NOTES ON ENERGY AND ENVIRONMENTAL MARKETS AT 31 03 2017

OVERVIEW OF ITALY AND BORDERING COUNTRIES

Milan, May 2017

WITH GLOSSARY

SUMMARY – Q1 2017

POWER AND ENVIRONMENTAL MARKETS – *Comparisons on yoy basis*

- In the first three months of 2017 there was a **0.6% increase in electricity demand** (0.9% corrected for the calendar effect).
- **Hydroelectric production decreased by -4.7%. An increase in solar production** was recorded (+15.5%), while there was a fall in wind production (-9.4%).
- **Thermoelectric production in Q1 increased by 9.8%,** with an increase in January (+21%) and February (+11%) - mainly due to the fall in import - and a decrease in March (-4.5%).
- **Strong decrease in the import-export balance (-28.8%):** -68% in January, -31% in February, +9% in March.
- **The first 3 months of the year saw a 17.8 €/MWh increase in PUN BL prices**: +25.8 €/MWh in January, +18.6 €/MWh in February, +9.2 €/MWh in March. The increase is connected to the slump in imports in the first two months, to low hydro production and to a higher gas cost.
- In Q117 **the CSS year-on-year increased by 5.2 €/MWh** for the baseload and by 8.3 €/MWh for the peakload. The rise is due to the high power prices, increased by more than gas costs.
- **Resilient correlation between PUN and PSV prices**, with gas-fueled thermal power plants as marginal source for the Italian power market. Coal prices reduced their correlation with the energy commodities analyzed, due to the surge in prices connected with China's political intervention in its domestic coal market.
- **Temperatures in Q117 in Italy were lower than in Q116 but above the 10YR average.** In particular, January was colder than January 2016 (-2.8 °C) and the average (-2.4 °C), but March was warmer compared to both (+1.6 °C). **Precipitations in Q117 were quite low**, both compared to last year (-27%) and to the 10YR average (-26%).
- After reaching levels above 6.5 €/ton in December, **EUA prices** declined to under 5 €/ton in mid January and kept a lateral trend around 5 €/ton, touching a 4.4 low at the beginning of May. This trend highlights the oversupply in the system, in a year without backloading (ended in 2016) and market stability reserve (which will begin in 2019).

SUMMARY – Q1 2017

GAS MARKETS - *Comparisons on yoy basis*

- Q117 showing **a significant rise in gas consumption**, on a year-on-year basis. **Thermal gas demand segment showing the largest improvement** (+18.9% in Q117 vs. Q116, more than 1 bcm of additional consumption). Slight increase in Distribution Network gas consumption during Q117 (about +0.5% on a year-on-year basis).

- After a strong return in 2016, **Algerian flows almost doubled in Q117** too, on a year-on-year basis. The Algerian surge came to the expense of Tarvisio and Gela, mainly. Lybian flows reduced due to civil unrest in the country and outages in key-fields (Wafa). **Increase in LNG imports** (+4.2% in Q117 on a year-on-year basis).

- **Strong gas price increase in Q117 vs. Q116 on the PSV (about +40%),** with a general price increase all over Europe due to stronger thermal gas consumption, with the nuclear issue in France and surging coal prices.

- **LNG rising global supply**, due to the rise in Australian exports. Rising exports from the US liquefaction plants as well, with Sabine Pass T3 commissioning in March 2017. Northeast Asia kept absorbing the largest chunk of fresh LNG cargoes due to large price premium and geographical proximity with Australia. European LNG imports recovered in Q117, with a smaller locational spread between Asian and European LNG prices.

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ITALIAN ELECTRICITY SUPPLY – BREAKDOWN BY SOURCE

INCREASE IN THERMAL PRODUCTION IN JANUARY AND FEBRUARY, MAINLY DUE TO VERY LOW IMPORTS

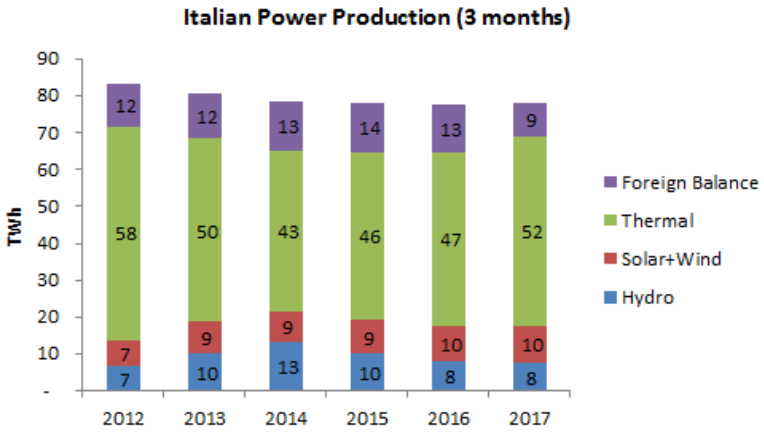
GWh	Q1 2017	Q1 2016	Var. % 2017/2016
Net Production			
Hydroelectric	7.535	7.906	-4,7%
Thermal	51.529	46.929	9,8%
Geothermal	1.459	1.488	-1,9%
Wind	5.311	5.865	-9,4%
Solar	4.592	3.977	15,5%
Total net production	70.426	66.165	6,4%
Import	10.793	14.464	-25,4%
Export	1.591	1.534	3,7%
Foreign balance	9.202	12.930	-28,8%
Pump storage	666	606	9,9%
Demand	78.962	78.489	0,6%

