COMMISSION
DE RÉGULATION
DE L'ÉNERGIE

WHOLESALE MARKETS OBSERVATORY

1st quarter 2019

Wholesale electricity and natural gas markets

Couverture intérieure : ne pas supprimer la page

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). 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 graphs) are detailed in the second part.

The underlying data of the tables displaying the key market indicators are available on the CRE's website in the "Open Data" section (www.cre.fr/Pages-annexes/Open-Data).

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QUARTERLY HIGHLIGHTS

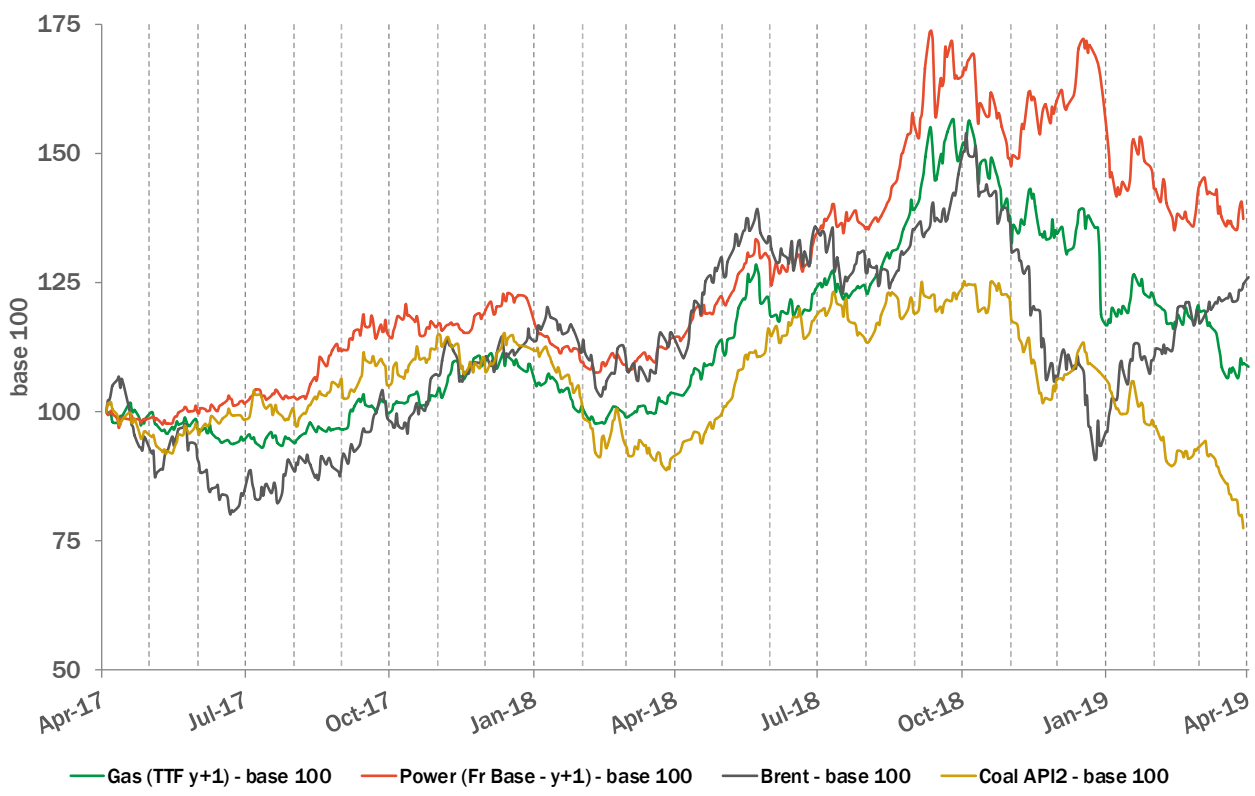
Oil prices surged by 30 % and dampened losses of last quarter, coal prices fell by 20 €/t

After the significant downward correction of last quarter 2018, Brent oil price started rebounding as 2019 began and rallied to end March at almost 70 $/bbl with a 15 $/bbl gain on the quarter. Oil prices settled on average (in euro) at 56 €/bbl, 8 % below the average price of 2018.

Venezuela's presidential crisis drove the rebound in January as the USA imposed sanctions on the Venezuelan state-owned oil company. The bullish trend was also bolstered by a more optimistic market view regarding the US-China trade tensions and by OPEC's announcements to continue to contain the production until June. Fears of economics slowdown and of recession had no visible impact on the prices.

On the other hand, coal prices had an opposite run as API2 fell by 30 % and ended the quarter with a 2 year-low of 55 €/t. Average coal price settled at 66 €/t, 20 % below the average price of 2018. In spite of oil prices surge, the bearish trend was driven by high inventories in Europe and Asia, by Chinese growth slowdown (6.6 % in 2018 vs. 6.9 % in 2019) and by a decrease of coal-fired generation in Europe.

Evolution of commodities prices



Source : EEX, ICIS Heren, Reuters, ICE

Despite a decrease in wholesale electricity market prices remain quite high compared to the first quarter of 2018

French power consumption decrease during the first quarter of 2019 and stood at around 131 TWh (Figure 14) while it was at 136 TWh during the same quarter of 2018 (-4 %). Nuclear availability decreased slightly with the average rate of availability being at 86 %, down by -0.6 points compared to the same quarter of 2018 (Figure 15). This rate is also higher by 10.3 points compared to the fourth quarter of 2018 (75.7 %). In this context, electricity produced by nuclear plants remain almost stable (-1%) reaching 111,7 TWh compared to the same quarter of 2018.

Hydraulic generation during the first quarter of 2019 reach 15.3 TWh, decreasing 30 % compared to the same quarter of 2018; being so, the lowest level of historical tunnel 2013-2017 (Figure 18). The quarter was also characterized by 11% of increase in wind generation (9.8 TWh) compared to the previous quarter. The availability rate

for coal and gas sectors (Figures 16 and 17) was 11% (or 0.69 TWh of production) and 49% (or 13.02 TWh of production) on average during the first quarter of 2019 respectively, compared to 32% and 45% in 2018. Compared to the fourth quarter of 2018, fossil production rose by 5.3%.

French export balance settled at 12,9 TWh, the same of first quarter of 2018 (Figure 20) .Cross-border exports were lower during the quarter and down by -3.1% with a -6.8% drop in exports during peak hours and -0.7% in exports outside these periods for the same quarter in 2018. Cross-border imports also decreased by -7.3%, with a -9.3% fall in imports during peak hours and -5.7% in imports outside these periods for the same quarter in 2018.

Spot prices rose to 47.2 €/MWh during the first quarter of 2019, an increase of 8% compared to the same quarter in 2018. German spot prices also went up to 41.3 € an increase of 16% (Graph 10) compared to the previous year (Figure 10). France-Germany spread was down -29% from 8.3 €/MWh in the first quarter of 2018 to 5.9 €/ MWh over the same period in 2019.

On future markets, the price of French Calendar Baseload 2020 product decreased by an average of -11% compared to the previous quarter, and its German equivalent decreased by -9%. The prices reached respectively 51.1 € / MWh (Calendar France Baseload 2020) and 48 € / MWh (Germany Calendar baseload 2020) on average. Compared to the same period in 2018 these prices increased by +28% on average for the French calendar.

Regarding traded volumes of futures market in the first quarter of 2019, yearly contracts (Y+1) volumes were down by 47% for the same period on 2018 and down by 59% from the fourth quarter of 2018. For Monthly products (M+1), traded volumes were down by -33% compared to the first quarter of 2018 and -8% compared to the fourth quarter of 2018. Finally, Spot market traded volumes down by -13 % compared to the same period in 2018 and up by 8% from the previous quarter (Table 3). This decrease is particularly related to ARENH's reserved volumes at the end of 2018 for the year 2019.

Fall of PEG prices amid record LNG influx and mild winter

LNG arrivals soared to record levels during the first quarter of 2019 as they did during the last month of 2018. Almost half of the annual volume of 2018 was received by French LNG terminal with 57 TWh during the first quarter with the greatest growth attributed to Dunkirk LNG whose send-out already exceeded 2018 annual volumes. European LNG market was very active due to the global LNG glut related to significant incremental supply and weaker demand in Asia. This context even lead the Asian index price under the price of European most liquid markets, exemplifying an unusual trend that was last observed in 2015.

In parallel, France experienced a mild winter resulting in a curbed demand of 179 TWh, down by 5 % compared to first 2018 quarter. Demand from gas-fired power plant slightly increased by 2.4 TWh (y.o.y.) and reached 13.4 TWh which is still inferior of 5 TWh to the level of the first quarter of 2017.

Storages withdrawals were subsequently low and - as they were historically full at the end of 2018 - French inventories finished the winter at a record-high level of 37 TWh, a remarkable turnaround compared to the critical 4 TWh of last winter.

Imports via pipeline fell by 13 % (-19 TWh) compared to the first quarter of 2018 whereas exports almost doubled (+18 TWh). Favorable conditions related to LNG and consumption enabled a limited supply from the North and stimulated exports to the South: exiting allocations of Oltingue settled at 17 TWh and those of Pirineos at 18 TWh, respectively a year-over-year surge of 100 % and 60 %. A greater economic interest for exports to Spain was also supported by a larger premium as higher-priced TRS merged with PEG Nord creating a unique PEG price.

In this context, gas prices were under downward pressure: PEG day-ahead lost 8 €/MWh and closed March at almost 14 €/MWh. The quarterly average price settled at 18.7 €/MWh compared to 21.2 €/MWh in the first quarter of 2018. The PEG-TTF spread remained good and settled at 0.25 €/MWh on average, PEG-ZTP spread notably increased from 0.17 €/MWh to 0.44 €/MWh. Virtualys link was proportionally used with a 62 % utilization rate compared to 45 % during the first quarter of 2018.

Future prices also fell : PEG Cal' 20 lost 1.5 €/MWh on the quarter ended March at 18.4 €/MWh, down to 2017 levels. Average PEG-TTF spread was 0.14 €/MWh, down by 0.16 €/MWh compared to the first quarter of 2018.

Exchanged volumes on PEG via exchanges and brokers settled 252 TWh, up by 2 % y.o.y. Future products exchanges reached a record-high of 206 TWh while spot volumes slightly fell.

The CO_2 price fluctuates because of the downward effect of the mild temperatures and the upward effect of the Brexit report perspectives

The first auction of the year of the European carbon market was awaited because it was the first auction occurring with the Market Stabilty Reserve (MSR) running. During this auction, there was a decrease of the exchanged volumes by 40%, comparing to the last year first auction. Whereas the spot price was decreasing in the very beginning of the year, it has then increased before the downward effect of the announcement of a decrease of the prevision of the German GDP, meaning the demand for quotas from the industrial sector will decrease.

In February 2019, because of a mild weather, fossil fuel power plants have been less used than usual, whose effect was a lower demand for carbon quota and thus has a bearish effect on prices. Mars opened with a price increase of 4 €/tCO_2 within a week, after the British Prime Minister made announcements regarding the Brexit, which meant that a Brexit without agreement was not favoured.

The CO_2 price then fluctuated: there was a bearish effect due to the gas price decrease and a bullish effect due to the Brexit postponing probability. In this context, the total traded volume during the quarter, including exchanges and brokers, was 749 $MtCO_2$, which is an increase by 15.9% compared to last year first quarter.

In the overall, the price has increased compared to last year and the last price of the quarter was 21.4 €/tCO_2.

MARKET INDICATORS

PART 1:
WHOLESALE ELECTRICITY MARKET

1. KEY DATES

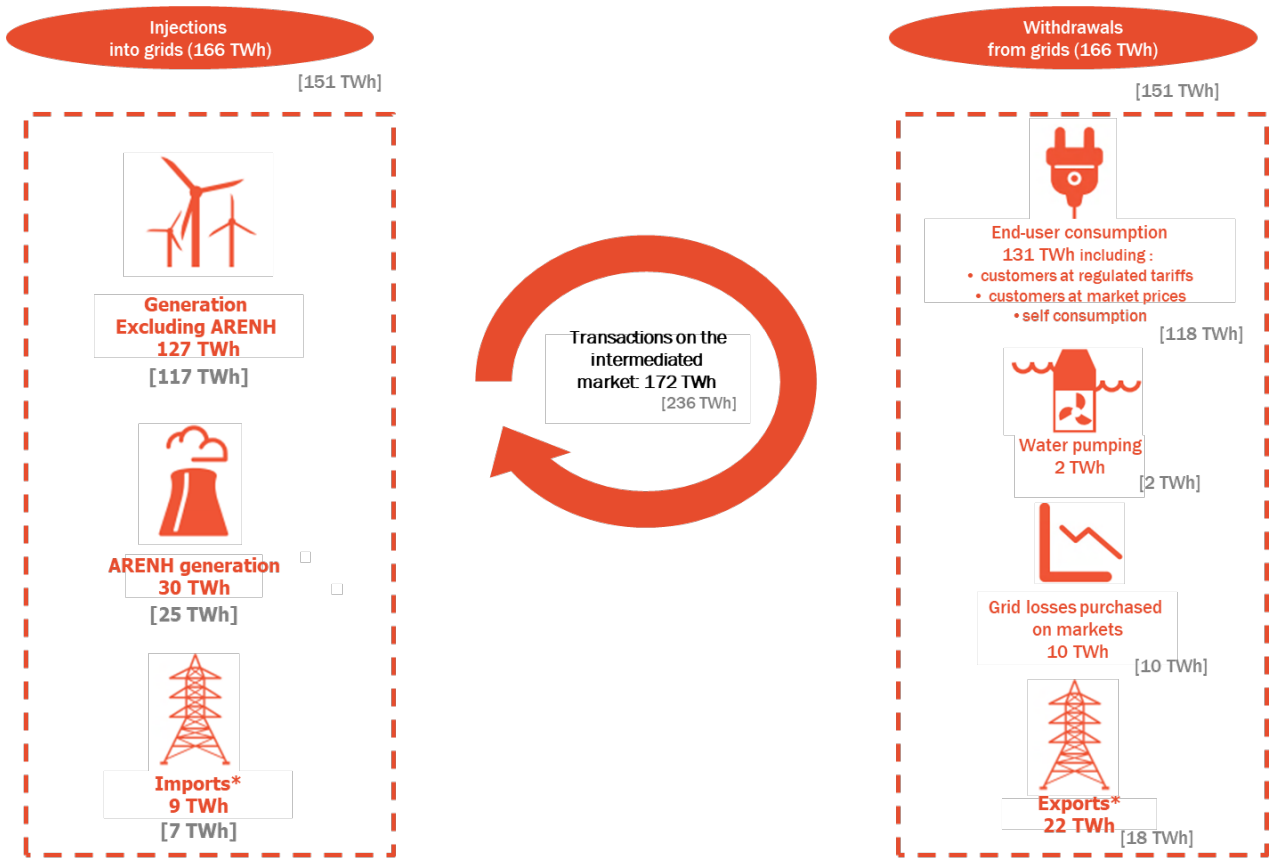
November 2000	CRE validated the initial version of the Balancing Responsible Entity (BR) contract
Early 2001	First purchases of losses on the market by RTE
May 2001	First OTC quotations published regarding the French electricity market
September 2001	First virtual power plant auctions set up by EDF (VPP)
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[1]
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 (www.eex-transparency.com)

[1] 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
June 2018	XBID launch : European cross-border intraday trading platform

2. BALANCE OF THE WHOLESALE ELECTRICITY MARKET

Graph 1 : Q1 2019 balance of the French electricity wholesale market



Données [T4 2018] et T1 2019

Source : RTE - Analysis : CRE

3. KEY DATA

Table 1: Physical flows on the wholesale electricity market

	Quarterly values					Quarterly variation Q1 2019 / Q4 2018		Yearly variation Q1 2019 / Q1 2018	
	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	In percentage	In values	In percentage	In values
Injections, in TWh									
Production (excluding ARENH and VPP), in TWh	140	103	92	117	127	8%	9,27	-9%	-13,25
ARENH, in TWh	23	24	25	25	30	-	4,91	27%	6,36
Imports, in TWh	10	5	6	9	10	8%	0,68	-8%	-0,81
Withdrawals, in TWh									
Consumption, in TWh	136	96	93	119	131	10%	12,17	-4,0%	-5,49
Water pumping, in TWh	2	2	2	2	2	-24%	-0,48	-19%	-0,37
Exports, in TWh	24	27	22	21	23	14%	2,79	-3%	-0,77
Grid losses, in TWh	11	7	7	10	10	4%	0,37	-10%	-1,06

Source: RTE – Analysis: CRE

Table 2: Wholesale electricity market prices during the quarter

	Quarterly values					Quarterly variation Q1 2019 / Q4 2018		Yearly variation Q1 2019 / Q1 2018	
	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	In percentage	In values	In percentage	In values
Spot Market prices									
Intraday Price France, in €/MWh	46,2	37,1	57,1	61,1	47,3	-23%	-13,81	2%	1,04
Day-Ahead Base Price France, in €/MWh	43,8	36,8	57,2	62,7	47,2	-25%	-15,50	8%	3,42
Day-Ahead Peak Price France, in €/MWh	52,1	44,2	64,3	75,5	55,3	-27%	-20,14	6%	3,20
Spread Base Day-Ahead France-Germany, in €/MWh	8,3	0,8	3,7	9,4	5,9	-37%	-3,46	-29%	-2,38
Spread Peak Day-Ahead France-Germany, in €/MWh	8,1	3,6	4,5	10,8	5,4	-50%	-5,47	-34%	-2,73
France-Germany Day-Ahead prices convergence rate	31%	28%	54%	23%	34%	48%	0,11	10%	0,03
Futures Market Prices									
M+1 Price France, in €/MWh	44,0	39,3	58,1	72,2	51,7	-28%	-20,43	18%	7,76
Spread M+1 France-Germany, in €/MWh	6,9	0,9	3,8	14,0	4,9	-65%	-9,04	-29%	-1,96
Q+1 Price France, in €/MWh	34,0	41,4	68,3	69,6	44,2	-36%	-25,37	30%	10,22
Spread Q+1 France-Germany, in €/MWh	1,3	0,6	13,1	11,2	0,1	-99%	-11,05	-91%	-1,19
Y+1 Price France, in €/MWh	40,0	45,0	53,3	57,6	51,1	-11%	-6,45	28%	11,16
Spread Y+1 France-Germany, in €/MWh	5,0	4,7	4,9	4,7	3,1	-34%	-1,61	-37%	-1,87
Ratios Y+1 Peakload/Baseload ratios									
France	128%	127%	127%	126%	131%	3%	0,04	2%	0,02
Germany	125%	124%	122%	122%	124%	2%	0,02	0%	-0,01

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

Table 3: Traded volumes during the quarter

	Quarterly values					Quarterly variation Q1 2019 / Q4 2018		Yearly variation Q1 2019 / Q1 2018	
	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	In percentage	In values	In percentage	In values
NEB									
NEB volumes, in TWh	119,92	102,17	99,65	110,01	142,21	29%	32,20	19%	22,29
Ratio NEB/Consumpion in France	88%	106%	107%	93%	109%	-	0,16	-	0,21
Spot Market, in TWh	**38,93**	**39,08**	**33,92**	**31,39**	**33,76**	**8%**	**2,37**	**-13%**	**-5,17**
Volumes on EPEX SPOT Intraday market, in TWh	2,0	1,8	1,8	1,7	1,6	-7%	-0,14	-20%	-0,40
Fr-De Cross-Border Intraday volumes market shares	65%	77%	100%	100%	100%	0%	0,00	54%	0,35
Volumes on EPEX SPOT Day-Ahead market, in TWh	29,8	31,4	28,1	24,5	27,7	12%	3,28	-7%	-2,07
Volumes on Brokers Day-Ahead market, in TWh	7,1	5,8	4,0	5,2	4,4	-15%	-0,78	-38%	-2,70
Futures Market									
Volumes, in TWh	**219,0**	**171,7**	**188,3**	**204,1**	**138,2**	**-32%**	**-66,0**	**-37%**	**-80,87**
Brokers market share	86,0%	83,3%	78,1%	75,7%	81,5%	-	5,8%	-	-4,5%
EEX Power Derivatives market share	14,0%	16,7%	21,9%	24,3%	18,5%	-	-5,8%	-	4,5%
Number of Transactions	**29 326**	**16 912**	**23 132**	**23 830**	**20 468**	**-14%**	**- 3 362**	**-30%**	**- 8 858**
Brokers market share	83,3%	83,8%	79,9%	73,7%	83,0%	-	9,3%	-	-0,3%
EEX Power Derivatives market share	16,7%	16,2%	20,1%	26,3%	17,0%	-	-9,3%	-	0,3%
Y+1 product									
Volumes, in TWh	55,0	59,6	54,9	71,2	29,3	-59%	-41,90	-47%	-25,63
Number of Transactions	1458	1667	1786	2526	1156	-54%	-1370	-21%	-302
Q+1 product									
Volumes, in TWh	32,2	19,7	29,6	24,9	16,8	-32%	-8,05	-48%	-15,38
Number of Transactions	2665	1371	2682	2578	1656	-36%	-922	-38%	-1009
M+1 product									
Volumes, in TWh	39,9	21,5	34,5	29,3	26,8	-8%	-2,46	-33%	-13,09
Number of Transactions	8972	4392	6922	7171	6253	-13%	-918	-30%	-2719

Source: RTE – Analysis: CRE

Table 4: Availability of electricity generating plants

	Quarterly values					Quarterly variation Q1 2019 / Q4 2018	Yearly variation Q1 2019 / Q1 2018
	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	In percentage	In percentage
Nuclear power plants							
Average nuclear generation rate (%)	80,2	66,5	61,5	70,4	82,8315747	12,4	2,6
Availability rate of nuclear power plants (%)	86,7	75,5	66,6	75,7	86,024311	10,3	-0,7
Hydraulic storage capacity rate							
Hydro storage level (end of quarter) (%)	37,9	37,1	25,6	19,5	27,0	7,5	-10,9

Source: RTE– Analysis : CRE

Table 5: Cross-border flows*

	Quarterly values					Quarterly variation Q1 2019 / Q4 2018		Yearly variation Q1 2019 / Q1 2018	
	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	In percentage	Variation	In percentage	Variation
Imports (TWh)	**9,6**	**4,4**	**4,9**	**7,2**	**8,9**	**23,6%**	**1,7**	**-7,3%**	**-0,7**
Peakload imports (TWh)	4,3	2,1	2,3	3,3	3,9	18,2%	0,6	-9,3%	-0,4
Offpeak imports (TWh)	5,3	2,3	2,6	3,9	5,0	28,2%	1,1	-5,7%	-0,3
Exports (TWh)	**22,5**	**25,2**	**20,4**	**18,2**	**21,8**	**19,8%**	**3,6**	**-3,1%**	**-0,7**
Peak exports (TWh)	8,8	9,8	7,2	6,5	8,2	26,2%	1,7	-6,8%	-0,6
Offpeak exports (TWh)	13,7	15,4	13,2	11,7	13,6	16,2%	1,9	-0,7%	-0,1
Net balance (TWh)	**12,9**	**20,8**	**15,4**	**11,0**	**12,9**	**17,3%**	**1,9**	**0,0%**	**0,0**

* Calculation method updated from Q3 2018

Source: RTE– Analysis : CRE

Table 6: French balancing responsible entities

	Quarterly values					Quarterly variation Q1 2019 / Q4 2018		Yearly variation Q1 2019 / Q1 2018	
	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	In percentage	Variation	In percentage	Variation
Balancing responsible									
Active in electricity generation	20	19	20	20	16	-20,0%	-4	-20,0%	-4
Holder of rights of regulated access to ARENH	18	17	18	18	21	0,0%	3	0,0%	3
Final customers provider	28	27	27	27	27	0,0%	0	-3,6%	-1
Active on imports/exports	49	46	44	42	42	0,0%	0	-14,3%	-7
Active on block exchange	82	82	83	85	79	-7,1%	-6	-3,7%	-3

