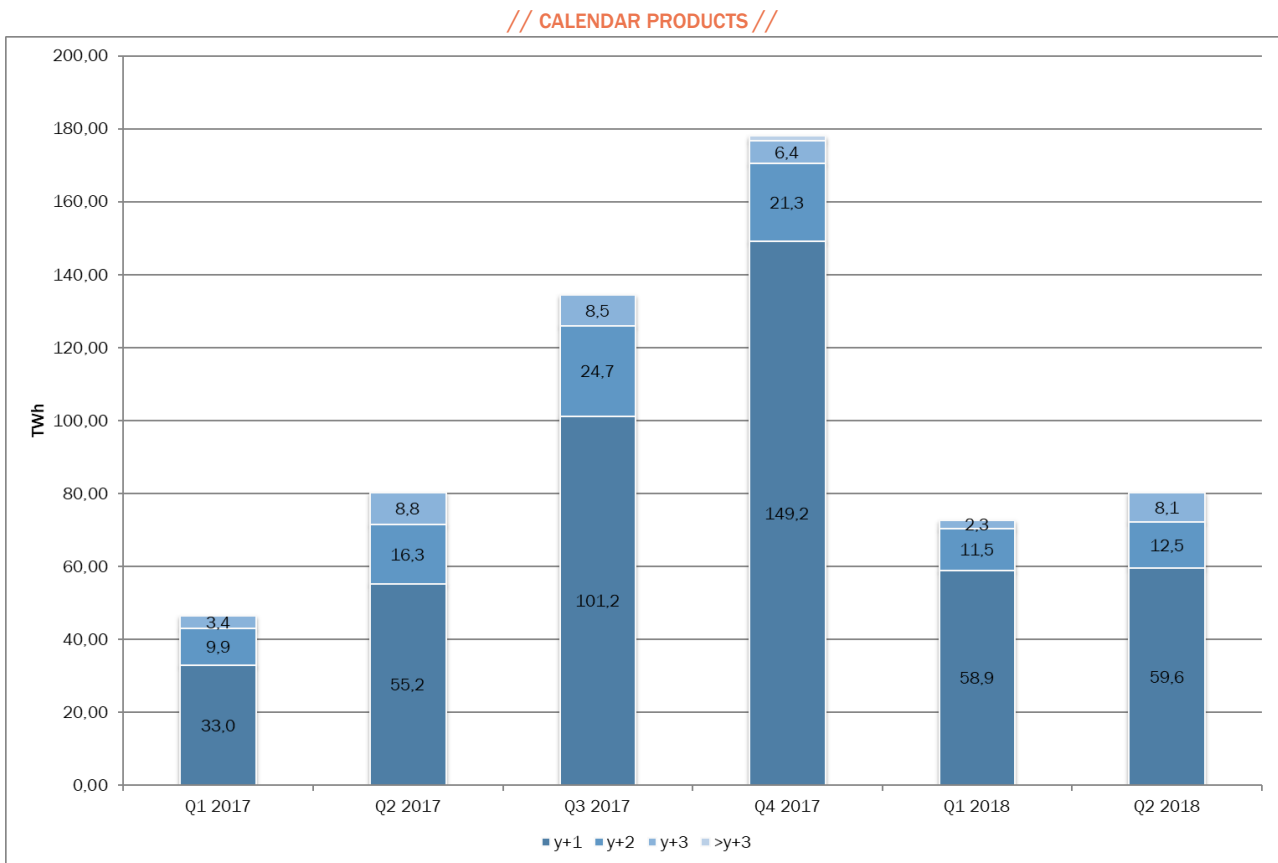
Source : Courtiers, EPD France – Analysis : CRE

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



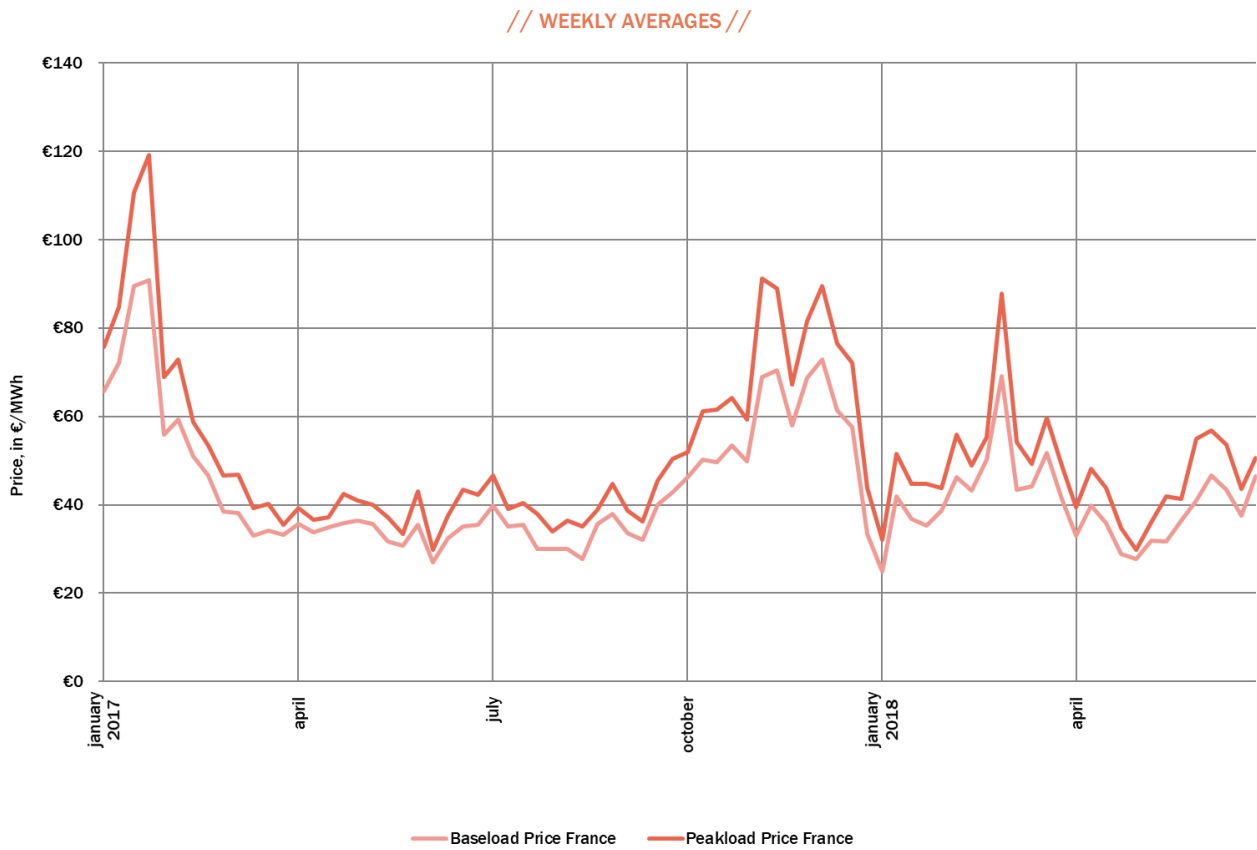
Source : Courtiers, EPD France – Analysis : CRE

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



Source : Courtiers, EPD France – Analysis : CRE

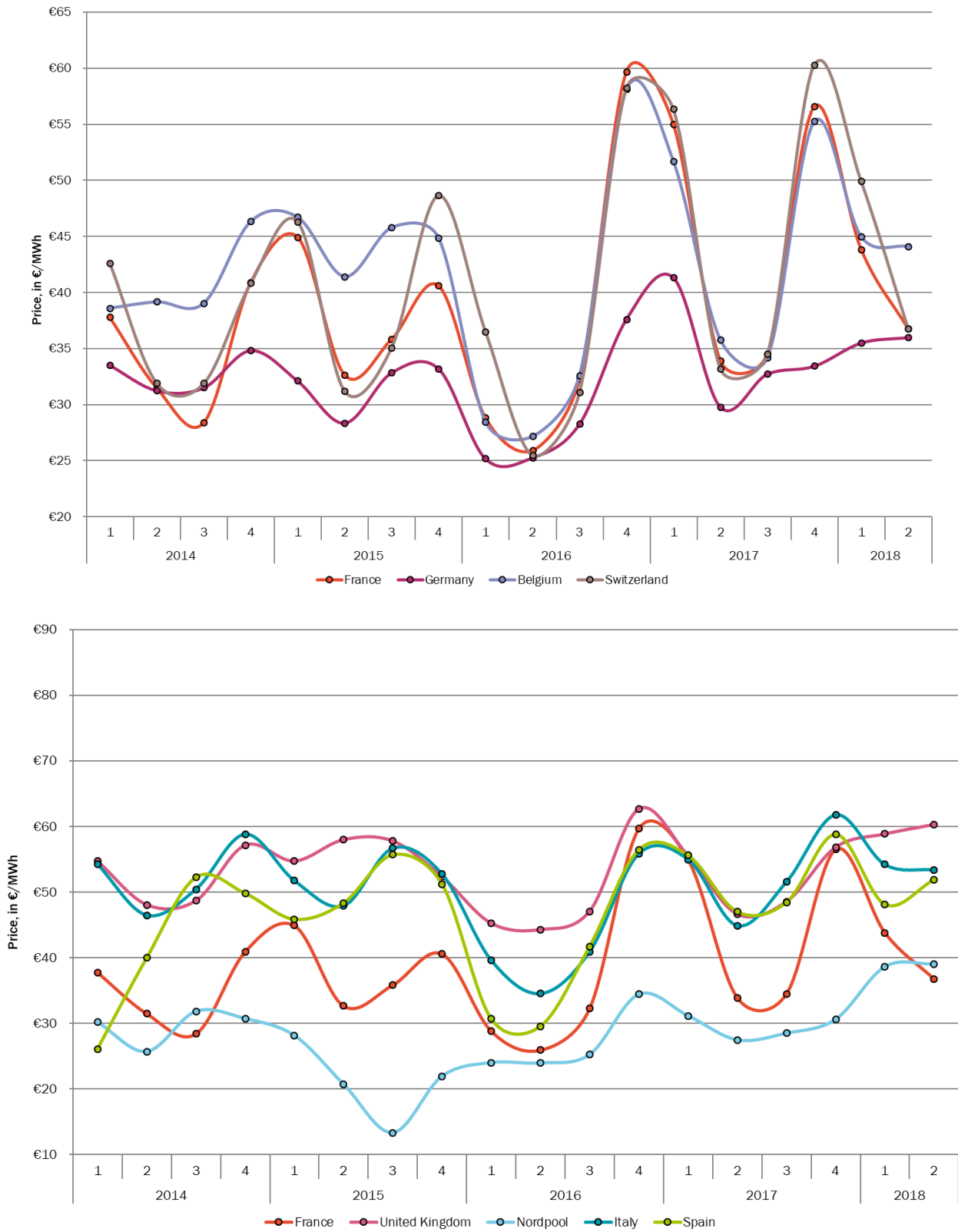
**Figure 9 : French Day-ahead prices on EPEX SPOT (baseload and peakload) EPEX SPOT**



Source : EPEX SPOT – Analysis : CRE

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

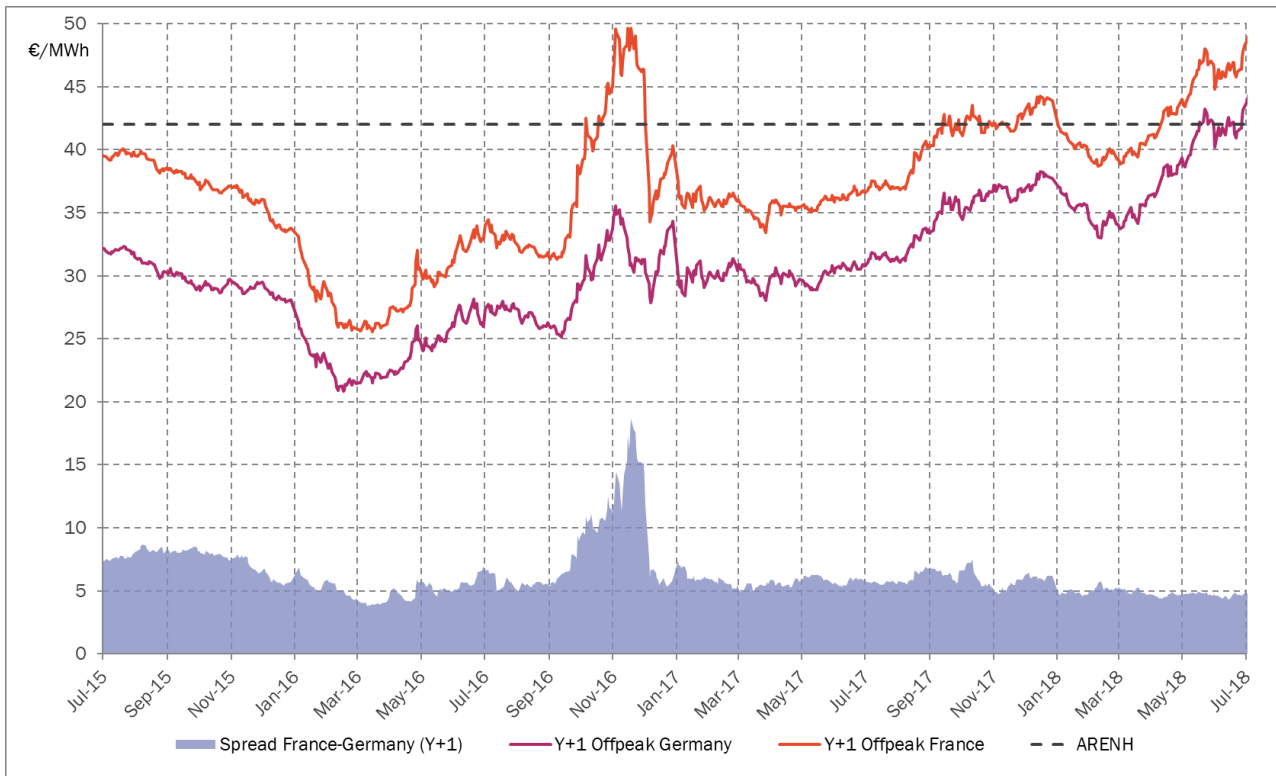
// QUARTERLY AVERAGES //



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

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

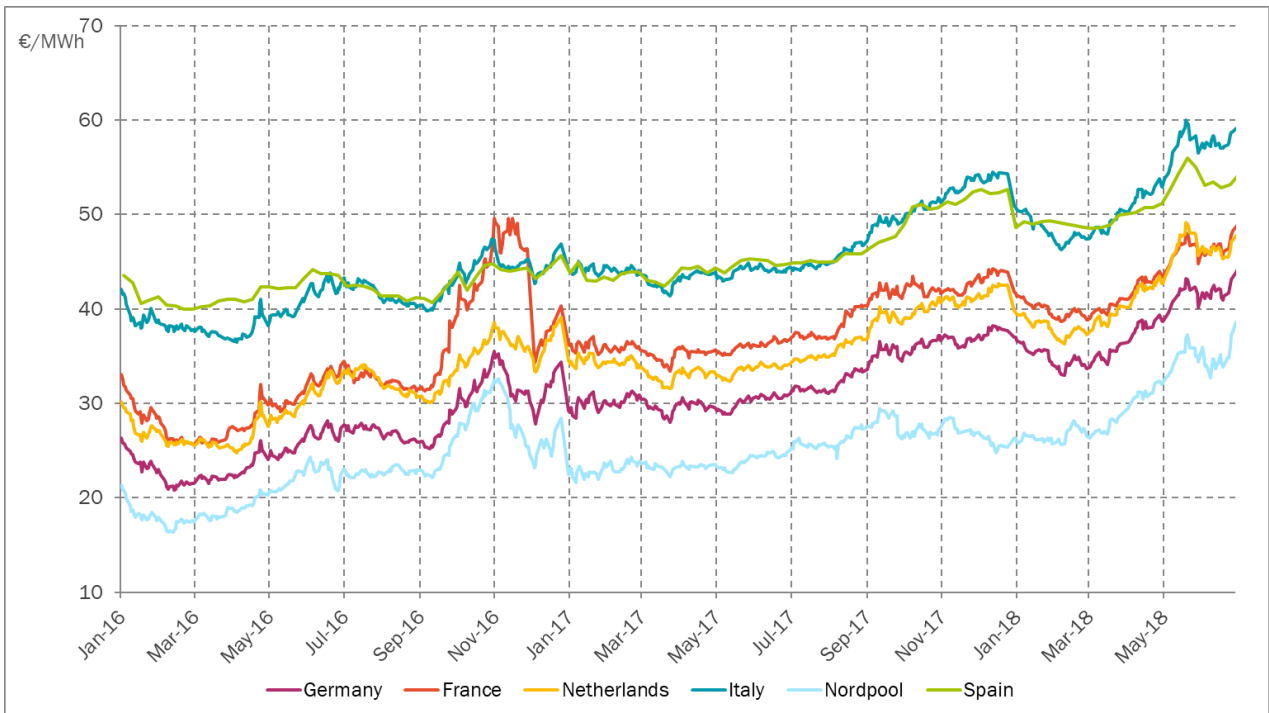
// DAILY VALUES //



Source : EEX Power Derivatives – Analysis : CRE

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

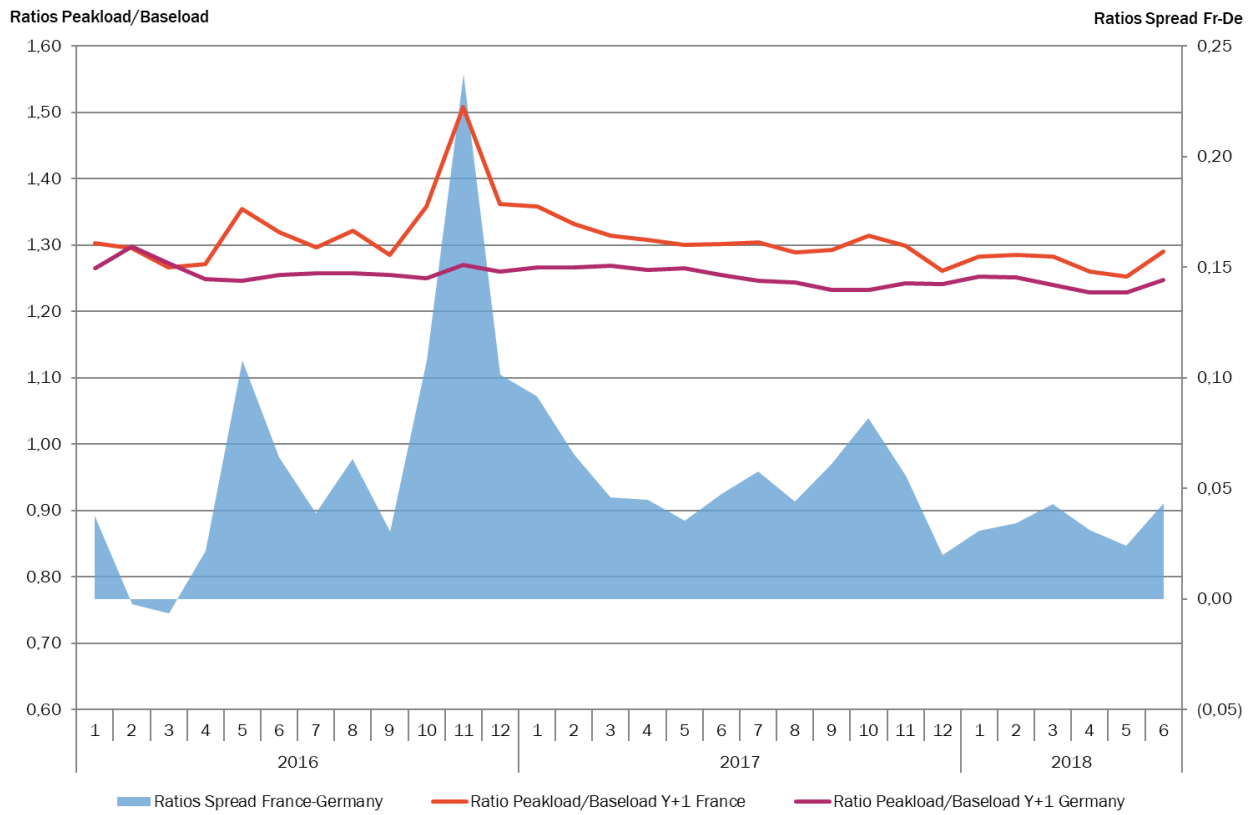
// DAILY VALUES //



Source : EEX Power Derivatives, Courtiers - Analysis : CRE

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

// MONTHLY AVERAGES //

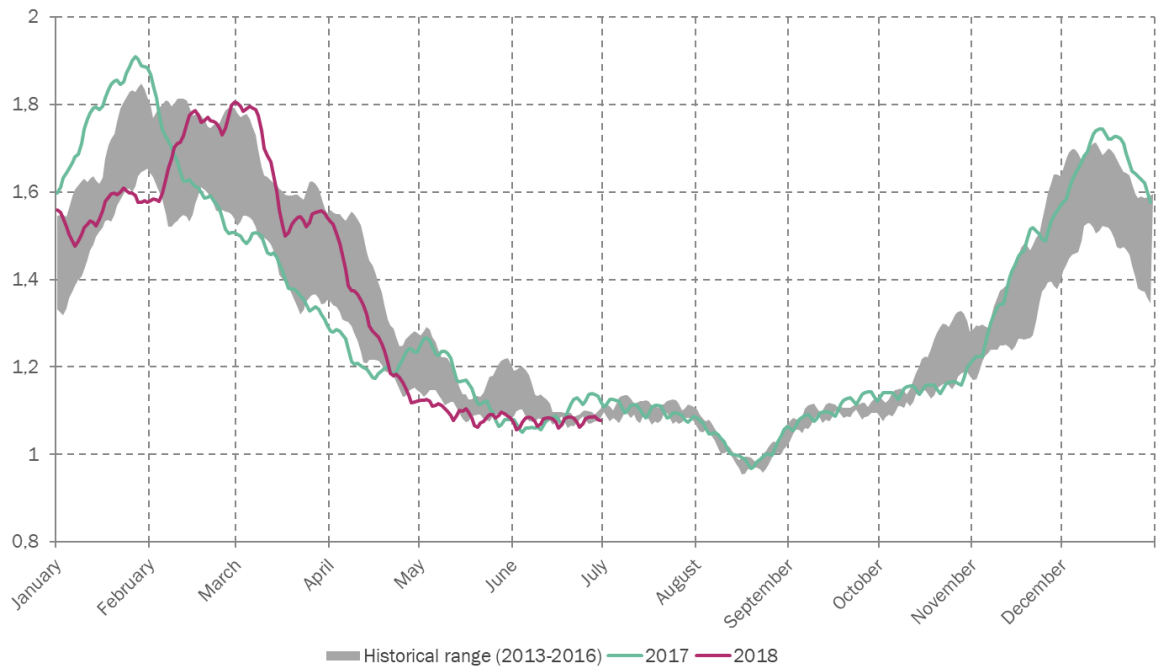


Source : EEX Power Derivatives – Analysis : CRE



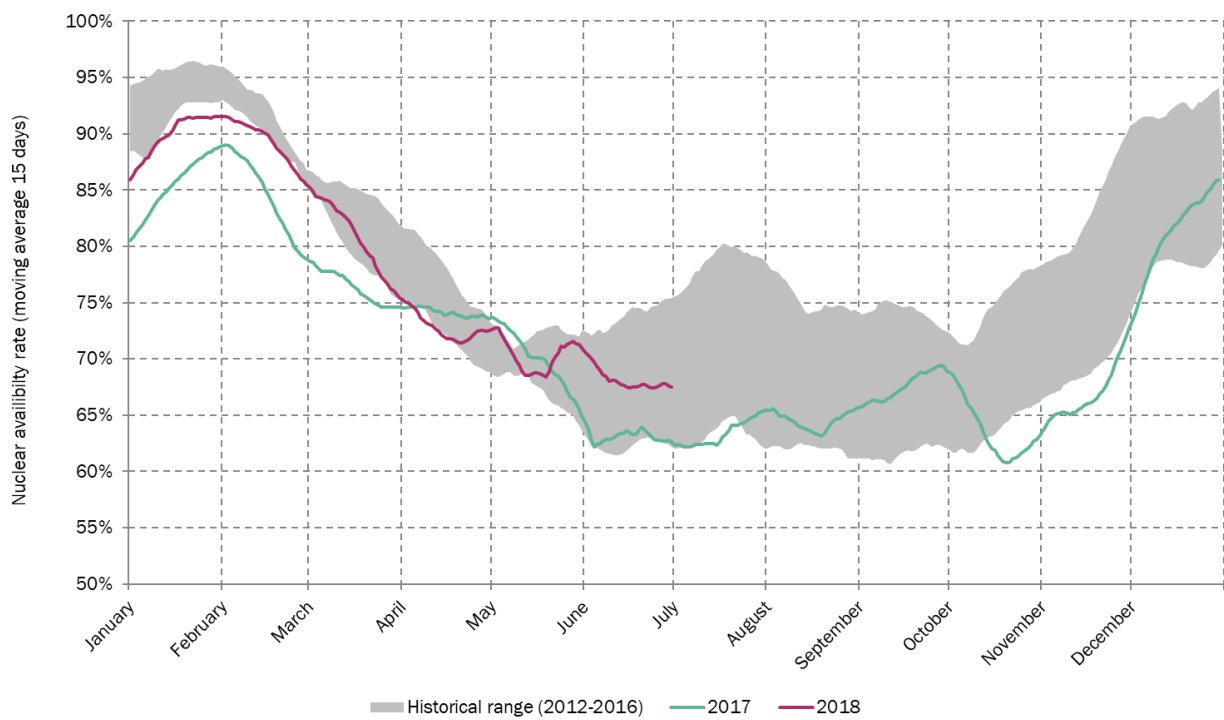
**Figure 14 : French electricity consumption**