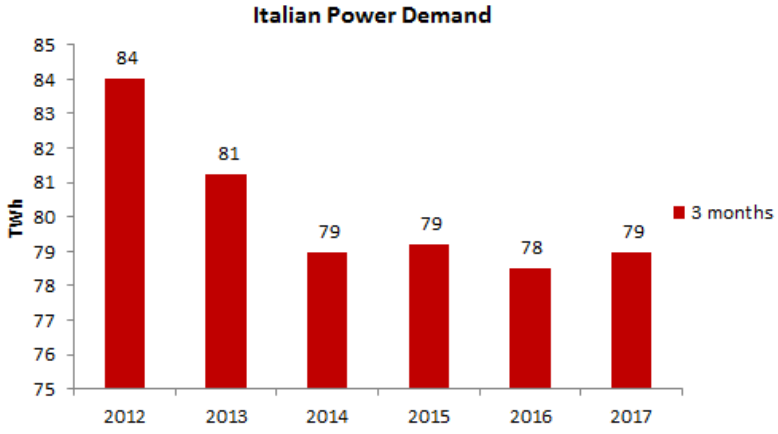
- In the first 3 months 2017 there was a **0.6% increase in electricity demand** (0.9% corrected for the calendar effect).
- **Hydroelectric production decreased by -4.7%:** in March, in particular, the fall was -16.5%; the reservoir content is near the historical minimum since 1970. In the first 3 months, **an increase in solar production** was recorded (+15.5%), particularly strong in March (+27.9%), while there was a fall in wind production (-9.4%).
- **Thermoelectric production in Q1 increased by 9.8%,** with an increase in January (+21%) and February (+11%) - mainly due to the fall in import - and a decrease in March (-4.5%).
- **Strong decrease in the import-export balance (-28.8%):** -68% in January, -31% in February, +9% in March. In particular, in January exports from France and Switzerland was affected by the combined effect of French nuclear power plants outages, a cold wave (in France power consumption reached the highest level since 2012), and the low hydro production.

Source: Terna - Monthly Report on the Electricity System.

ITALIAN ELECTRICITY DEMAND AND SUPPLY – HISTORICAL TRENDS

DEMAND AT THE 2014 LEVEL





Thermal production was at the highest level since 2012, due to the reduction in imports and in hydro production.

Imports were at a record low level, in particular in January.

Combined wind and solar production was at the same level as in 2016, due to the reduction in wind and the increase in solar power.

Hydro production was at the second lowest level in 15 years, after 2012.

0.6% increase in electricity demand (+4.9% in January, due to the cold wave, -3% in February – but roughly stable in terms of daily demand -0.1% in March)

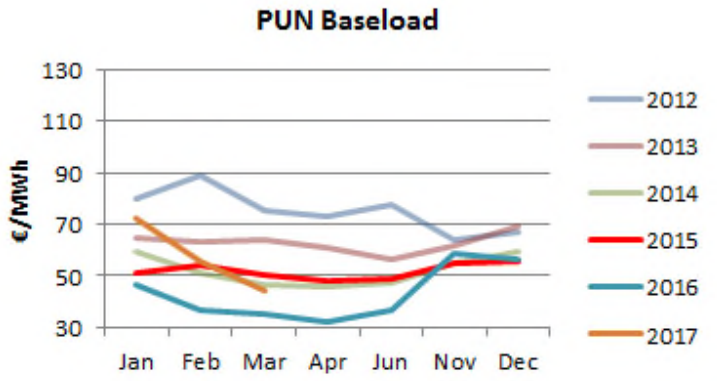
Demand was at the same level as in 2014, still behind the levels of the previous years.

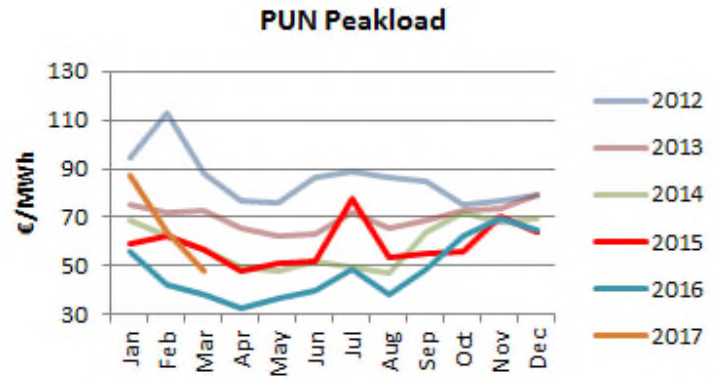
Source: Terna - Monthly Report on the Electricity System.