Source : RTE– Analysis : CRE

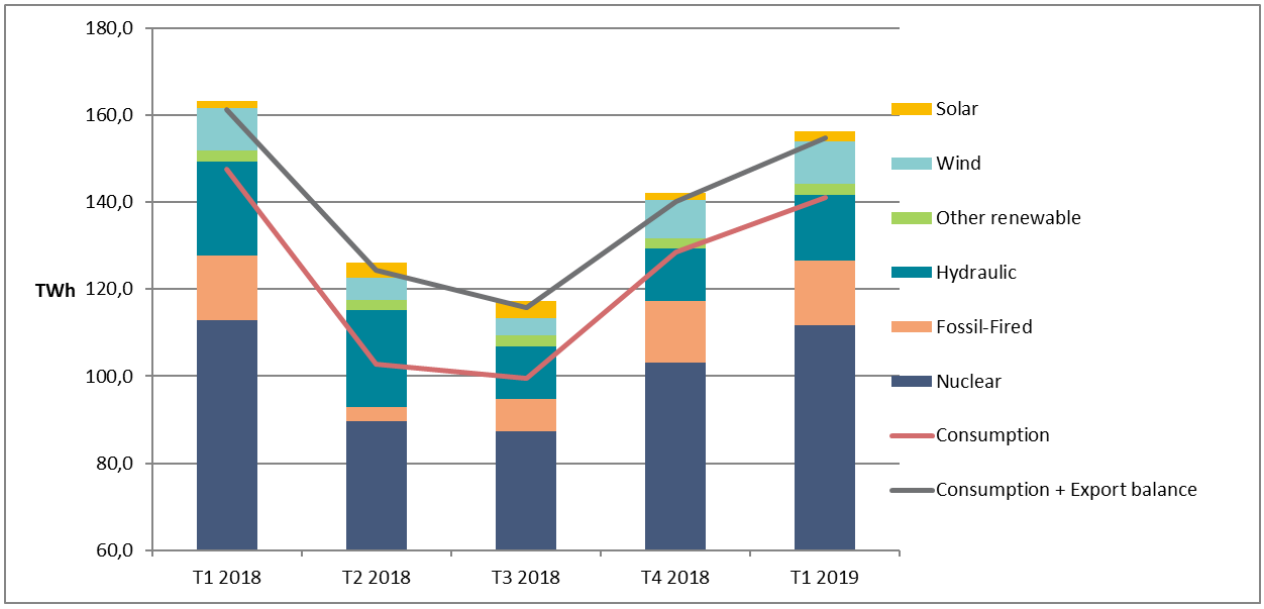
Table 7: Concentration indices on French electricity market

	HHI - Concentration indices					
	Q1 2018		Q4 2018		Q1 2019	
Wholesale energy market		*EDF included*		*EDF included*		*EDF included*
OTC - block purchases	616	*959*	528	*794*	641	*853*
OTC - block sales	814	*738*	711	*678*	980	*836*
EPEX - purchases	448	*784*	491	*841*	583	*1085*
Injections						
Generation	4152	*6687*	2959	*4467*	4149	*3618*
Imports	1809	*1373*	1091	*901*	786	*743*
Deliveries						
End-consumer consumption	1821	*4927*	1461	*4302*	1684	*4350*
Grid losses	2048	*1718*	1952	*1709*	1921	*1615*
Exports	1428	*3372*	716	*2258*	684	*2476*

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

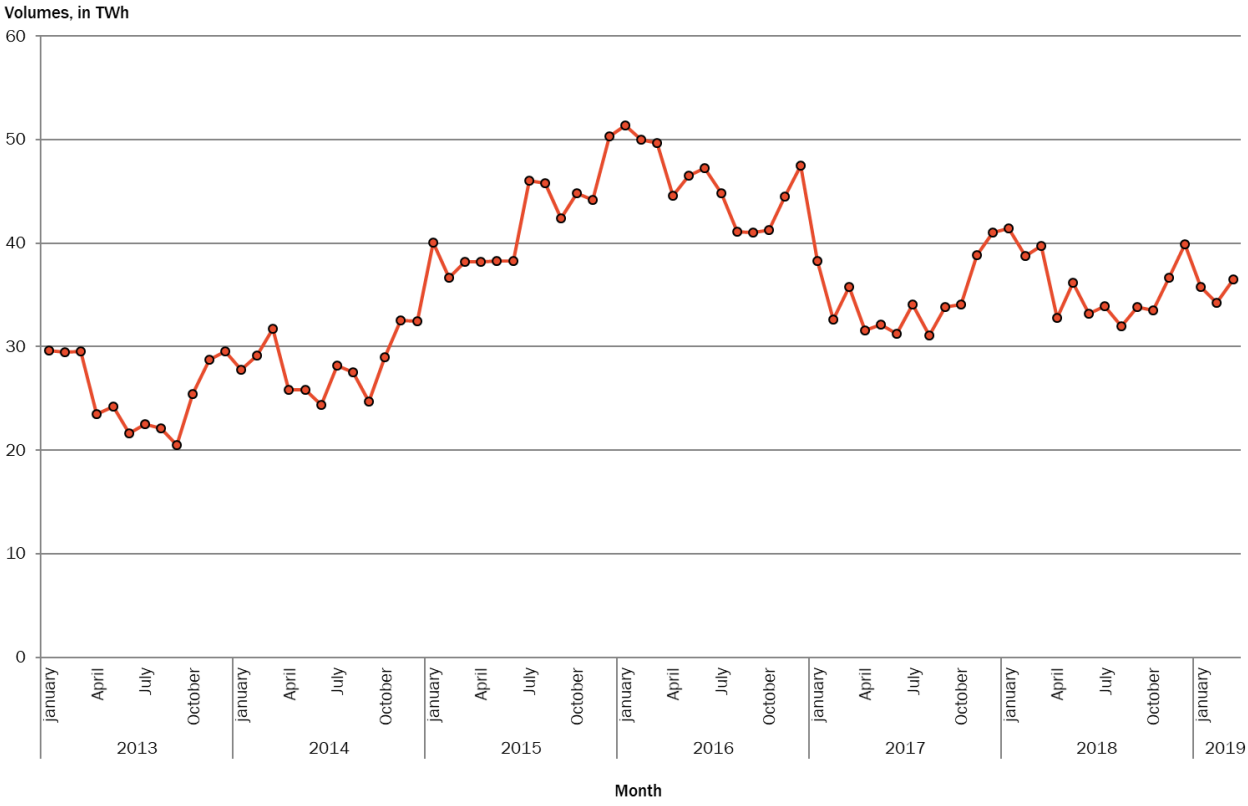
4. FIGURES

Figure 2: Volume of net deliveries resulting from OTC transactions (excluding ARENH)



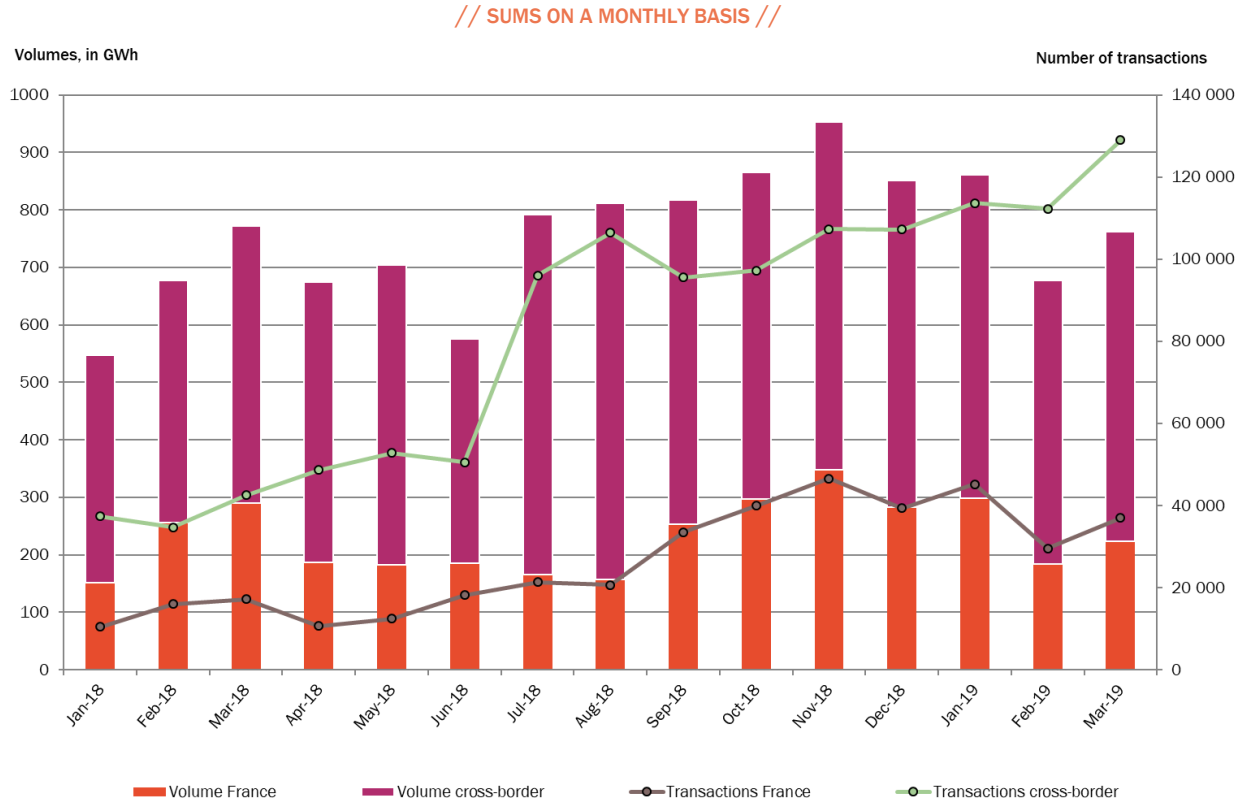
Source: RTE – Analysis: CRE

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



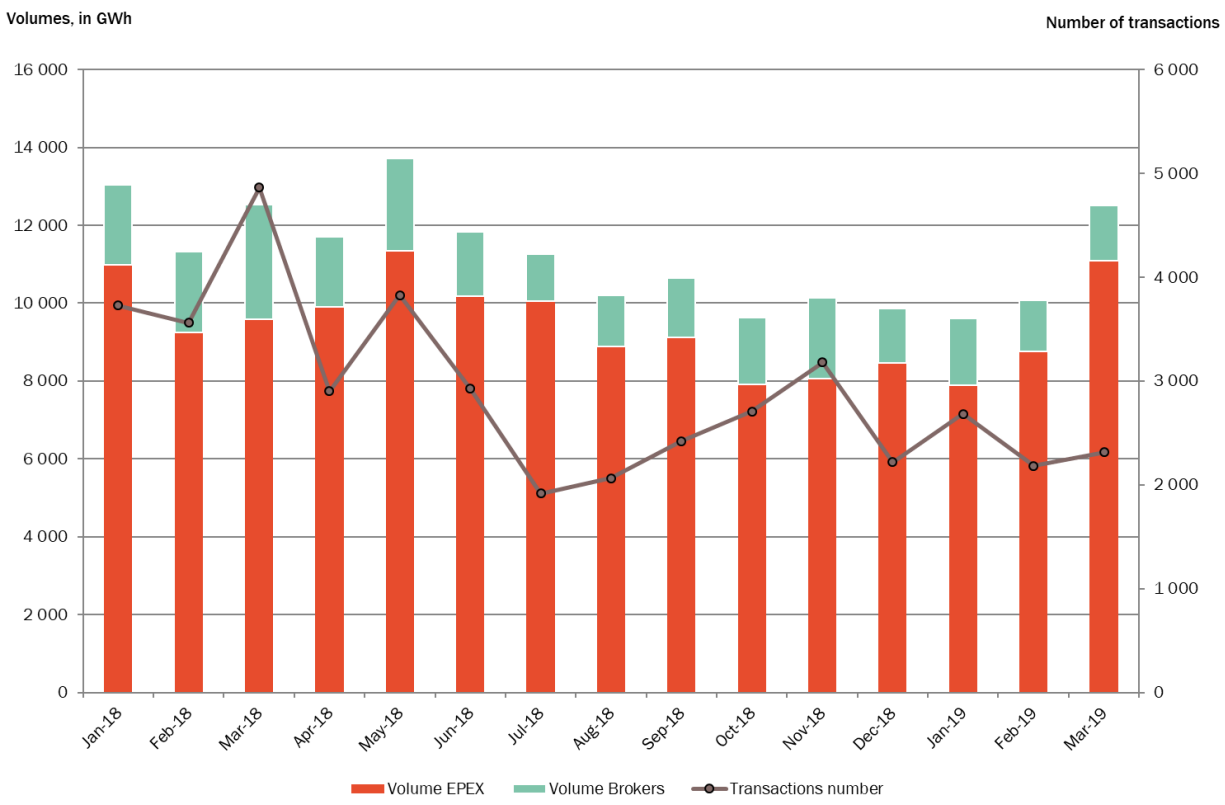
Source : RTE – Analysis : CRE

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



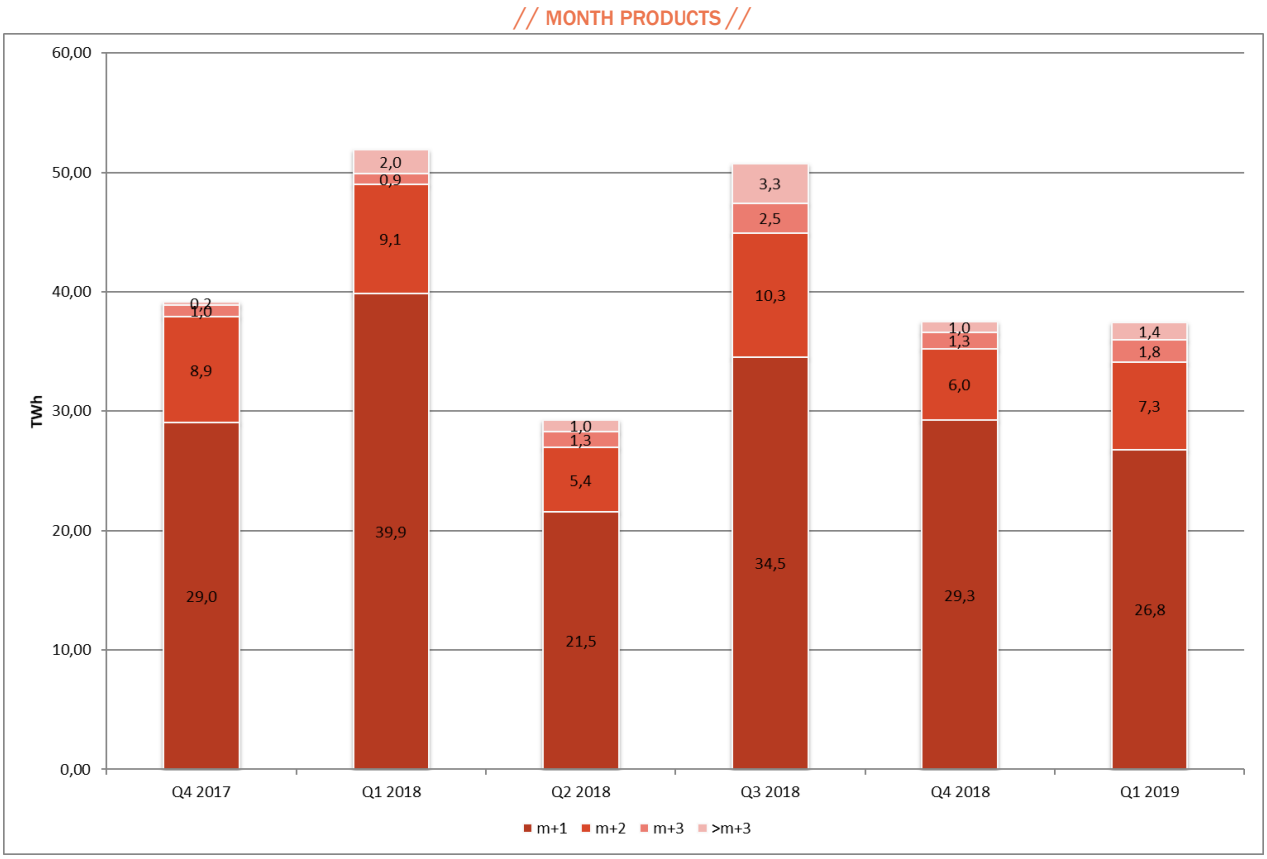
Source: EPEX SPOT, Brokers – Analysis: CRE

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



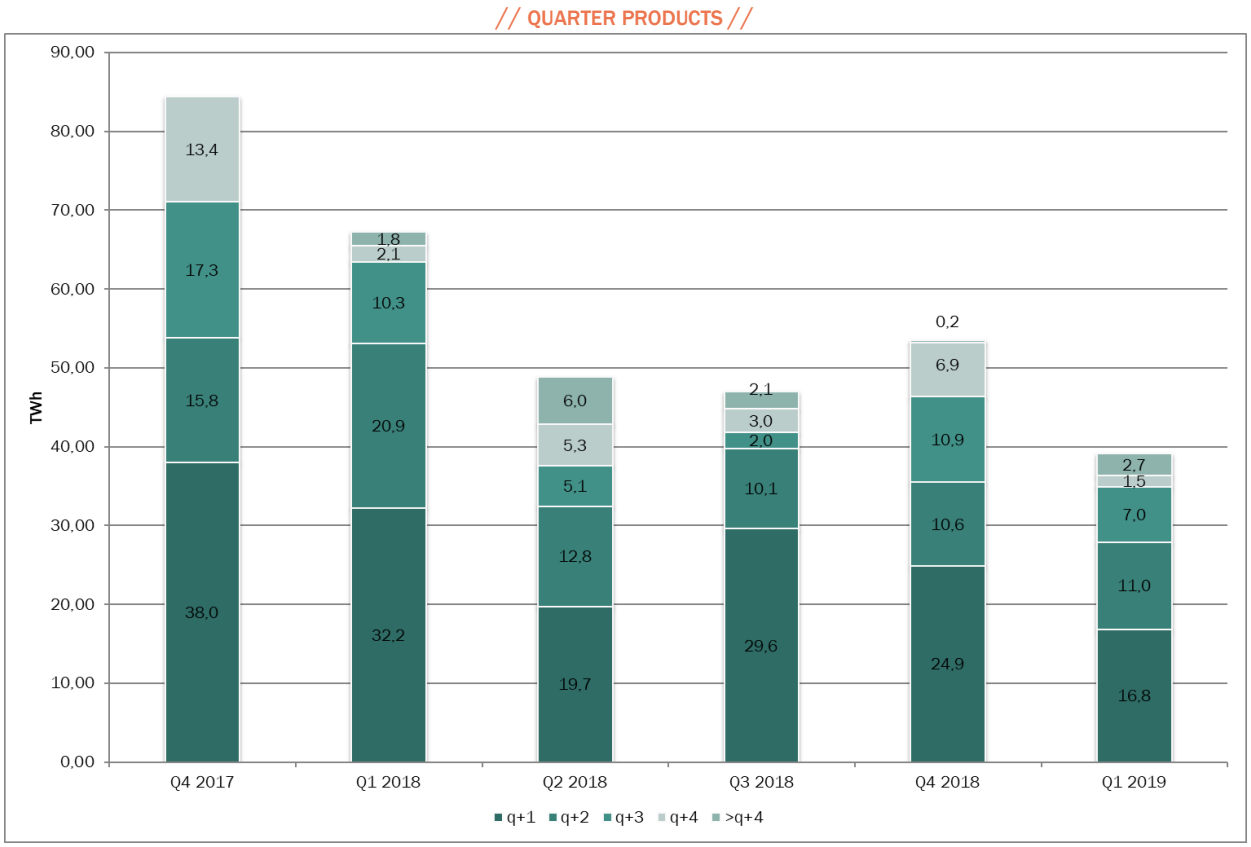
Source: EPEX SPOT, Brokers – Analysis: CRE

Figure 6: Quarterly traded volumes on the intermediated wholesale market



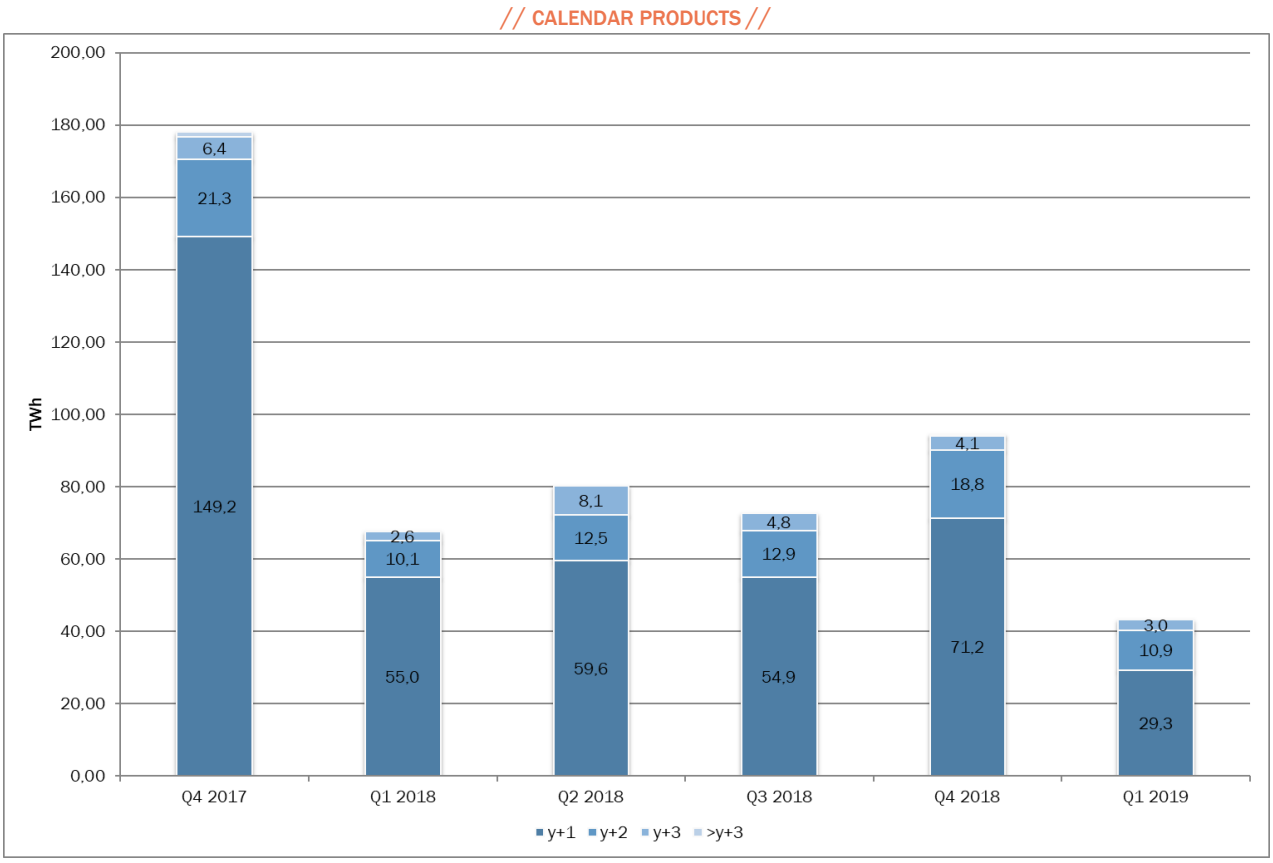
Source: Brokers, EPD France – Analysis: CRE

Figure 7: Quarterly traded volumes on the intermediated wholesale market



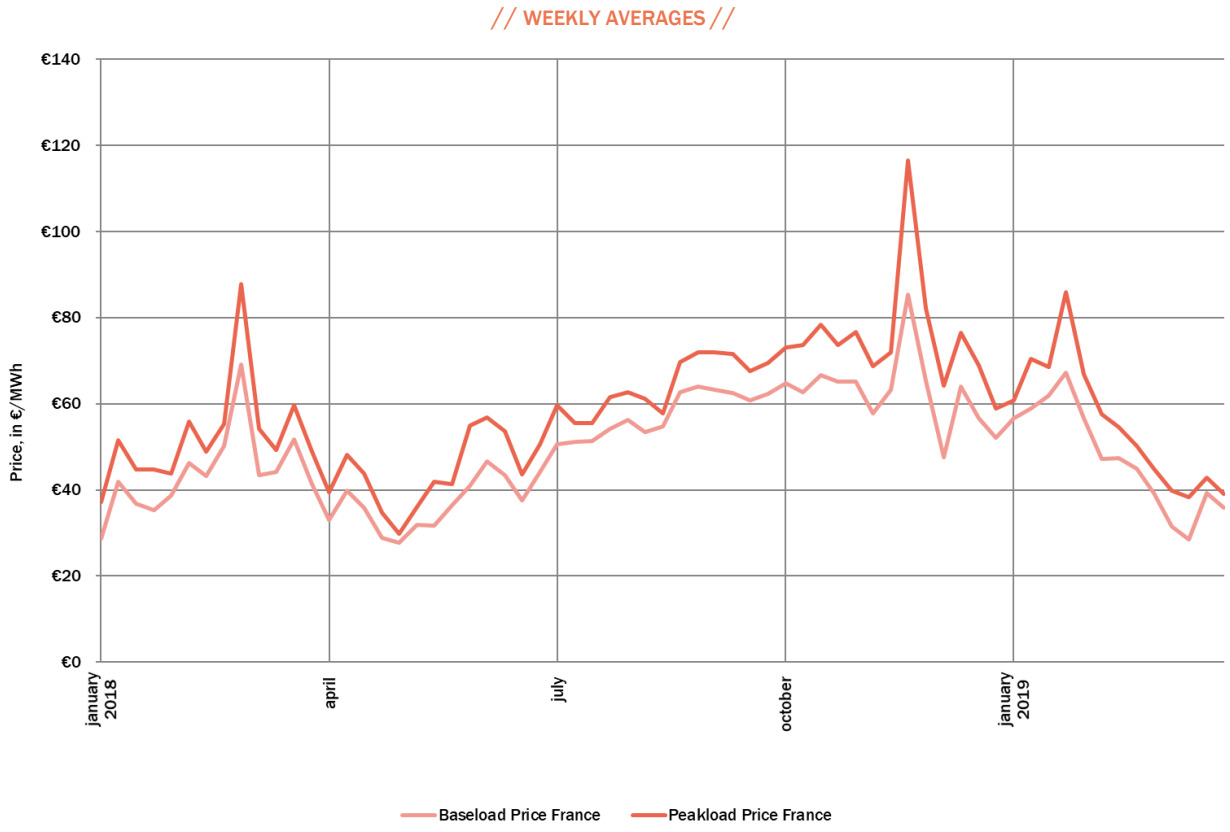
Source: Brokers, EPD France – Analysis: CRE