Daily consumption (TWh) - moving average 15 days



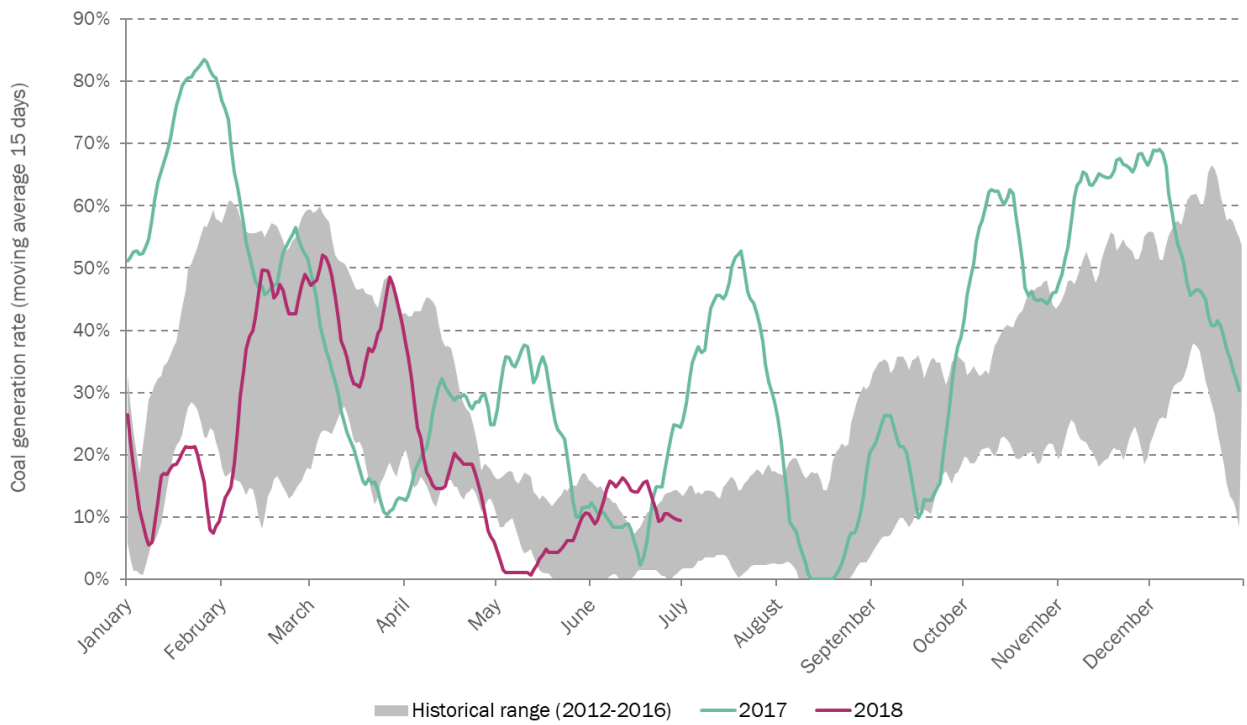
Source : RTE - Analysis : CRE

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



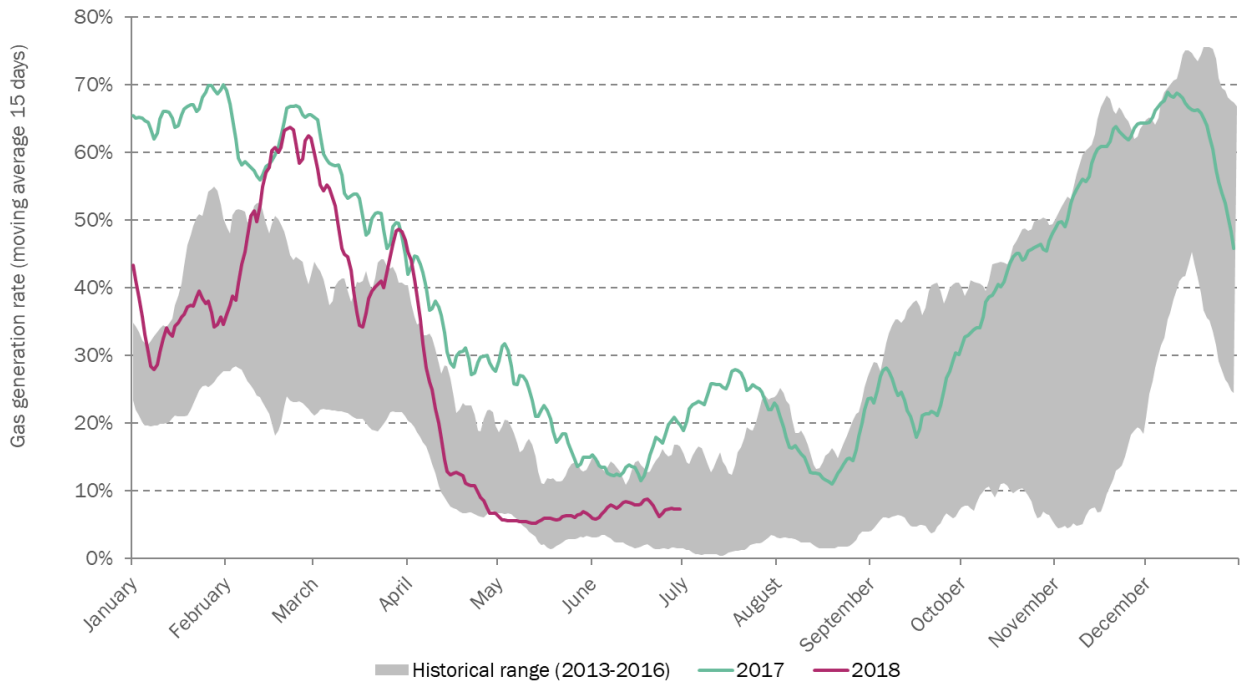
Source : RTE - Analysis : CRE

**Figure 16 : Average coal generation rate**



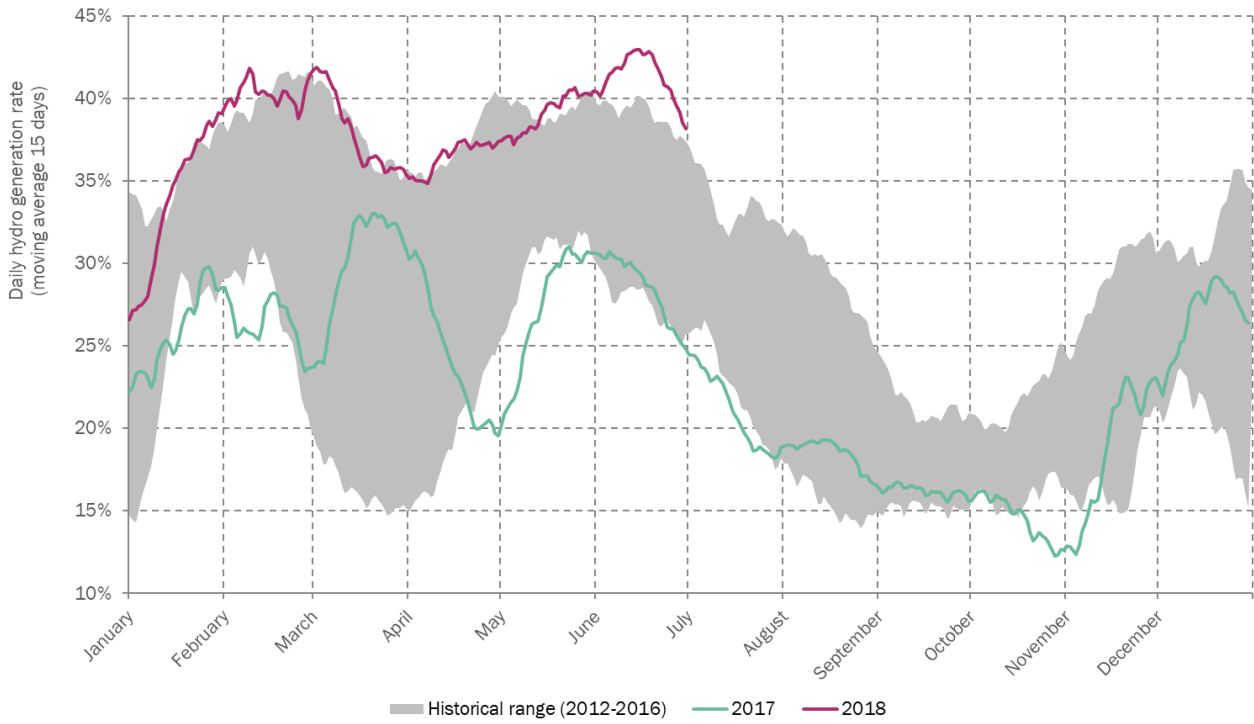
Source : RTE – Analysis : CRE

**Figure 17 : Average gas generation rate**



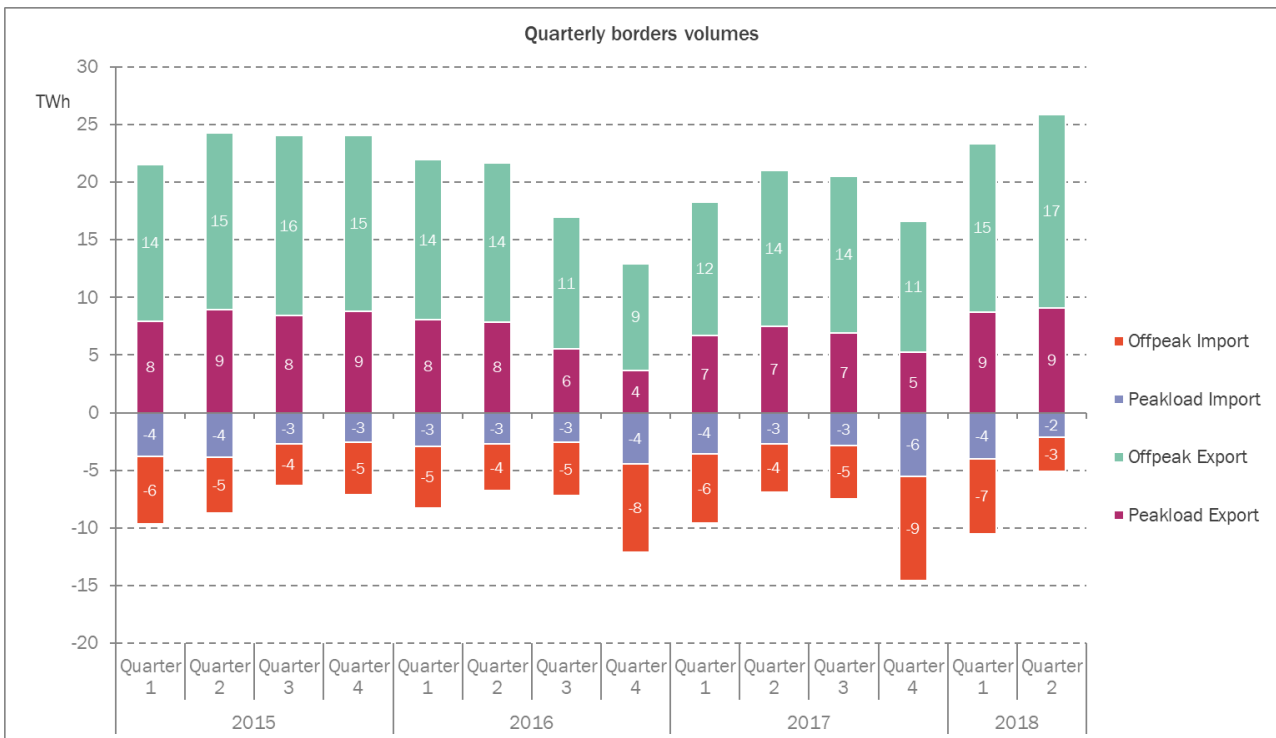
Source : RTE – Analysis : CRE

**Figure 18 : Hydraulic generation rate**



Source : RTE – Analysis : CRE

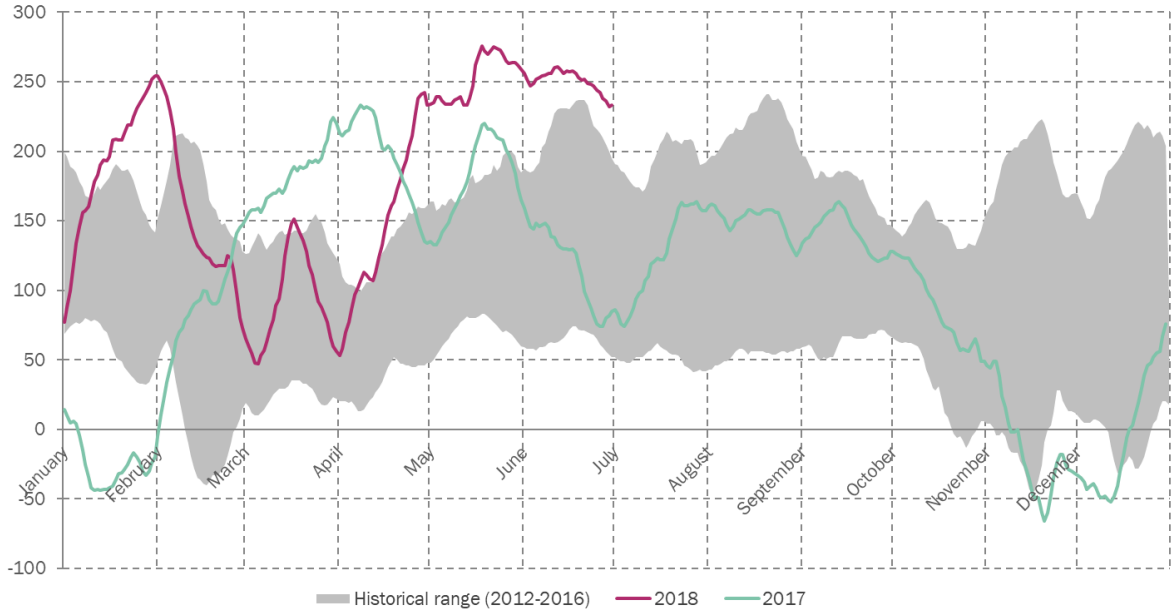
**Figure 19 : Imports and exports (peak/Off-peak)**



Source : RTE – Analysis : CRE

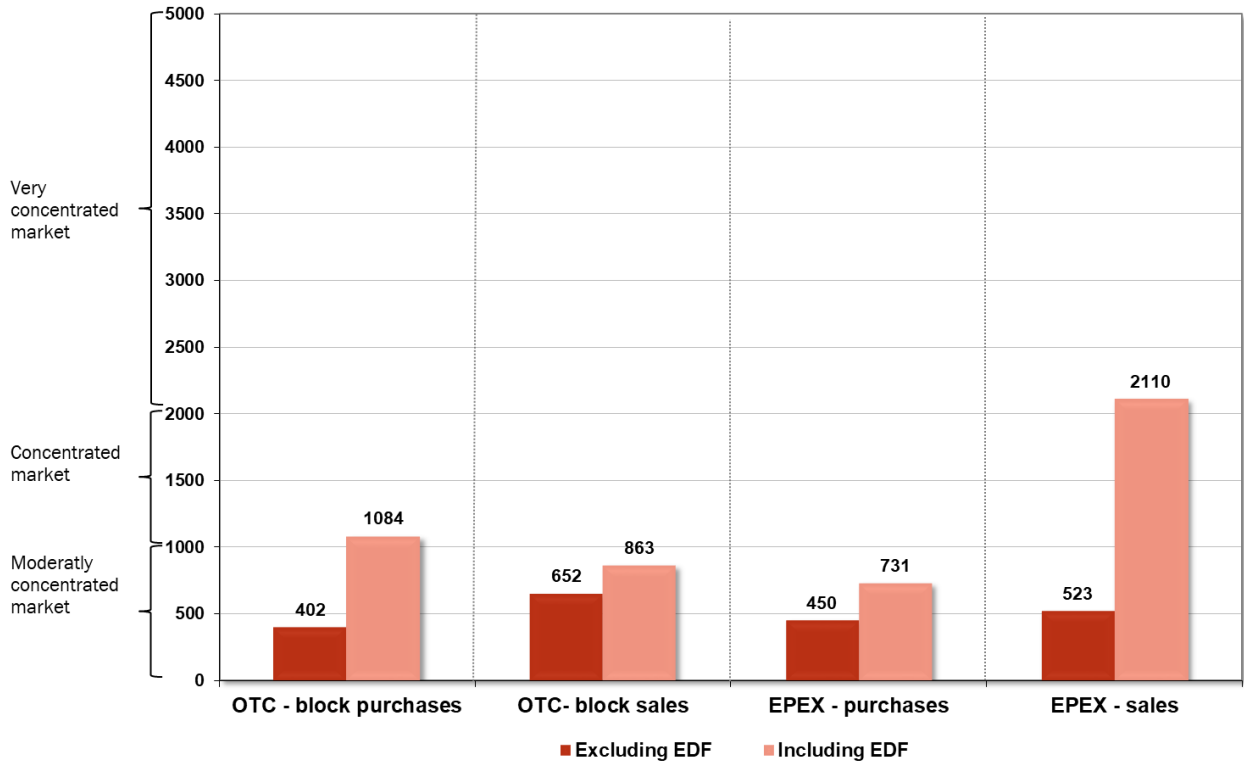
**Figure 20 : Export balance**

Daily net exports (GWh)  
moving average 15 days



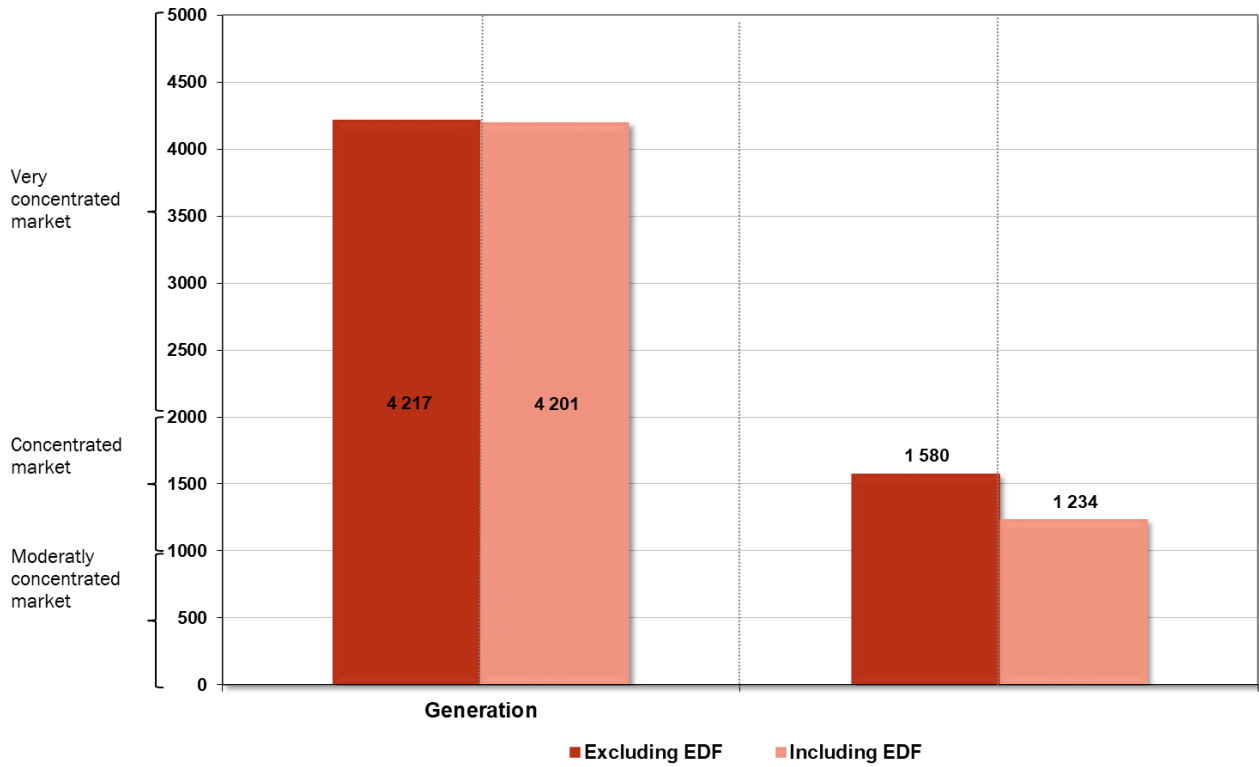
Source : RTE – Analysis : CRE

**Figure 21 : HHI concentration index – Energy wholesale market in Q2 2018**



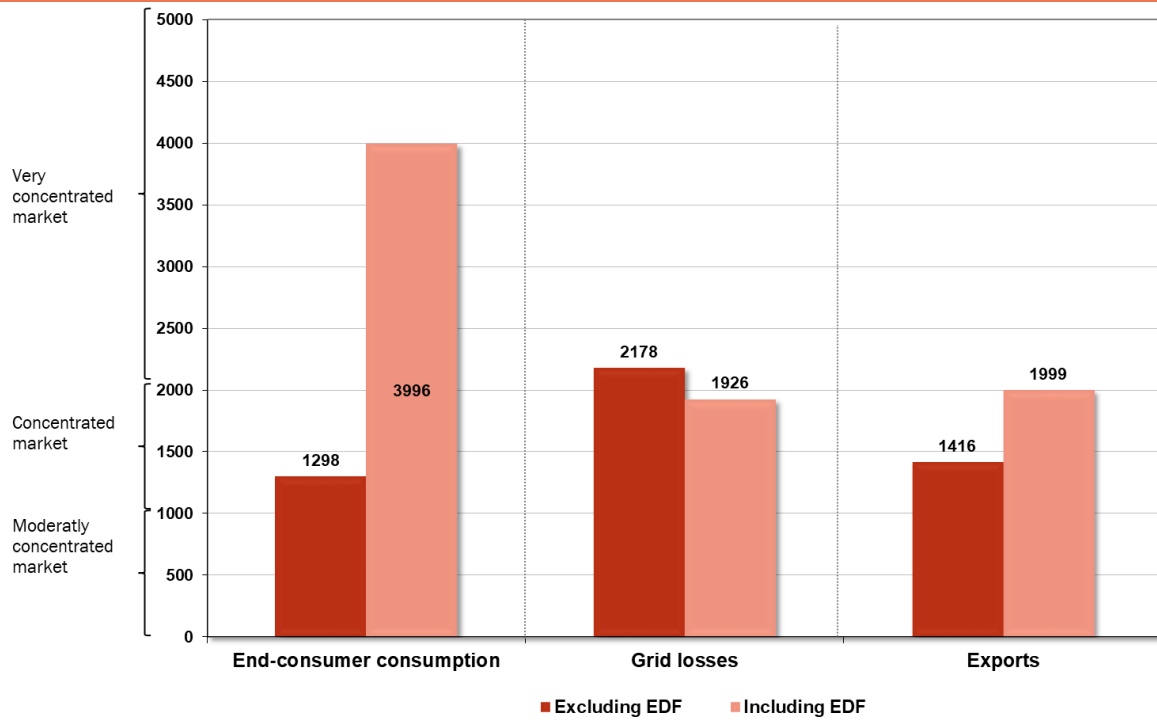
Source : EPEX SPOT, EEX Power Derivatives, Courtiers – Analysis : CRE