ITALIAN ELECTRICITY SPOT PRICES

PUN STRONG INCREASE y/y (especially in January); HIGHER PL-BL SPREAD

€/MWh		PUN BL	PUN PL	PL - BL
2016	Q1	39,6	45,2	5,6
	Q2	34,5	36,4	1,8
	Q3	40,9	45,1	4,2
	Q4	55,9	65,8	9,9
2017	Q1	57,5	66,2	8,7
3 months 2017 vs 2016		17,8	21,0	3,1





- The first 3 months of the year saw a 17.8 €/MWh increase in PUN BL prices: +25.8 €/MWh in January, +18.6 €/MWh in February, +9.2 €/MWh in March. PUN in January, at 72.2 €/MWh, was at the maximum level since September 2012. The increase is connected to the slump in imports in the first two months, to the increase in demand in January, to low hydro production and to a higher gas cost.
- Peakload prices increased more than baseload prices, bringing up the BL-PL spread (+3.1 €/MWh y/y)

Source: Gestore Mercato Elettrico (GME)

ITALIAN ELECTRICITY SPOT PRICES: MARGINAL TECHNOLOGY ON MGP

INCREASE IN THE NUMBER OF HOURS IN WHICH IMPORT IS MARGINAL; HIGHER MARGINAL PRICES FOR ALL THE TECHNOLOGIES

MARGINAL TECHNOLOGY										2017-2016								
	Coal, Dual Fuel Coal	CCGT	Renewables	Run-of-river hydro	Storage hydro	Pumped storage hydro	Market Coupling	Oil + gas turbines + Others	Import	Coal, Dual Fuel Coal	CCGT	Renewables	Run-of-river hydro	Storage hydro	Pumped storage hydro	Market Coupling	Oil + gas turbines + Others	Import
Q1	17%	42%	2%	5%	4%	2%	21%	2%	6%	4%	-4%	-3%	-4%	-2%	-3%	15%	-4%	1%

MARGINAL PRICE €/MWh										2017-2016								
	Coal, Dual Fuel Coal	CCGT	Renewables	Run-of-river hydro	Storage hydro	Pumped storage hydro	Market Coupling	Oil + gas turbines + Others	Import	Coal, Dual Fuel Coal	CCGT	Renewables	Run-of-river hydro	Storage hydro	Pumped storage hydro	Market Coupling	Oil + gas turbines + Others	Import
Q1	50,5	54,4	53,7	63,6	62,2	70,1	58,3	65,5	58,6	17,7	13,6	23,2	25,3	19,3	26,2	20,0	25,2	19,5

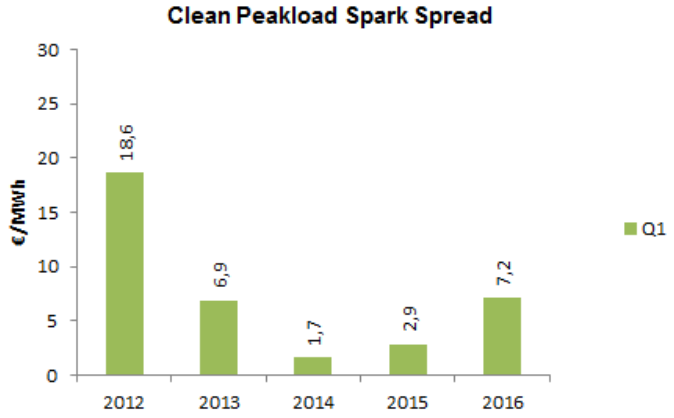
- General decrease in the number of hours in which Italian technologies are marginal (except for coal), due to the higher number of hours of marginality for imports (given high foreign prices).
- Marginal prices are strongly higher than last year for all the technologies. CCGT is the technology with the lowest increase; also foreign imports were "more expensive" at the margin, due to higher prices in France and Switzerland. The difference between CCGTs and coal plants marginal prices reduced to 4 €/MWh, due to the increase in the coal price.

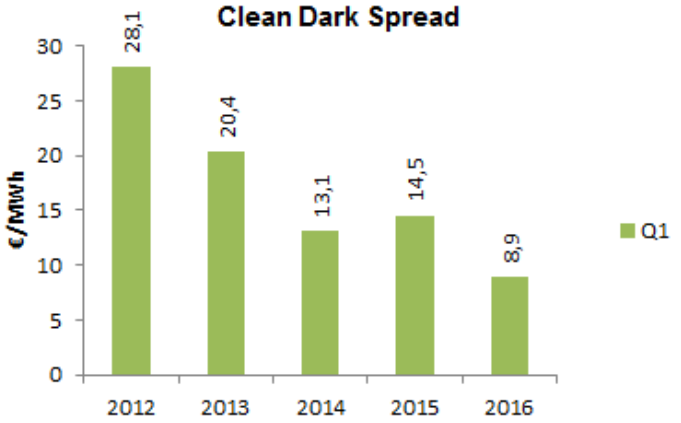
Source: MPF (on GME data). The data are calculated as weighted averages for the six zones (North, South, CSouth, CNorth, Sardinia, Sicily)