Figure 8: Quarterly traded volumes on the intermediated wholesale market



Source : Brokers, EPD France – Analysis : CRE

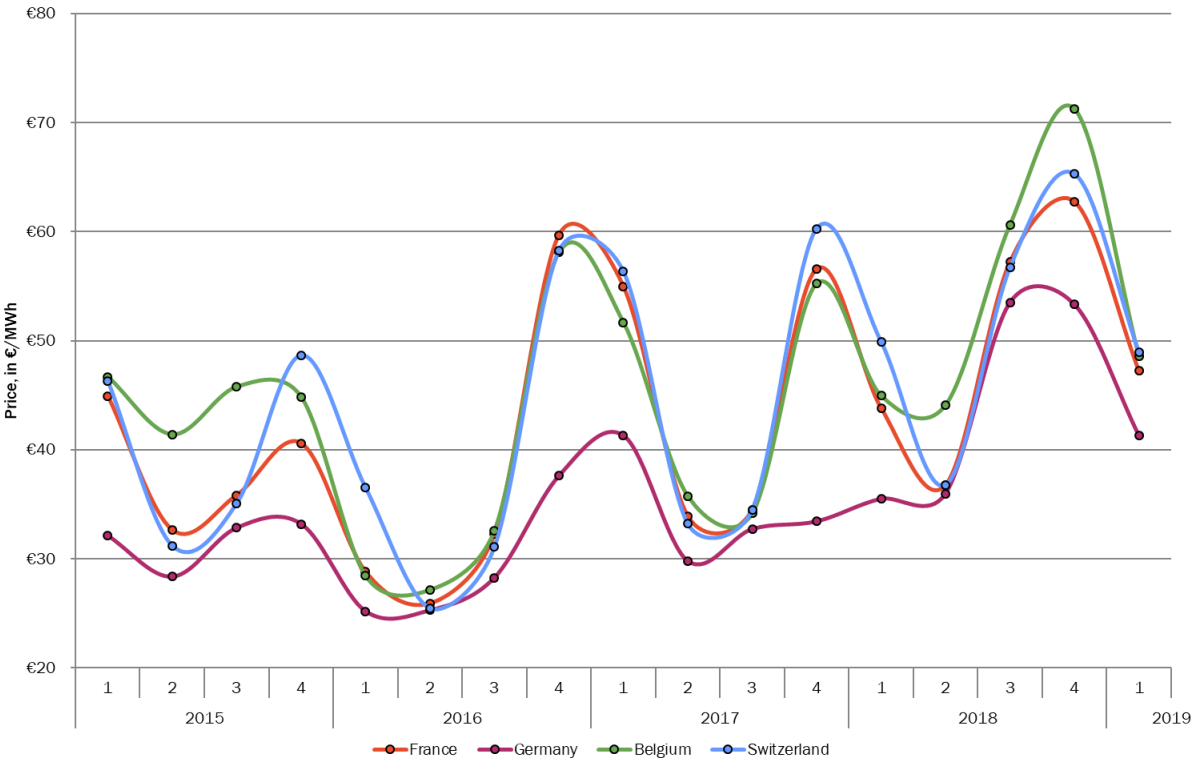
Figure 9: French Day-ahead prices on EPEX SPOT (baseload and peakload)

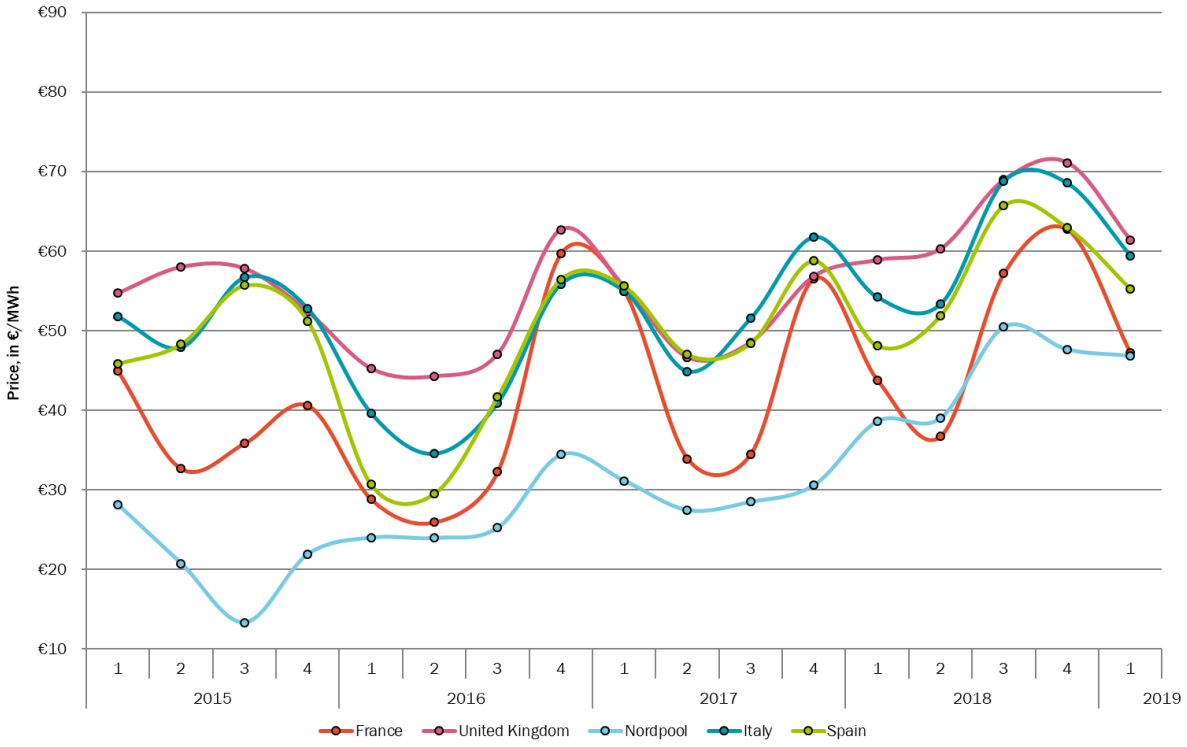


Source: EPEX SPOT – Analysis: CRE

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

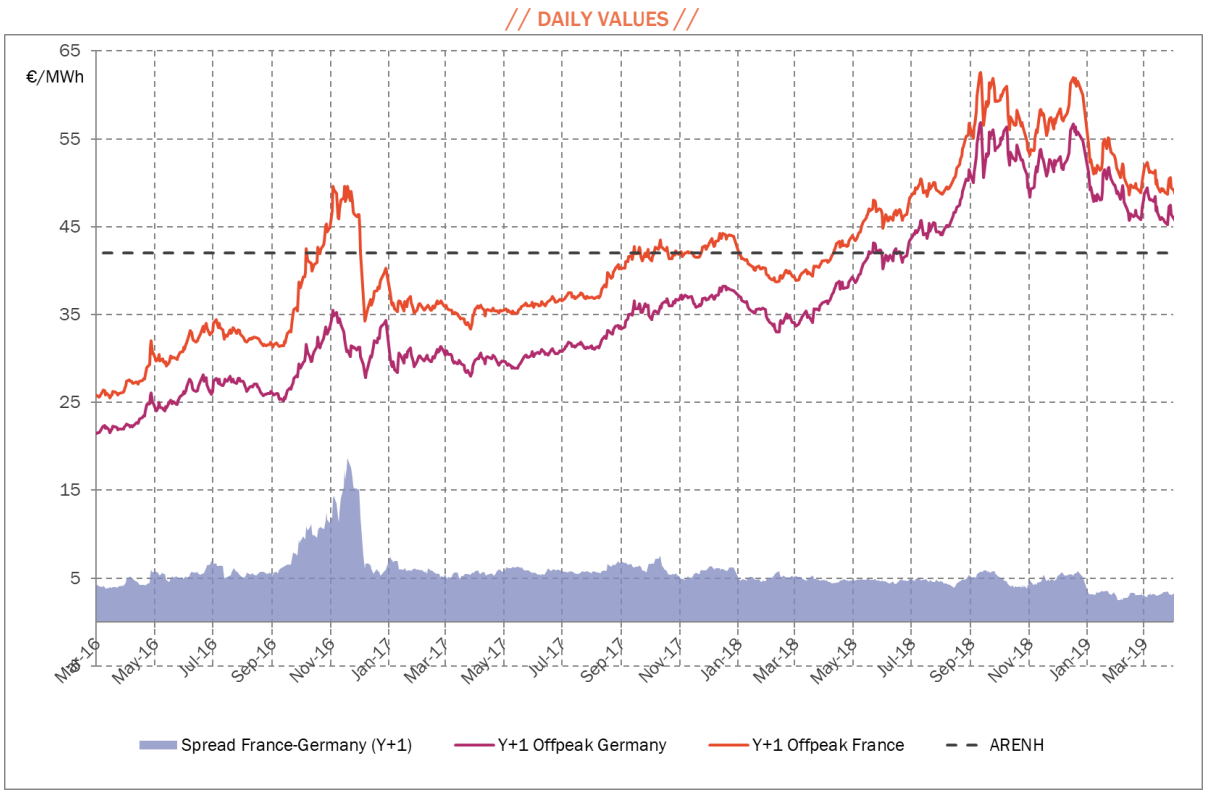
// QUARTERLY AVERAGES //





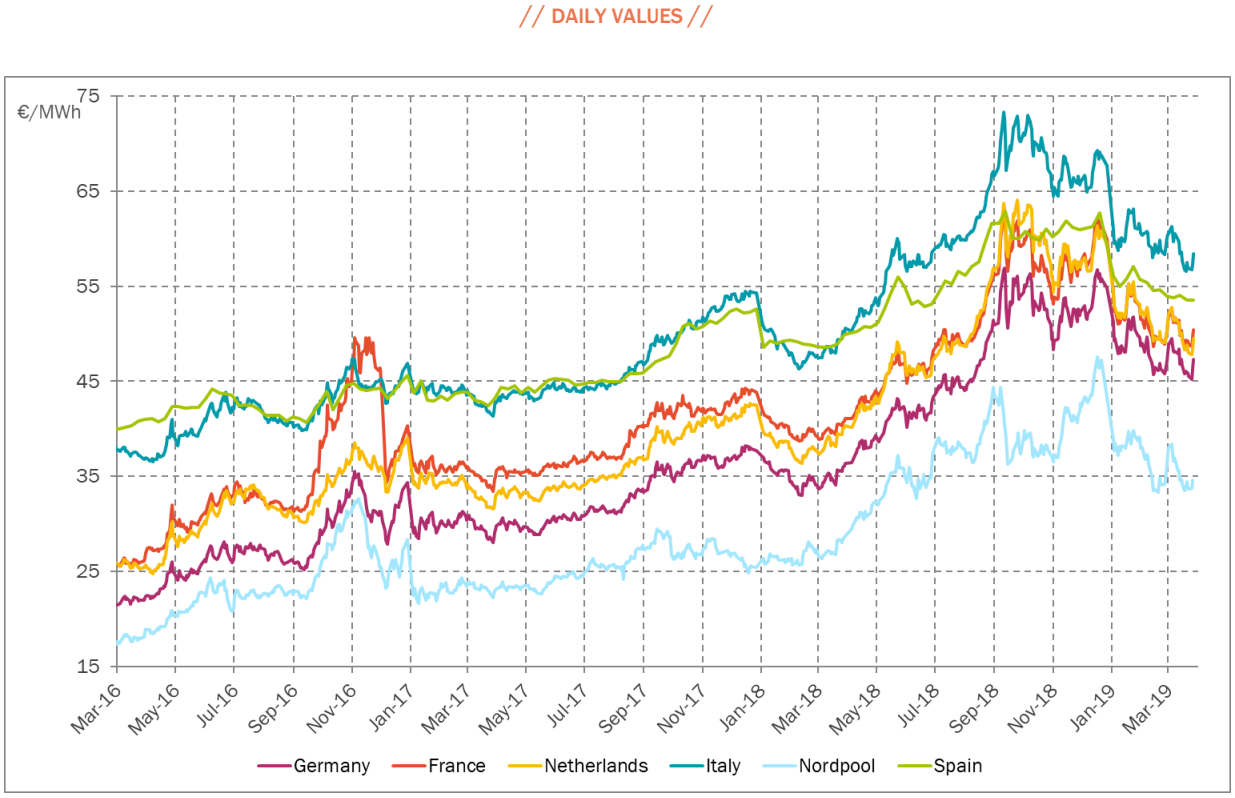
Source: EPEX SPOT, Nordpool, N2EX, GME, OMEL, BELPEX – Analysis: CRE

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



Source: EEX Power Derivatives – Analysis: CRE

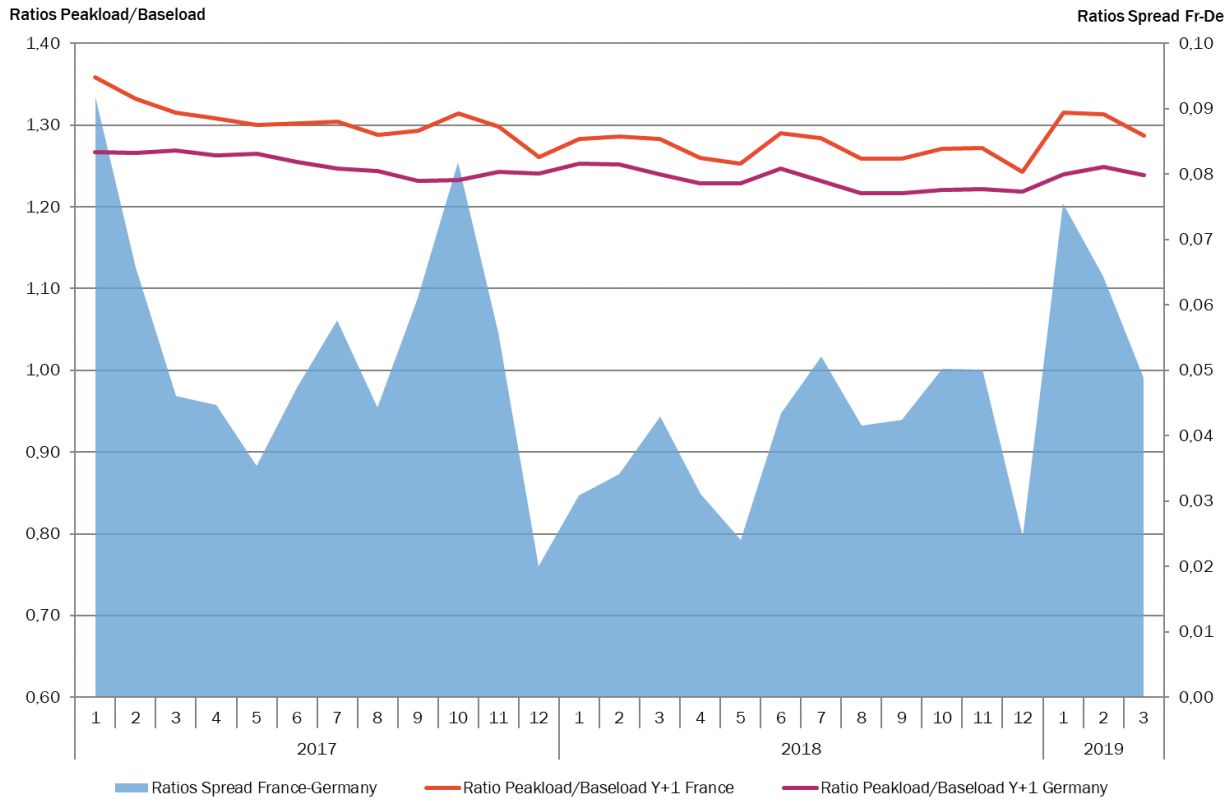
Figure 12: Baselaod Y+1 calendar prices in Europe



Source : EEX Power Derivatives, Courtiers – Analysis : CRE

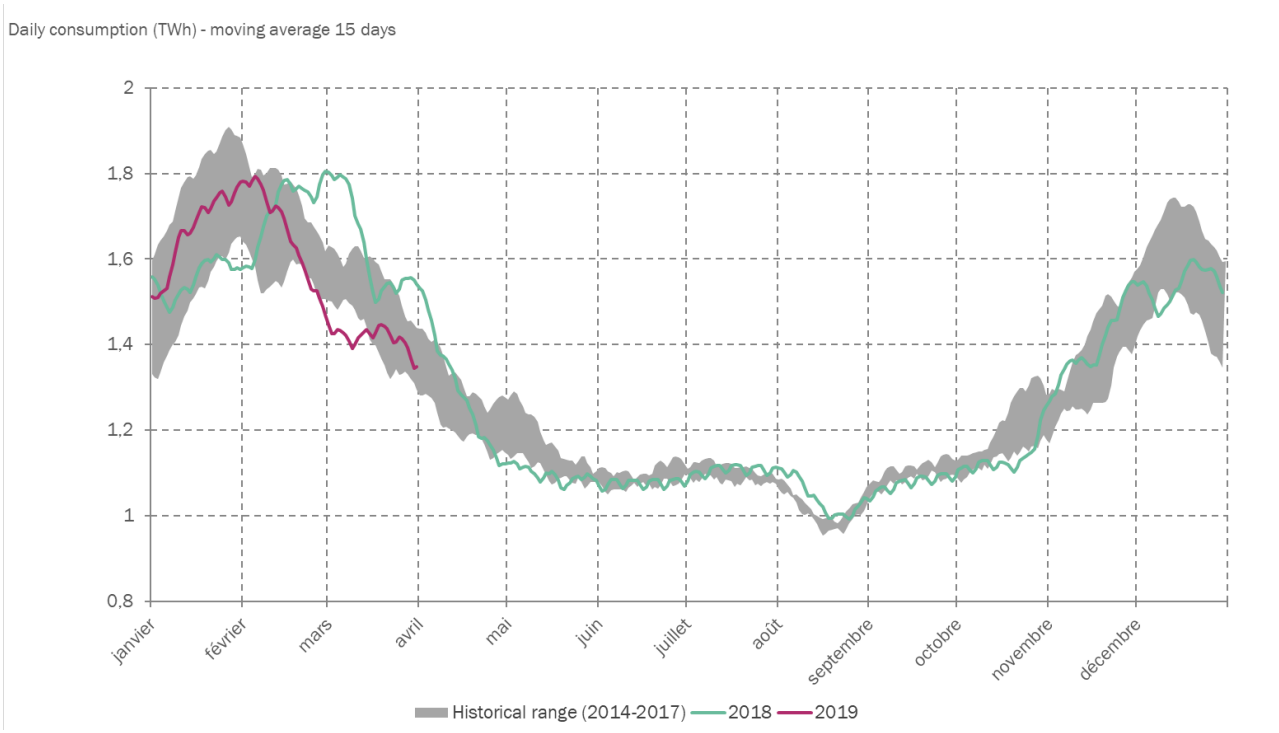
Figure 13: Ratio Peakload/Baseload of Y+1 calendar prices in France and Germany

//MONTHLY AVERAGES //



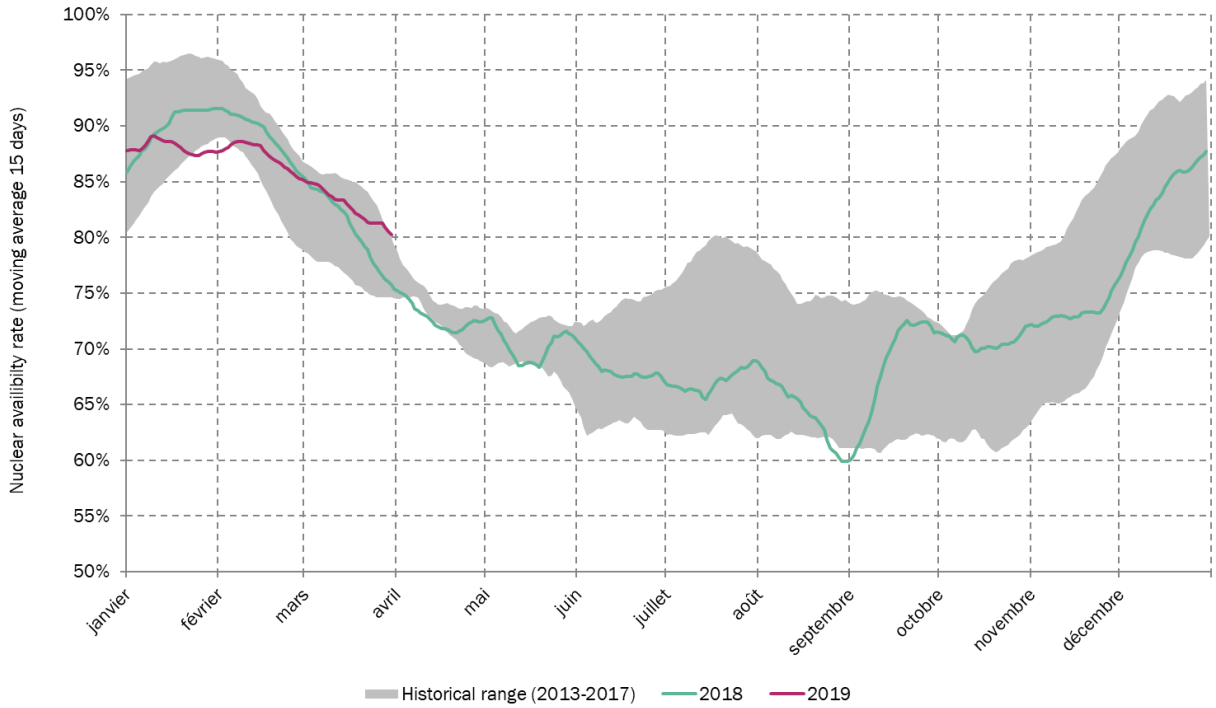
Source: EEX Power Derivatives – Analysis: CRE