**Figure 22 : HHI concentration index – Injections in Q2 2018**



Source : RTE – Analysis : CRE

**Figure 23 : HHI concentration index – Withdrawals in Q2 2018**



Source : RTE – Analysis : CRE



## PART 2: WHOLESALE NATURAL GAS MARKET

### 1. KEY DATES

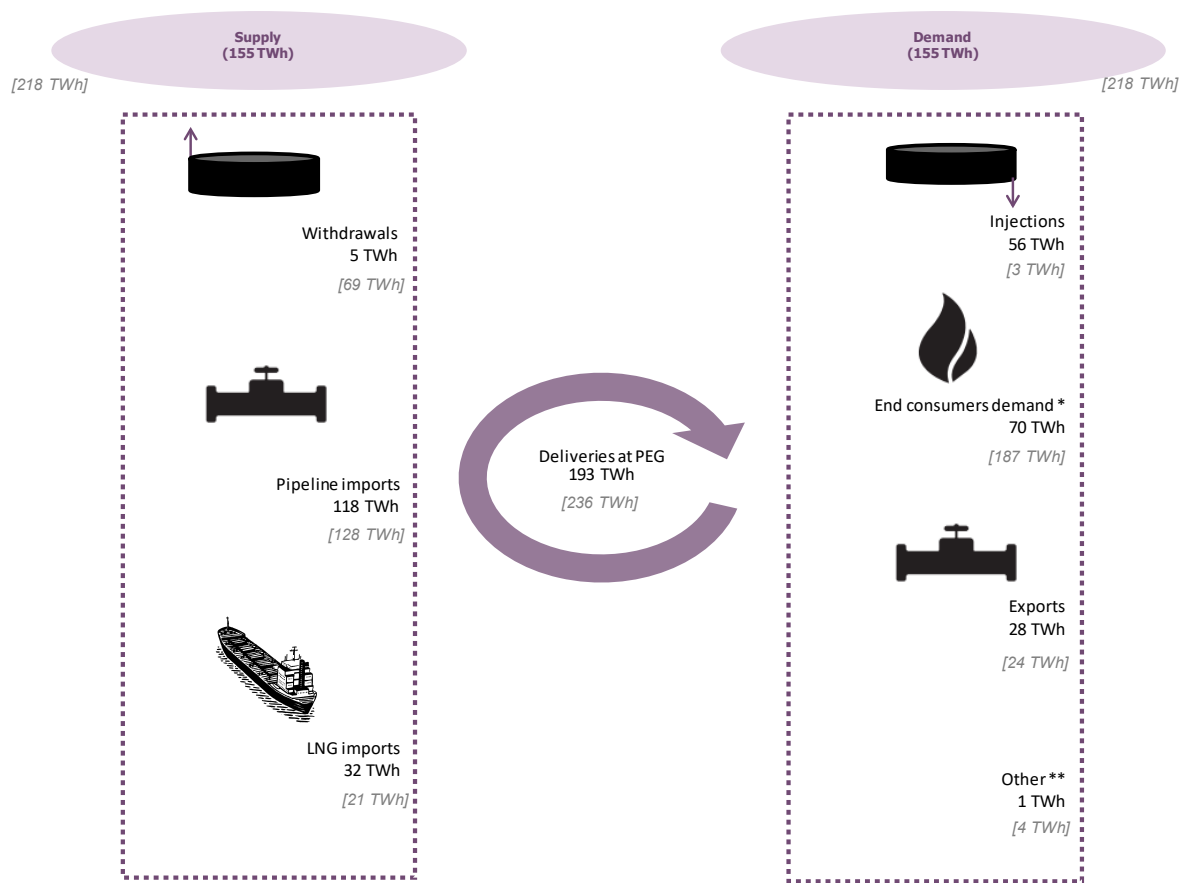
2004	First publication of price references for the French gas markets
January 2005	Launch of the French Gas Release program on a volume of 16.3 TWh/yr during 3 years
April 2007	Launch of the platform Pownext Balancing GRTgaz designed as a market access for the TSO in order to cover its daily balancing needs
2008	Accessibility to the wholesale market for consumers directly connected to GRTgaz transmission system
November 2008	Launch of Pownext Gas Spot and Pownext 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 Pownext Gas Spot platform (Pownext 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	Pownext launches a spread PEG Nord / PEG Sud contract on its platform Pownext Gas Spot
July 2011	GRTgaz and Pownext Gas Spot launch the first market coupling initiative in the European gas markets
December 2011	TIGF becomes a member of Pownext 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	Pownext 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	Pownext 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	Pownext 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 [Q1 2018] and Q2 2018

Source: GRTgaz, Teréga

**3. KEY DATA**
**Table 8 : Fundamentals**

Market fundamentals	Quarterly values					Quarterly variation		Yearly variation	
	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q2 2018 / Q1 2018		Q2 2018 / Q2 2017	
						In percentage	In value	In percentage	In value
<b>Entry and exit flows</b>									
Supply (TWh)	154	142	194	218	155	-29%	-63	0	1
Storages withdrawals	6	4	36	69	5	-93%	-64	-13%	-1
Imports	148	138	157	149	150	0%	1	1%	2
Pipeline	117	111	135	128	118	-8%	-10	1%	1
LNG	31	27	22	21	32	49%	11	4%	1
Demand (TWh)	154	142	194	218	155	-29%	-63	1%	1
Storages injections	37	46	9	3	56		53	49%	18
End consumer demand	80	62	163	187	70	-63%	-118	-13%	-10
Distribution consumers	43	24	102	135	39	-71%	-96	-9%	-4
Consumers connected to the transmission system	37	38	61	53	31	42%	-22	-17%	-6
Exports	35	33	20	24	28	20%	5	-19%	-7
Other	2	2	2	4	1	-67%	-3	-27%	0
Deliveries at PEG (TWh)	186	195	210	236	193	-18%	-43	4%	7
PEG Nord	152	160	179	198	162	-18%	-35	7%	11
TRS	34	35	32	38	30	-21%	-8	-10%	-3
<b>Infrastructure figures</b>									
North-to-South link	89%	92%	97%	78%	99%		22%		10%
Availability of the North-to-South link	79%	81%	94%	92%	70%		-22%		-10%
Utilization of Virtualys (Entry)	60%	57%	59%	45%	50%		5%		-10%
Utilization of Obergaibach interconnection (Entry)	41%	64%	53%	56%	75%		18%		33%
Stock levels (TWh as at the end of the Quarter)	59	98	70	4	12	202%	8	-79%	-46
Avg. Net variation of French stocks (GWh/j)	348	447	-303	-732	556	-176%	1288	60%	209
Avg. LNG terminals emissions (GWh/j)	338	293	240	238	352	48%	114	4%	13
Avg. Exports from France to Spain (GWh/j)	123	135	118	125	70	-44%	-55	-43%	-53

\* 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	
	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q2 2018 / Q1 2018		Q2 2018 / Q2 2017	
						In percentage	In value	In percentage	In value
<b>Spot prices (€/MWh)</b>									
PEG Nord day-ahead (avg.)	15,6	16,0	19,6	21,2	21,0	-1%	-0,2	35%	5,4
TRS day-ahead (avg.)	15,9	16,2	22,2	21,2	22,8	8%	1,6	44%	7,0
Day-ahead PEG Nord/Sud spread (avg.)	0,3	0,3	2,6	0,0	1,9	4491%	1,8	505%	1,6
Day-ahead PEG Nord/TTF Spread (avg.)	0,0	-0,1	0,4	-0,3	-0,1	-48%	0,1	576%	-0,1
<b>Forward prices (€/MWh)</b>									
PEG Nord M+1 (avg.)	15,3	15,9	19,9	19,0	20,9	10%	1,9	36%	5,5
PEG Nord Y+1 (avg.)	16,6	16,6	18,2	17,4	19,8	14%	2,4	19%	3,2
M+1 PEG Nord/Sud spread (avg.)	0,8	0,8	4,0	0,6	0,8	42%	0,2	0%	0,0
M+1 PEG Nord/TTF spread (avg.)	0,2	0,2	0,3	0,3	0,2	-25%	-0,1	-9%	0,0
Summer-ahead/Winter-ahead spread * (avg.)	1,8	1,4	1,5	1,3	0,9	-30%	-0,4	-49%	-0,9

\* 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	
	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q2 2018 / Q1 2018		Q2 2018 / Q2 2017	
						In percentage	In value	In percentage	In value
<b>Activity in the French wholesale gas markets</b>									
Natural gas exchanged at PEG* (TWh)	129	144	150	175	142	-19%	-33	11%	14
% of national consumption	162%	232%	92%	93%	205%				
<b>Trading volumes in the French intermediated markets</b>									
<b>Spot market (TWh)</b>	<b>44</b>	<b>39</b>	<b>50</b>	<b>60</b>	<b>46</b>	<b>-23%</b>	<b>-14</b>	<b>5%</b>	<b>2</b>
Intraday	5	6	9	10	7	-26%	-2.6	37%	1.9
Day Ahead	25	23	28	31	24	-23%	-7.3	-3%	-0.7
Exchange (DA, WD, WE, other spot)	38	33	45	53	38	-27%	-14.5	1%	0.3
Brokers (DA, WD, WE, other spot)	6	6	5	7	8	10%	0.7	28%	1.7
<b>Forwards market (TWh)</b>	<b>126</b>	<b>100</b>	<b>68</b>	<b>186</b>	<b>80</b>	<b>-57%</b>	<b>-105</b>	<b>-36%</b>	<b>-46</b>
M+1	32	31	21	24	21	-16%	-3.8	-35%	-11.2
Q+1	24	4	15	2	11	478%	9.5	-53%	-12.8
S+1	20	12	14	75	14	-81%	-60.7	-30%	-5.8
Y+1	10	9	4	10	3	-68%	-6.6	-70%	-7.3
Exchange (all maturities)	6	8	3	4	3	-36%	-1.5	-57%	-3.6
Brokers (all maturities)	120	92	65	181	78	-57%	-103.5	-35%	-42.0
<b>Number of transactions in the French intermediated markets</b>									
<b>Spot market</b>	<b>35318</b>	<b>29541</b>	<b>41303</b>	<b>45148</b>	<b>36358</b>	<b>-19%</b>	<b>-8790</b>	<b>3%</b>	<b>1040</b>
Intraday	6 273	6 864	8 618	9 319	7 766	-17%	-1553	24%	1493
Day Ahead	23 237	18 628	26 877	28 584	22 588	-21%	-5996	-3%	-649
Exchange (DA, WD, WE, other spot)	33 283	27 486	39 574	43 577	33 535	-23%	-10042	1%	252
Brokers (DA, WD, WE, other spot)	2 035	2 055	1 729	1 571	2 823	80%	1252	39%	788
<b>Forwards market</b>	<b>1647</b>	<b>1478</b>	<b>1040</b>	<b>1648</b>	<b>1022</b>	<b>-38%</b>	<b>-626</b>	<b>-38%</b>	<b>-625</b>
M+1	918	960	605	811	561	-31%	-250	-39%	-357
Q+1	240	63	191	24	105	338%	81	-56%	-135
S+1	91	73	52	300	60	-80%	-240	-34%	-31
Y+1	50	44	15	39	16	-59%	-23	-68%	-34
Exchange (all forwards)	311	303	147	176	157	-11%	-19	-50%	-154
Brokers (all forwards)	1 336	1 175	893	1 472	865	-41%	-607	-35%	-471
<b>Concentration of the natural gas market in France</b>									
Number of shippers active in the market	95	98	107	103	98	-5%	-5	3%	3
Active in Powernext Gas Spot	53	56	56	58	56	-3%	-2	6%	3
Active in Powernext Gas Futures	36	31	28	31	32	3%	1	-11%	-4

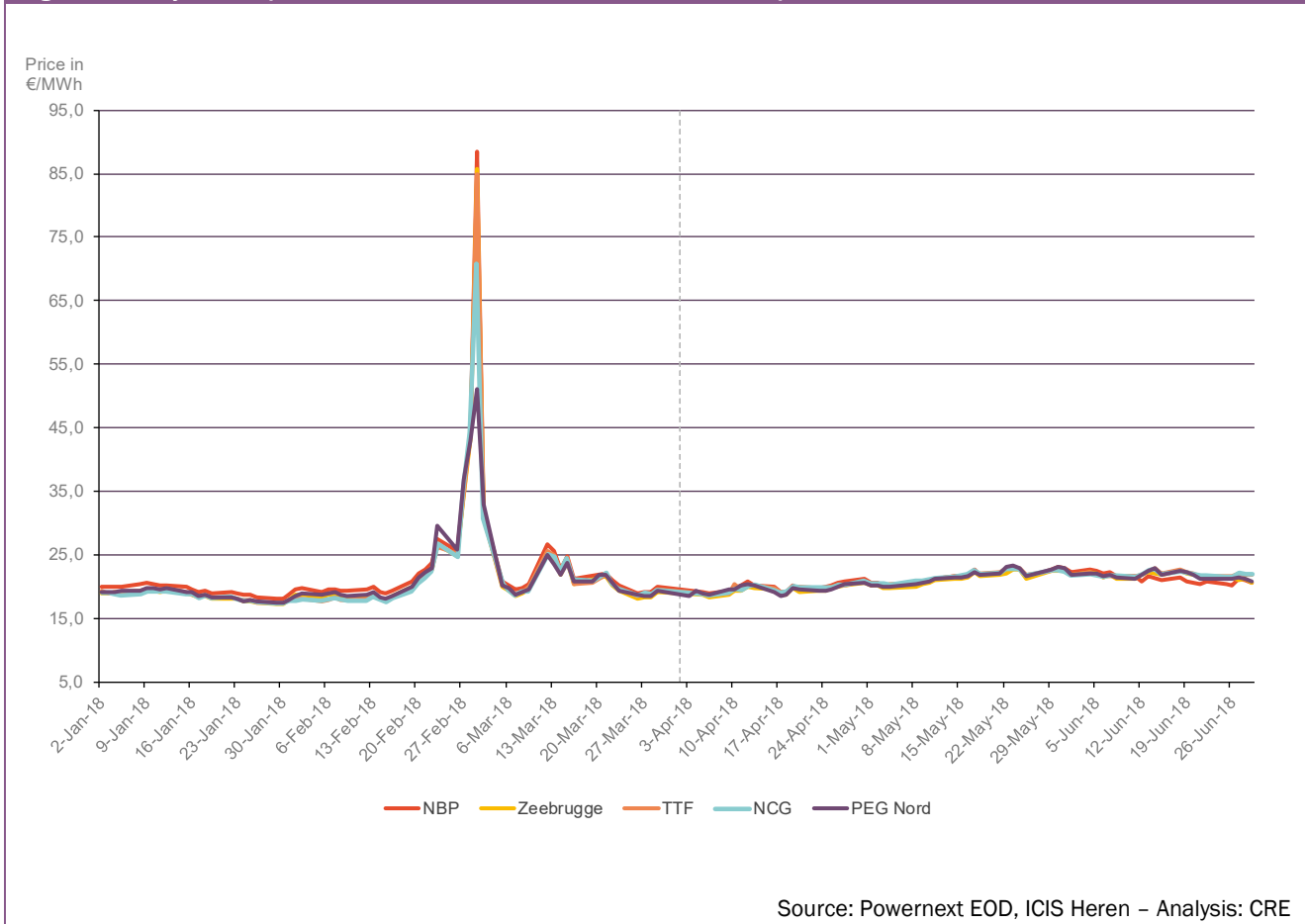
\* Deliveries resulting from exchanges in the intermediated markets in France