ITALIAN ELECTRICITY CLEAN SPARK AND DARK SPREADS (CSS AND CDS)

IMPROVEMENT IN CSS DUE TO HIGH POWER PRICES

GWh		clean baseload spark spread - 51% efficiency	clean peakload spark spread - 51% efficiency	clean dark spread - 35% efficiency
2016	Q1	1,5	7,2	8,9
	Q2	-2,6	-0,8	3,1
	Q3	4,4	8,6	6,1
	Q4	8,6	18,4	9,5
2017	Q1	6,6	15,4	13,5
9 months 2016 vs 2015		5,2	8,3	4,6





- In Q117 the CSS year-on-year increased by 5.2 €/MWh for the baseload and by 8.3 €/MWh for the peakload. The rise is due to the high power prices, increased by more than gas costs. CPSS is at the highest level since 2012 (when CSS was anyway lower than in 2017)
- Also CDS increased, despite higher coal prices. Please note that the calculation of CDS for 2017 includes updated estimates of the spread MED and variable trasport costs.

Clean Spark Spread: PUN (BL/PL) – gas PSV cost (eff. 51%) – EUA cost – CV cost (up to 2014)- variable transport costs
Clean Dark Spread PUN BL –coal cost (API2 + spread MED + variable transport costs - eff. 35%) – EUA cost – CV cost (up to 2014)

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ITALIAN GAS SUPPLY – BREAKDOWN BY SOURCES

STRONG ALGERIAN FLOWS, WEAKENING DOMESTIC PRODUCTION

mcm	Q1 2017	Q1 2016	Δ% Q117/Q116
Import			
Mazara del Vallo (Algeria)	6.339	3.272	93,7%
Gela (Lybia)	1.189	1.249	-4,8%
Tarvisio (Austria)	6.728	7.373	-8,7%
Gorizia (Slovenia)	2	-	-
Passo Gries (Switzerland)	1.715	1.597	7,4%
Total Pipeline	15.973	13.491	18,4%
Cavarziere	1.533	1.472	4,2%
Panigaglia	2	2	-
Livorno (OLT)	1	-	-
Total LNG	1.536	1.474	4,2%
Total Import	17.509	14.965	17,0%
Domestic Production	1.425	1.535	-7,2%
Delta Stock	6.675	7.086	-5,8%
Demand	25.444	23.584	7,9%

- After a strong return in 2016, Algerian flows almost doubled in Q117 too, on a year-on-year basis.
- The Algerian surge came to the expense of Tarvisio and Gela, mainly. Lybian flows reduced due to civil unrest in the country and outages in key-fields (Wafa).
- Increase in LNG imports (+4.2% in Q117 on a year-on-year basis).

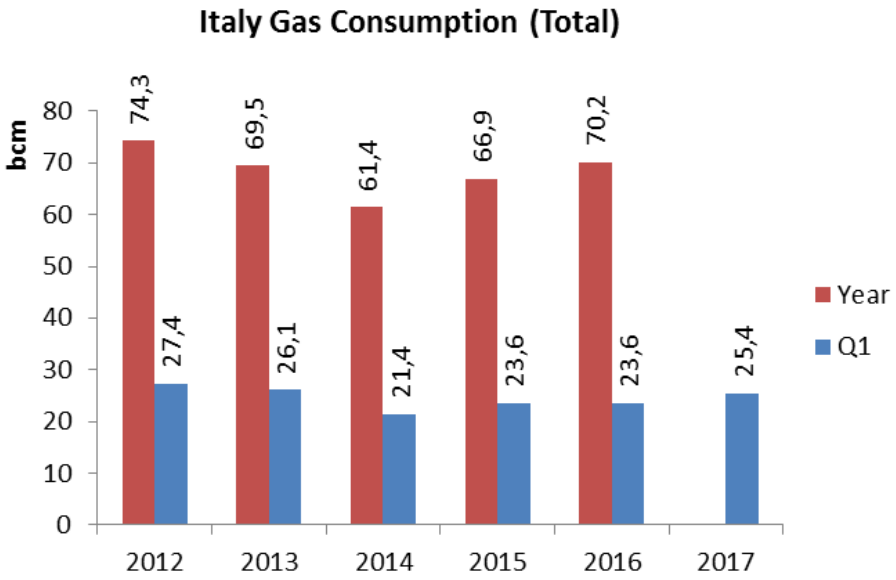
Source: Bloomberg, Snam Rete Gas, PCS correction by Snam Rete Gas during 2016, data corrections by Snam Rete Gas