Figure 14: French electricity consumption



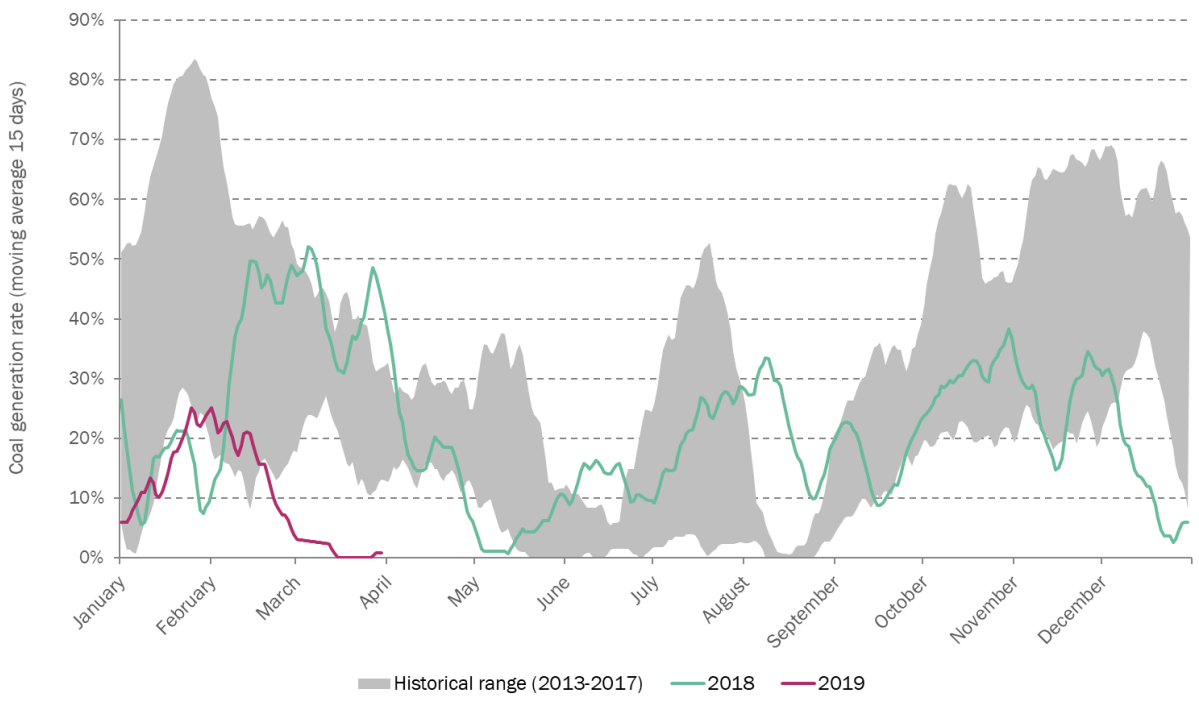
Source : RTE – Analysis : CRE

Figure 15: Availability of nuclear generating capacity



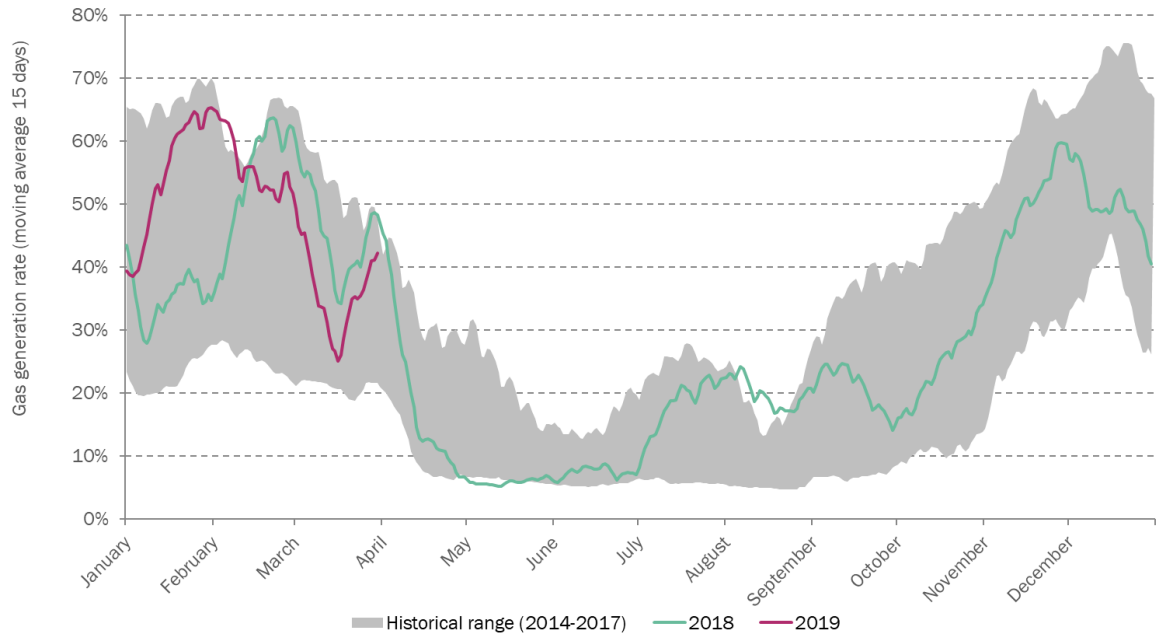
Source: RTE – Analysis : CRE

Figure 16: Average coal generation rate



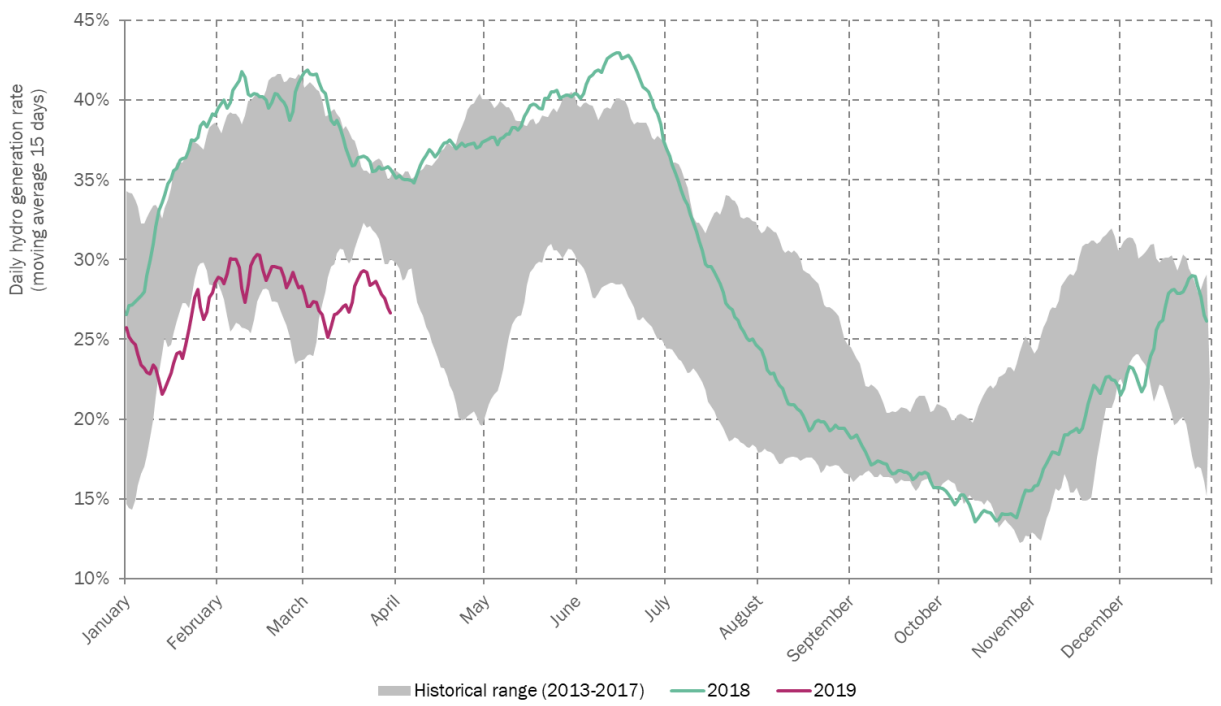
Source: RTE – Analysis : CRE

Figure 17: Average gas generation rate



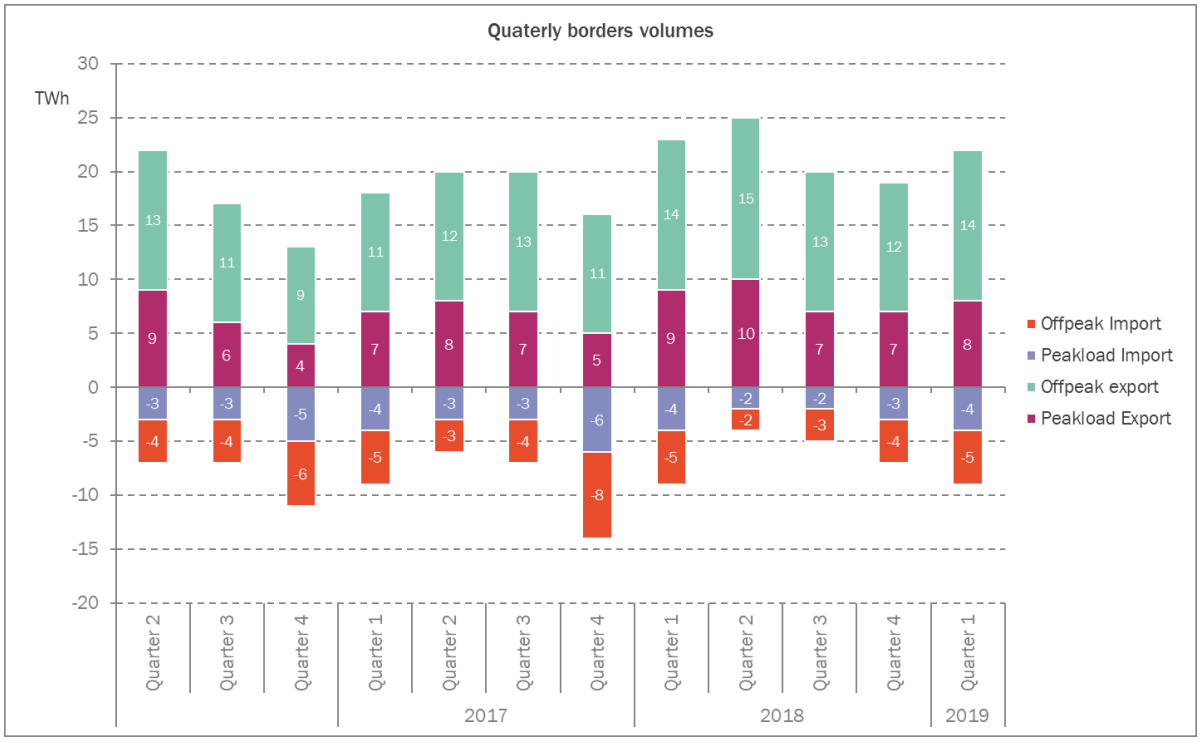
Source: RTE – Analysis : CRE

Figure 18: Hydraulic generation rate



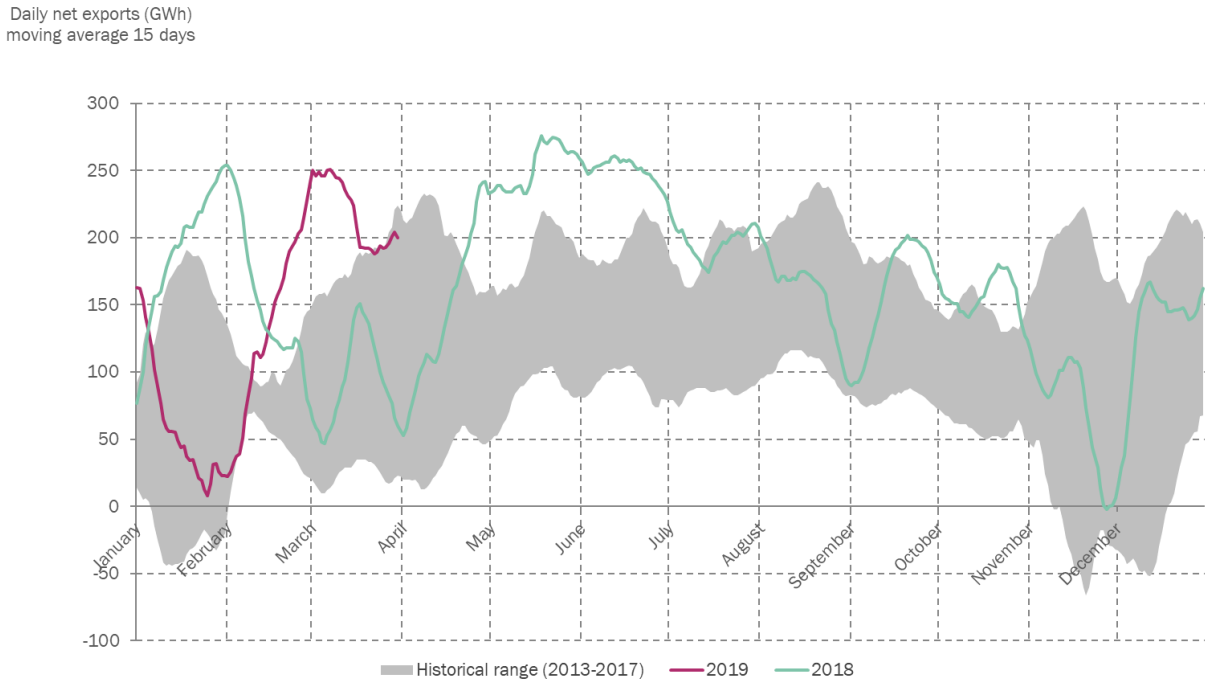
Source: RTE – Analysis : CRE

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



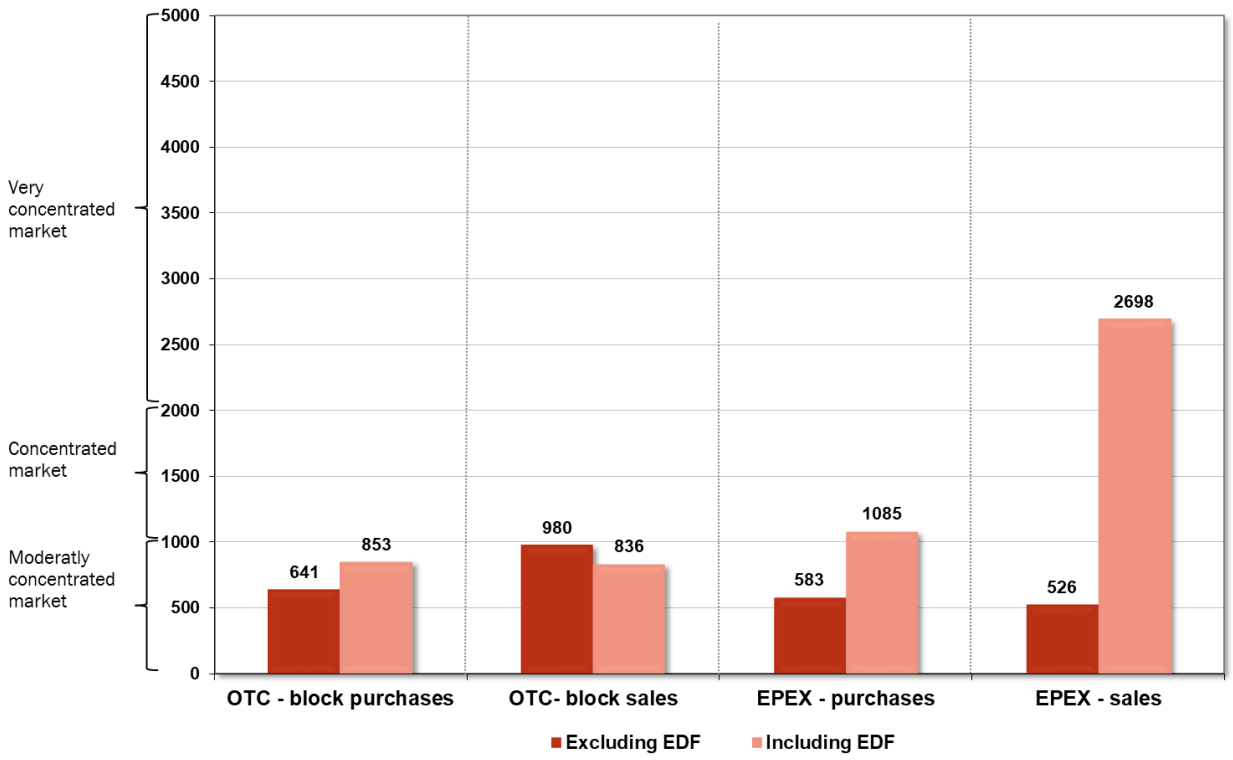
Source: RTE – Analysis : CRE

Figure 20: Export balance



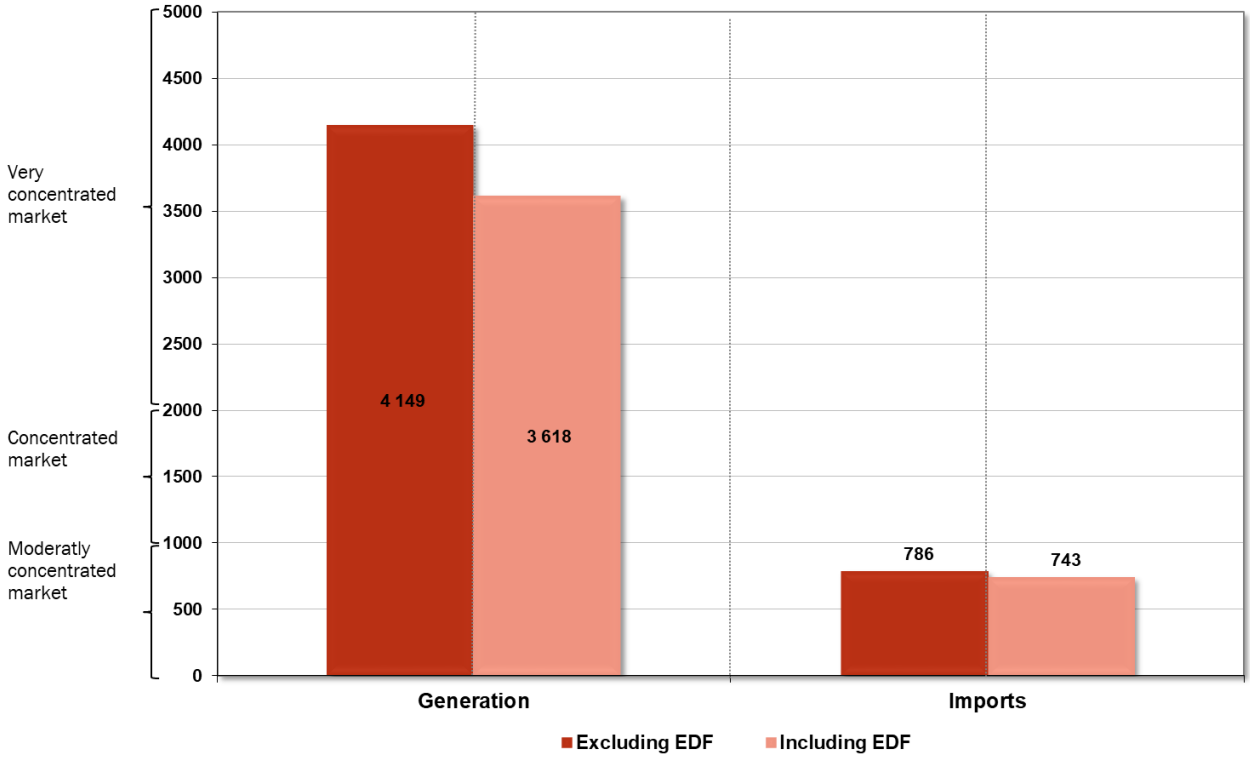
Source: RTE – Analysis : CRE

Figure 21: HHI concentration index – Energy wholesale market in Q1 2019



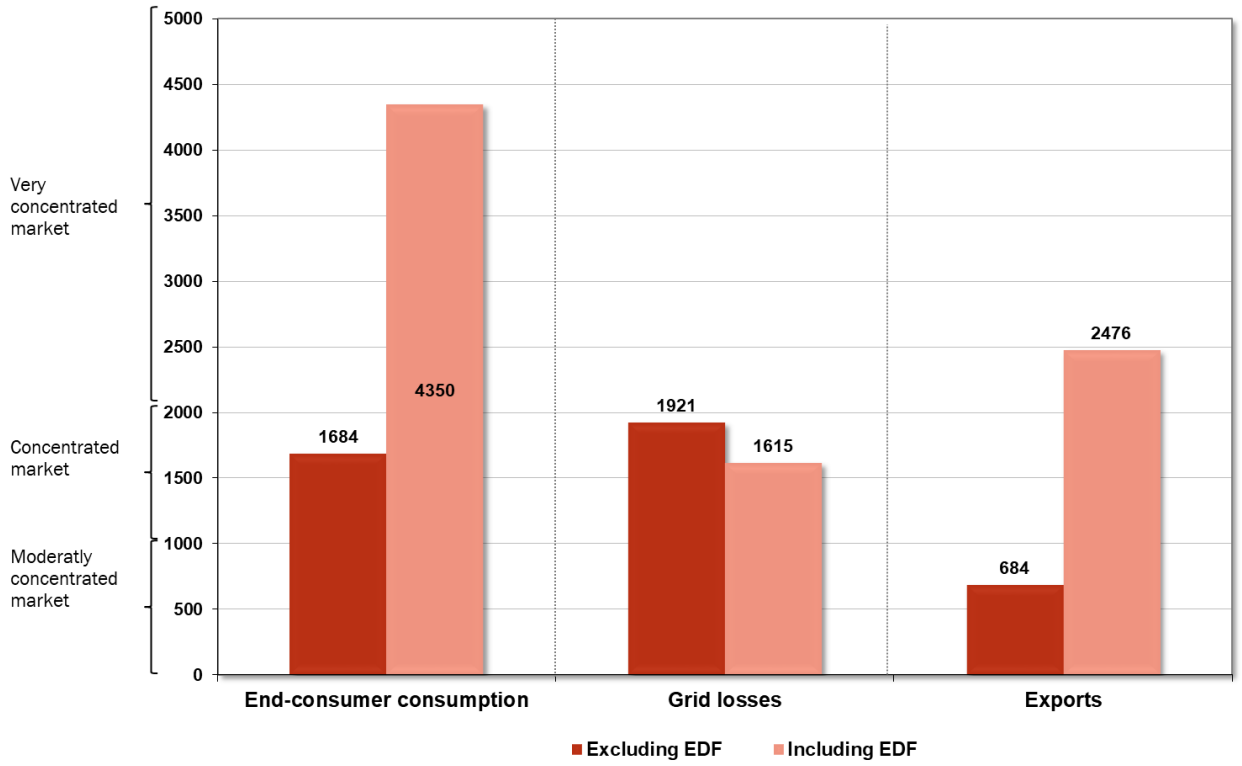
Source : EPEX SPOT, EEX Power Derivatives, Courtiers – Analyse : CRE

Figure 22: HHI concentration index – Injections in Q1 2019



Source: RTE – Analysis: CRE

Figure 23: HHI concentration index – Withdrawals in Q1 2019



Source: RTE – Analysis: CRE

PART 2:
WHOLESALE NATURAL GAS MARKET

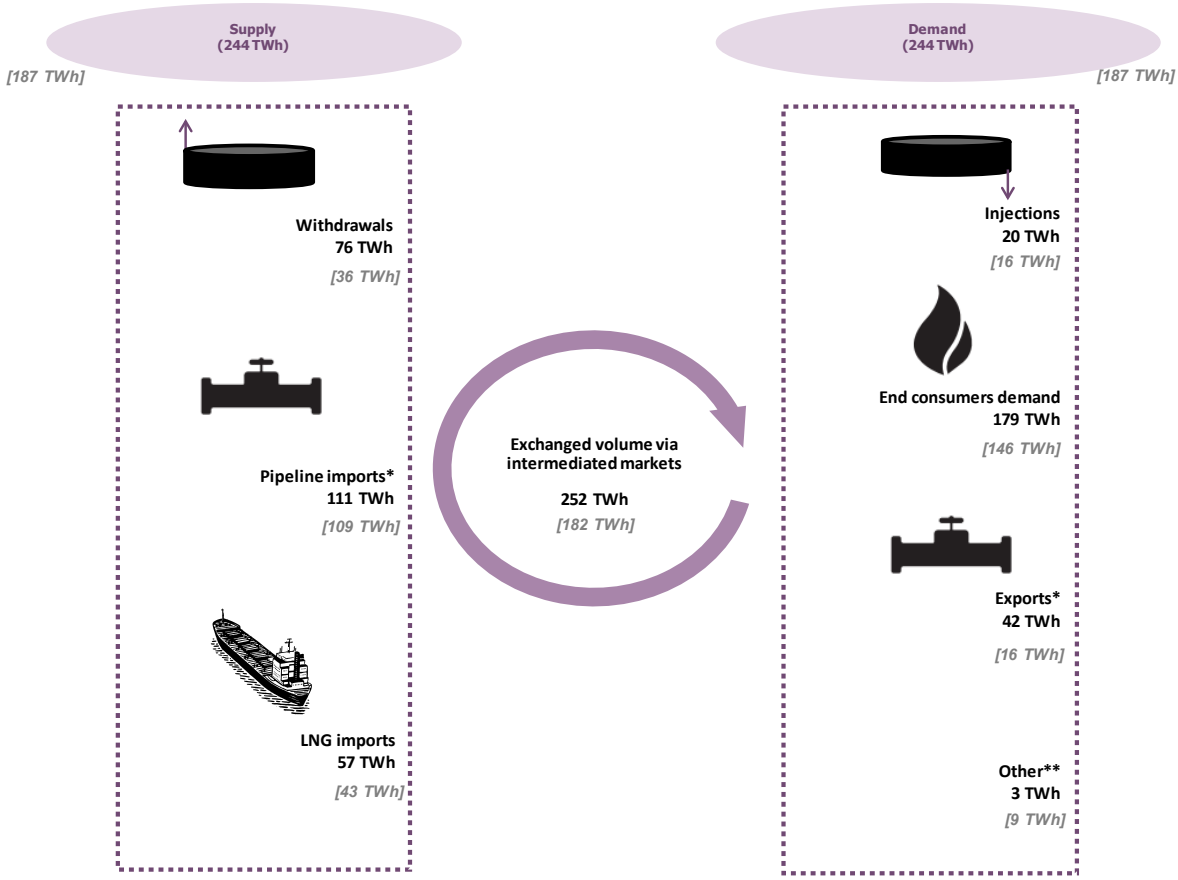
1. KEY DATES

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 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 merger 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
November 2018	Launch of the single gas marketplace : the Trading Region France (TRF) resulting from the merger of PEG Nord and TRS