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

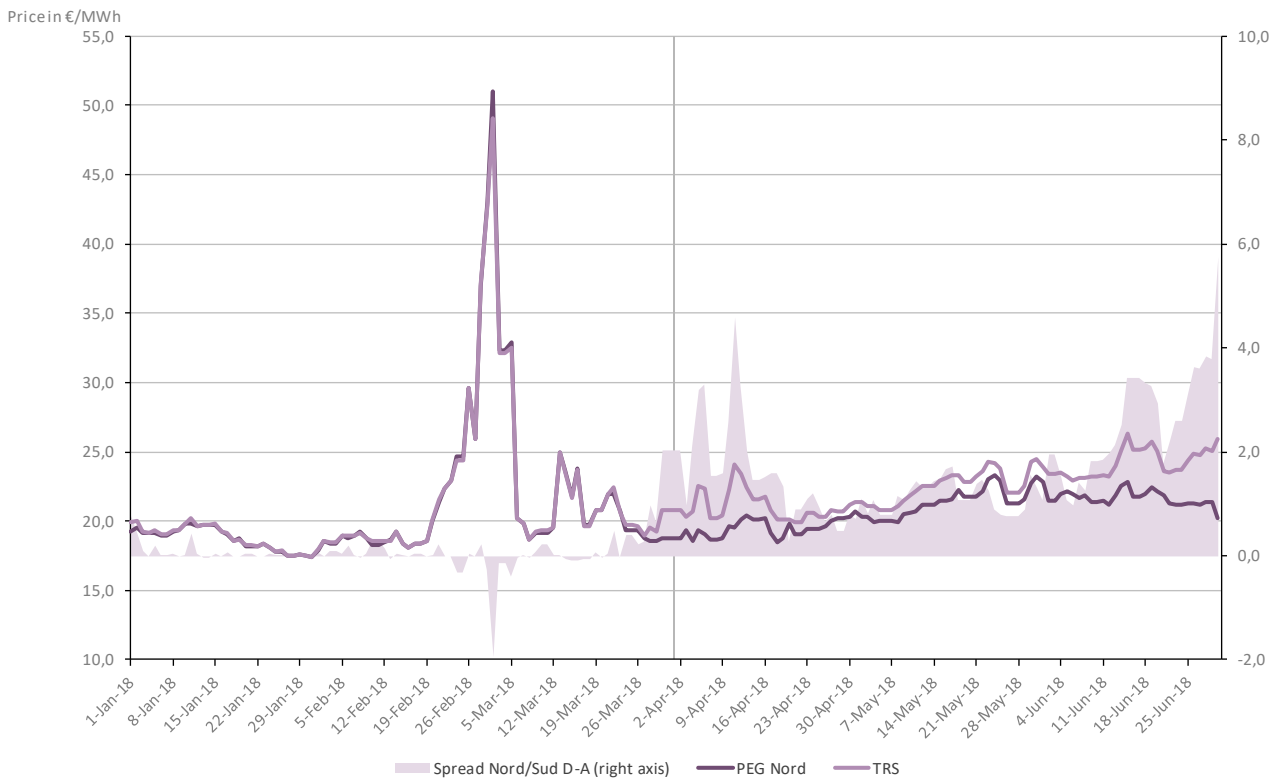
**4. FIGURES**

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

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

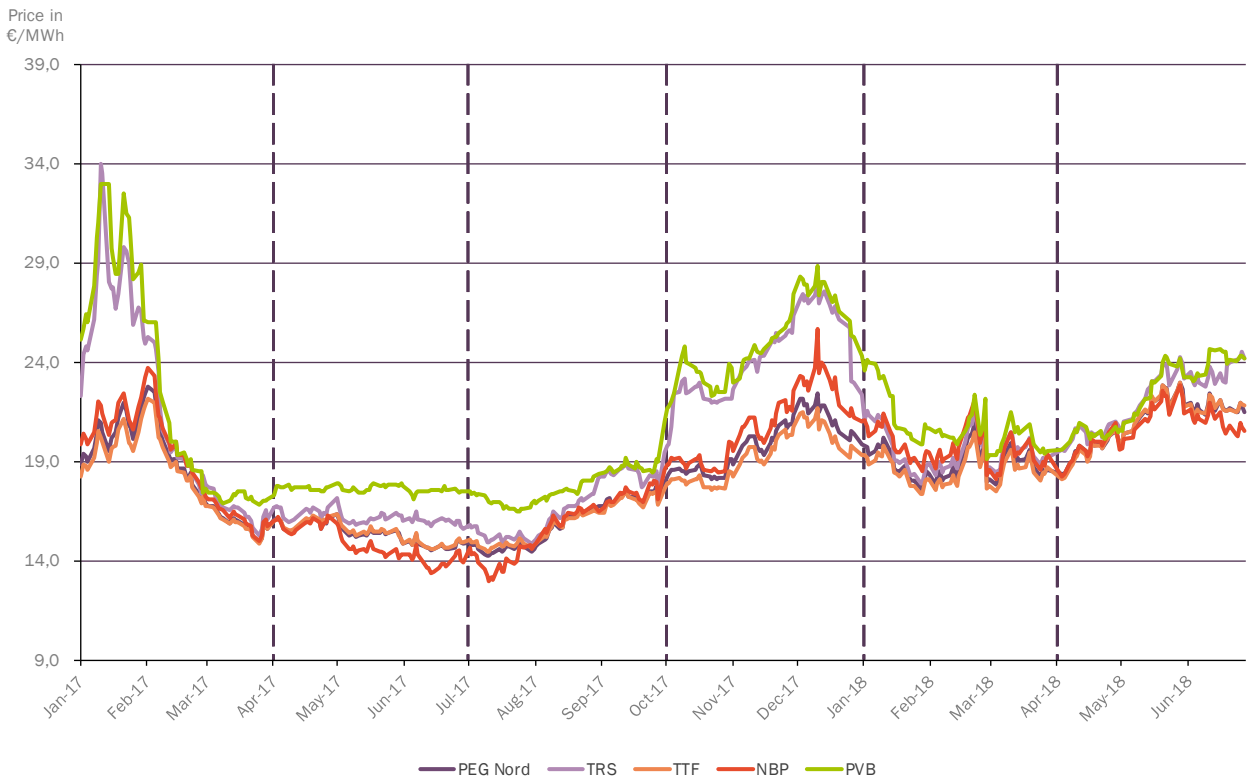


**Figure 26: Day-ahead prices in the wholesale market in France**



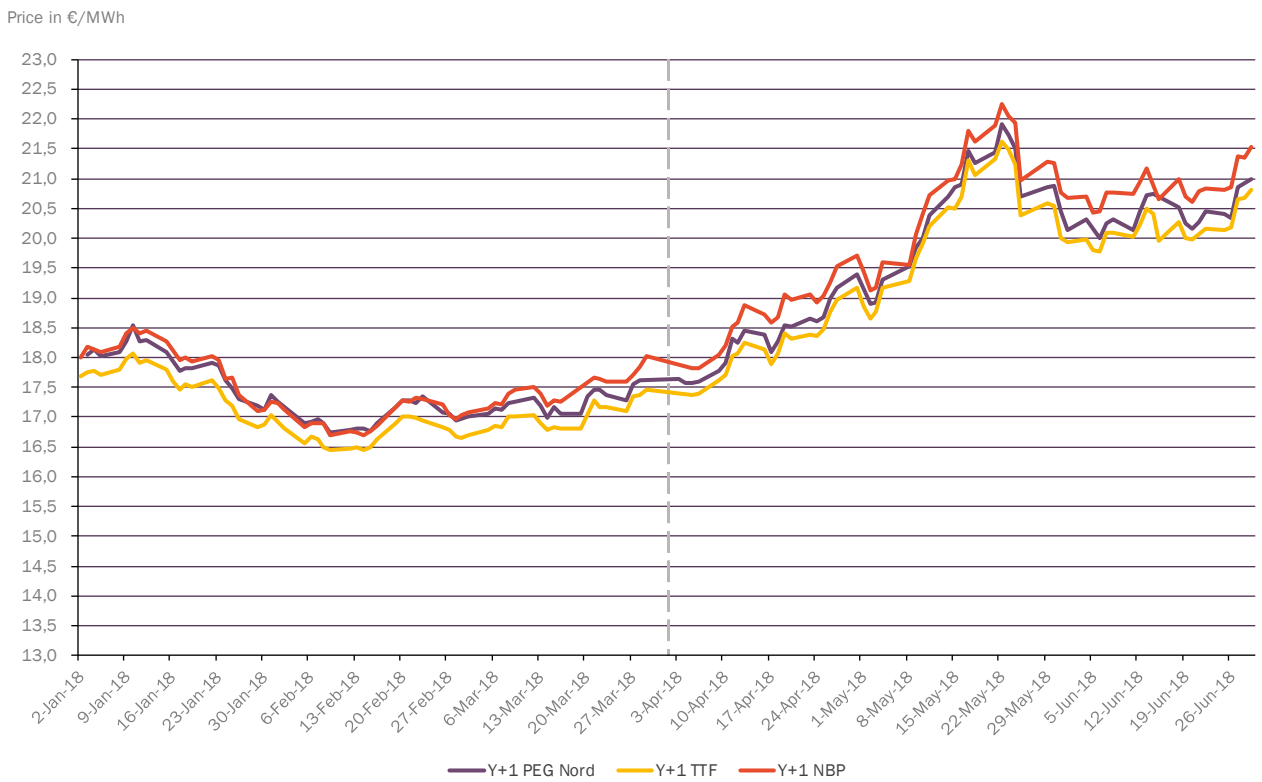
Source: Powernext EOD, ICIS Heren for TRS – Analysis: CRE

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



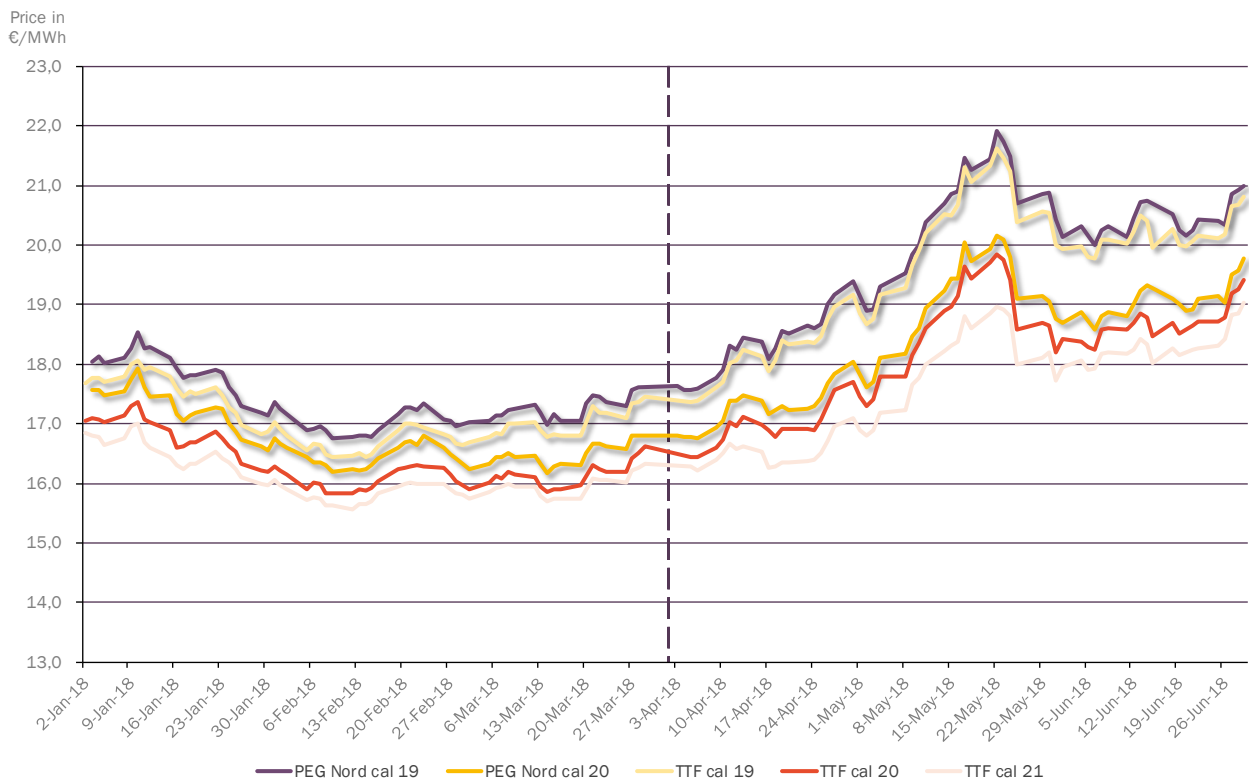
Source: Powernext, ICIS Heren – Analysis: CRE

**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**

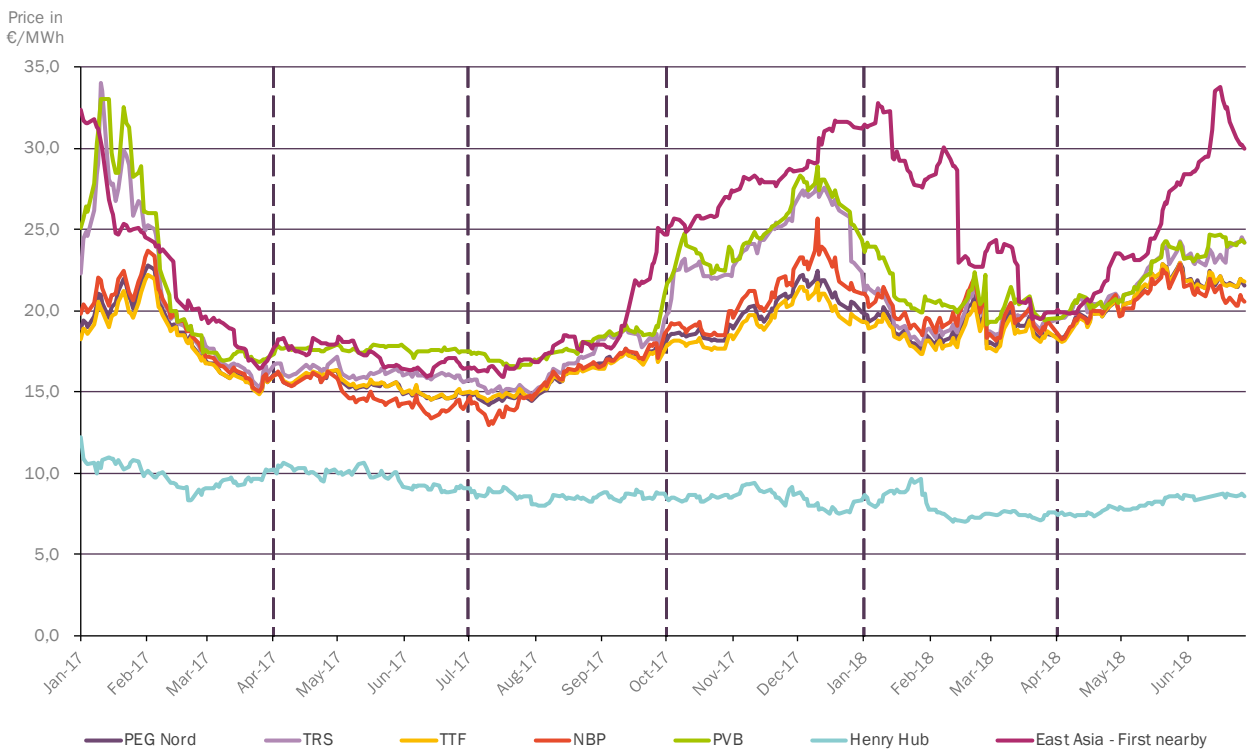


Source: Powernext, ICIS Heren – Analysis: CRE



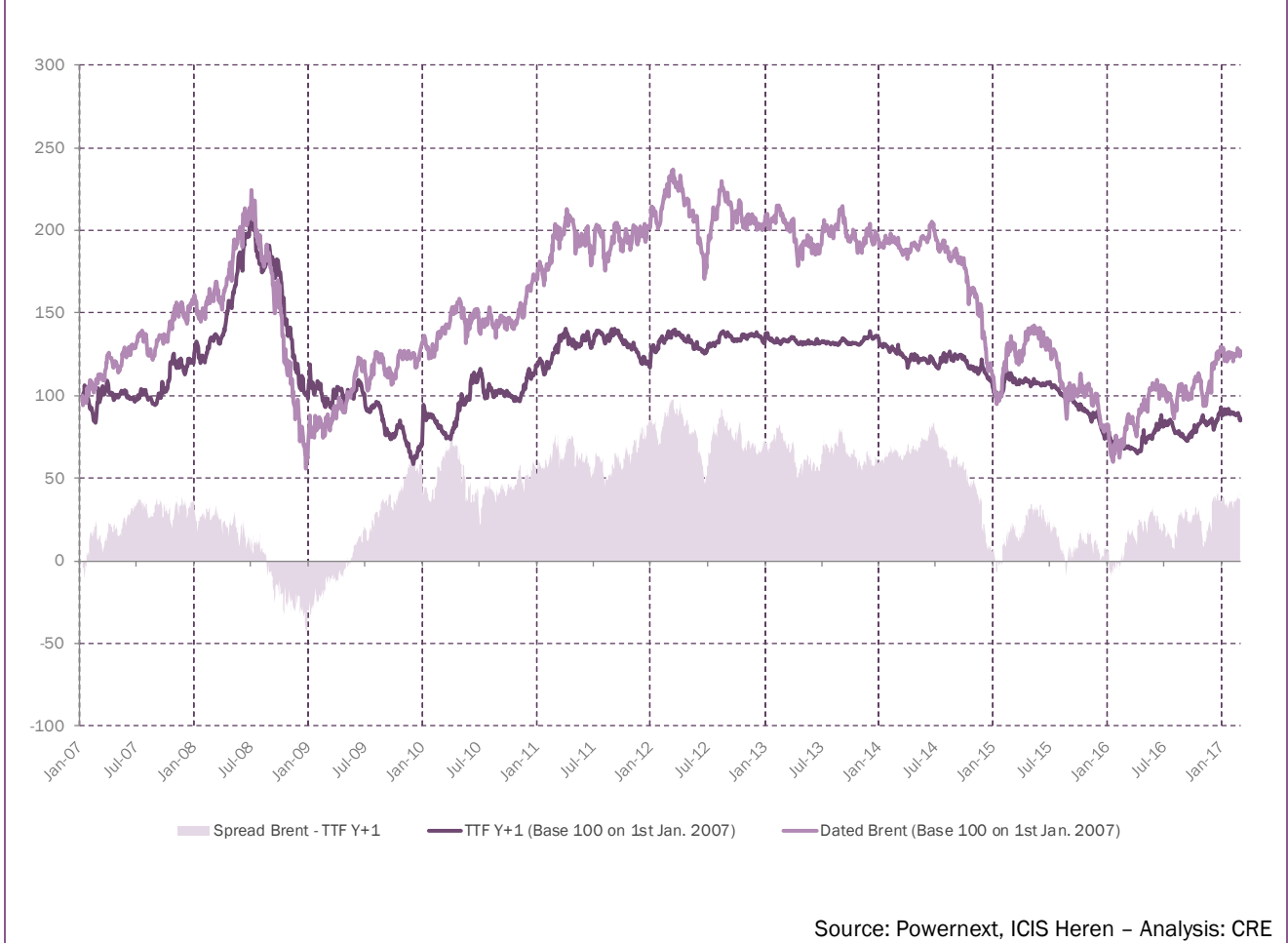
**4.2 Global markets**

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



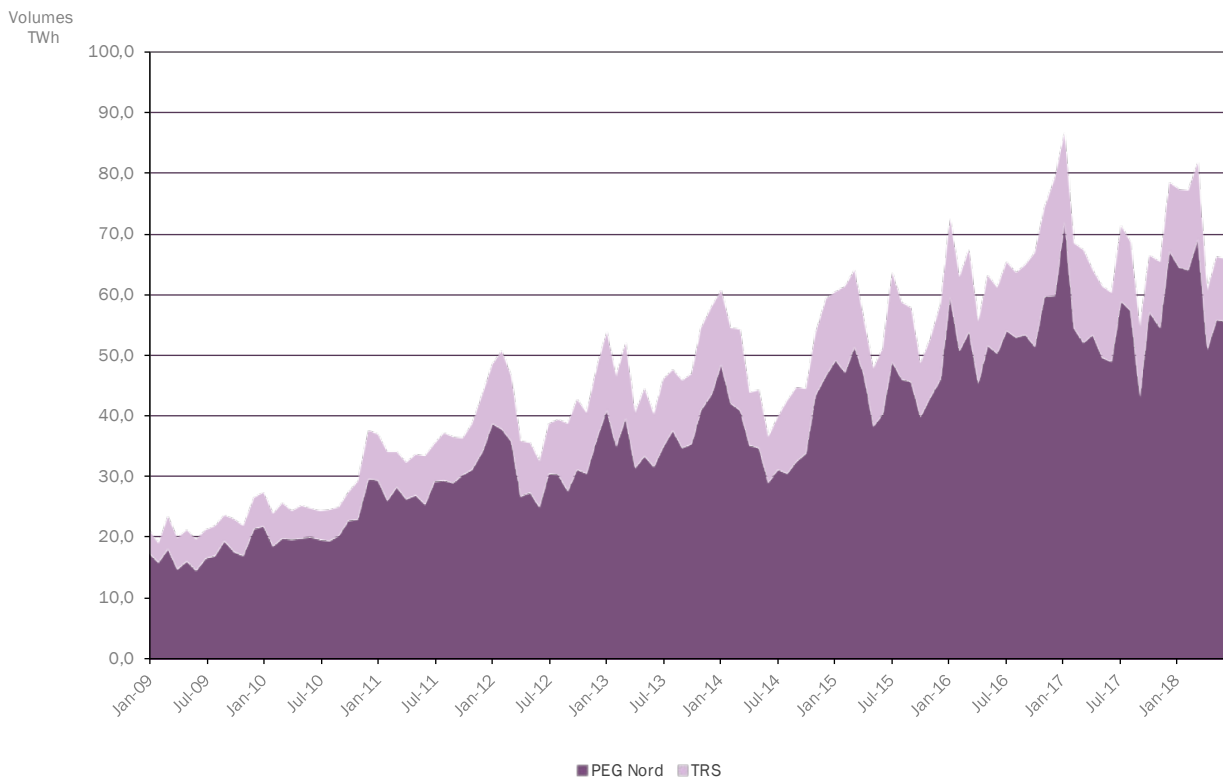
Source: Powernext, ICIS Heren – Analysis: CRE

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



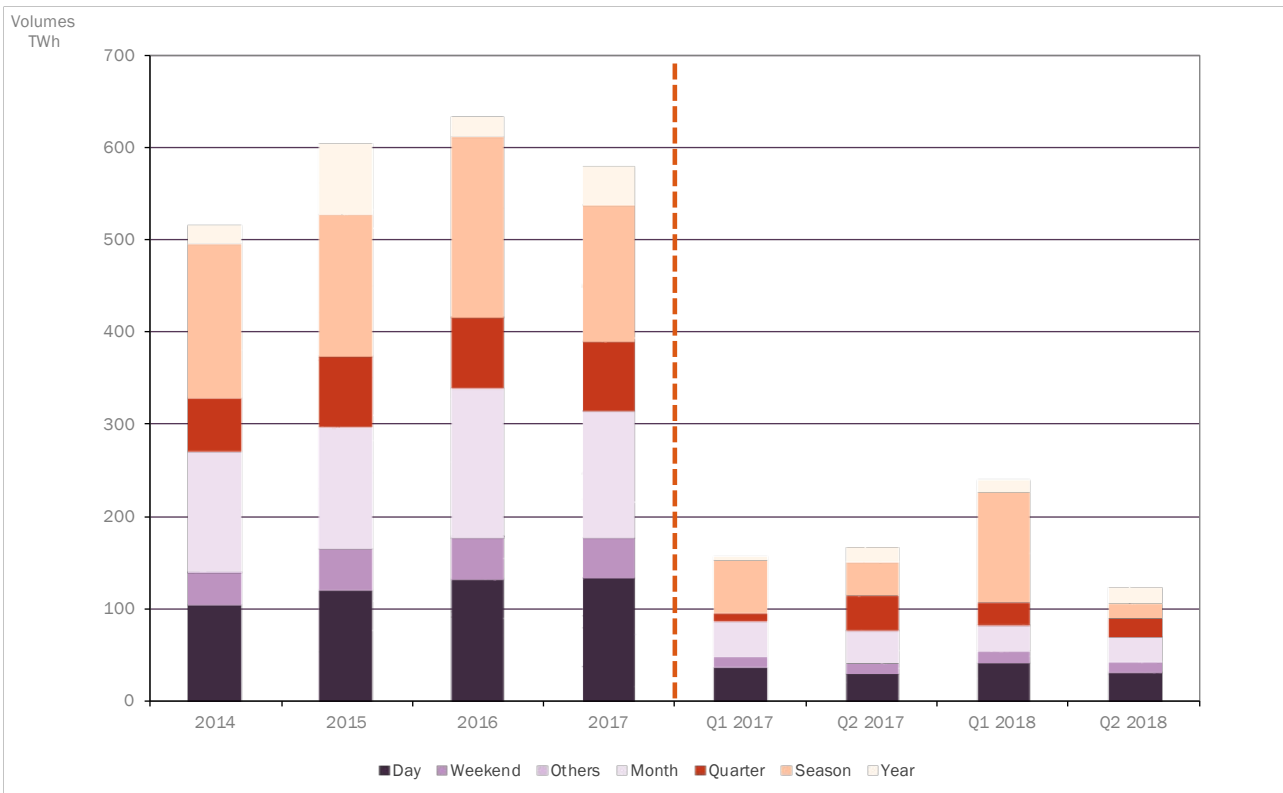
### 4.3 Development of the French natural gas markets