ITALIAN GAS CONSUMPTION

GROWING DEMAND IN Q1-17 (+7.9% YOY) WITH THERMAL USE SURGING

Italy: Gas consumption

mcm		Industry	Thermal	Distribution Network	Other networks	Total
2016	Q1	3.501	5.632	13.680	771	**23.584**
	Q2	3.283	4.475	4.187	199	**12.145**
	Q3	2.983	6.054	2.843	254	**12.134**
	Q4	3.613	7.178	10.964	534	**22.289**
	Tot.	**13.380**	**23.339**	**31.674**	**1.758**	**70.151**
2017	Q1	3.737	6.699	14.379	631	**25.444**
Q1-17 vs. Q1-16		**236**	**1.066**	**699**	**- 141**	**1.860**



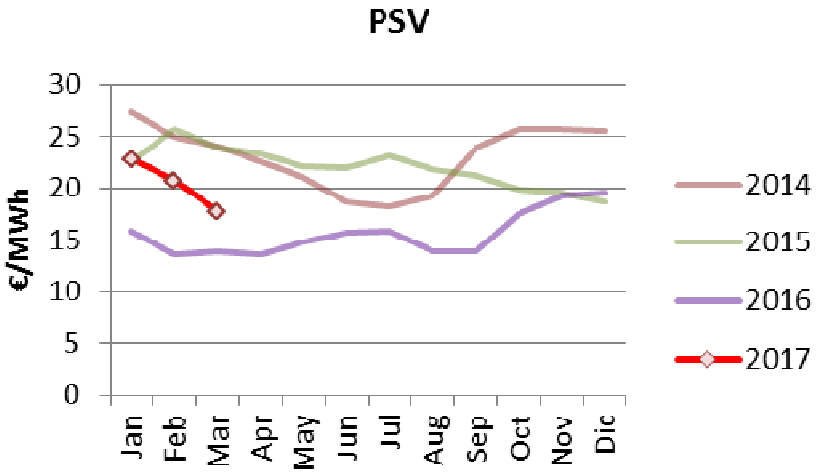
- Q117 showing a significant rise in gas consumption, on a year-on-year basis.
- Thermal gas demand segment showing the largest improvement (+18.9% in Q117 vs. Q116, more than 1 bcm of additional consumption).
- Slight increase in Distribution Network gas consumption during Q117 (about +0.5% on a year-on-year basis)

Source: Bloomberg, Snam Rete Gas, PCS correction by Snam Rete Gas during 2016, data corrections by Snam Rete Gas

SPOT GAS PRICES – PSV AND MAIN HUBS SPREAD

PSV PRICES INCREASED IN Q1-17 (+40% Y-O-Y) ON HIGHER DEMAND

€/MWh		PSV	PSV-TTF	PSV-VTP	PSV-PEG NORD
2016	Q1	14,5	1,6	1,1	1,3
	Q2	14,7	1,6	0,8	1,5
	Q3	14,5	1,8	0,5	1,5
	Q4	18,8	1,7	1,1	1,4
	Year	**15,6**	**1,7**	**0,9**	**1,4**
2017	Q1	20,4	1,9	1,3	1,4
	Q2	-	-	-	-
	Q3	-	-	-	-
	Q4	-	-	-	-
	Year	-	-	-	-
Q1-17 vs. Q1-16		**6,0**	**0,3**	**0,1**	**0,1**



- Strong gas price increase in Q117 vs. Q116 on the PSV (about +40%), with a general price increase all over Europe due to stronger thermal gas consumption, with the nuclear issue in France and surging coal prices.
- Spreads with the Austrian VTP, TTF and Peg Nord (Q117 vs. Q116) marked an uptick as well.

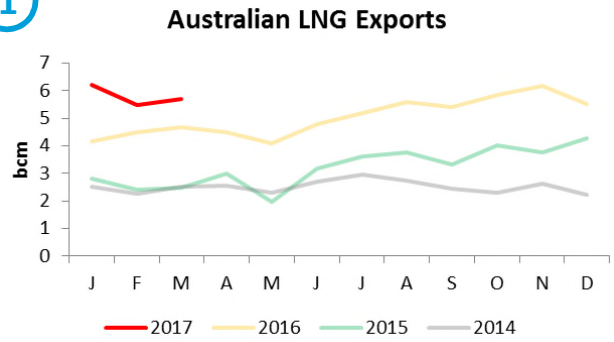
Source: Bloomberg, ICE-Endex, CEGH, Powernext