2. BALANCE OF THE WHOLESALE GAS MARKET

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



Data [Q4 2018] and Q1 2019

** of which reverse allocations*

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

Source: GRTgaz, Teréga

3. KEY DATA

Table 8: Fundamentals

Market fundamentals	Quarterly values					Quarterly variation Q1 2019 / Q4 2018		Yearly variation Q1 2019 / Q1 2018	
	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	In percentage	In value	In percentage	In value
Entry and exit flows									
Supply (TWh)	218	155	146	187	244	30%	57	0	26
Storages withdrawals	69	5	6	36	76	114%	40	11%	7
Imports	149	150	139	151	168	11%	16	13%	19
Pipeline	*128*	*118*	*118*	*109*	*111*	*2%*	*2*	*-13%*	*-17*
LNG	*21*	*32*	*21*	*43*	*57*	*33%*	*14*	*166%*	*36*
Demand (TWh)	218	155	146	187	244	30%	57	12%	26
Storages injections	3	56	68	16	20		4	613%	17
End consumer demand	187	70	60	146	179	22%	33	-5%	-9
Distribution consumers	*135*	*39*	*22*	*91*	*124*	*36%*	*33*	*-8%*	*-11*
Consumers connected to the transmission system	*53*	*31*	*38*	*55*	*55*	*0%*	*0*	*4%*	*2*
Exports	24	28	16	16	42	170%	26	78%	18
Other	4	1	2	9	3	-66%	-6	-19%	-1
Deliveries at PEG (TWh)	275	223	245	234	231	-1%	-3	-16%	-44
PEG*	236	193	205	218	231	6%	13	-2%	-5
Infrastructure figures									
Utilization of Virtualys (Entry)	45%	50%	46%	34%	62%		27%		17%
Utilization of Obergailbach interconnection (Entry)	56%	75%	46%	36%	17%		-19%		-39%
Stock levels (TWh as at the end of the Quarter)	4	55	118	94	37	-61%	-57	853%	33
Avg. Net variation of French stocks (GWh/j)	-732	556	669	-212	-621	193%	-410	-15%	111
Avg. LNG terminals emissions (GWh/j)	238	352	229	460	635	38%	175	167%	397
Avg. Exports from France to Spain (GWh/j)	125	70	85	152	200	31%	48	59%	74

** PEG Nord and TRS before 1st November 2018*

Source: GRTgaz, Teréga – Analysis: CRE

Table 9: Prices

Prices	Quarterly values					Quarterly variation Q1 2019 / Q4 2018		Yearly variation Q1 2019 / Q1 2018	
	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	In percentage	In value	In percentage	In value
Spot prices (€/MWh)									
PEG* day-ahead (avg.)	21,2	21,0	24,4	24,6	18,7	-24%	-5,9	-12%	-2,5
Day-ahead PEG*-TTF Spread (avg.)	-0,3	-0,1	-0,2	-0,1	0,3	-325%	0,4	-190%	0,5
Forward prices (€/MWh)									
PEG* M+1 (avg.)	19,0	20,9	24,6	25,1	18,7	-26%	-6,4	-1%	-0,3
PEG* Y+1 (avg.)	17,4	19,8	22,9	23,7	19,9	-16%	-3,8	14%	2,5
M+1 PEG*-TTF spread (avg.)	0,3	0,2	0,3	0,2	0,1	-41%	-0,1	-53%	-0,2
Summer-ahead/Winter-ahead spread ** (avg.)	1,3	0,9	0,7	1,3	2,9	129%	1,6	118%	1,6

** PEG Nord before 1st November 2018*

*** 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 Q1 2019 / Q4 2018		Yearly variation Q1 2019 / Q1 2018	
	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	In percentage	In value	In percentage	In value
Activity in the French wholesale gas markets									
Natural gas exchanged at PEG via intermediated markets	172	141	145	176	180	2%	4	4%	7
% of national consumption	92%	202%	243%	120%	101%				
Trading volumes in the French intermediated markets									
Spot market (TWh)	60	46	44	50	46	-7%	-4	-23%	-14
Intraday	10	7	7	9	8	-5%	-0,4	-18%	-1,7
Day Ahead	32	24	23	26	24	-7%	-1,8	-24%	-7,5
Exchange (DA, WD, WE, other spot)	53	38	37	38	36	-5%	-1,7	-32%	-17,0
Brokers (DA, WD, WE, other spot)	7	8	7	12	11	-15%	-1,8	41%	3,0
Forwards market (TWh)	186	81	82	132	206	56%	74	11%	20
M+1	24	21	20	31	29	-6%	-1,7	19%	4,6
Q+1	2	11	8	19	6	-67%	-13,0	217%	4,3
S+1	75	14	11	32	82	153%	49,6	10%	7,4
Y+1	10	3	3	4	9	142%	5,2	-9%	-0,9
Exchange (all maturities)	4	3	2	2	4	77%	1,8	-3%	-0,1
Brokers (all maturities)	181	79	80	130	202	55%	71,9	11%	20,5
Number of transactions in the French intermediated markets									
Spot market	45353	36371	35322	36052	32859	-9%	-3193	-28%	-12494
Intraday	9 319	7 766	7 570	8 088	7 292	-10%	-796	-22%	-2027
Day Ahead	28 768	22 601	22 082	22 312	20 652	-7%	-1660	-28%	-8116
Exchange (DA, WD, WE, other spot)	43 577	33 535	32 398	31 874	29 538	-7%	-2336	-32%	-14039
Brokers (DA, WD, WE, other spot)	1 776	2 836	2 924	4 178	3 321	-21%	-857	87%	1545
Forwards market	1648	1045	965	1323	1709	29%	386	4%	61
M+1	805	573	484	600	756	26%	156	-6%	-49
Q+1	24	105	71	177	75	-58%	-102	213%	51
S+1	300	60	46	114	274	140%	160	-9%	-26
Y+1	39	16	15	36	50	39%	14	28%	11
Exchange (all forwards)	176	157	94	127	194	53%	67	10%	18
Brokers (all forwards)	1 472	888	871	1 196	1 515	27%	319	3%	43
Concentration of the natural gas market in France									
Number of shippers active in the market	103	98	97	101	106	5%	5	3%	3
Active in Powernext Gas Spot	*58*	*56*	*55*	*63*	*66*	*5%*	*3*	*14%*	*8*
Active in Powernext Gas Futures	*31*	*32*	*29*	*30*	*36*	*20%*	*6*	*16%*	*5*

** Quarterly 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

Source: Powernext EOD, ICIS Heren – Analysis: CRE

Figure 26: Year-ahead prices in the main wholesale markets in Europe

Source: Powernext, ICIS Heren – Analysis: CRE

Figure 27: Price of calendar-year contracts for PEG and TTF

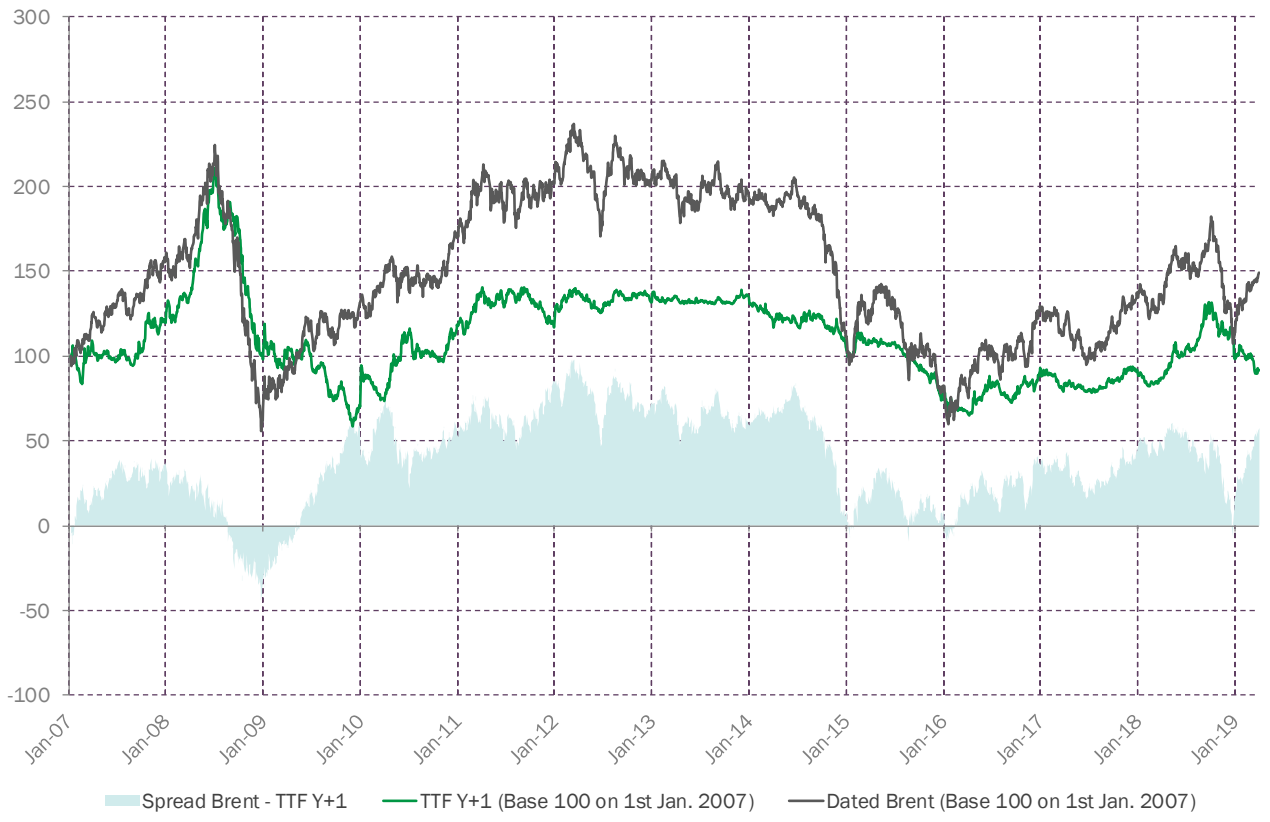
Source: Powernext, ICIS Heren – Analysis: CRE

4.2 Global markets

Figure 28: International month-ahead natural gas prices

Source: Powernext, ICIS Heren – Analysis: CRE

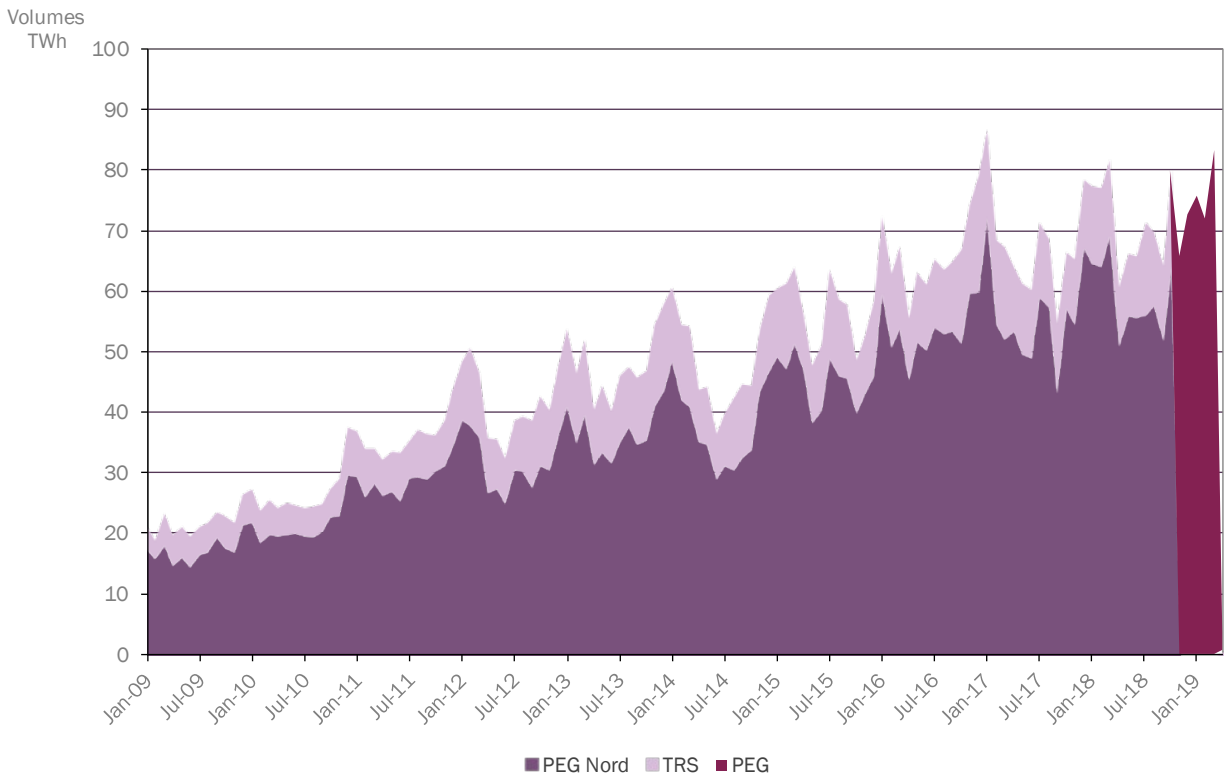
Figure 29: Comparison between natural gas and oil prices



Source: Powernext, ICIS Heren – Analysis: CRE

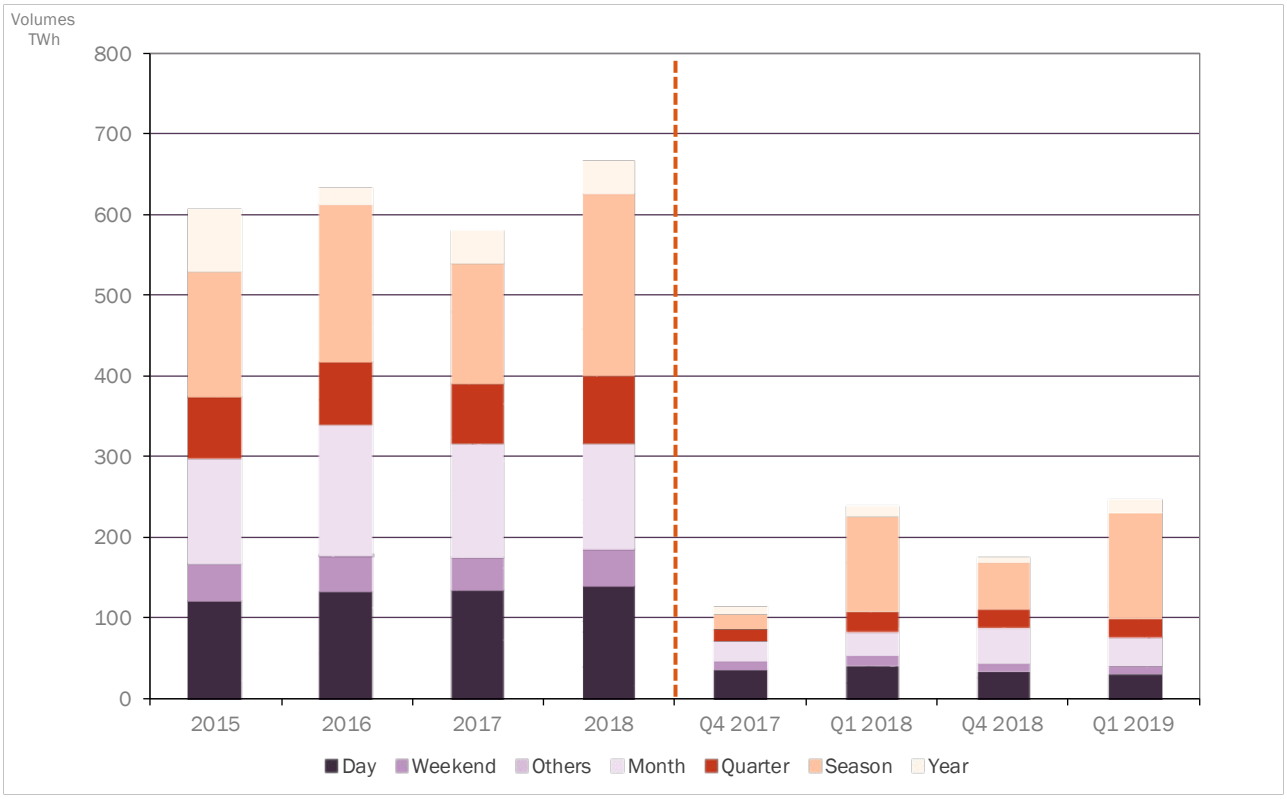
4.3 Development of the French natural gas markets

Figure 30: Deliveries at PEGs



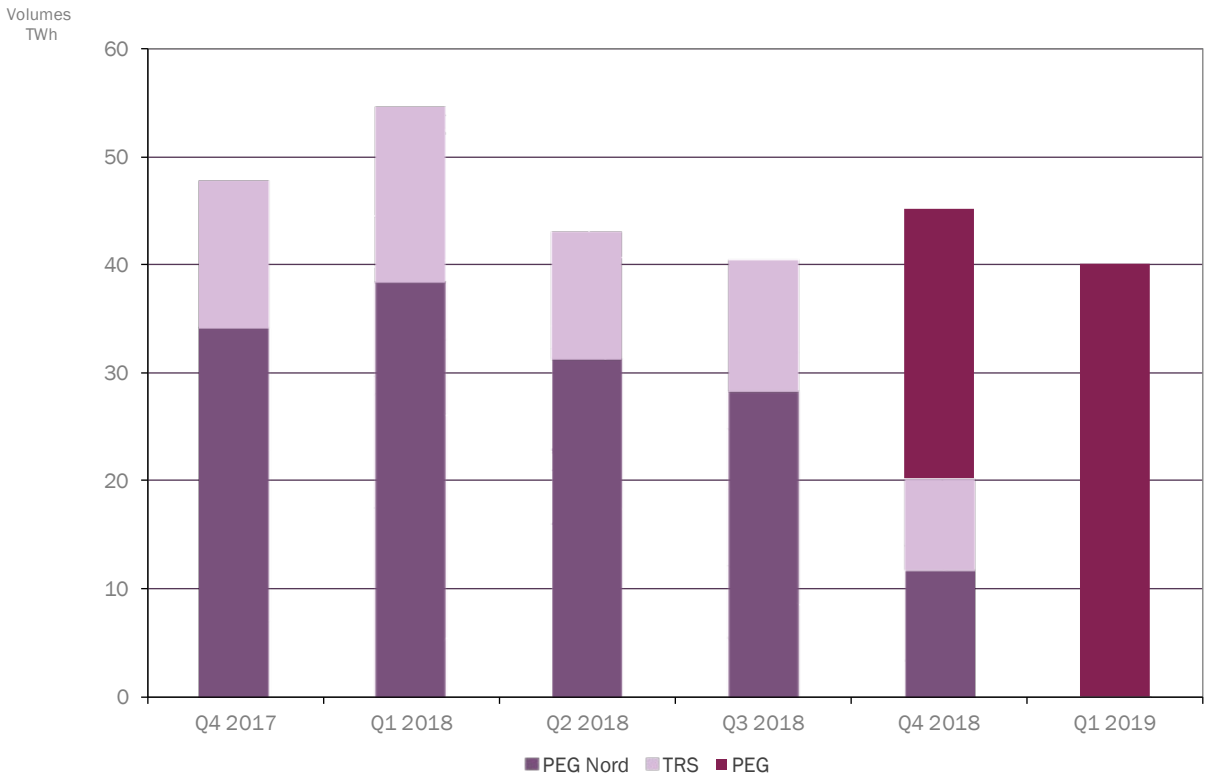
Source: GRTgaz, Teréga – Analysis: CRE

Figure 31: Trading volumes in the intermediated markets by contract



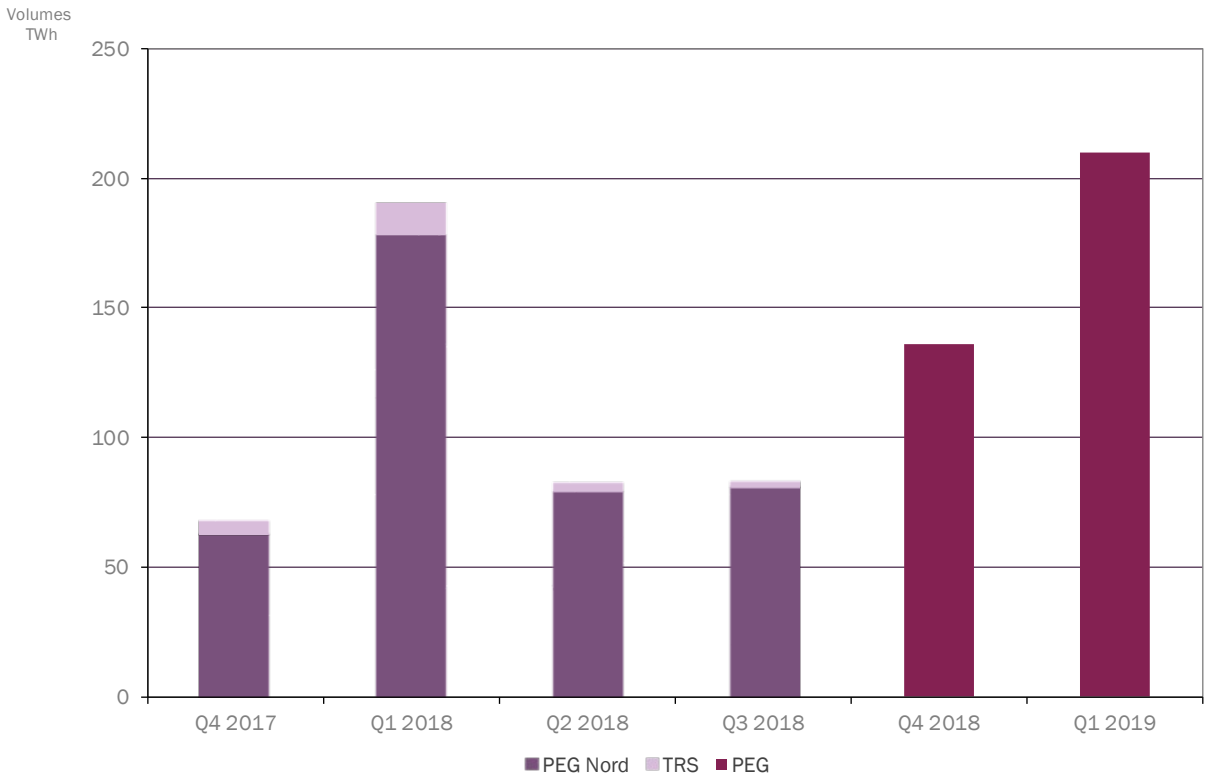
Source: Powernext, Brokers – Analysis: CRE

Figure 32: Trading volumes in the spot markets by zone



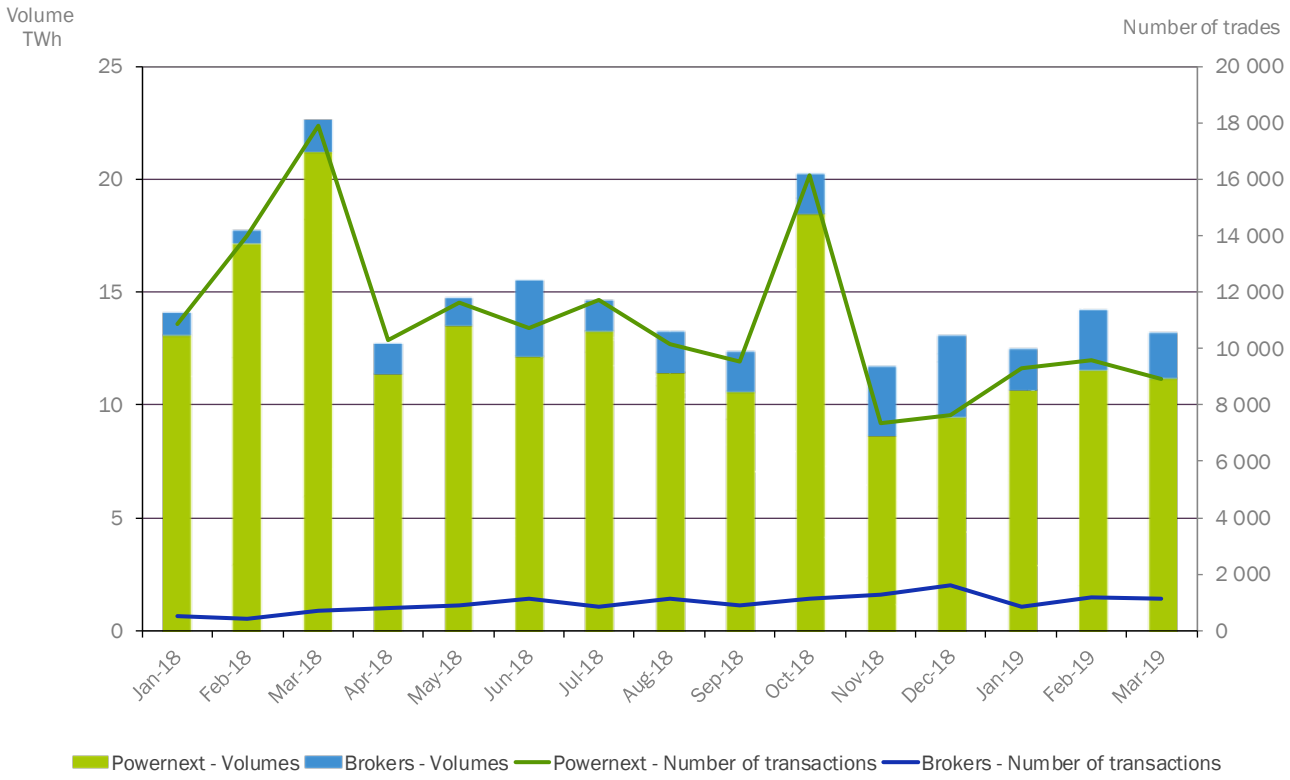
Source: Powernext, Brokers – Analysis: CRE