Figure 32: Deliveries at PEGs



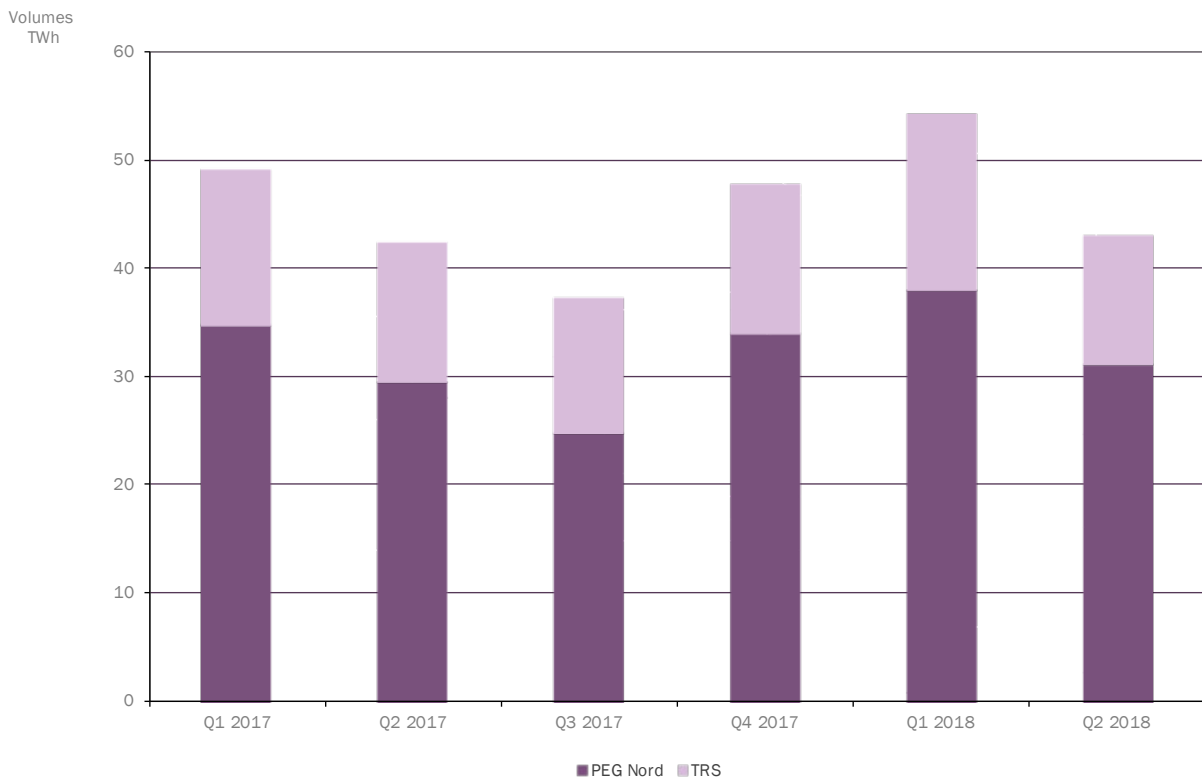
Source: GRTgaz, Teréga – Analysis: CRE

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



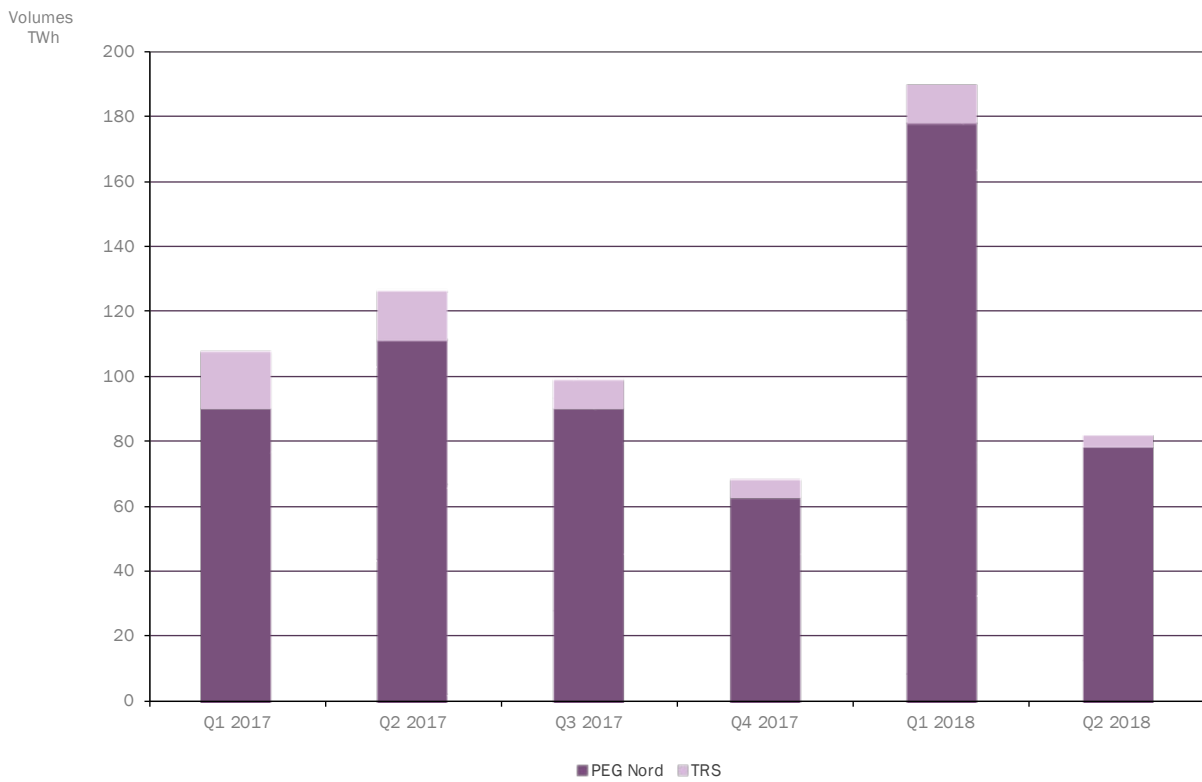
Source: Powernext, Brokers – Analysis: CRE

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



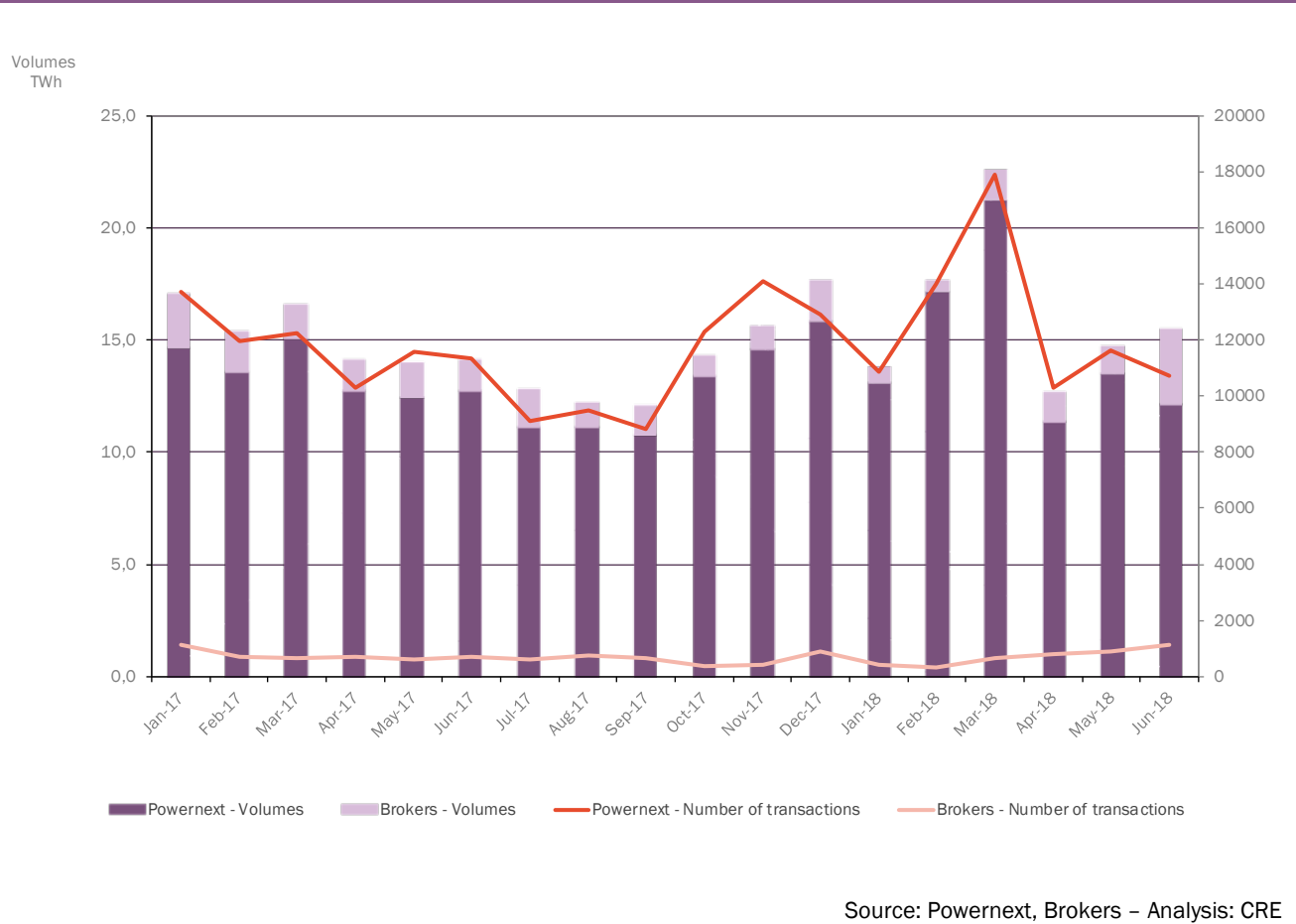
Source: Powernext, Brokers – Analysis: CRE

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

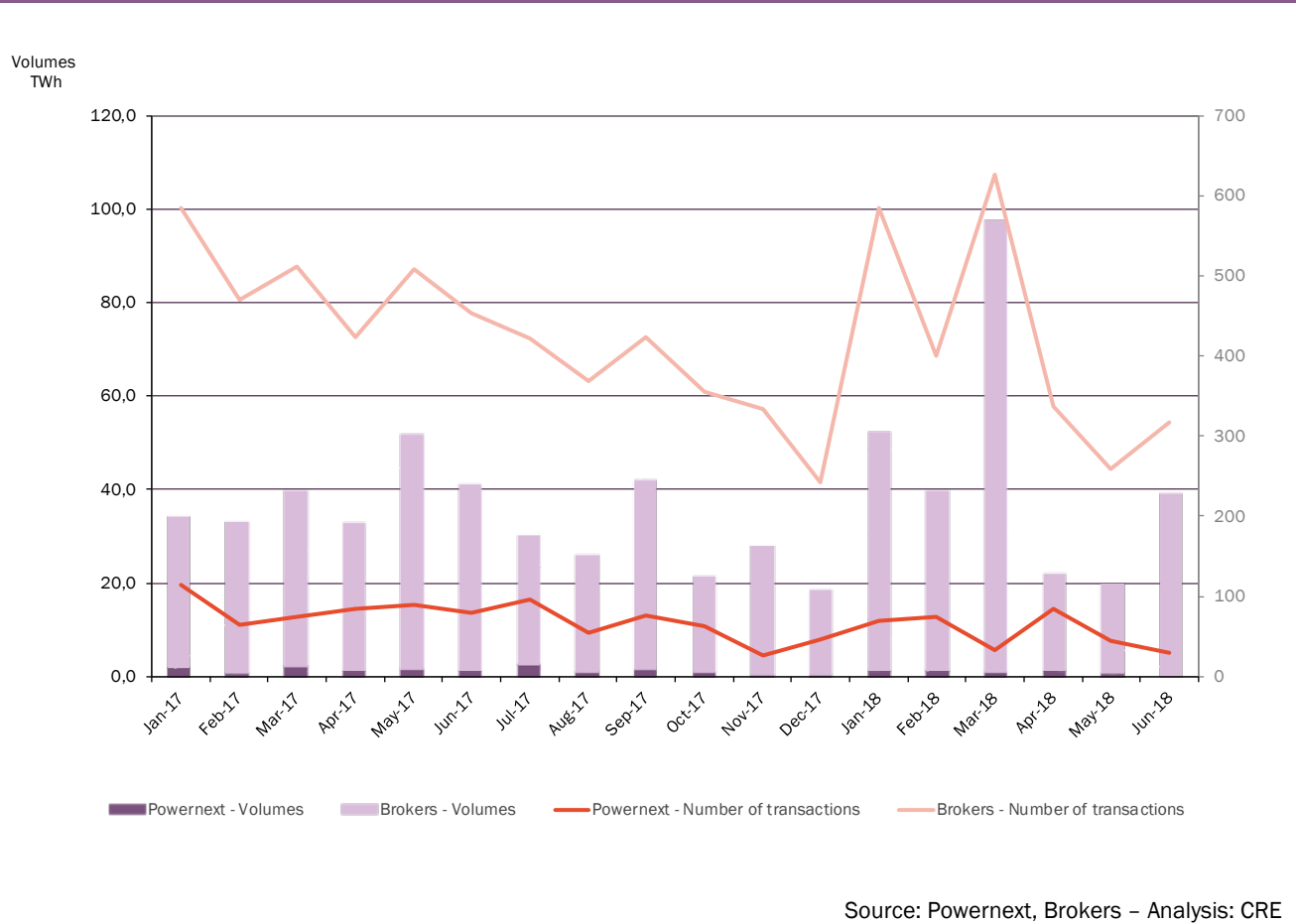


Source: Powernext, Brokers – Analysis: CRE

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

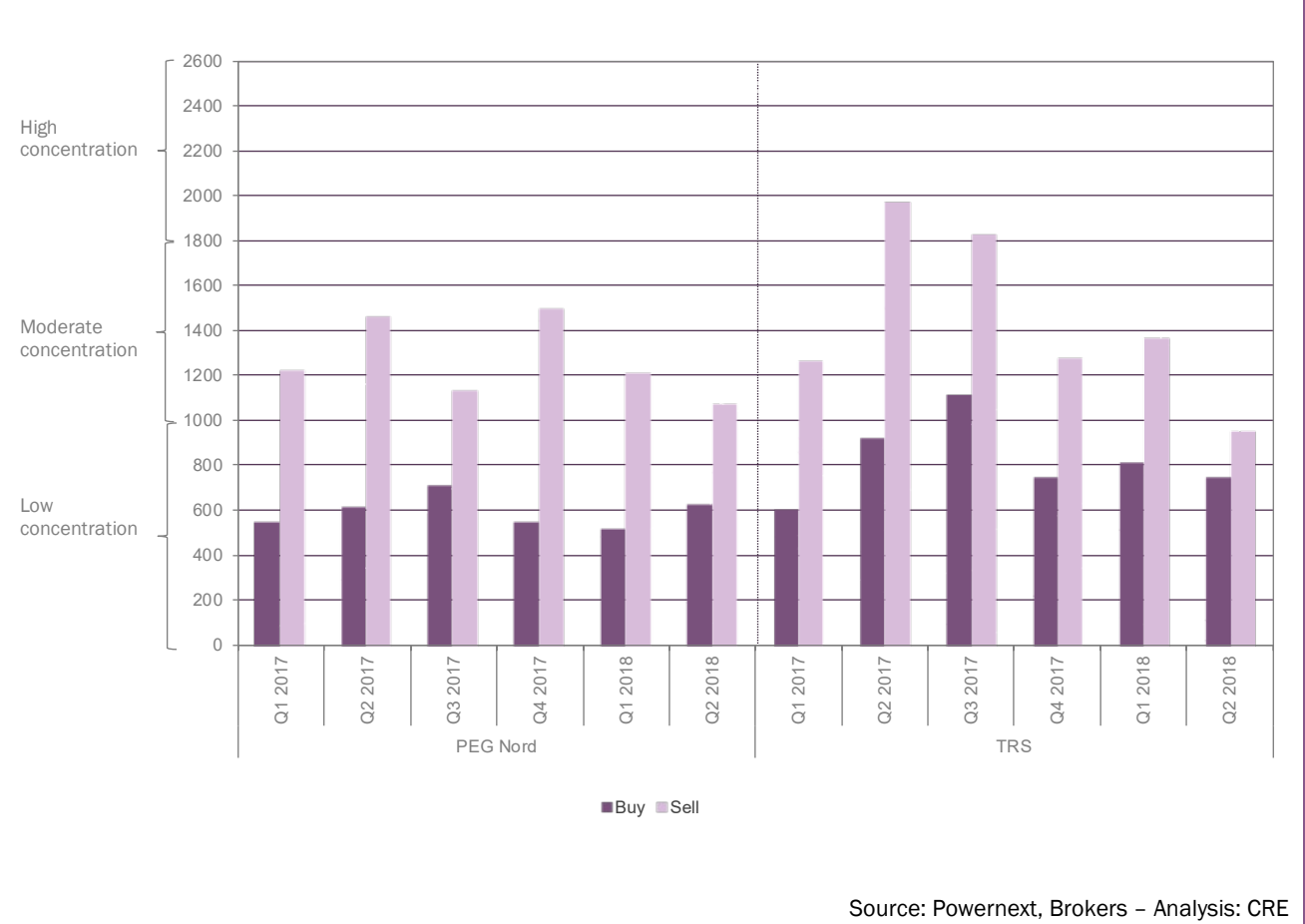


**Figure 37: Trading volumes in the forward markets by type of intermediation**



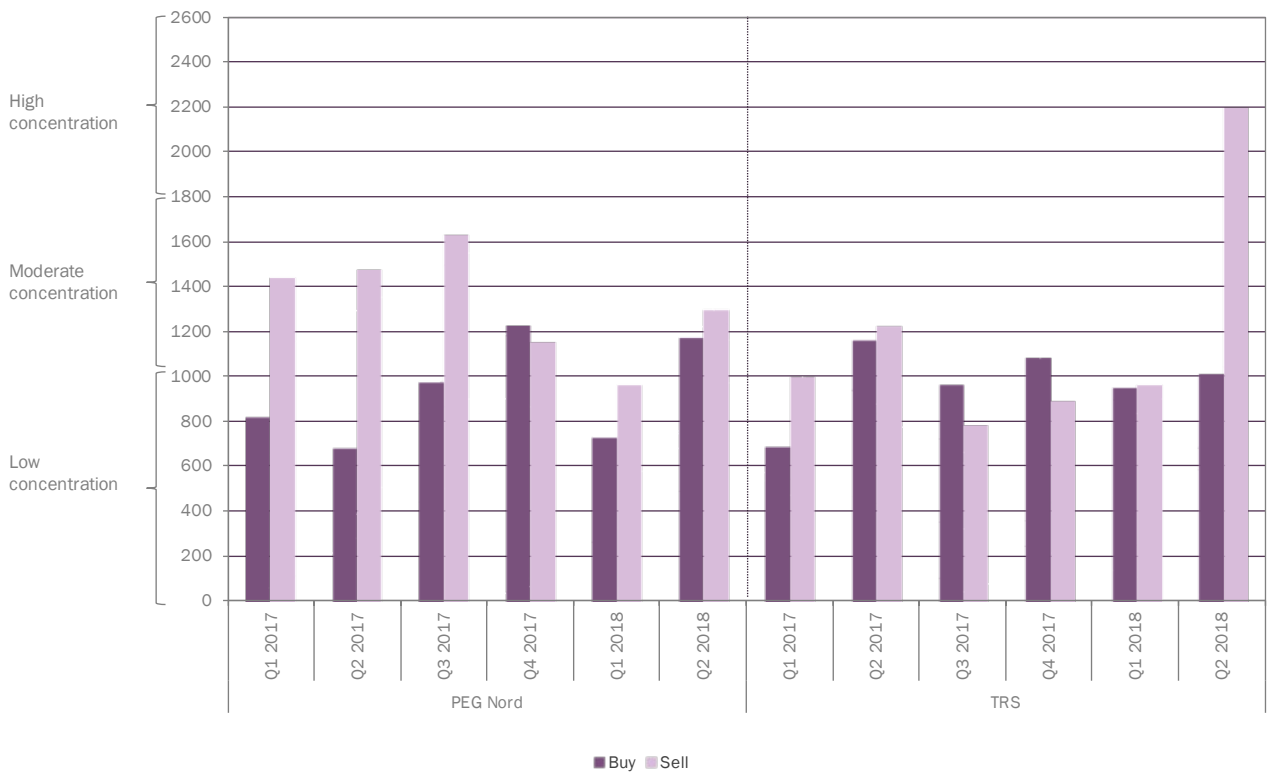


**Figure 38: Concentration indexes in France on the spot market, by zone**



Source: Pownertex, Brokers – Analysis: CRE

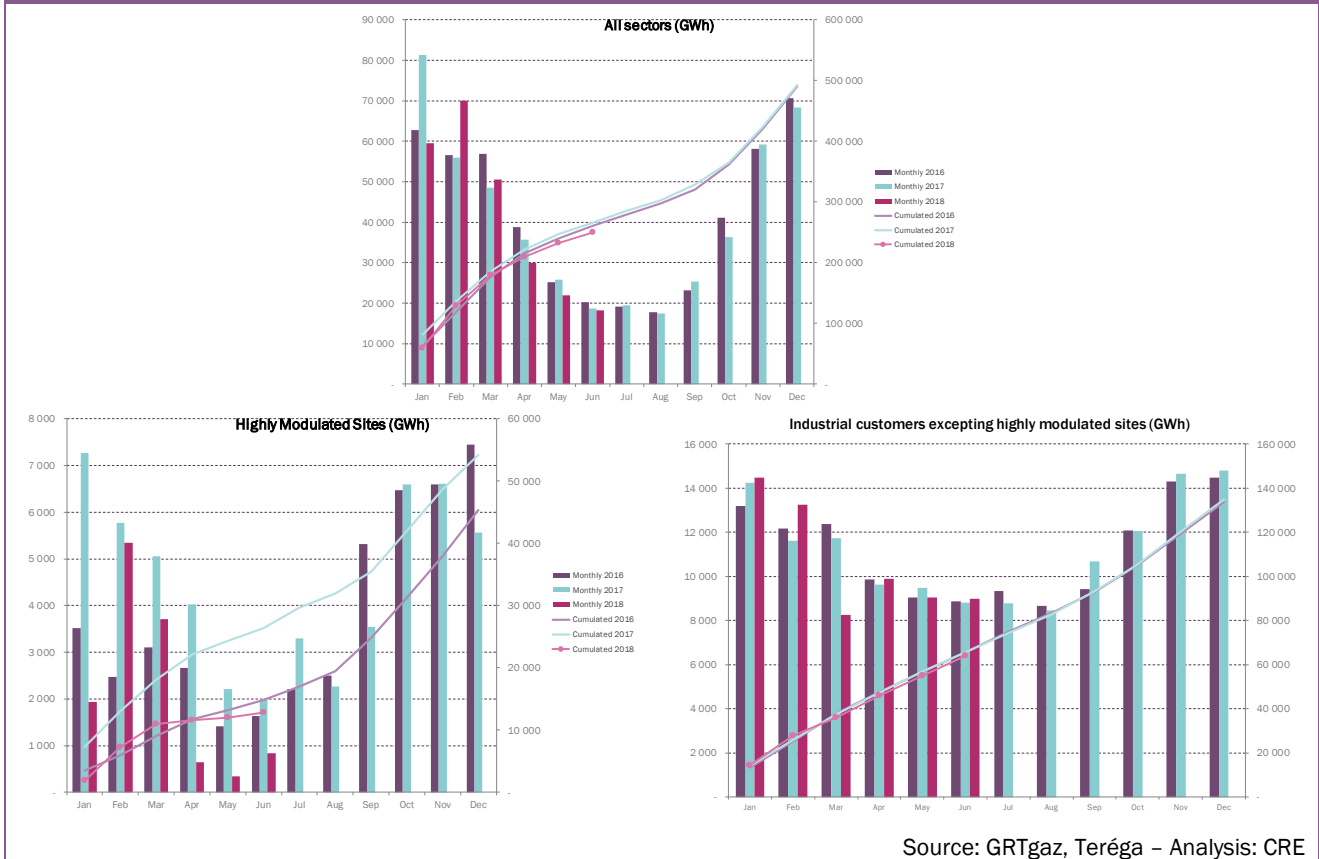
**Figure 39: Concentration indexes in France, by zone**