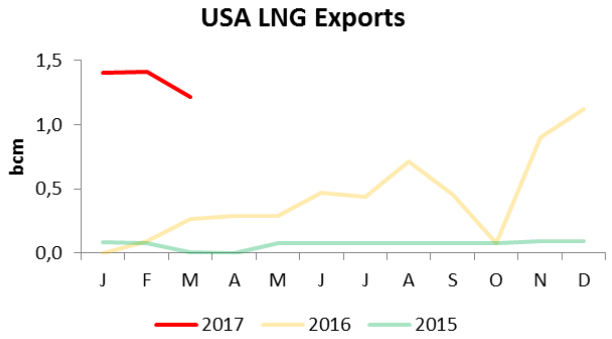
GLOBAL GAS OUTLOOK – LNG

GROWING SUPPLY, EUROPEAN LNG IMPORTS RECOVERED IN Q1-17

SUPPLY

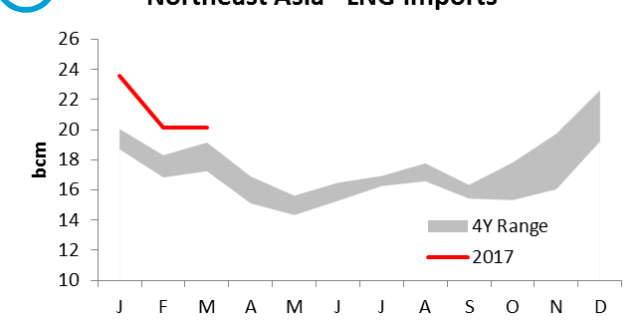
1

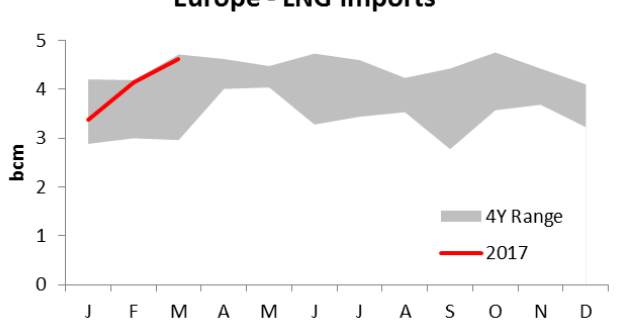




DEMAND

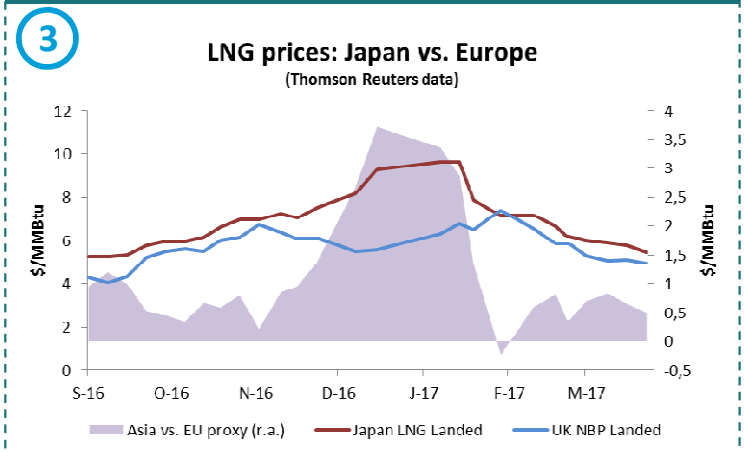
2





RELATIVE PRICE DYNAMICS

3



- Rising global supply (1), due to the rise in Australian exports. Rising exports from the US liquefaction plants as well, with Sabine Pass T3 commissioning in March 2017.
- Northeast Asia kept absorbing the largest chunk of fresh LNG cargoes due to large price premium and geographical proximity with Australia (2).
- European LNG imports recovered in Q117, with a smaller locational spread between Asian and European LNG prices (3).

Source: Thomson Reuters. European LNG imports including Spain, UK, France, Belgium, Greece, Italy, The Netherlands, Portugal, Poland. Northeast Asia LNG imports including Japan, South Korea, China and Chinese Taipei.