Figure 33: Trading volumes in the future markets by zone



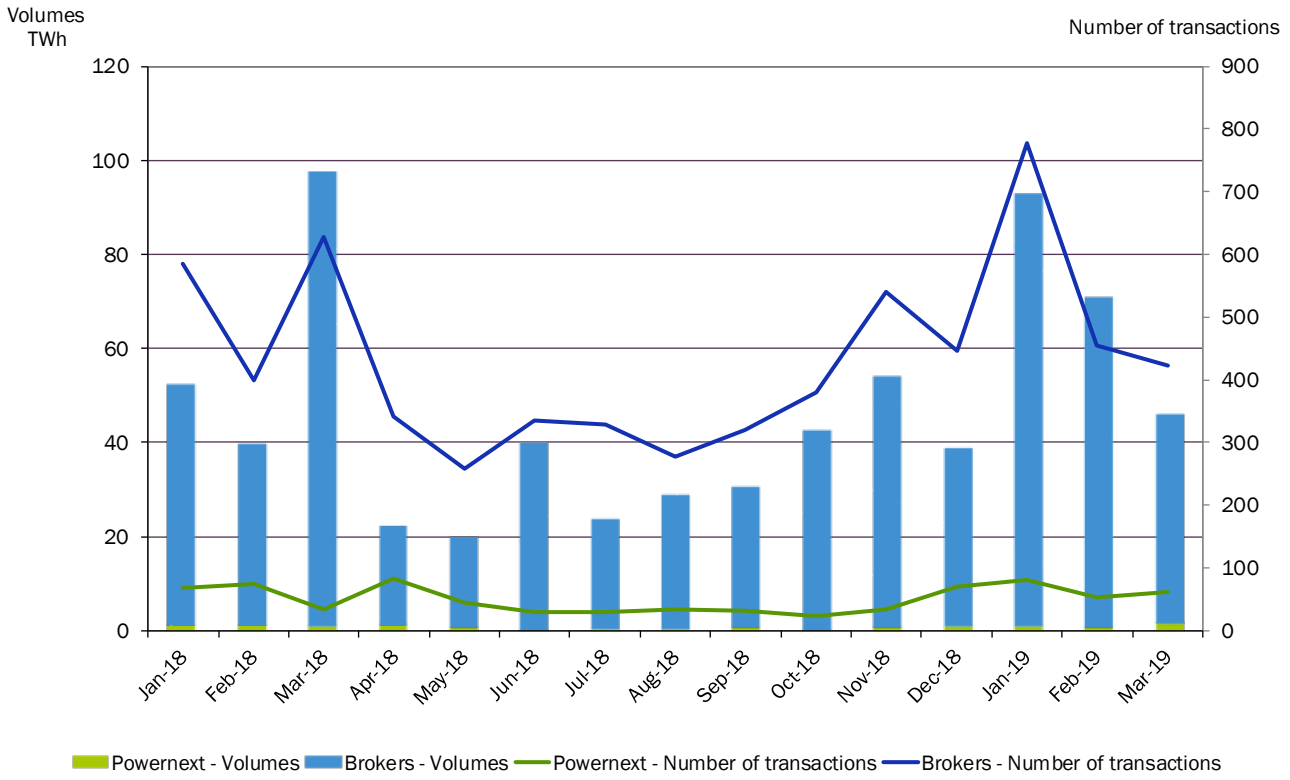
Source: Powernext, Brokers – Analysis: CRE

Figure 34: Trading volumes in the spot markets by type of intermediation



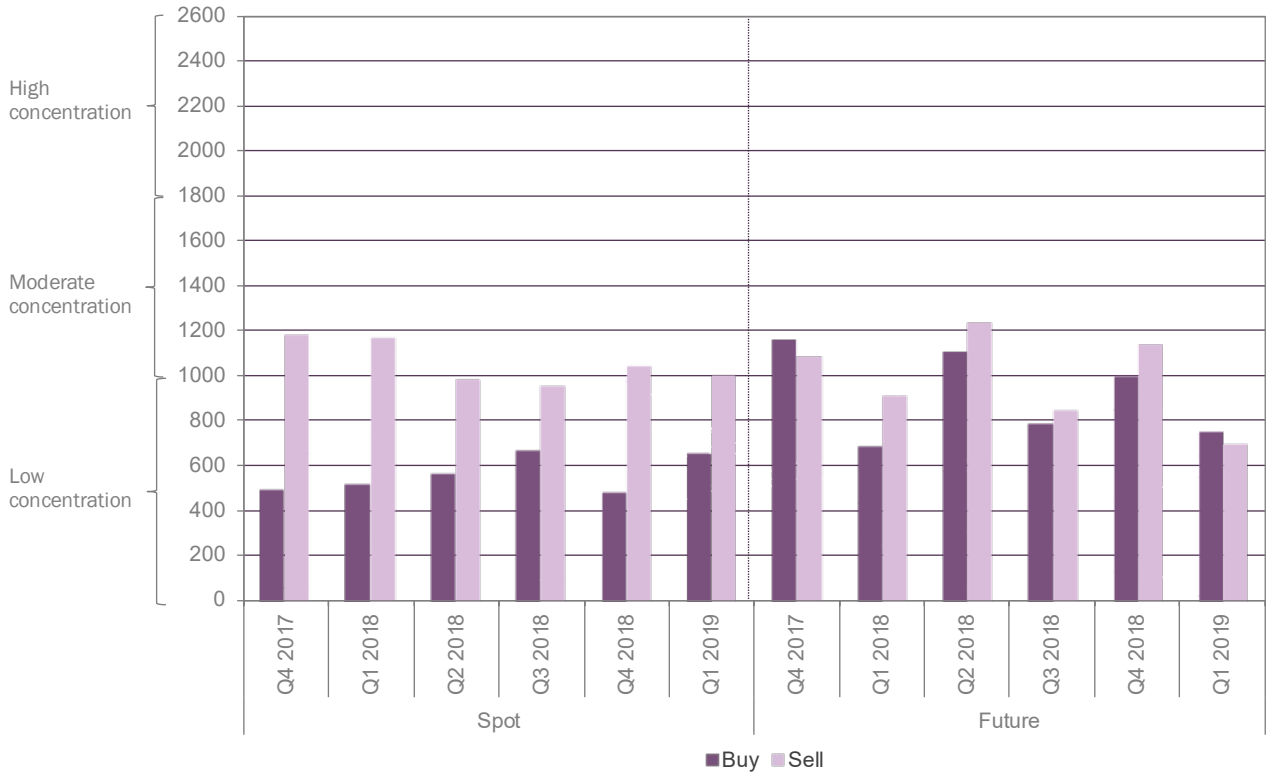
Source: Powernext, Brokers – Analysis: CRE

Figure 35: Trading volumes in the future markets by type of intermediation



Source: Powernext, Brokers – Analysis: CRE

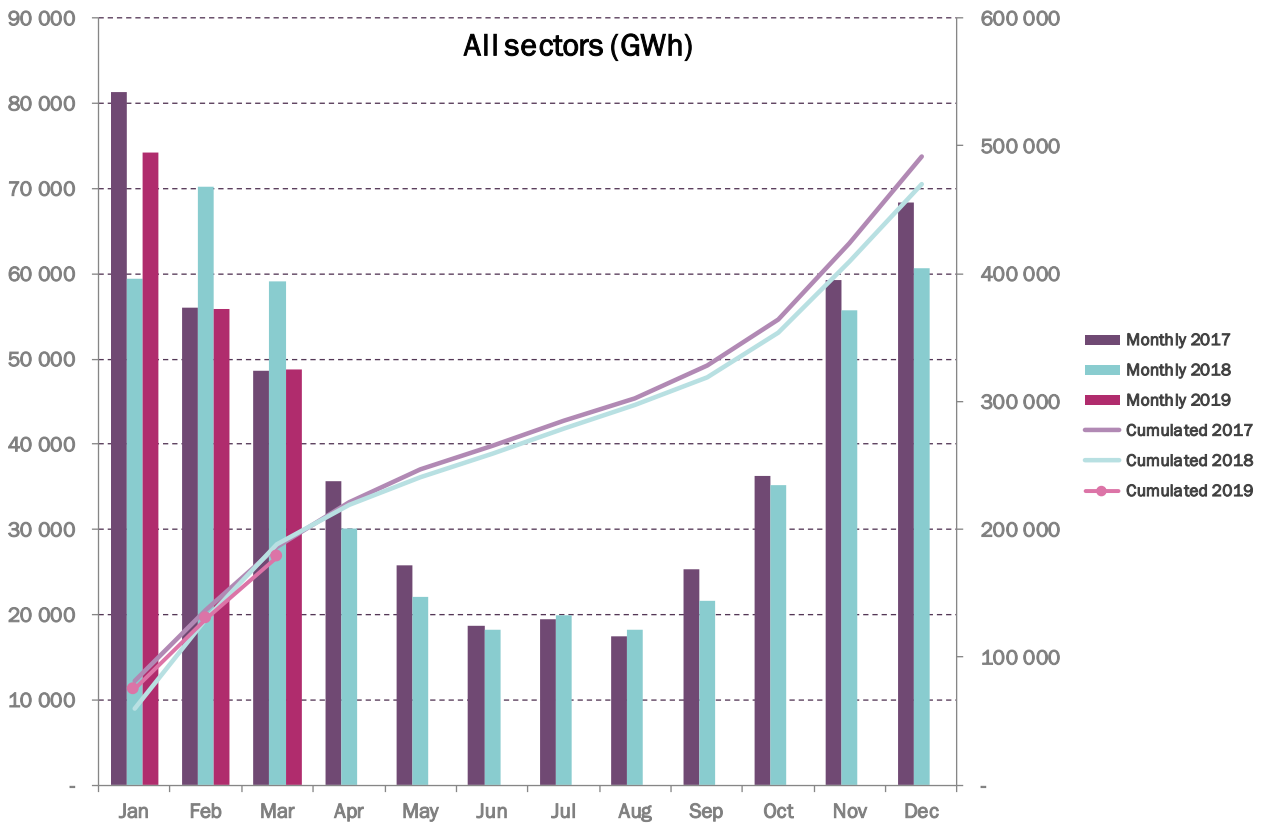
Figure 36: Concentration indexes in France on the spot and future markets by zone



Source: Powernext, Brokers – Analysis: CRE

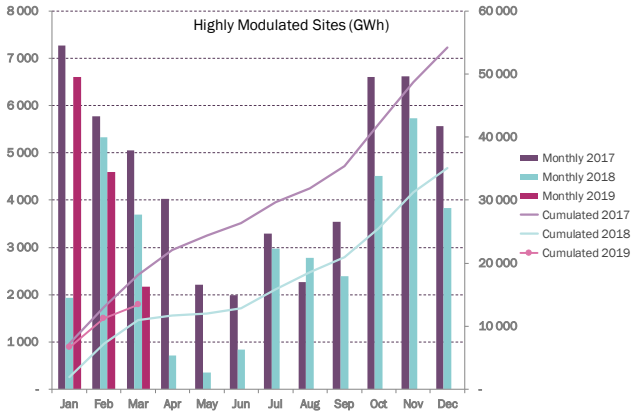
4.4 Market fundamentals

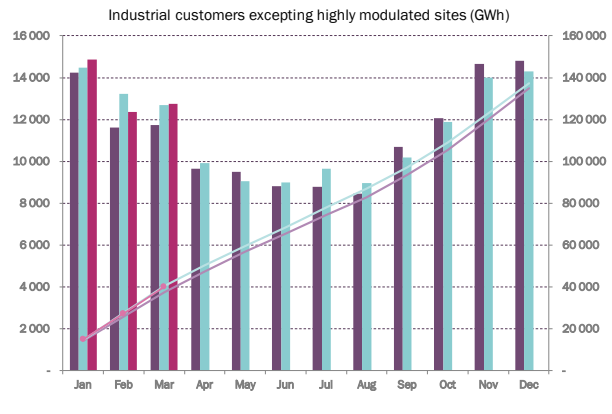
Figure 37: Natural gas consumption in France



Source : GRTgaz, Teréga – Analysis : CRE

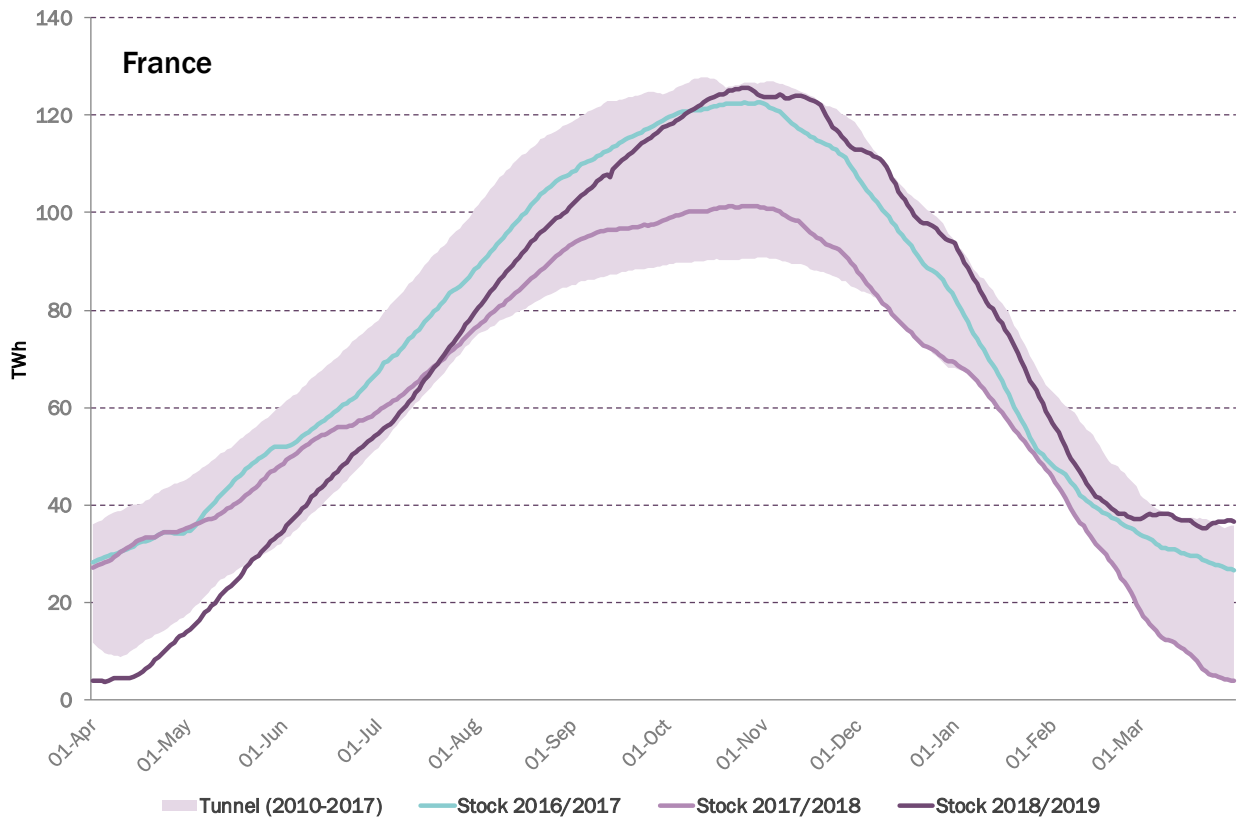
Figure 38 : Natural gas consumption by type of site





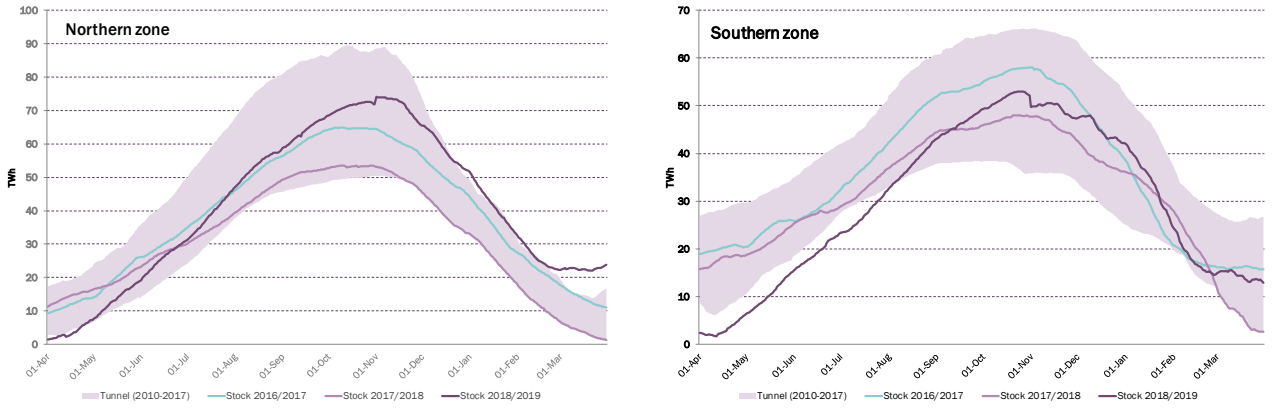
Source : GRTgaz, Teréga – Analysis : CRE

Figure 39: French stocks



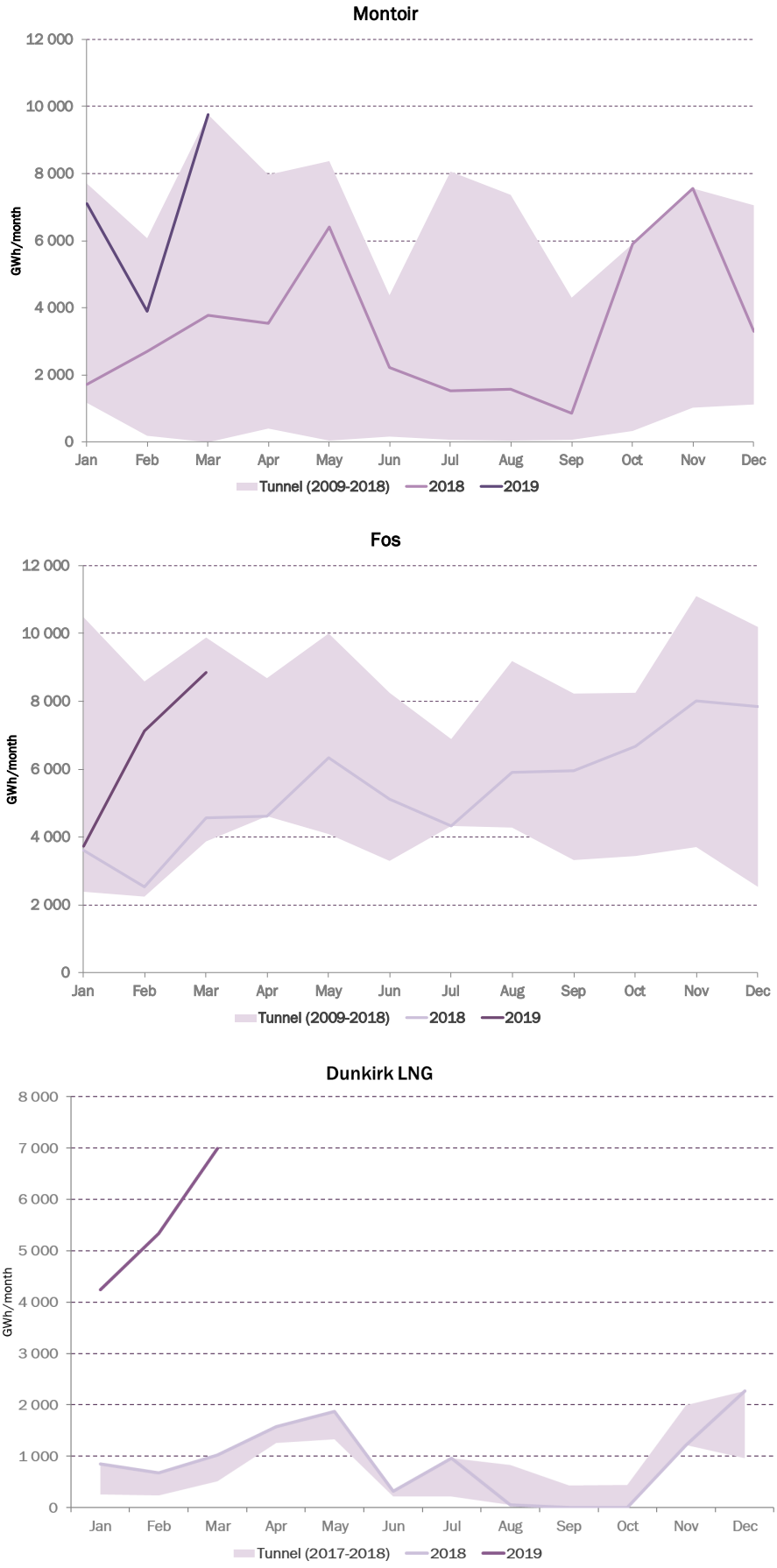
Source: Storengy, Teréga – Analysis: CRE