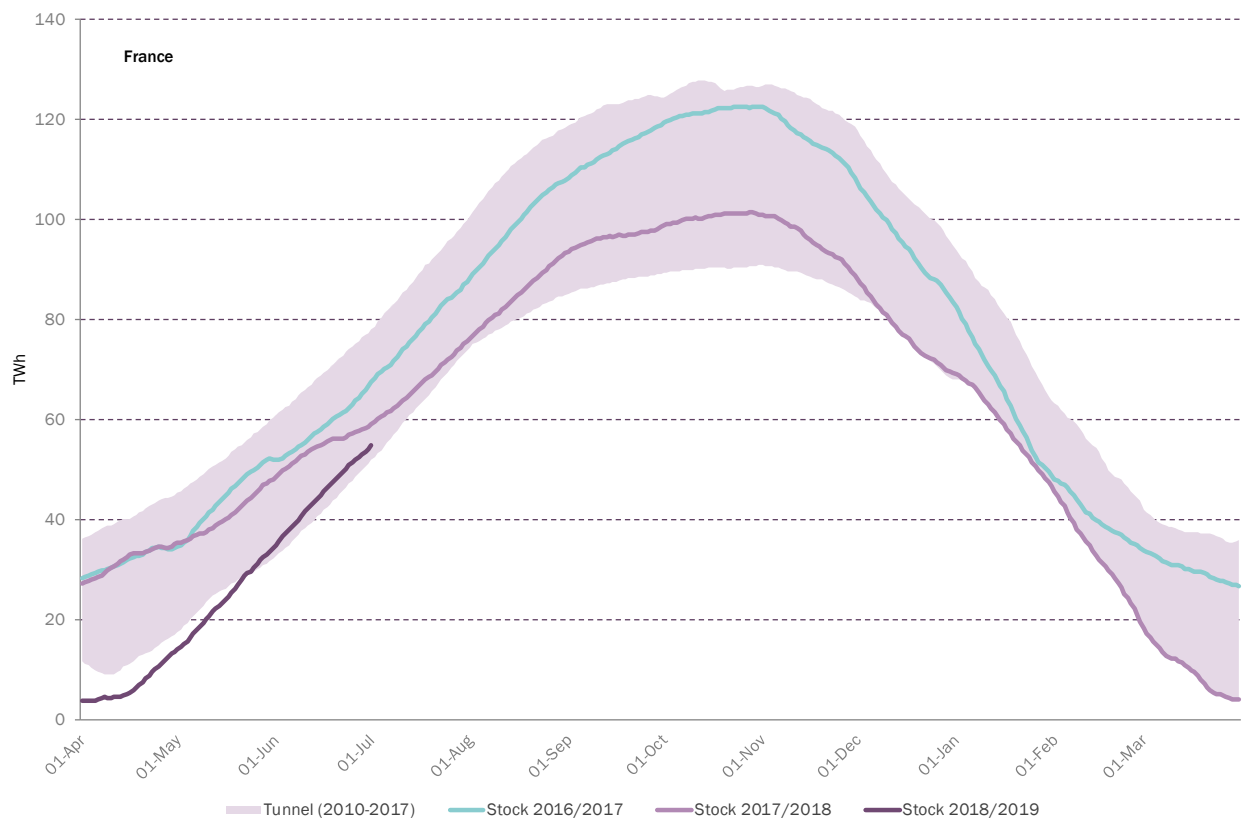
Source: Powernext, Brokers – Analysis: CRE

**4.4 Market fundamentals**

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

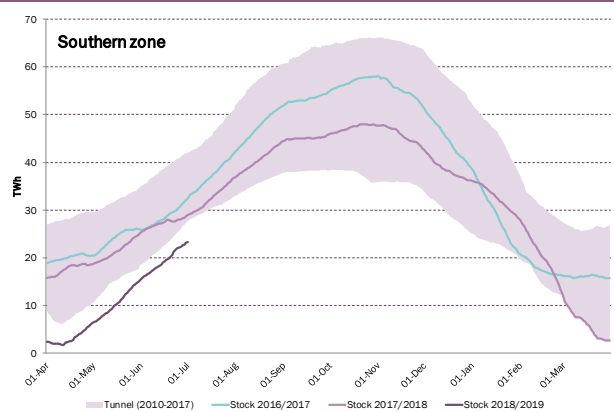
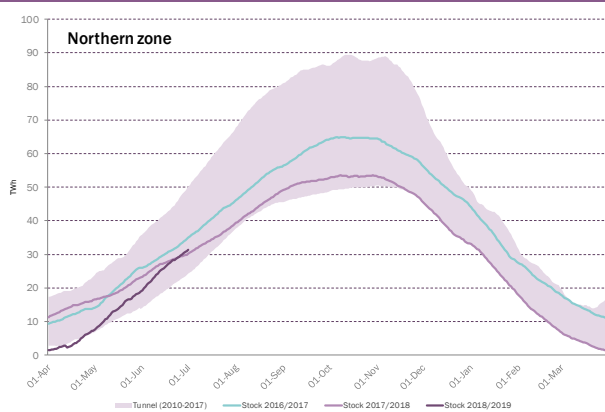


**Figure 41: French stocks**



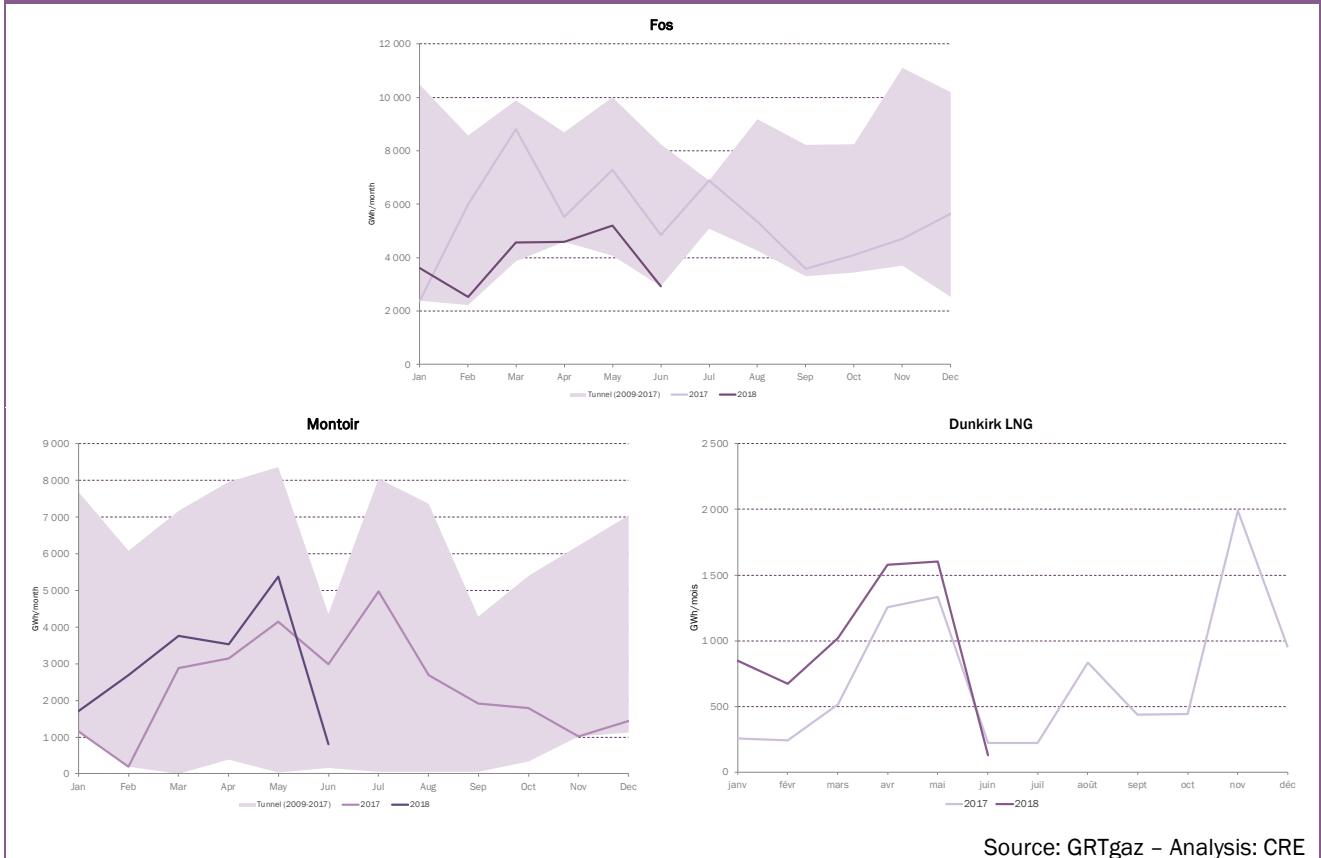
Source: Storengy, Teréga – Analysis: CRE

**Figure 42: French stocks by zone**

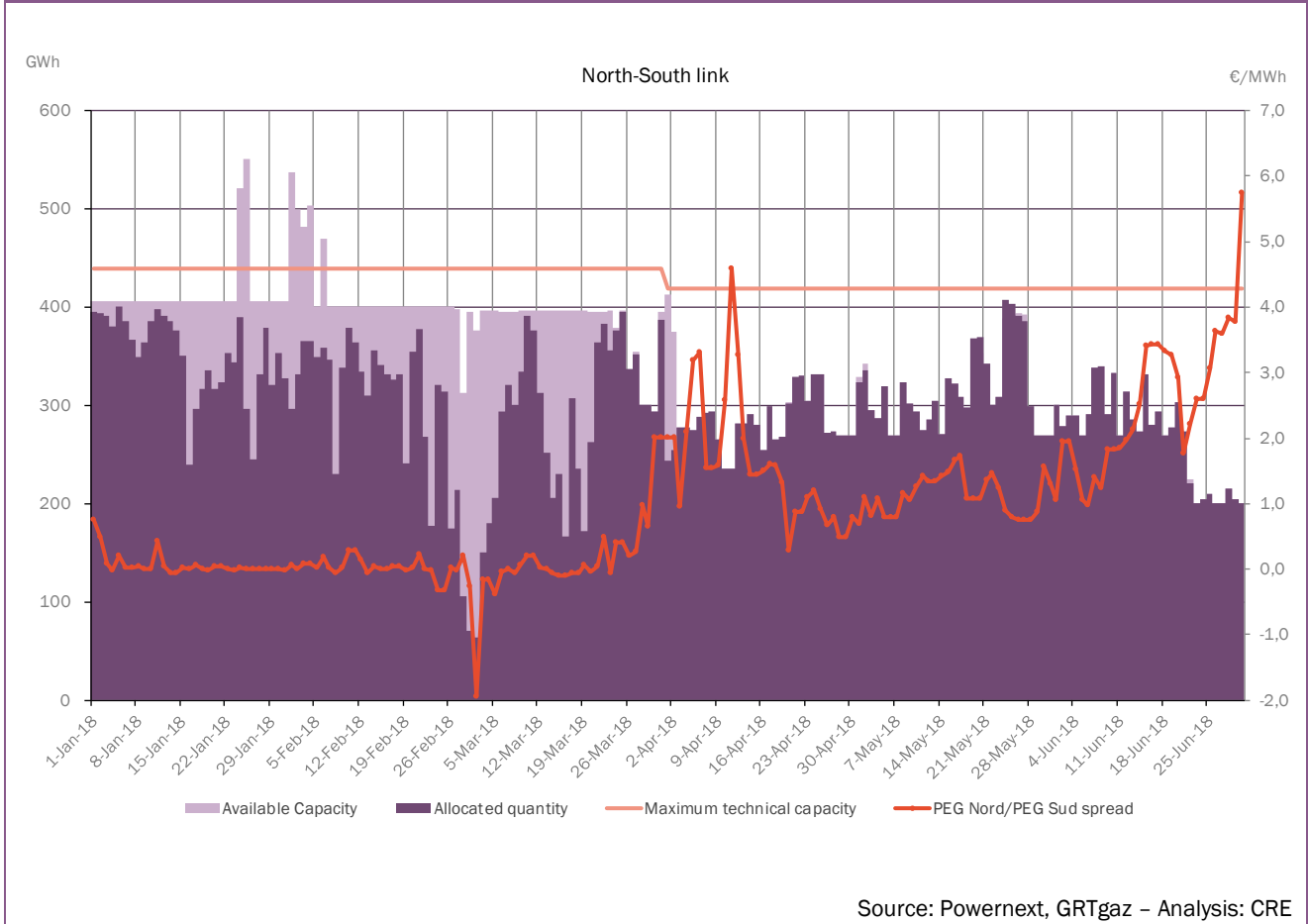


Source: GRTgaz, Teréga – Analysis: CRE

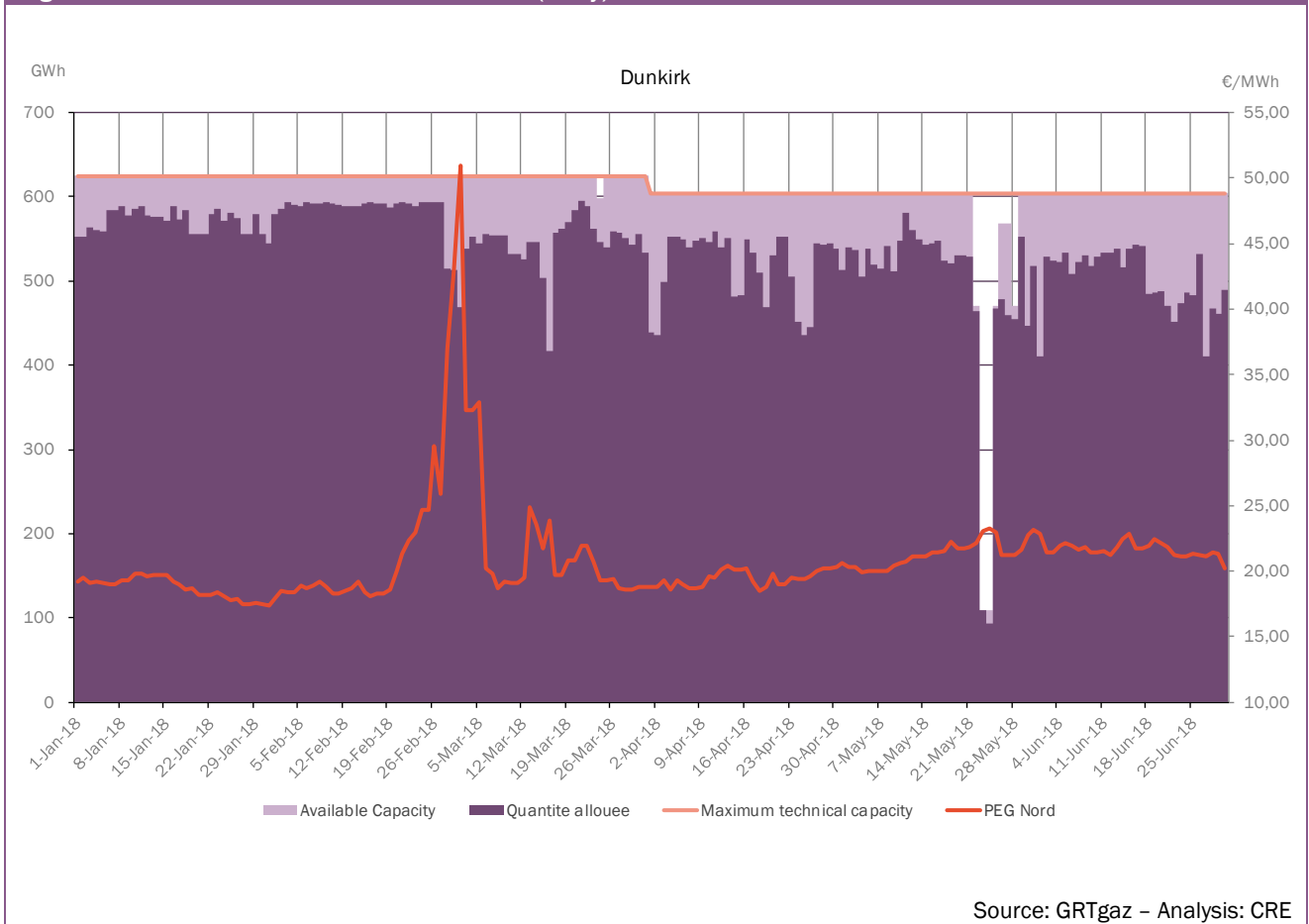
**Figure 43: Send-out of the French LNG terminals**



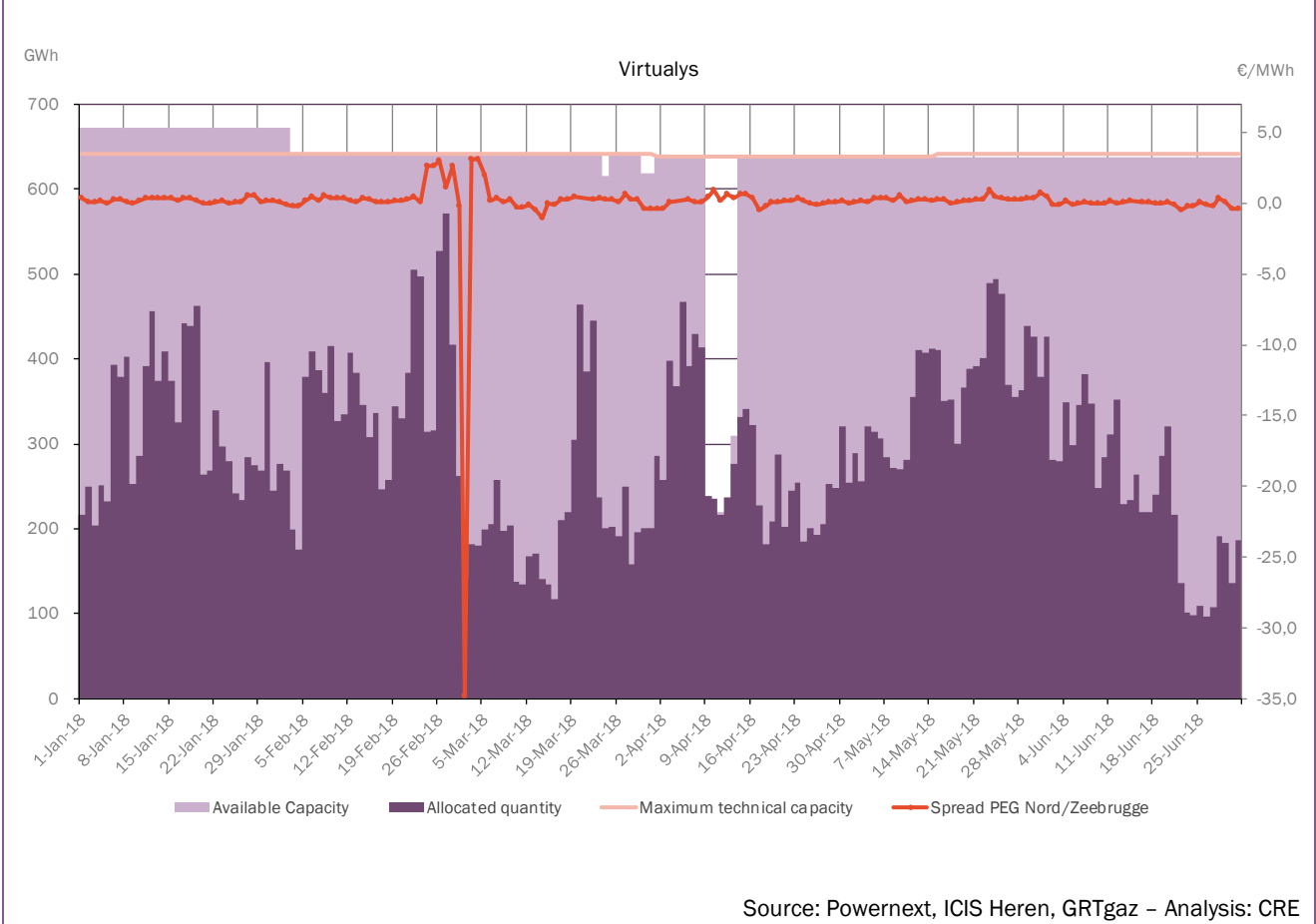
**Figure 44: North-South link utilization (North to south)**