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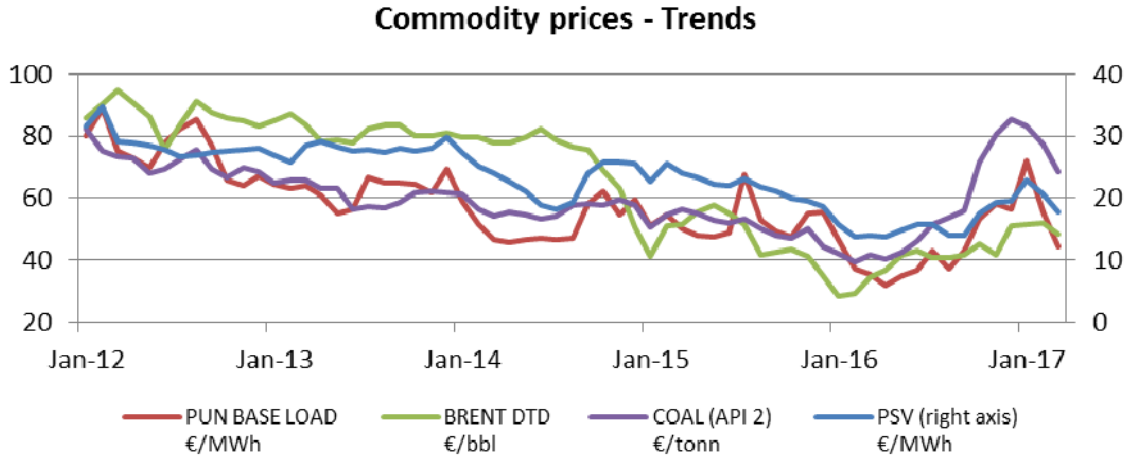
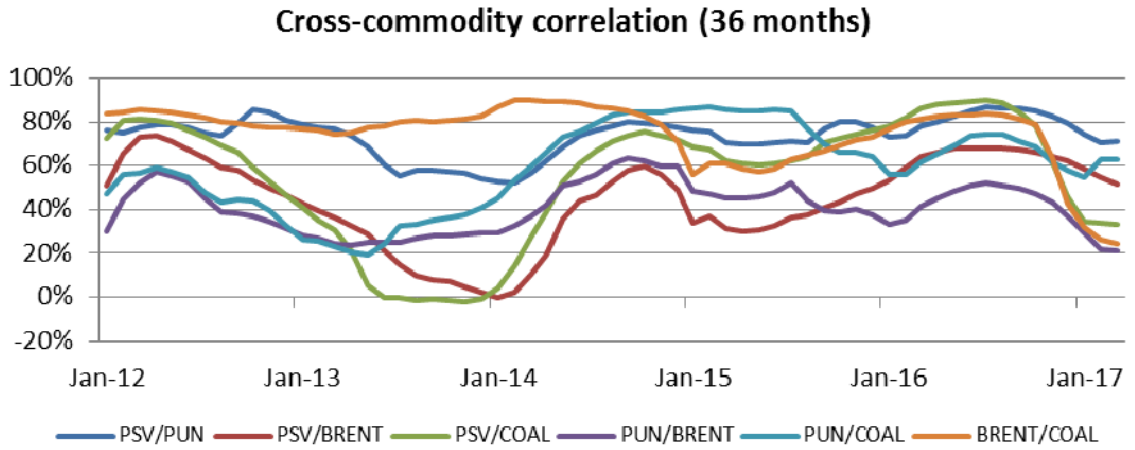
CORRELATION AMONG COMMODITIES

CORRELATION AMONG ENERGY COMMODITIES WEAKENED IN Q1-17

	PSV-PUN	PSV-BRENT	PSV-COAL	PUN-BRENT	PUN-COAL	BRENT-COAL
MAX	87%	74%	90%	63%	87%	90%
MIN	52%	0%	-2%	21%	19%	25%
AVG. 5Y	74%	44%	55%	41%	59%	75%

- Resilient correlation between PUN and PSV prices, with gas-fueled thermal power plants as marginal source for the Italian power market.
- Coal prices reduced their correlation with the energy commodities analyzed, due to the surge in prices connected with China's political intervention in its domestic coal market.
- Stable, and mildly weak, PSV-Brent correlation (fewer gas supplies linked to oil formulas but global LNG prices still linked to oil formulas)





Source: GME, Thomson Reuters, Bloomberg

ITALIAN TEMPERATURES, PRECIPITATIONS AND WIND

LOWER TEMPERATURES IN JANUARY; LOW PRECIPITATIONS

	Temperature (°C)	Precipitations (mm *100)	Wind (speed)	Temp. 17 vs. 16	Prec. 17 vs. 16	Wind 17 vs. 16	Temp. 17 vs. 10-YR Avg.	Prec. 17 vs. 10-YR Avg.	Wind 17 vs. 10-YR Avg.
Q1 10-YR Average	8,0	181,0	6,8						
Q1 2016	8,9	183,5	7,1						
Q1 2017	8,3	134,6	7,1	-6%	-27%	0%	4%	-26%	5%

- **Temperatures in Q117 in Italy were lower than in Q116 but above the 10YR average.** In particular, January was colder than January 2016 (-2.8 °C) and the average (-2.4 °C), but March was warmer compared to both (+1.6 °C) .
- **Precipitations in Q117 were quite low**, both compared to last year and to the 10YR average.
- **Wind** in Q117 was in line with Q116 and above the 10YR average.

Source: Bloomberg. Temperatures are the average temperature (usually of the high and low) that was observed between 7am and 7pm local. Precipitations include rainfall and the liquid equivalent of snow and sleet (measurement: Integer in 100th millimeters). Wind Speed is the average sustained winds which does not include wind gust.
Bloomberg data (in particular, data about precipitations) are subject to ex-post adjustiments.

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EUA MARKET

OVERSUPPLY WEIGHED ON THE MARKET IN A YEAR WITHOUT REGULATORY MEASURES TO SUPPORT THE PRICE

- After reaching levels above 6.5 €/ton in December, EUA prices declined to under 5 €/ton in mid January and kept a lateral trend around 5 €/ton, touching a 4.4 low at the beginning of May. This trend highlights the oversupply in the system, in a year without backloading (ended in 2016) and market stability reserve (which will begin in 2019).