Figure 40: French stocks by zone



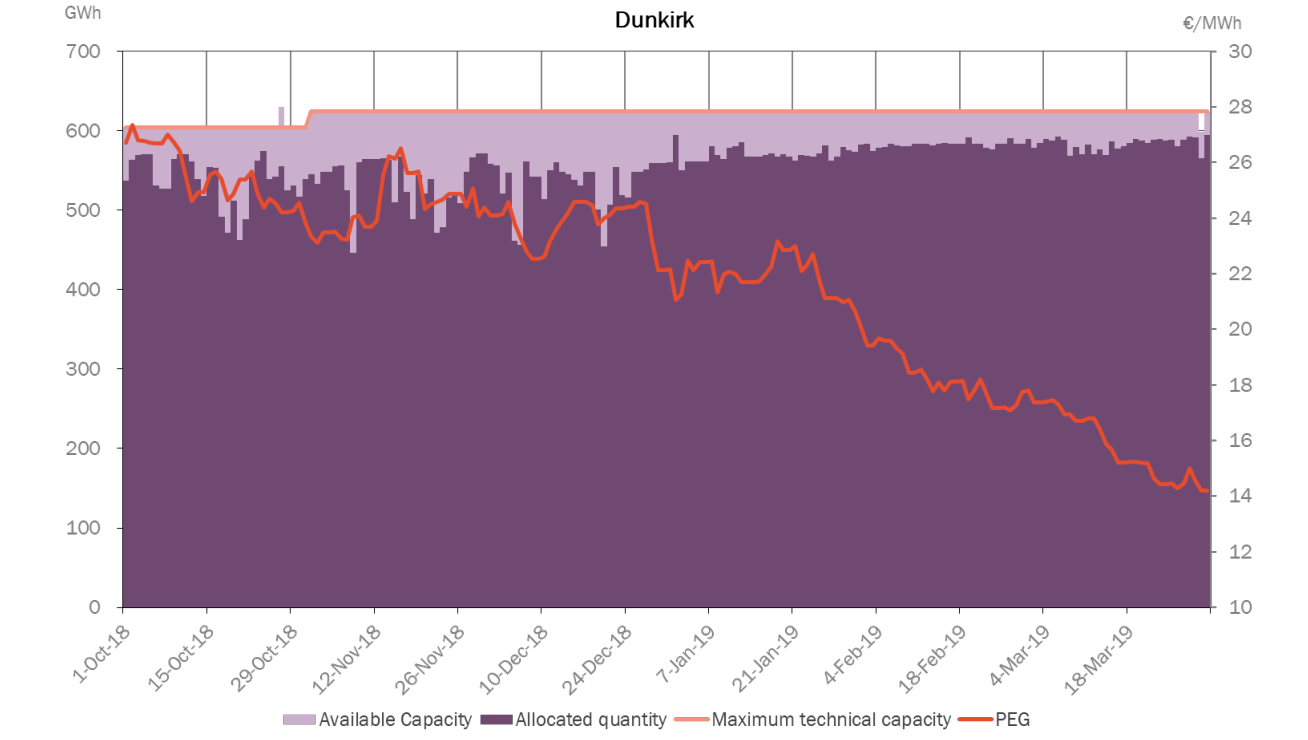
Source: GRTgaz, Teréga – Analysis: CRE

Figure 41 : Send-out of French LNG terminals



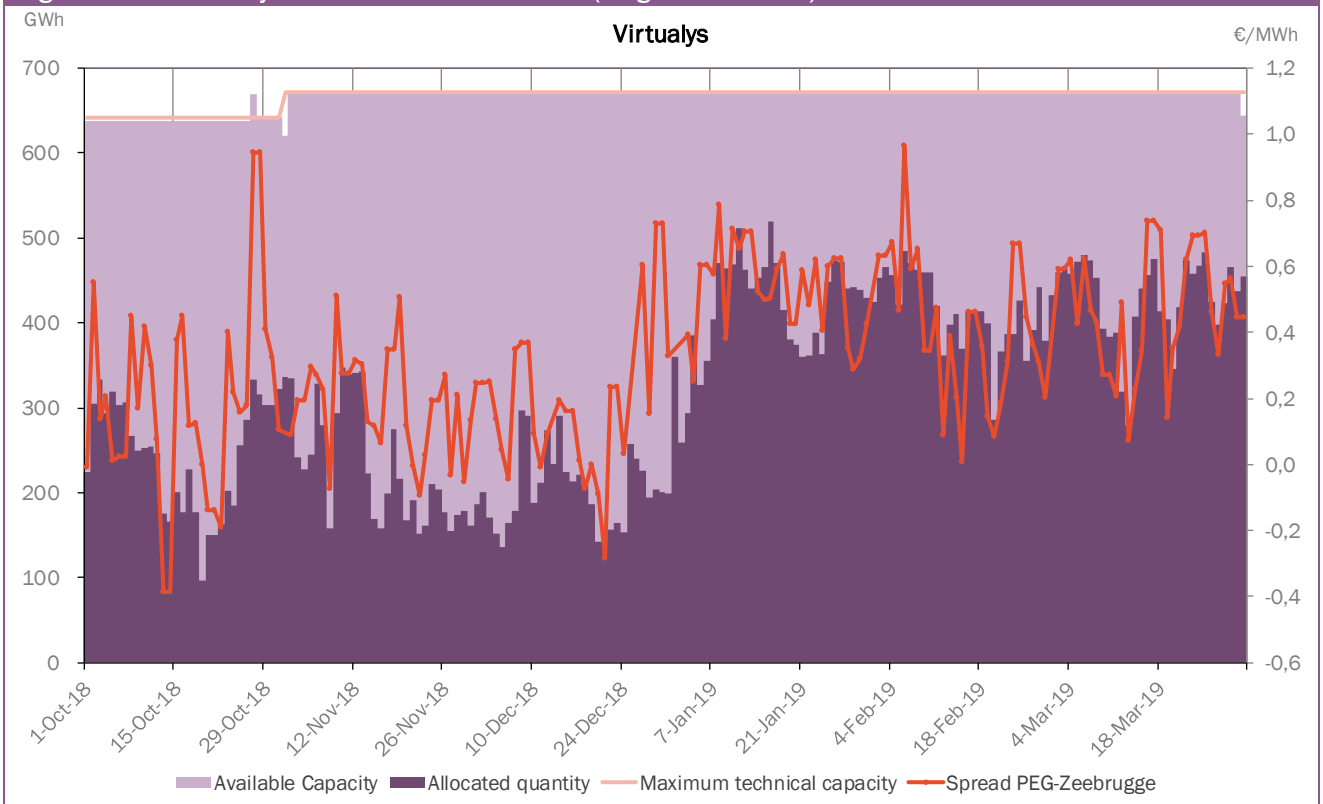
Source : GRTgaz – Analysis : CRE

Figure 42: Dunkirk interconnection utilization (entry)



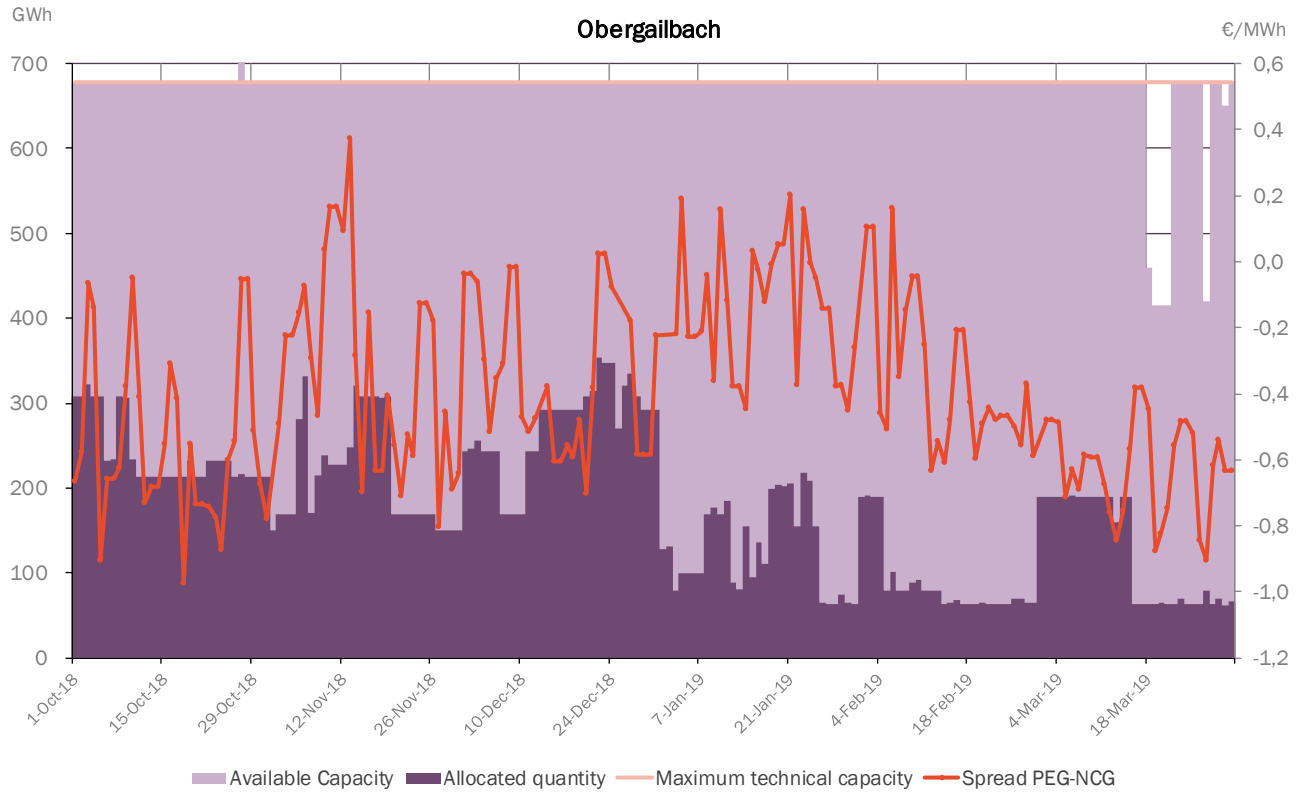
Source: GRTgaz – Analysis: CRE

Figure 43: PIV Virtualys interconnection utilization (Belgium to France)



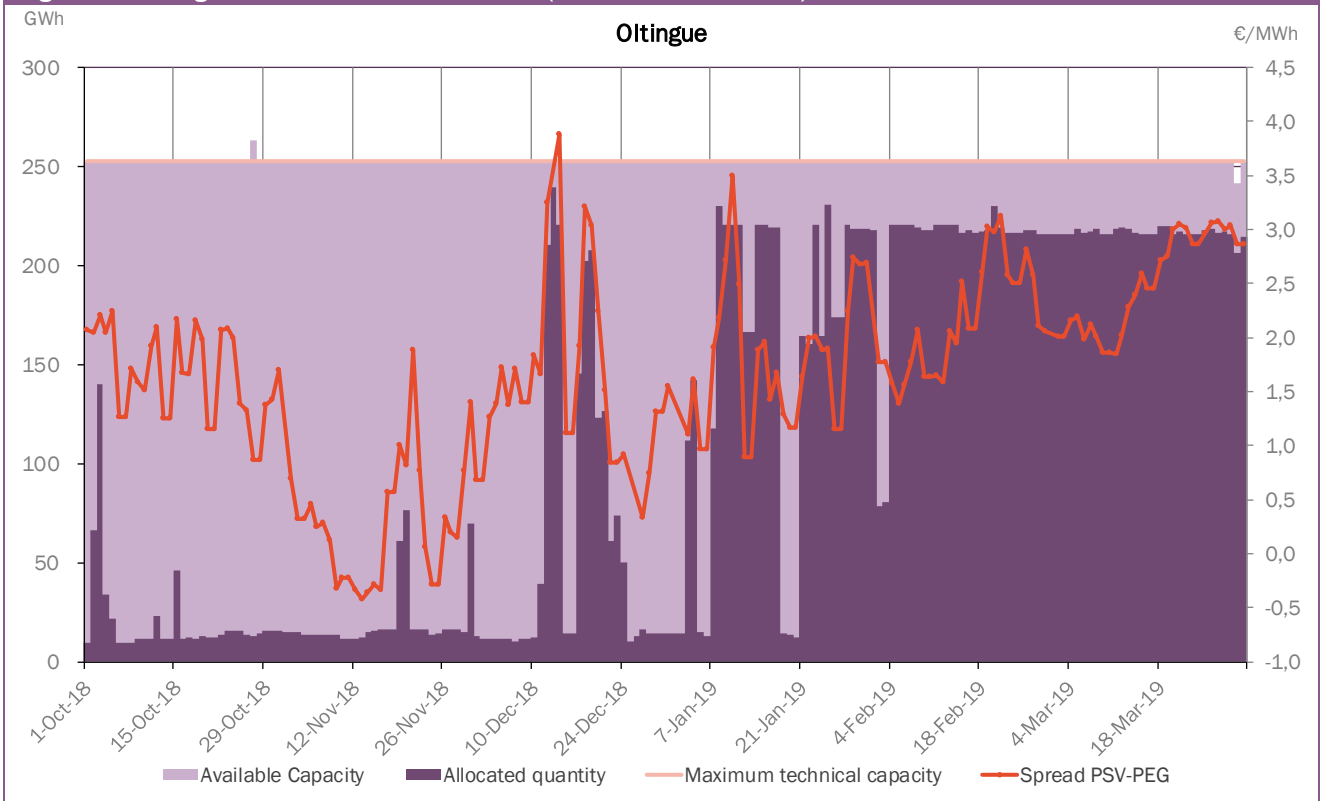
Source: Powernext, ICIS Heren, GRTgaz – Analysis: CRE

Figure 44: Obergailbach interconnection utilization (Germany to France)



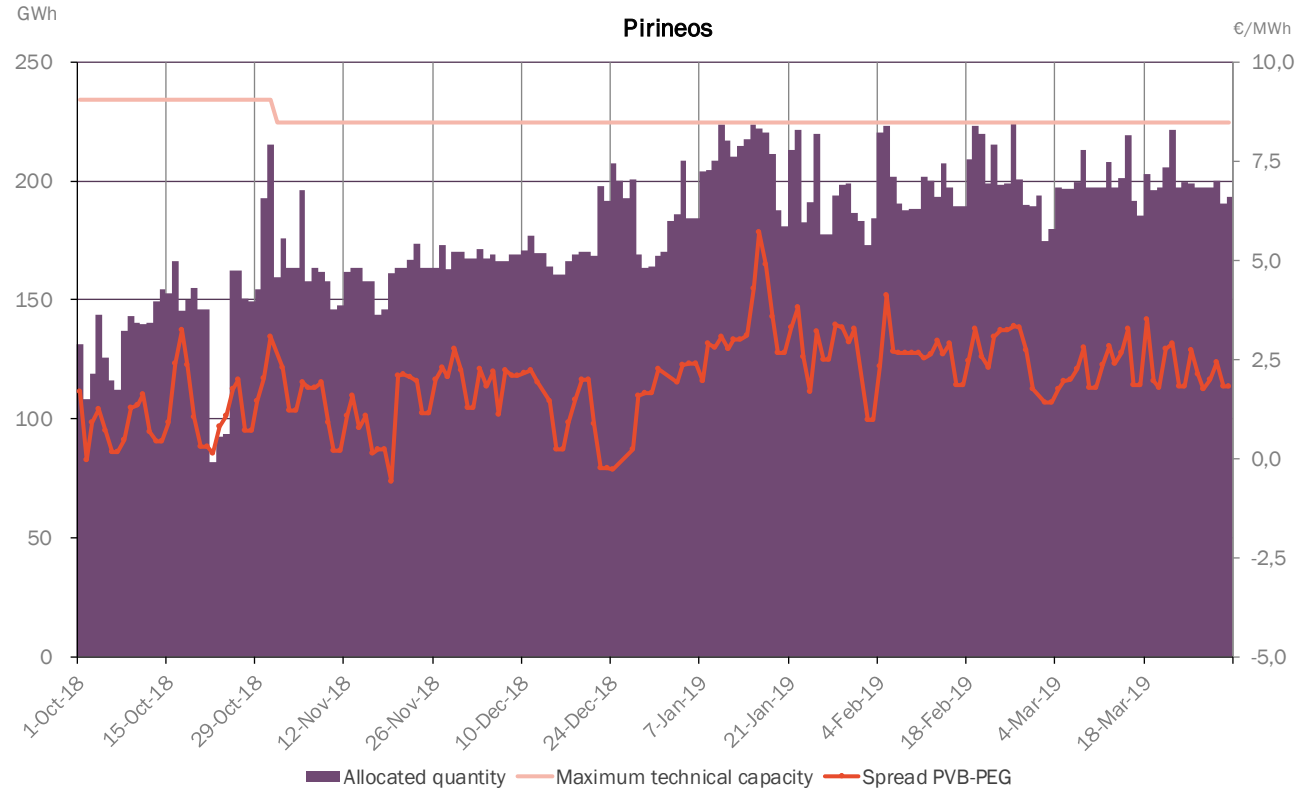
Source: Powernext, ICIS Heren, GRTgaz – Analysis: CRE

Figure 45: Oltingue interconnection utilization (France to Switzerland)



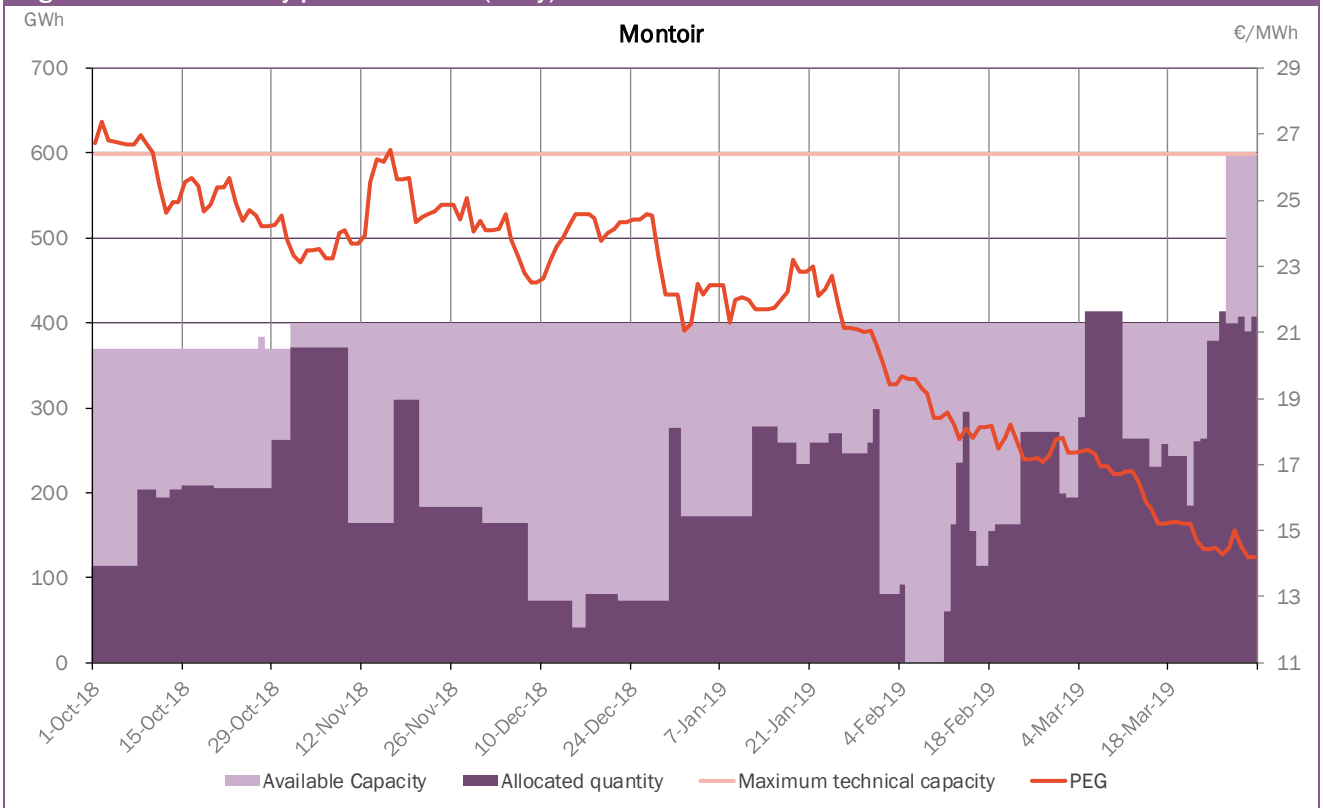
Source: Powernext, ICIS Heren, GRTgaz – Analysis: CRE

Figure 46: Pirineos interconnection utilization (France to Spain)



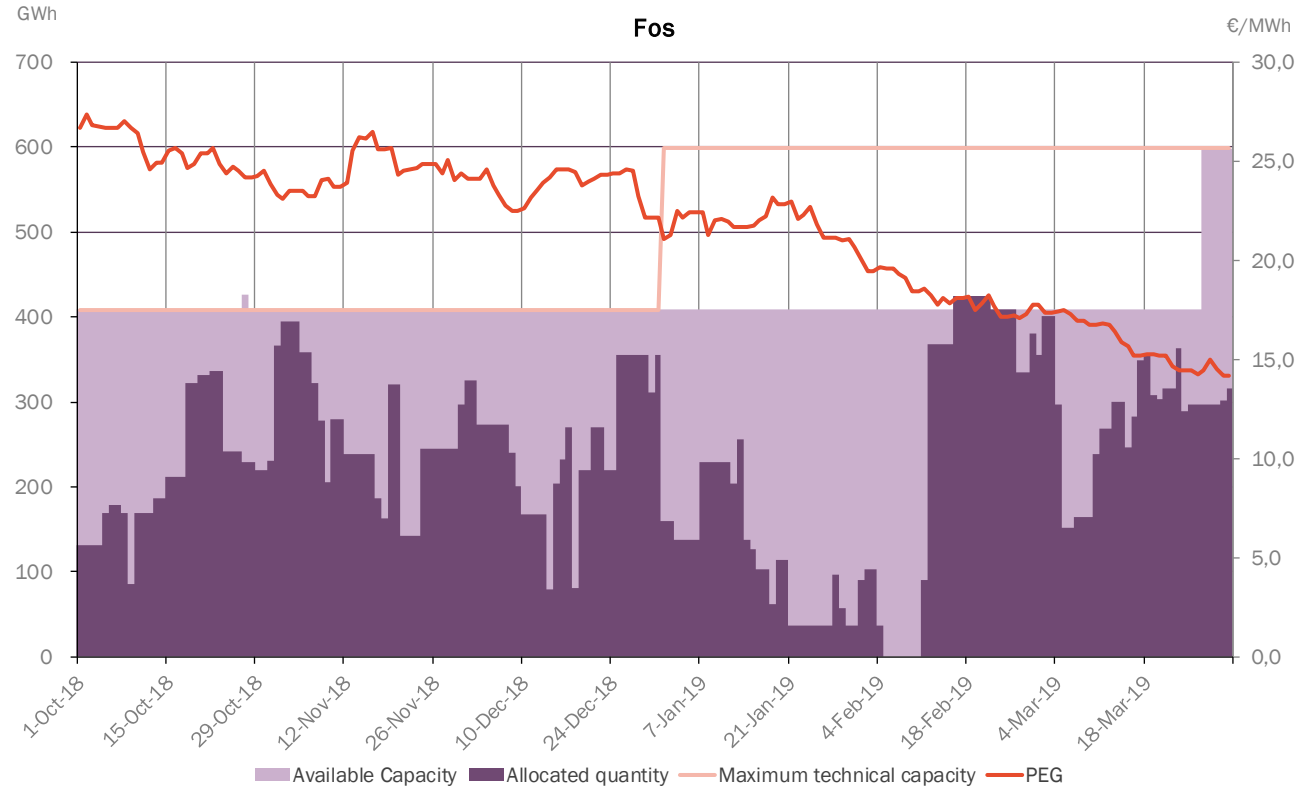
Source: Powernext, Terega – Analysis: CRE

Figure 47: Montoir entry point utilization (entry)



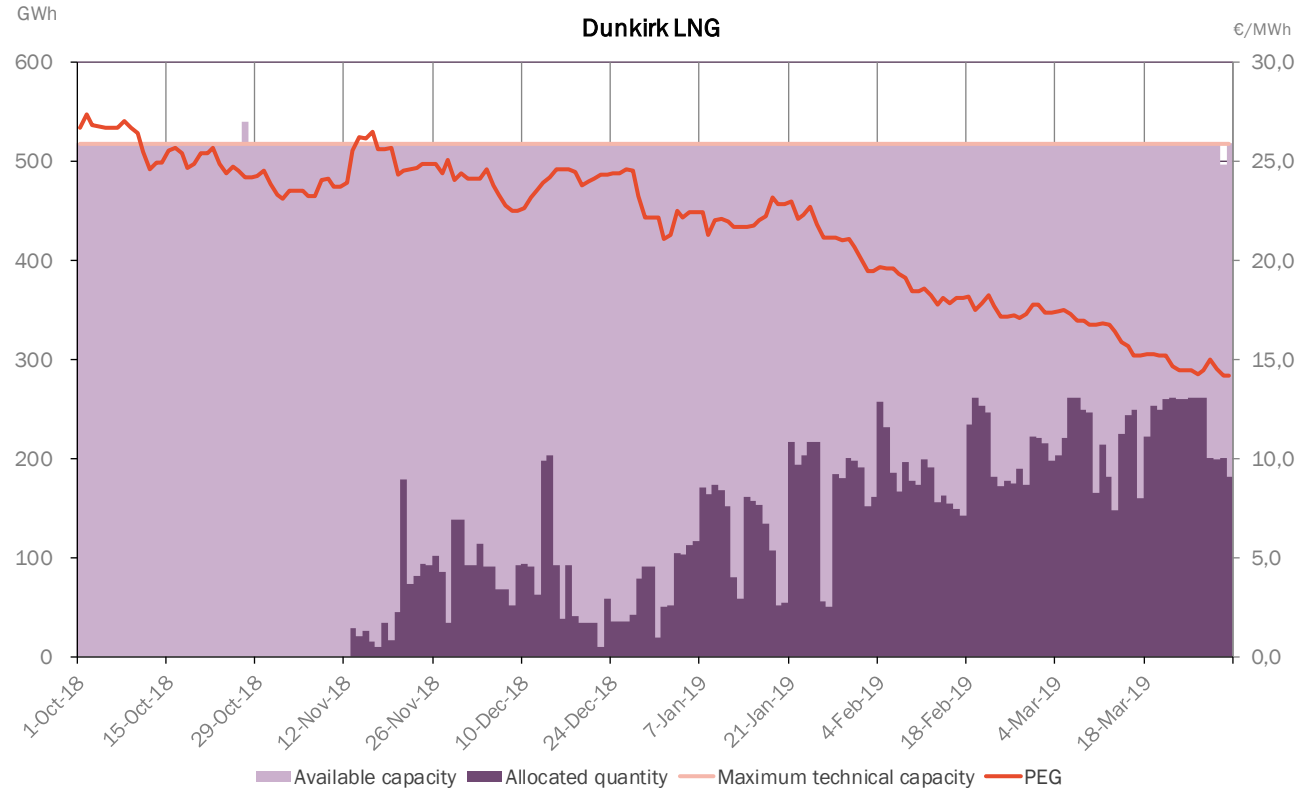
Source: GRTgaz – Analysis: CRE

Figure 48: Fos entry point utilization (entry)