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

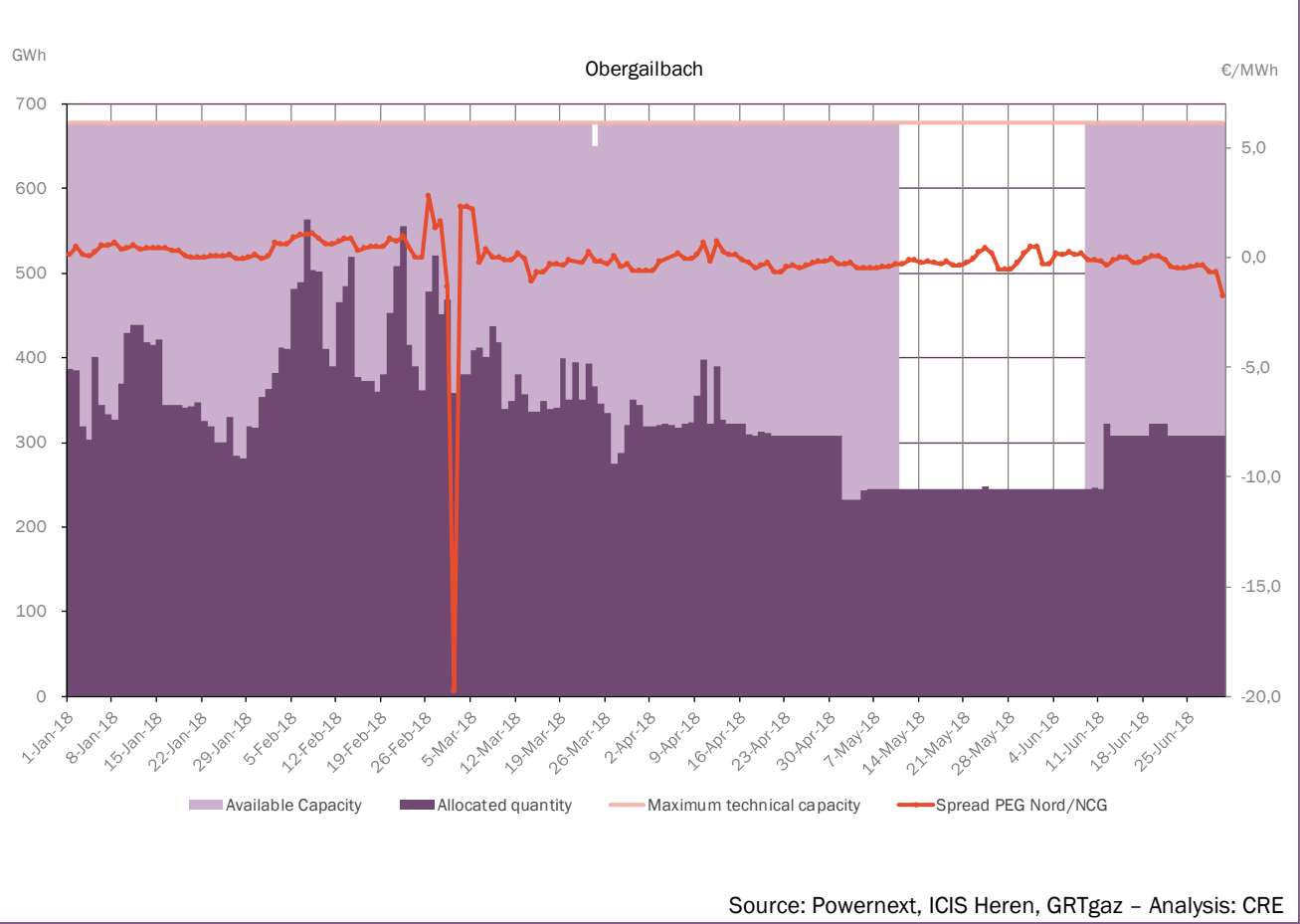


**Figure 46: Taisnieres-H interconnection utilization (Belgium to France)**

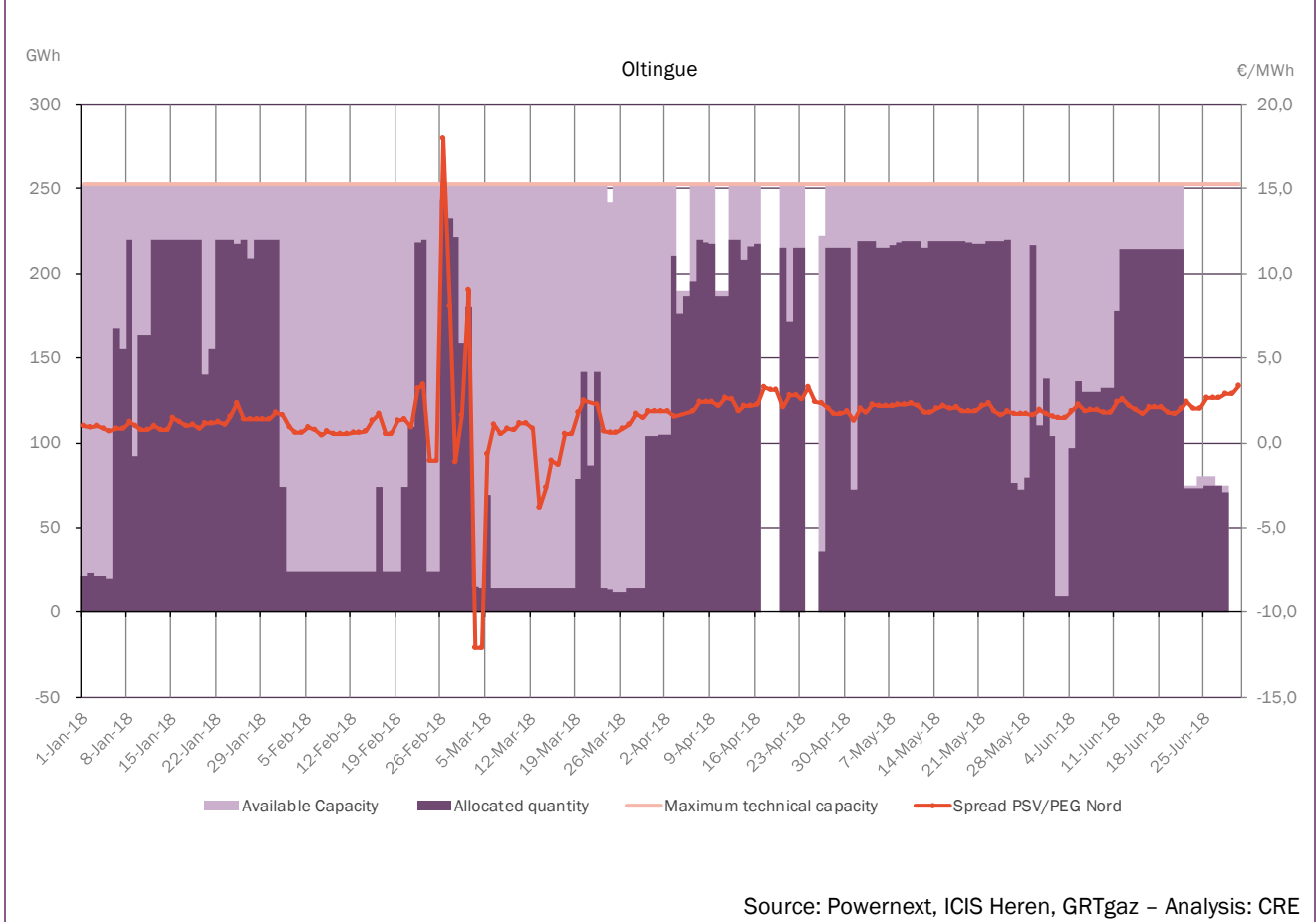




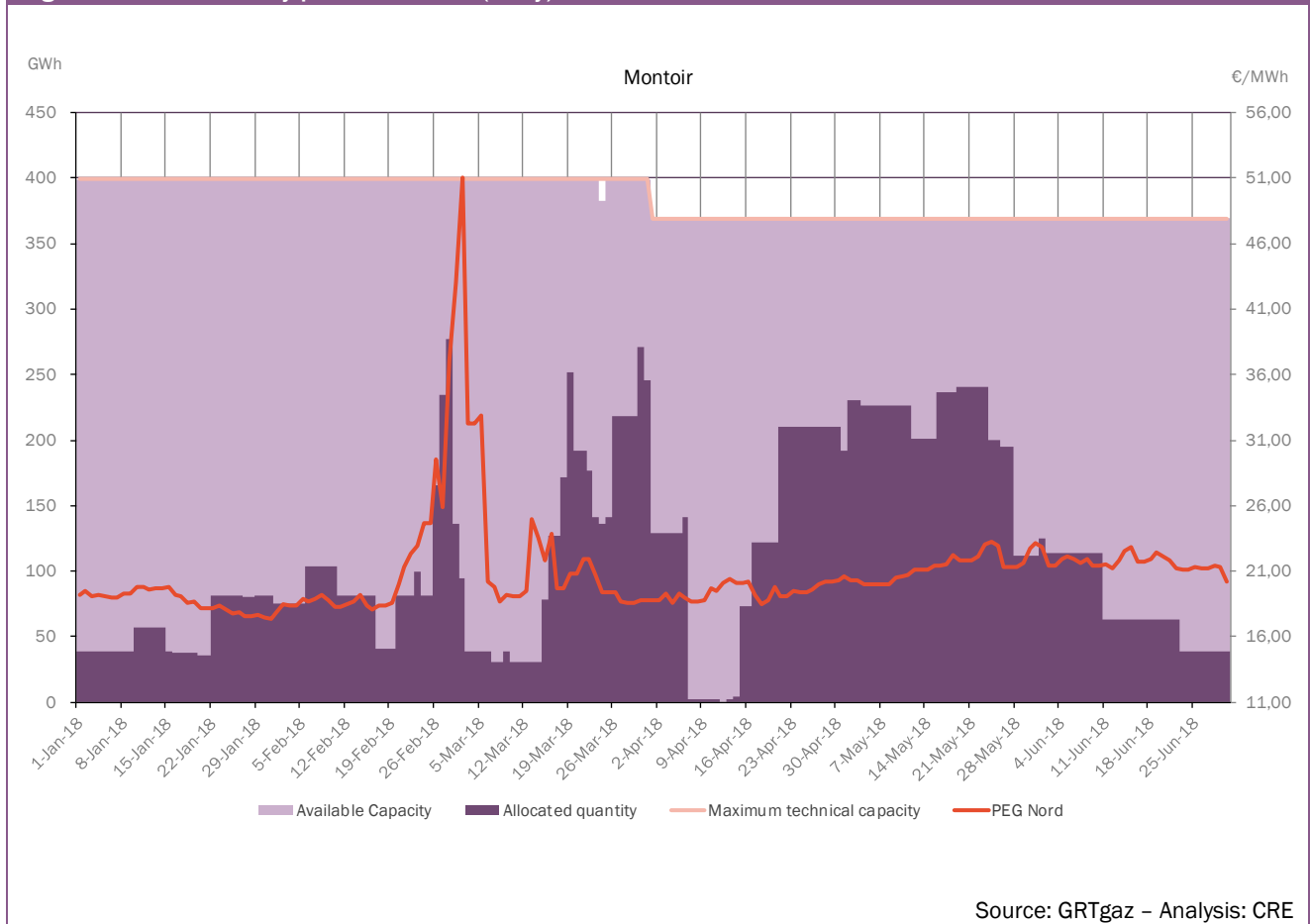
**Figure 47: Obergailbach interconnection utilization (Germany to France)**



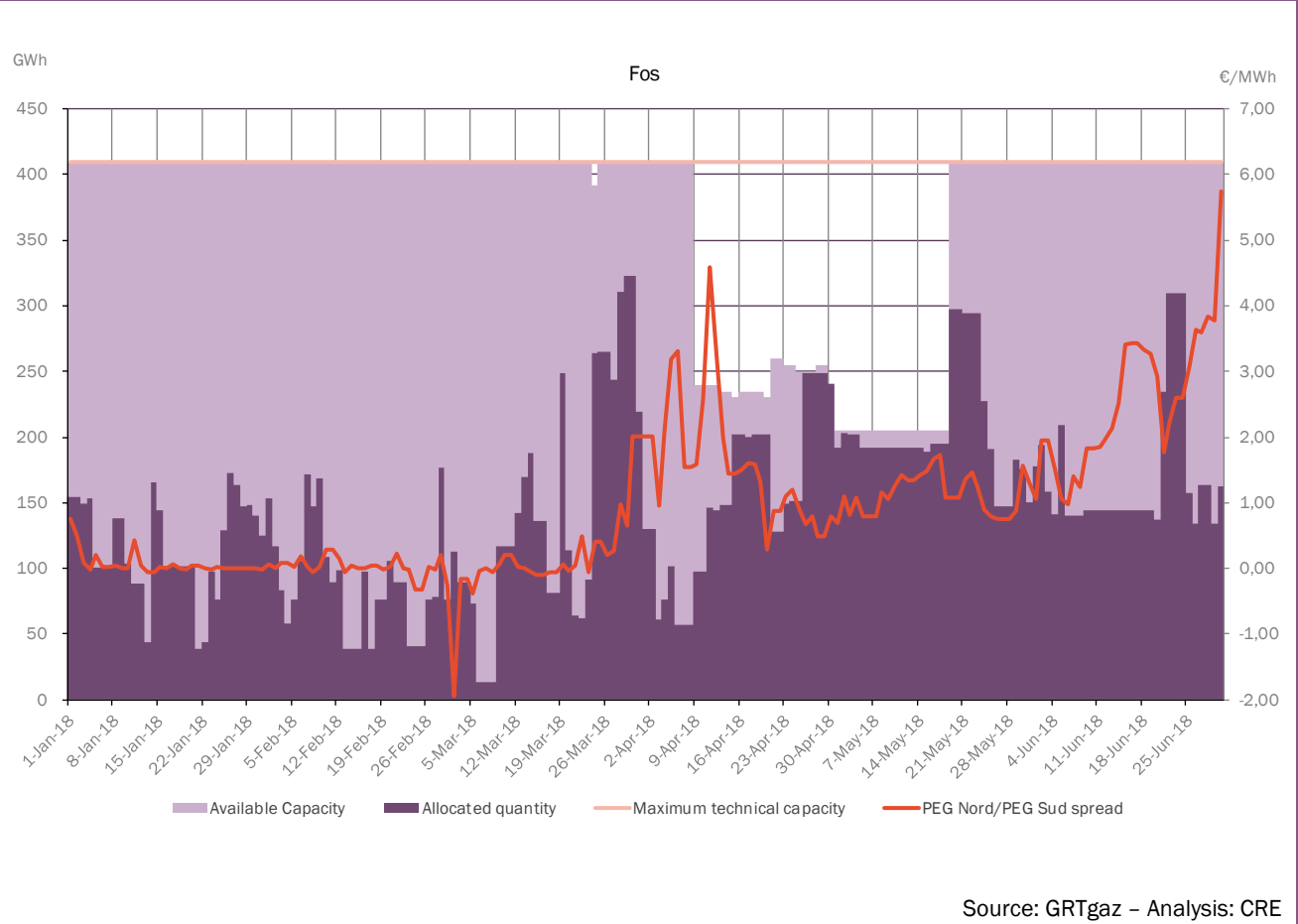
**Figure 48: Oltingue interconnection utilization (France to Switzerland)**



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

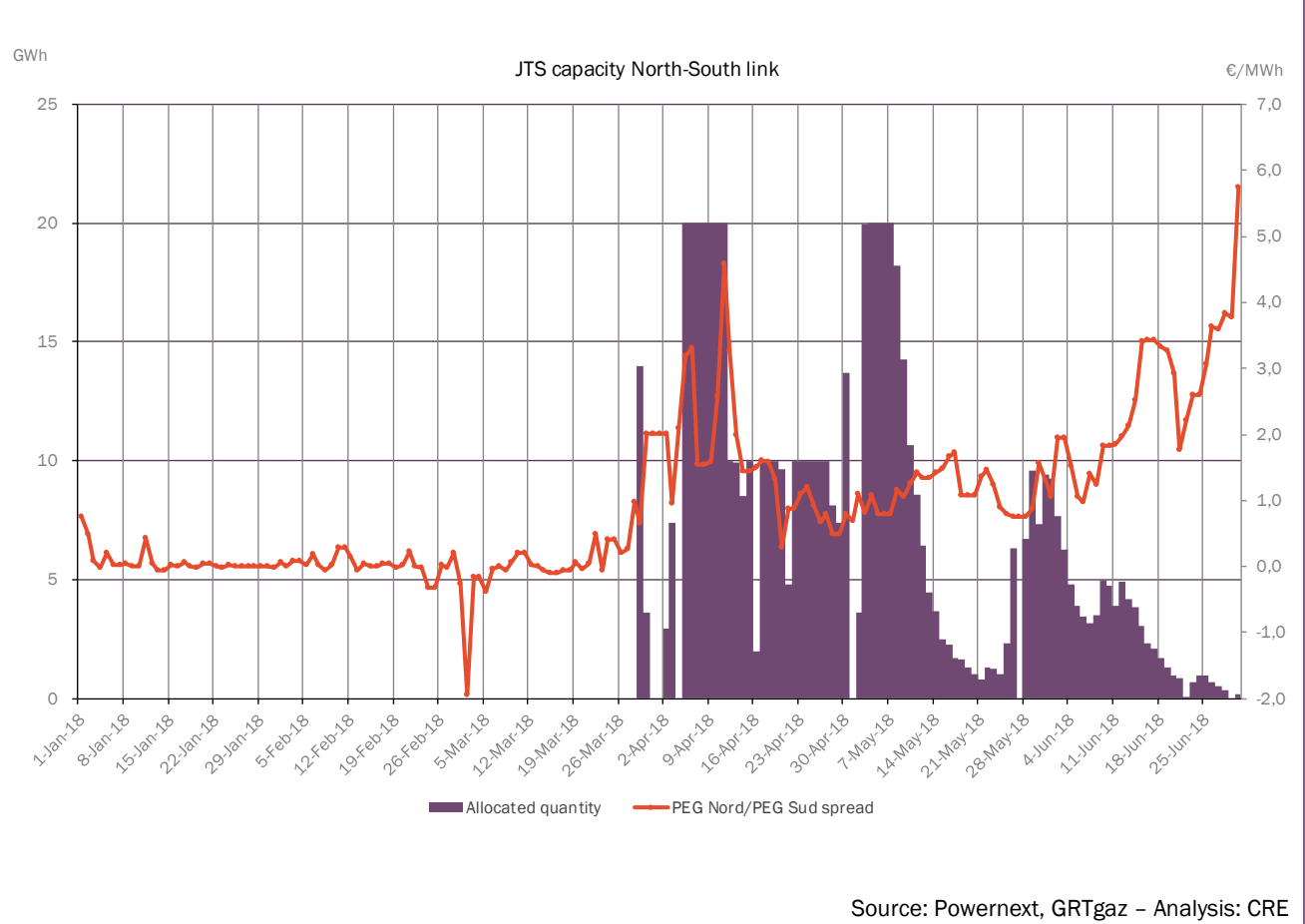


**Figure 50: Fos entry point utilization (entry)**

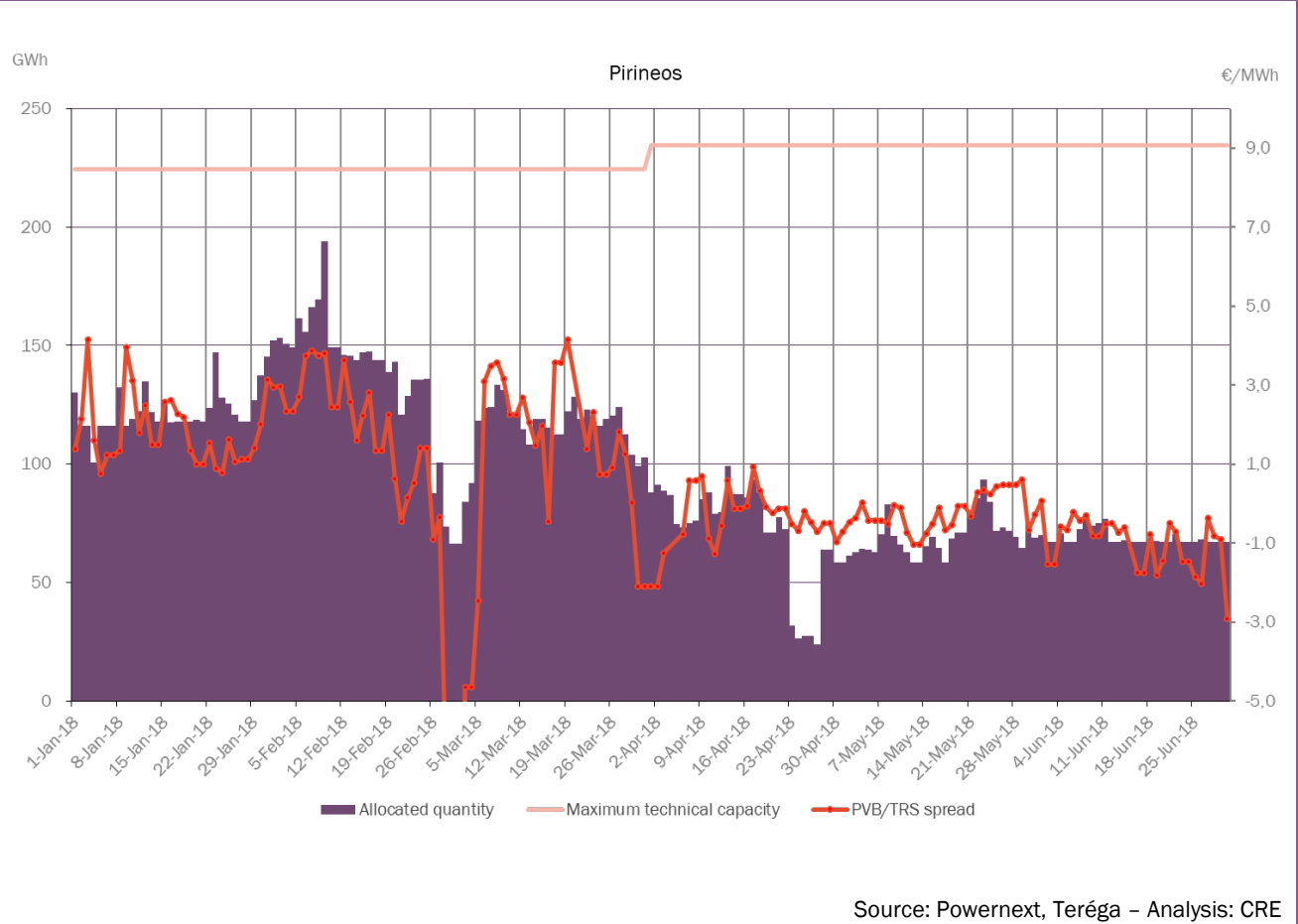


Source: GRTgaz – Analysis: CRE

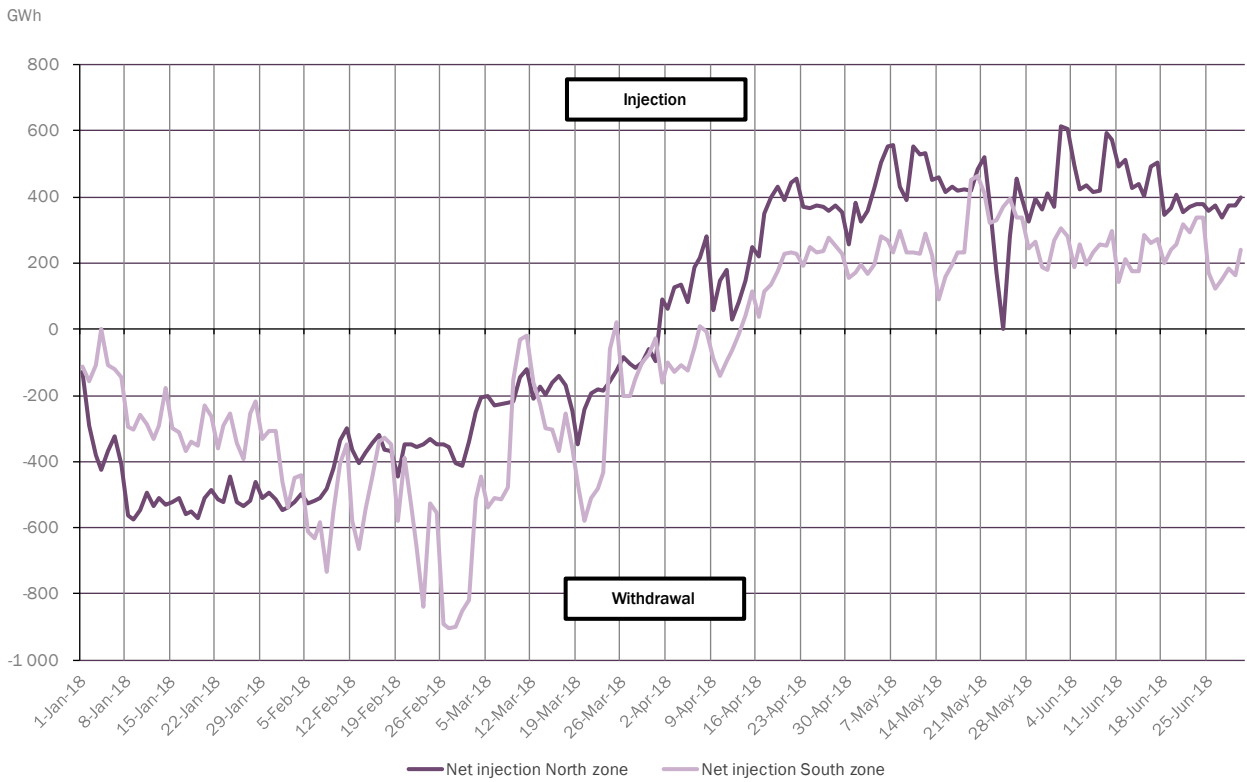
**Figure 51: JTS capacity utilization (North to South)**