- The emissions data published by the EU Commission in April show a 2.8 decrease y/y (5th consecutive year of reduction), driven mainly by the heat and power sector (-4.4%), due to lower coal production.

- EU Commission, Parliament and Council are negotiating on phase 4 ETS (2020-2030): the EU Parliament and Council positions, both adopted in February, do not seem very far and are stronger than the Commission proposals (in particular, they foresee a doubling of the MSR in the first years). Negotiations will go on for some months to come.

Table: EU ETS emissions 2015 and 2016

Sector	2016	2015	Mt change	% change
Power & Heat	967.1	1011.5	-44.4	-4.4%
Industry	785.5	791.5	-6.0	-0.8%
- Metals	184.2	190.2	-6.0	-3.1%
- Cement, lime, glass	180.4	179.7	0.7	0.4%
- Oil and gas	187.6	186.9	0.7	0.4%
- Other	201.8	202.9	-1.1	-0.5%
- Paper and pulp	31.5	31.3	0.2	0.7%
Total EU ETS (w/o aviation)	1752.6	1803.0	-50.4	-2.8%
Aviation	61.6	57.1	4.5	8.0%
Total EU ETS (incl. Aviation)	1814.3	1860.1	-45.8	-2.5%

Comparing proposals on the table

Proposal	Commission	Parliament	Council
Linear reduction factor (today 1.74%)	2.2%	2.2%	Not discussed
Market stability reserve	12%	24% in first four years	24% in first five years
	1 billion metric tons by 2023	1.6 billion metric tons by 2023	1.7 billion metric tons by 2023
Cancelling allowances	–	800 MMt in 2021	2 billion metric tons in 2024

Note: MMt = million metric tons.
Source: IHS
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Sources: Reuters, IHS.

BACKUP SLIDES

MARKET ANALYSIS & PRICE FORECASTING

Milan, May 2017

GLOSSARY (1)

Baseload (BL-PL): A Baseload Day consists of all hours from 00:00 to 23:59 Central European Time of each calendar day

CDS (Clean Dark Spread): It represents the margin an hypothetical coal plant with 35% efficiency can obtain on energy markets by selling one unit of electricity, given fuel and environmental costs. Throughout our analysis CDS are computed as follows

CDS = PUN BL –coal cost (API2 + spread MED + variable transport costs - eff. 35%) – EUA cost – CV cost (up to 2014)

China DES: it is the Argus' price assessment for Chinese landed LNG cargoes delivered in the ports of Guangdong, Fujian, Shanghai, Jiangsu, Dalian, Zhejiang, Tangshan, Zhuhai, Tianjin

CSS (Clean Spark Spread): It represents the margin that an hypothetical CCGT power plant with 51% efficiency can obtain on energy markets by selling one unit of electricity, given fuel and environmental costs. Throughout our analysis CSS are computed as follows:

CSS = PUN (BL/PL) – gas PSV cost (eff. 51%) – EUA cost – CV cost (up to 2014)- variable transport costs

EUA (European Union Allowances): A tradable and bankable unit under the EU ETS. Each allowance equals 1 tonne of CO_2.

Heating degrees days: it is a proxy of the average Italian temperature during the winter season. It is related to gas consumption for heating. It is calculated as follows:

HDD = Y – AVG, Y = 18 ºC, HDD = Mean, if HDD<0 then HDD=0

GLOSSARY (2)

Henry Hub: It is the main US gas hub, located in Erath, Louisiana. It serves as the official delivery location for futures contracts on the NYMEX
Marginal Technology: electricity generating technology that sets the selling price on the Italian day-ahead market in each hour. Data on marginal technologies are an average of zonal data taken from the marginal technology index (ITM) published by the GME.
Peakload (PL): A Peakload Day consists of all hours from 08:00 to 19:59 Central European Time of each weekday (i.e. Monday to Friday inclusive)
PSV (Punto di Scambio Virtuale): virtual trading point for natural gas in Italy, as established by the relevant Network Operator and located between the entry points and the exit points of the national transportation network where shippers may exchange and sell natural gas
PUN (Prezzo Unico Nazionale): average of Zonal Prices in the Day-Ahead electricity Italian Market, weighted for total purchases and net of purchases for Pumped-Storage Units and of purchases by Neighboring Countries' Zones.
VTP (Virtual Trading Point): a notional point in Austria at which gas can be traded within the market area after injection and before offtake. The VTP is not a physical entry/exit point but enables grid users to transfer capacity titles from one balancing group to another within the market area (for trading) without the need to book capacity.
TTF (Title Transfer Facility): it is a virtual trading point for natural gas in the Netherlands.
Peg Nord (Point d'Echange du Gaz): it is one of the virtual trading locations for the sale, purchase and exchange of natural gas and LNG in France. It is one of the pricing and delivery points for Powernext natural gas futures contracts.