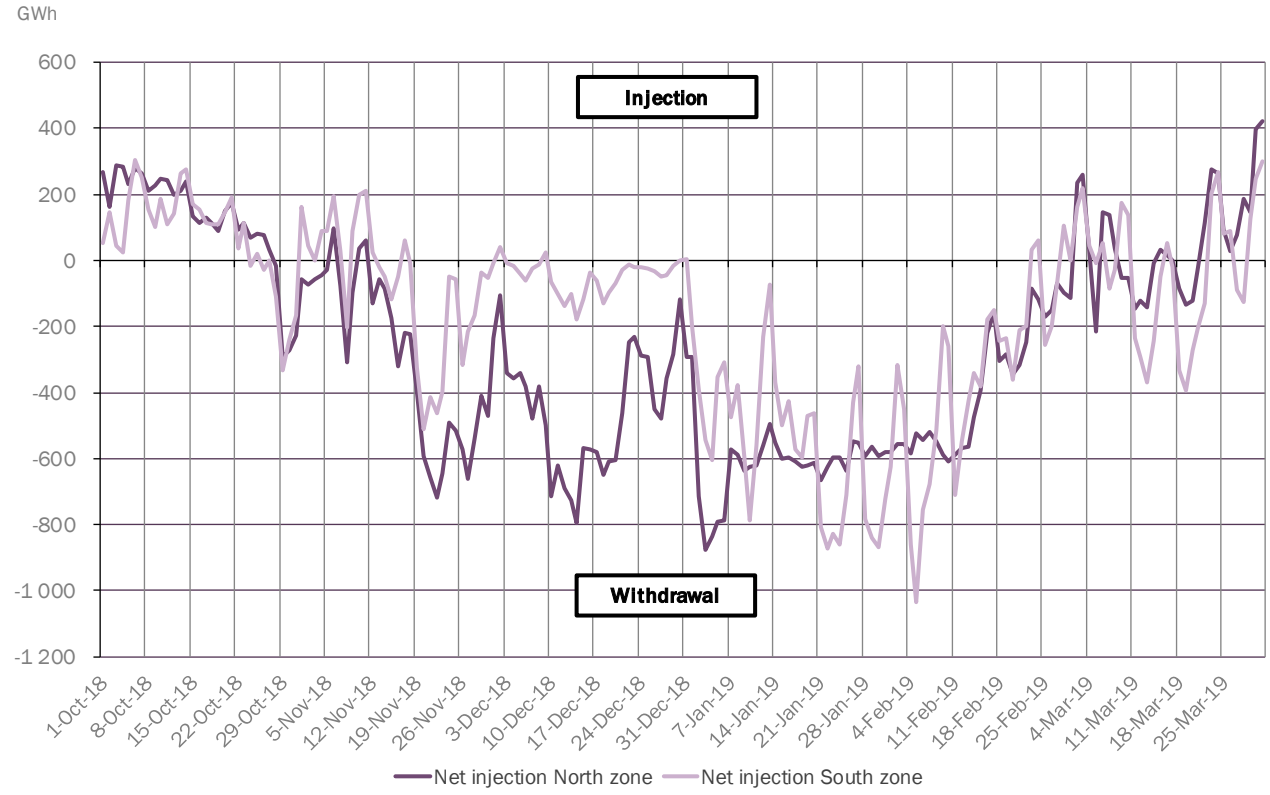
Source: GRTgaz – Analysis: CRE

Figure 49: Dunkirk LNG entry point utilization (entry)



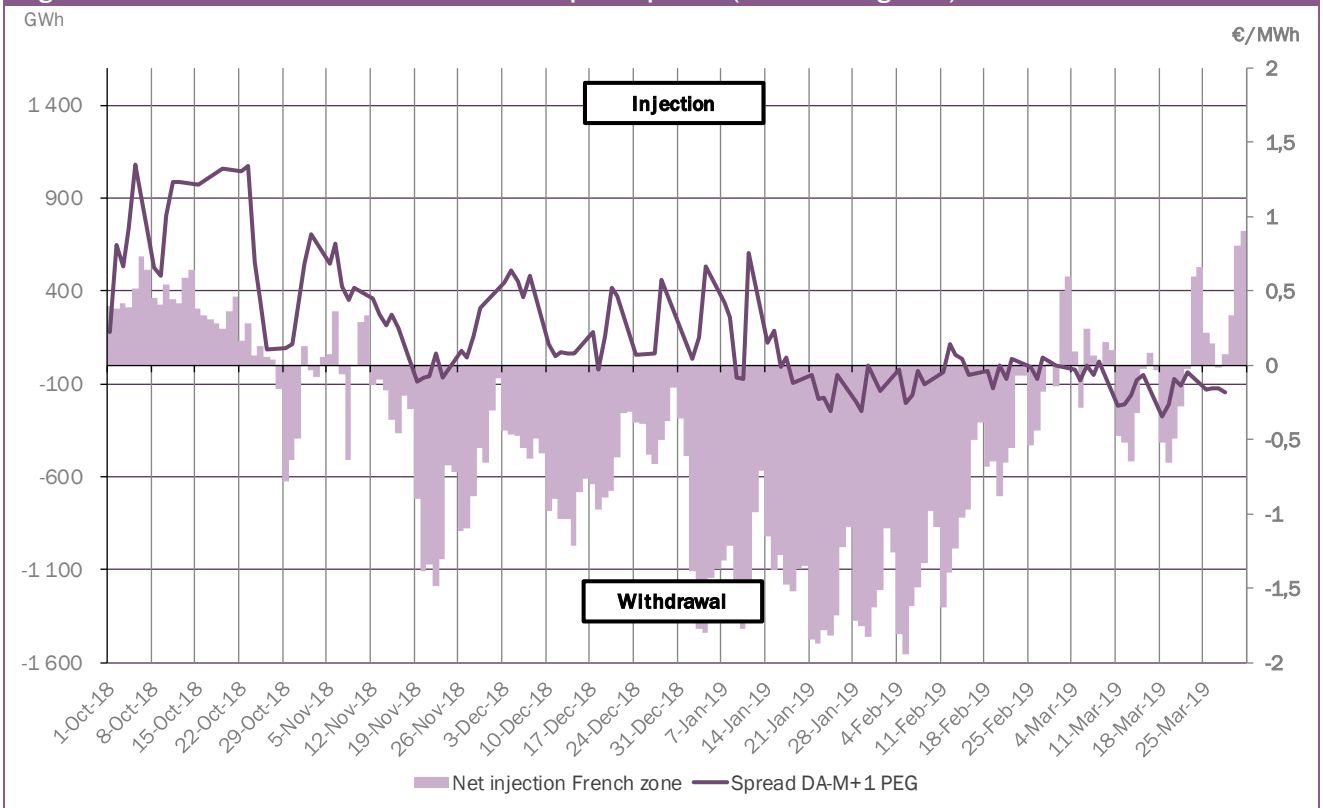
Source: GRTgaz – Analysis: CRE

Figure 50: Storages utilization



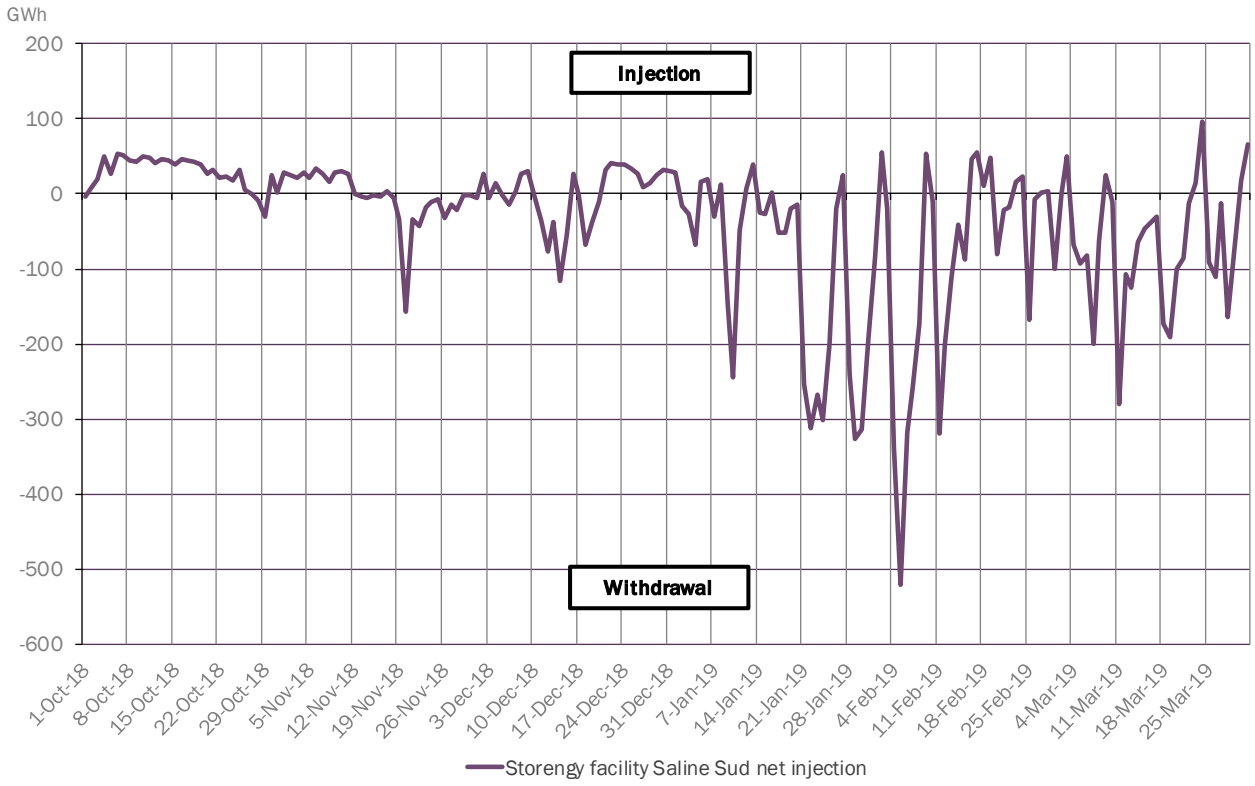
Source: GRTgaz, Terega – Analysis: CRE

Figure 51: Net stock variation in France and temporal spreads (same trading date)



Source: Powernext, GRTgaz – Analysis: CRE

Figure 52: Net stock variation of Salins site in the south zone

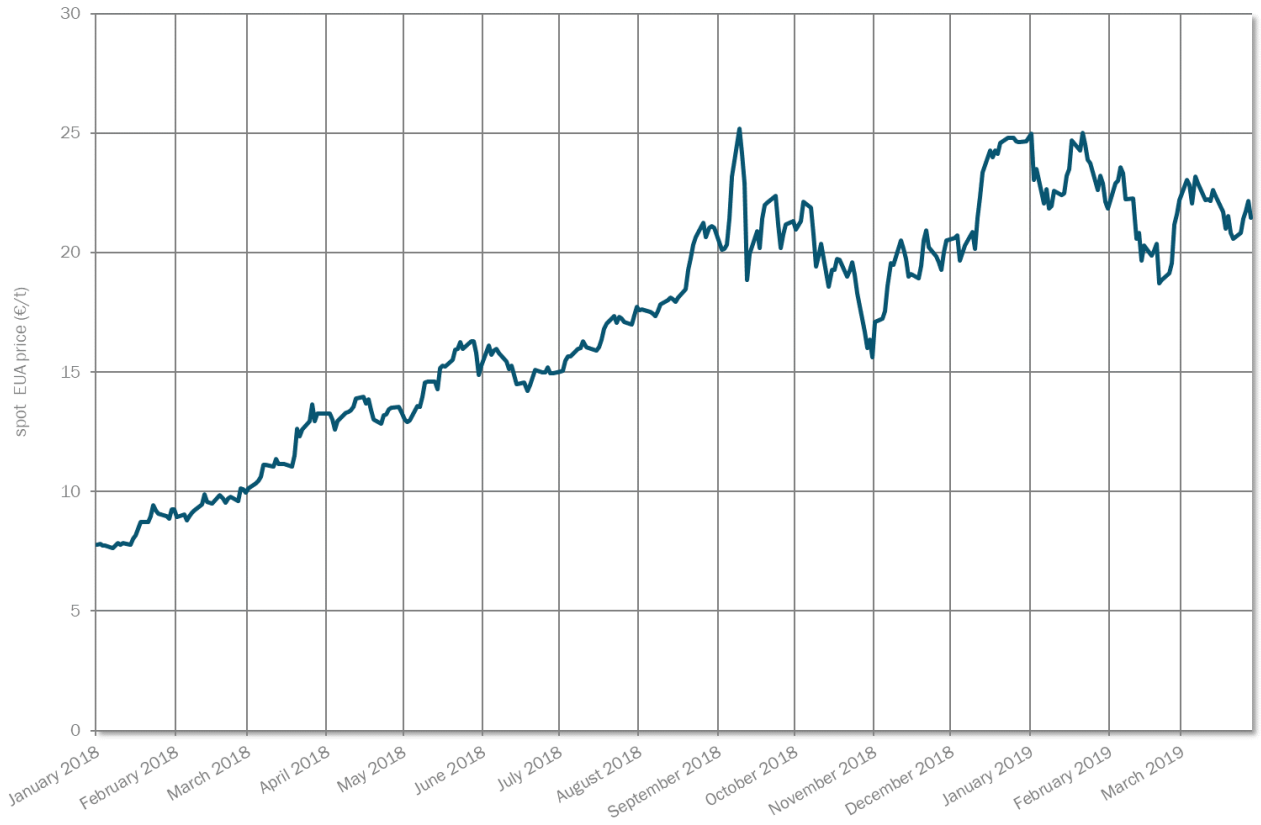


Source: GRTgaz – Analysis: CRE

PART 3:
OTHER INDICATORS

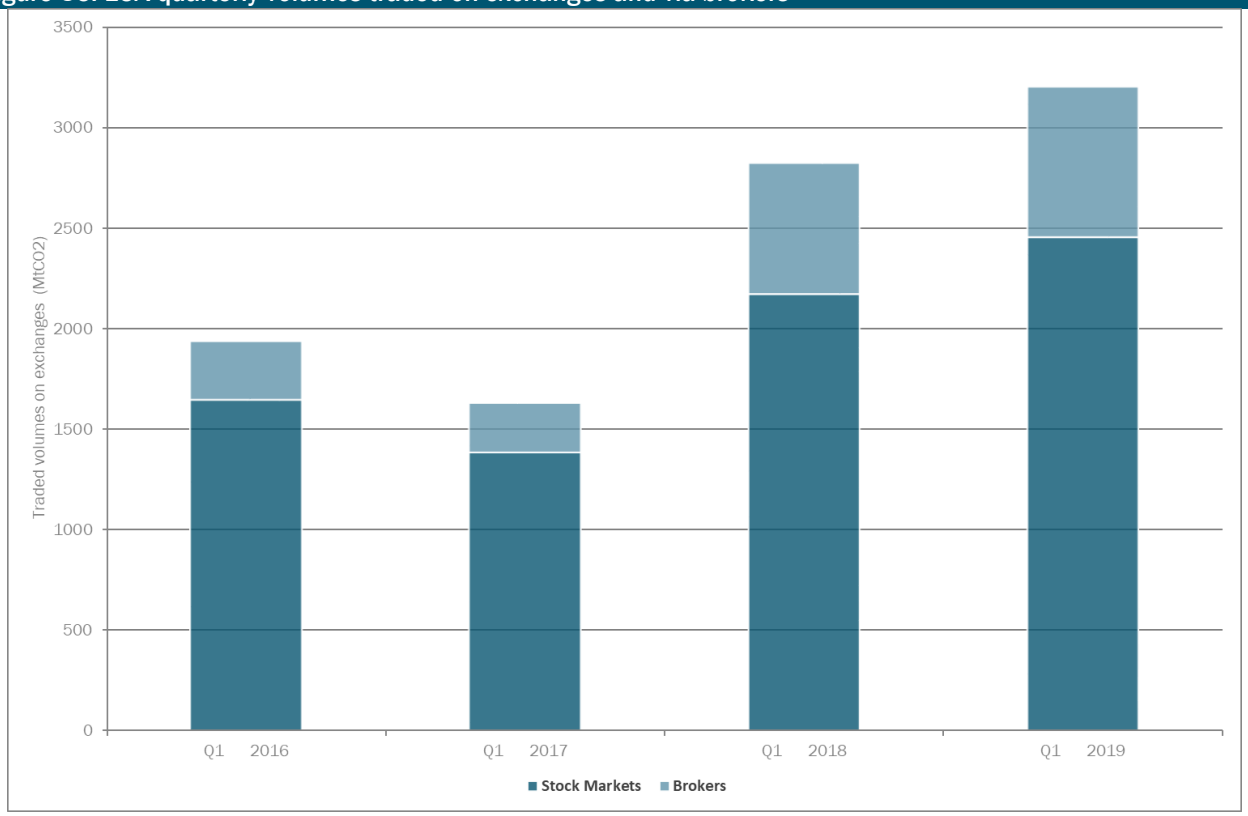
1. PRICE OF CO_2 ALLOWANCES

Figure 53: Evolution of EUA prices



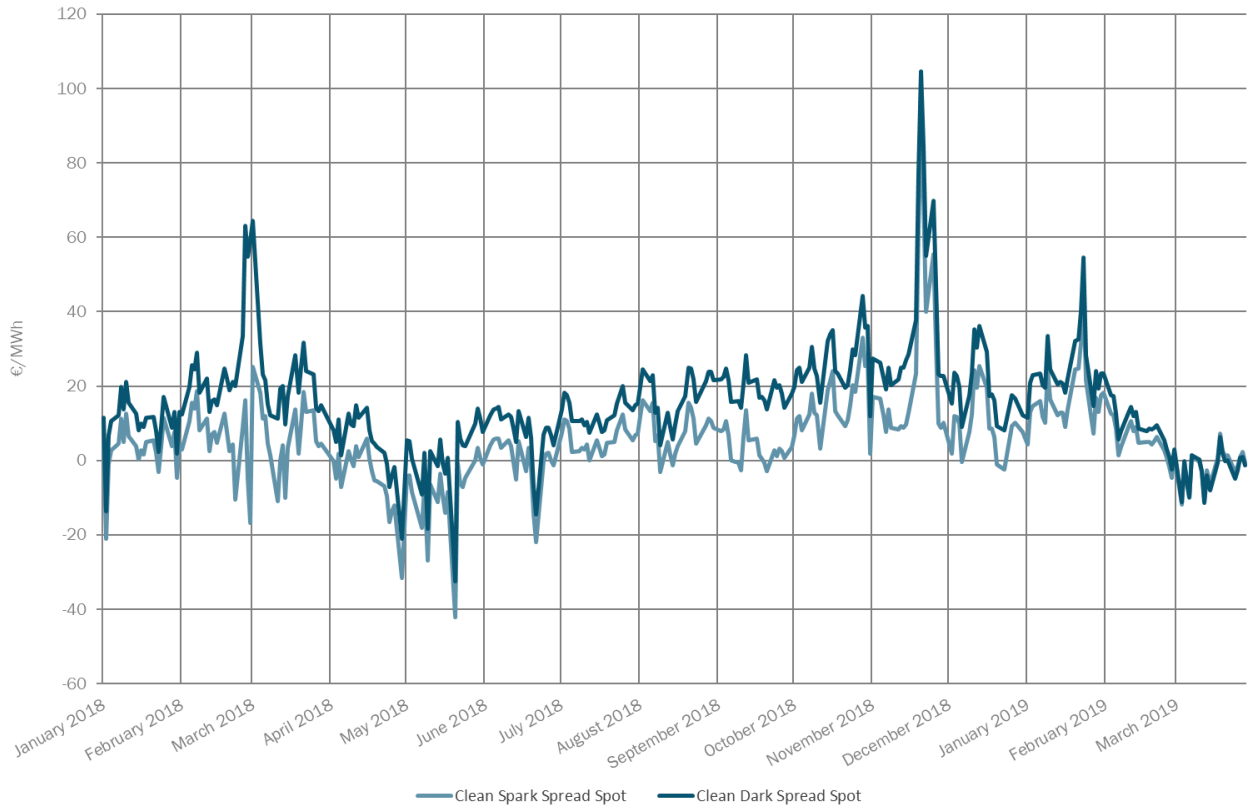
Source: ECX

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



Source: Powernext, ICIS HEREN, EPEX Spot, EPD Futures, RTE

Clean Dark Spread (€/MWh) = $p_E - (\alpha p_C + \beta p_{CO2})$	Clean Spark Spread (€/MWh) = $p_E - (\gamma p_G + \delta p_{CO2})$
• p_E spot peakload price in France (€/MWh) • p_C M+1 coal price (€/MWh) • p_{CO2} spot CO_2 price(€/MWh) • α includes the calorific power value and the coal yield* • β coal emission factor**	• p_E spot peakload price in France (€/MWh) • p_G M+1 gas price at PEG North (€/MWh) • p_{CO2} spot CO_2 price(€/MWh) • γ gas yield*** • δ gas emission factor****

** 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.*

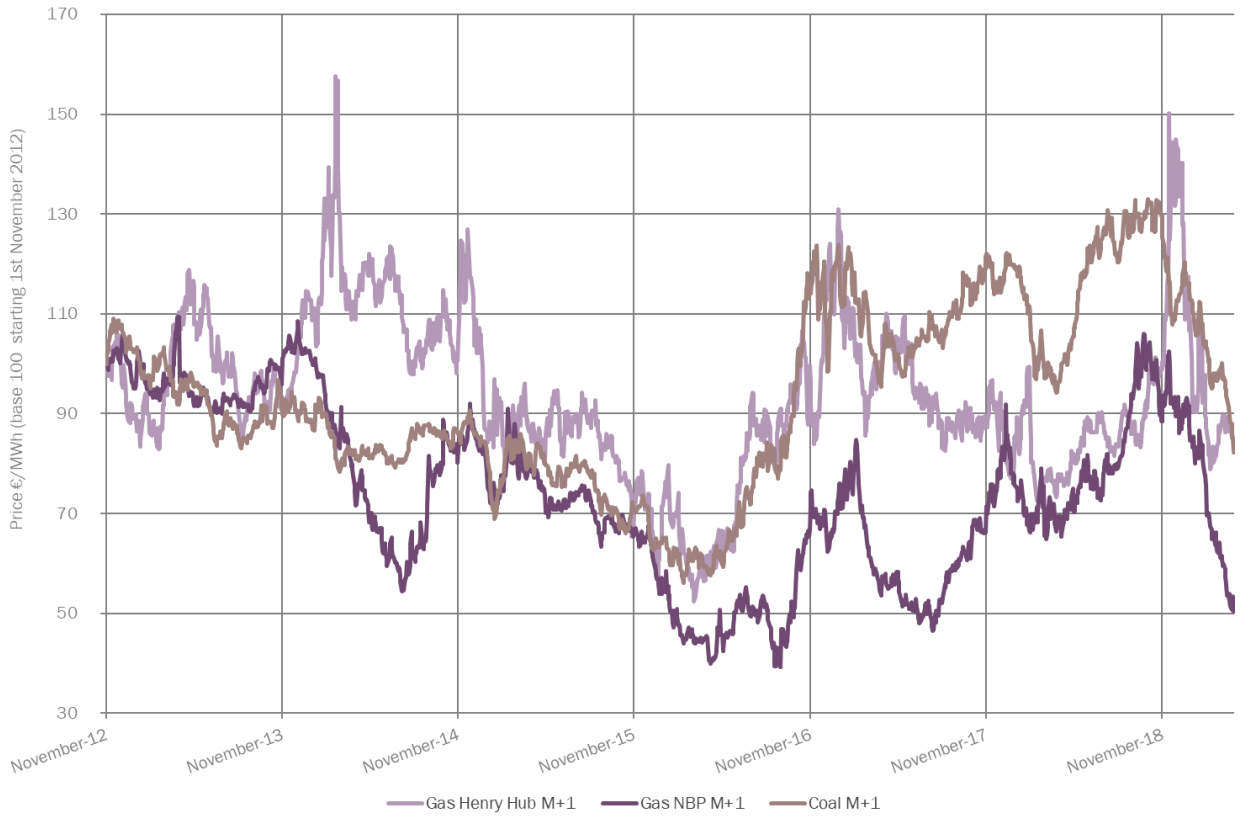
*** Based on an assumed emission factor of 0.96 t CO2/MWh for coal-fired plants.*

**** Based on an assumed yield of 49% for gas plants.*

***** Based on an assumed emission factor of 0.46 t CO2/MWh for gas plants.*

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)



Source: ICIS Heren, EEX

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).
- **EEX Power Derivatives**: German European Energy Exchange power exchanges, non mandatory (www.eex.de).
- **APX:** Dutch Amsterdam Power Exchange power exchanges, mandatory for imports and exports to the Netherlands (www.apx.nl).
- **Omel:** Spanish pool, almost mandatory (www.omel.es).
- **NordPool:** Scandinavian power exchanges, non-mandatory (one of the power exchanges in Europe, 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.
- **Purchases and sales via EPEX Spot, the French electricity power exchange:** 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.
- **Ventes aux gestionnaires de réseaux pour la compensation de leurs pertes :** http://www.rte-france.com/htm/fr/offre/offre_perte.htm.

• **VPP - Products auctioned off by EDF:**

- **VPPs baseload:** these are products that 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: t**hese are products that 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: geoFigureical 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.

ENTSOG: 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).

Liquified 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, Weekend, 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 C02 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)

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 that 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 CO2 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 CO2 allowances available on the market. This mechanism will start in 2019 and will absorb 12 % of the market surplus when it is above 833 MtCO2 and release 100 MtCO2 when it is below 400 MtCO2. 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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