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

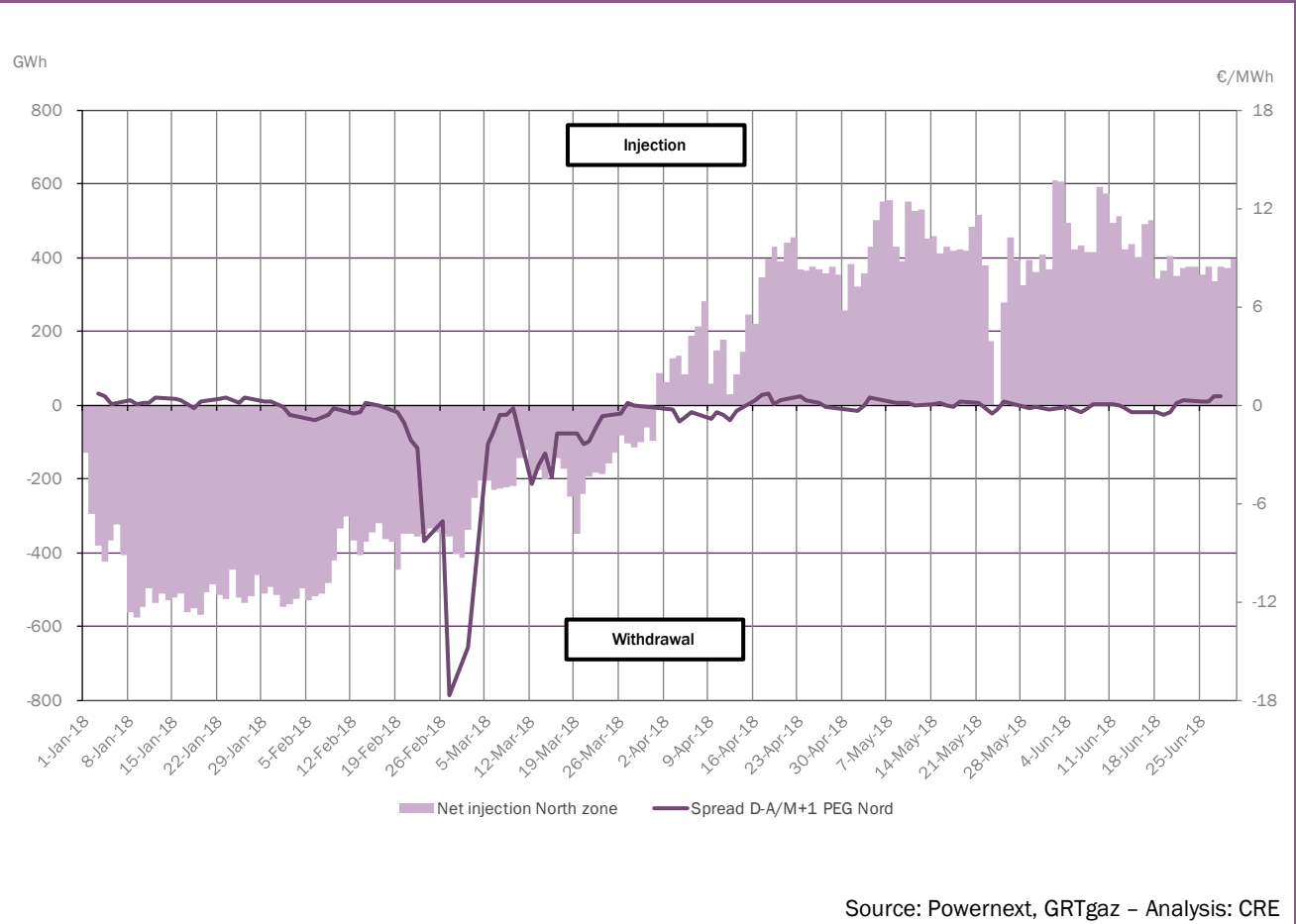


**Figure 53: Storages utilization**



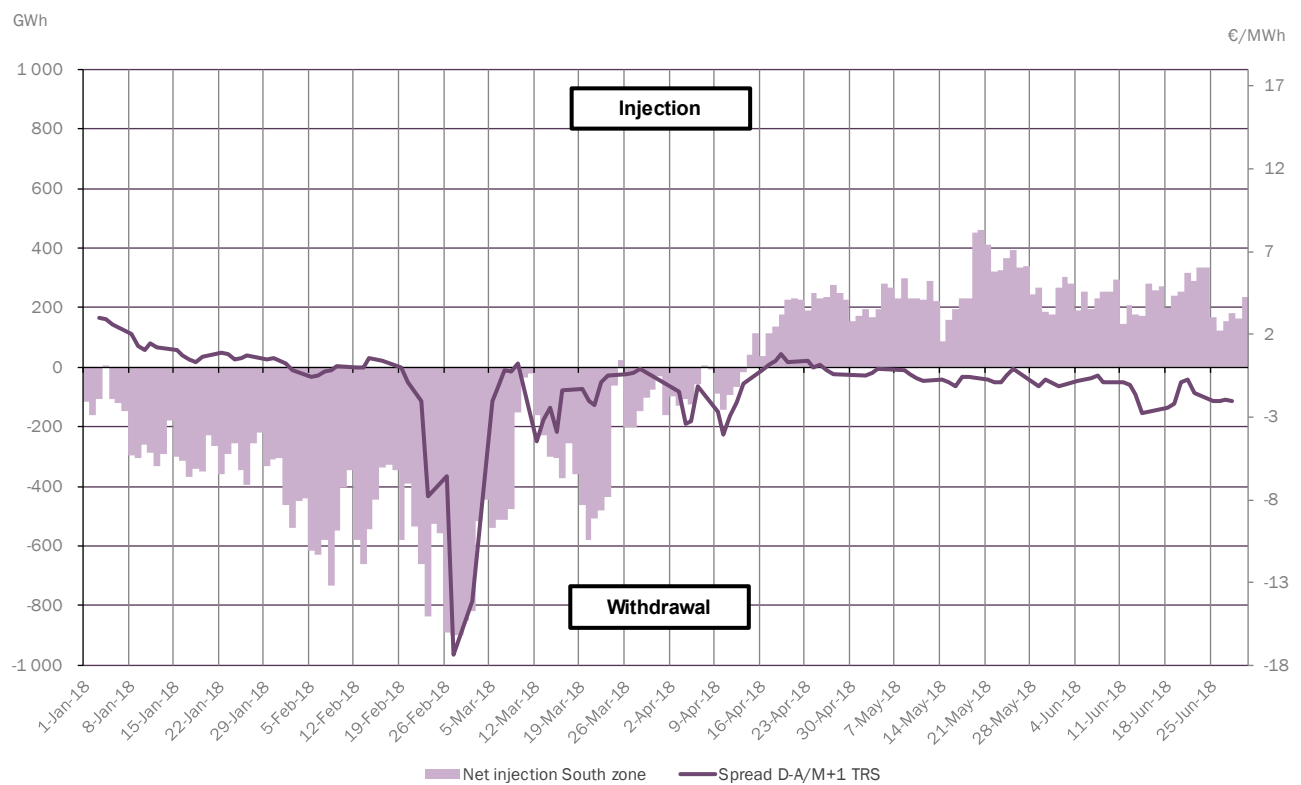
Source: GRTgaz, Teréga – Analysis: CRE

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



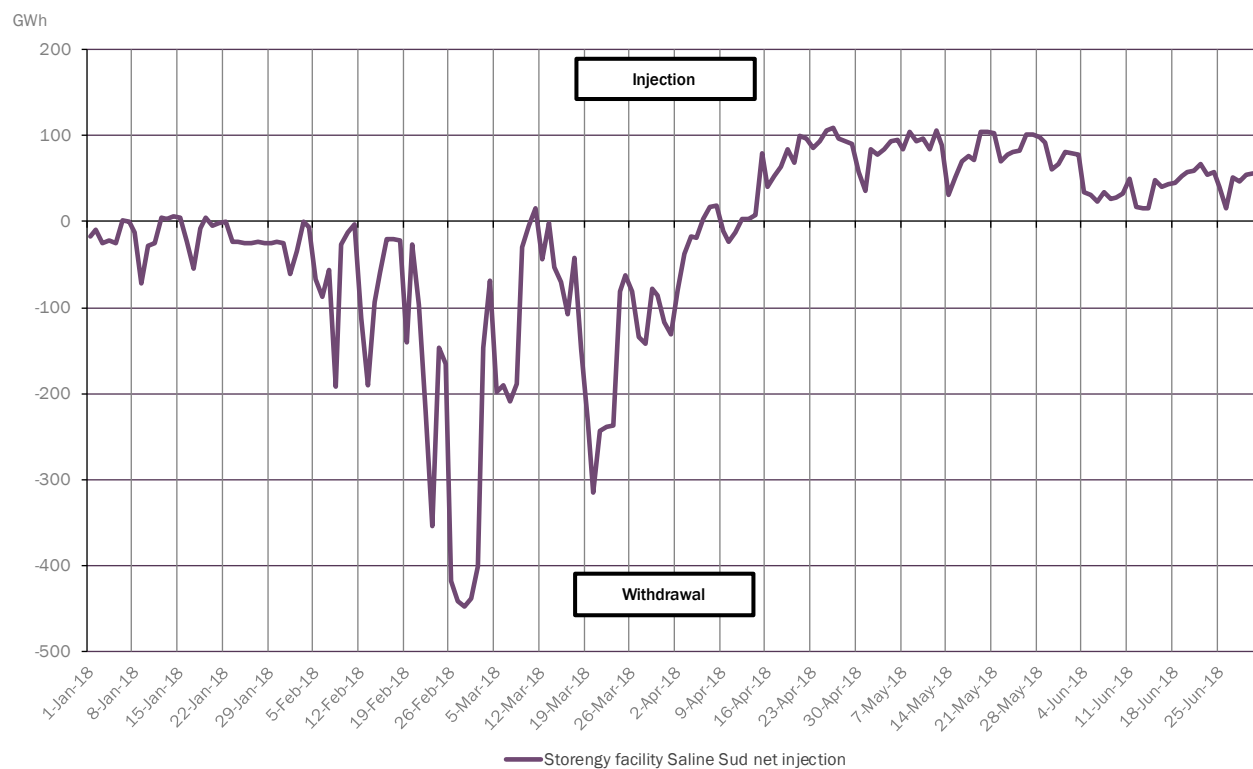


**Figure 55: Net stock variation in the South zone vs temporal spreads (same trading date)**



Source: Pownext, GRTgaz – Analysis: CRE

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

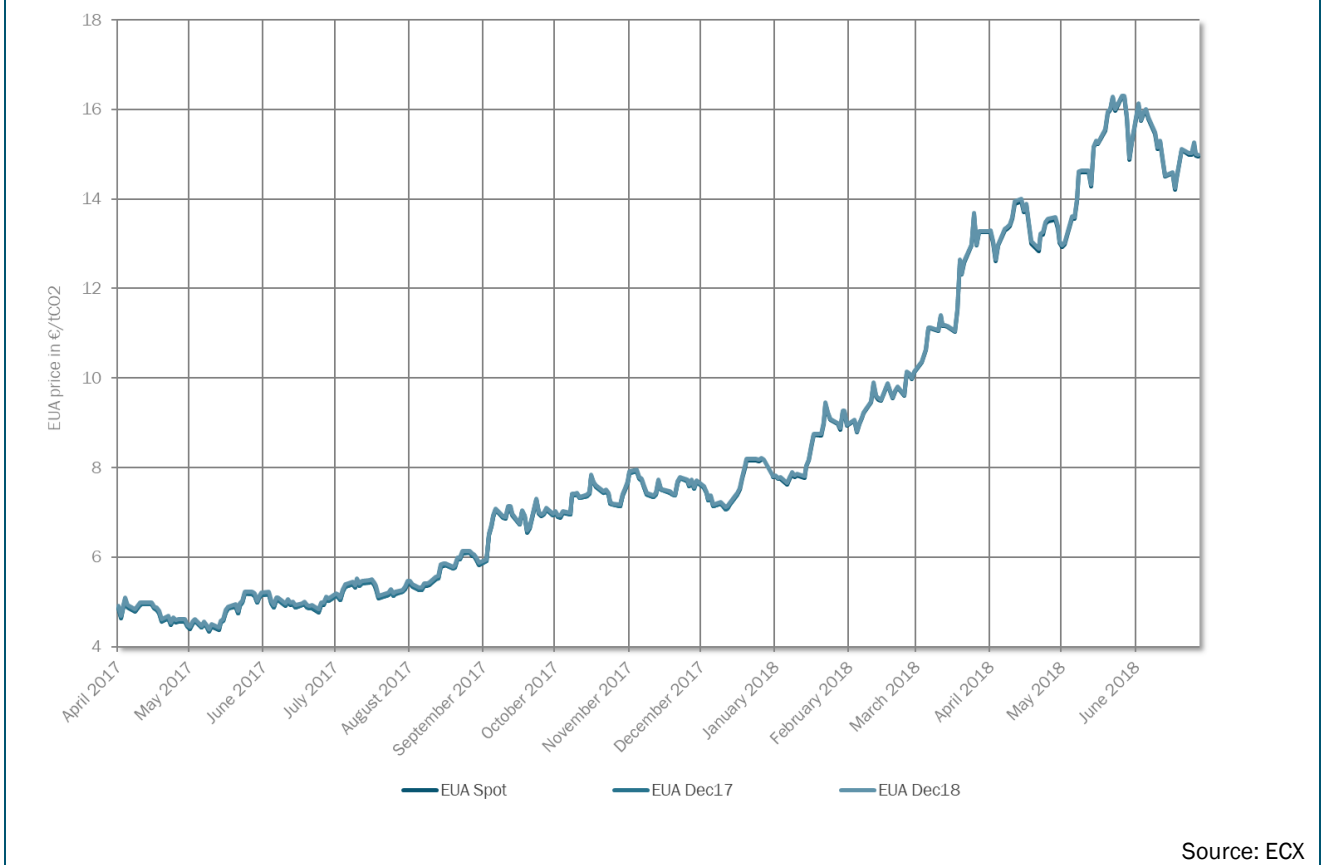


Source: GRTgaz, Teréga – Analysis: CRE

## **PART 3:** **OTHER INDICATORS**

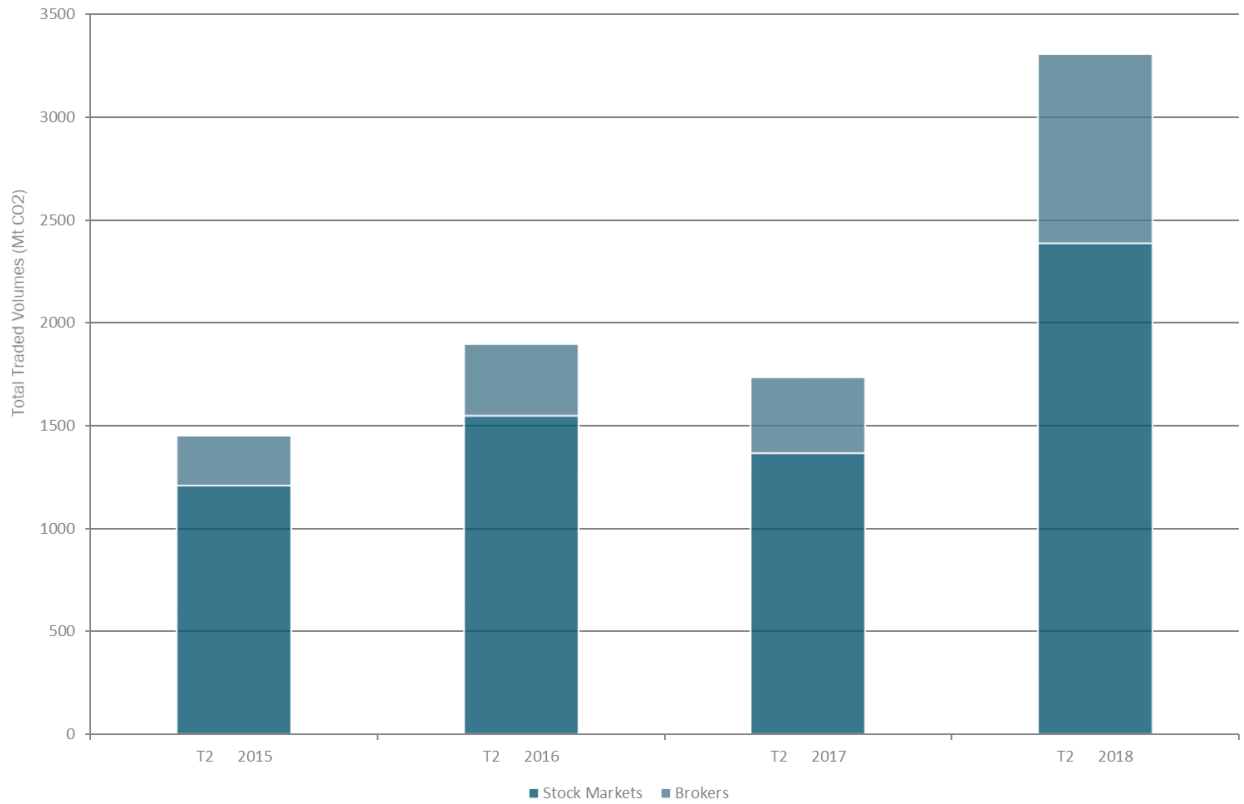
### **1. PRICE OF CO<sub>2</sub> ALLOWANCES**

**Figure 57: Evolution of EUA prices**



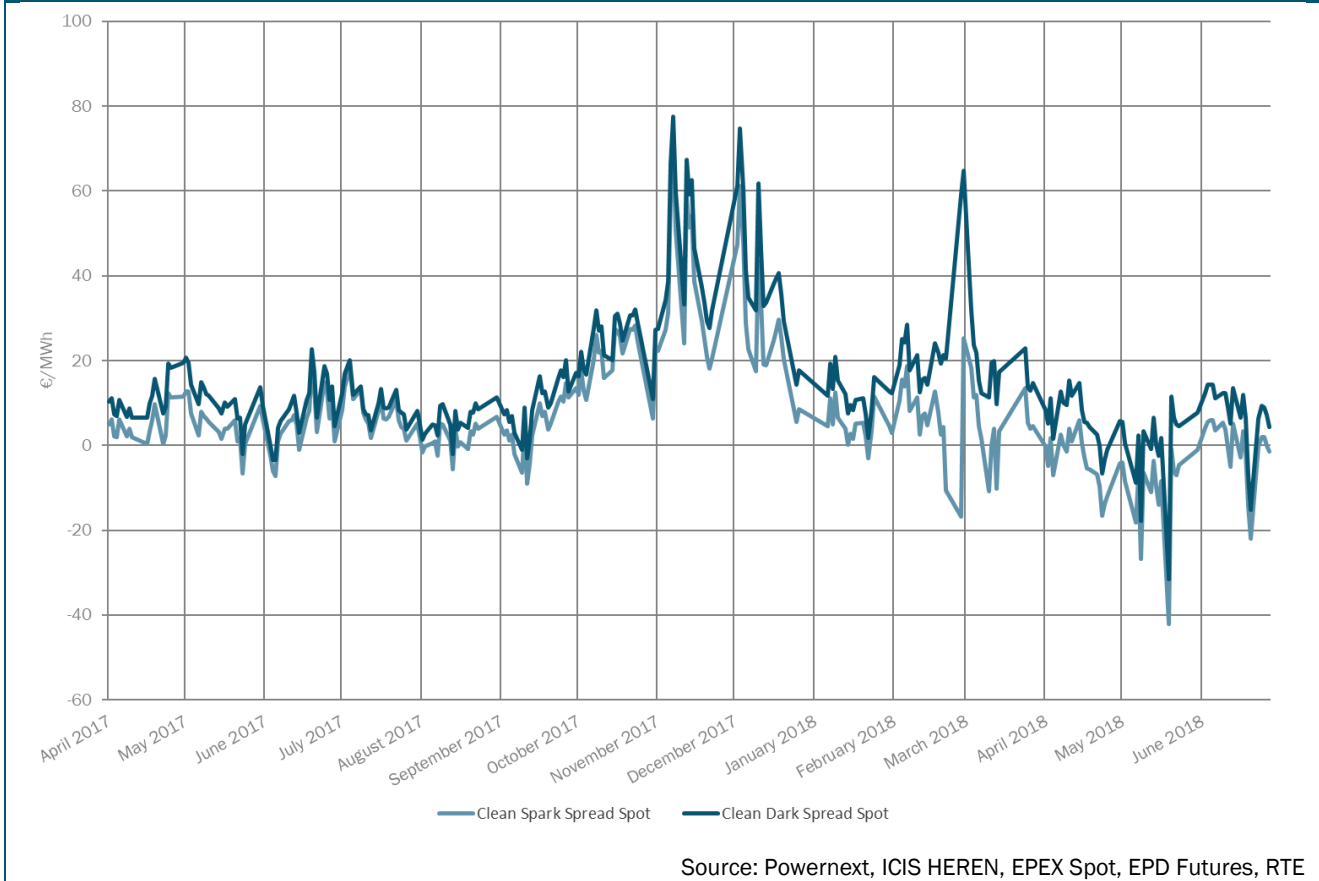
Source: ECX

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



Source: EEX, ECX, LEBA

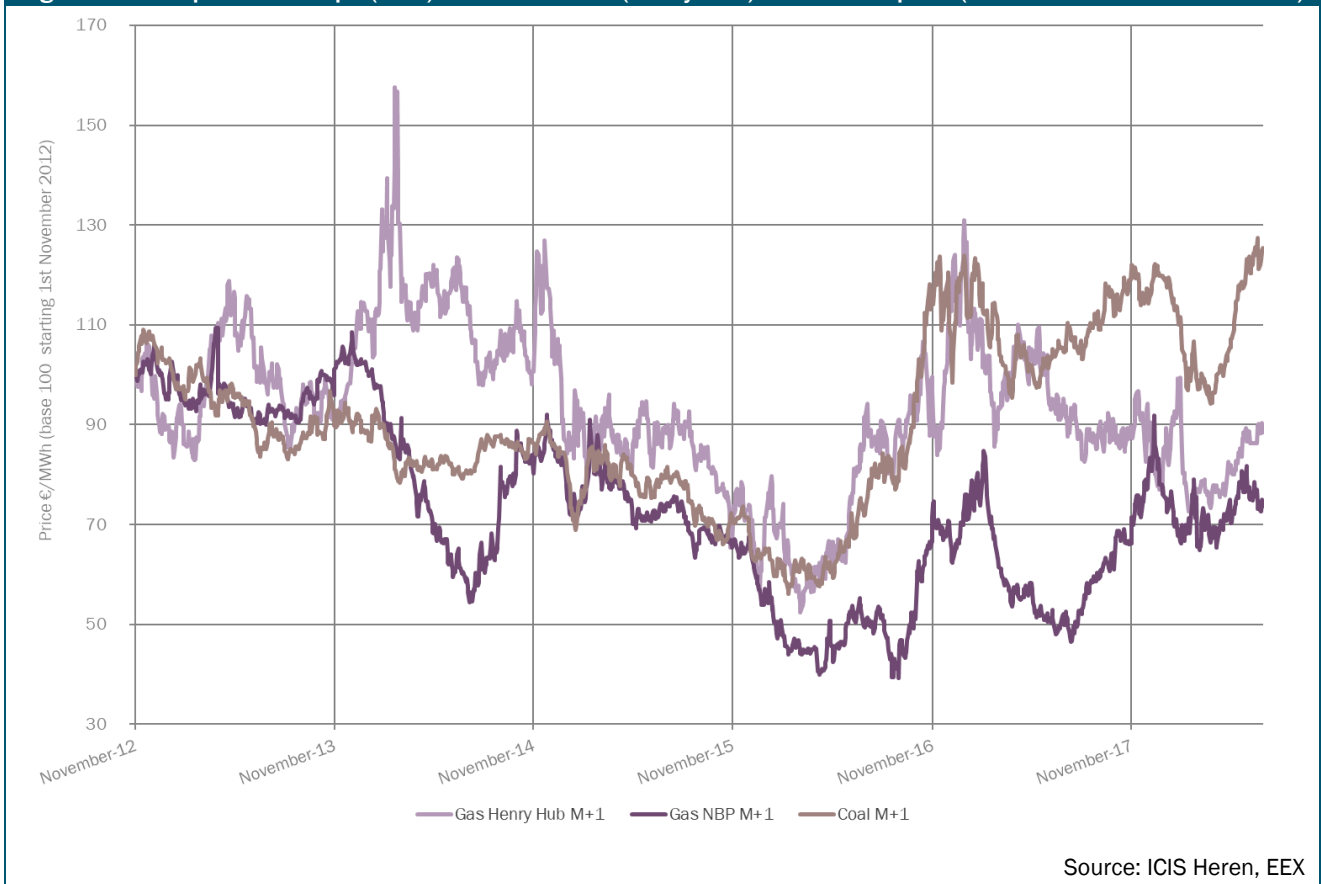
**Figure 57: Evolution of the Clean Dark Spread and Clean Spark Spread on spot peakload**



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 CO2 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 followings 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 (CO2):** 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 CO2 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 tonne 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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