



Bimonthly Gas Market Watch

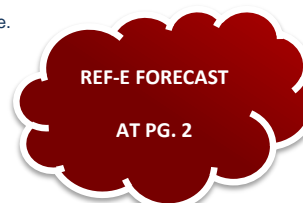
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Report N° 17 - Publication Date: 29-09-17

Euro/MWh	PSV			TTF			AVTP			NBP		
	Last Quote	-14 days	Trend	Last Quote	-14 days	Trend	Last Quote	-14 days	Trend	Last Quote	-14 days	Trend
DA	19.6	18.5	↑	17.4	17.3	→	17.4	17.6	→	17.6	17.4	↑
MA	19.2	19.1	→	17.3	17.2	→	17.9	17.8	→	17.7	17.3	↑
Q+1	19.7	19.6	→	17.8	17.7	→	18.4	18.2	↑	18.3	18.7	↓
SEASON+1	19.9	19.8	→	18.0	17.9	→	18.6	18.4	↑	18.9	19.1	↓
SEASON+2	18.6	18.5	→	16.6	16.6	→	17.5	17.4	→	15.9	16.1	↓
SEASON+3	18.4	17.8	↑	16.8	16.2	↑	17.5	17.0	↑	18.8	19.0	↓
GY+1	19.3	19.1	→	17.3	17.2	→	18.1	17.9	→	17.4	17.6	↓
CY+1	19.2	19.0	→	17.2	17.2	→	18.0	17.9	→	17.5	17.0	↑
GY+2	18.7	18.6	→	17.0	17.0	→	17.7	17.7	→	17.0	17.2	↓
CY+2	18.5	18.5	→	16.9	16.9	→	17.6	17.6	→	17.2	16.8	↑

Source: REF-E elaborations and Thomson Reuters data, Powered by STREAM - REF-E Market Data-Warehouse.

The prices are indicative - not official quotes



MARKET HIGHLIGHTS

ITALIAN MARKET

EUROPEAN MARKETS

 BULLISH DRIVERS	<ul style="list-style-type: none"> BoM and Q4-17: Recent attacks to oil&gas fields in Libya highlights a relevant geopolitical risk which could affect Gela flow (as recently happened). 	<ul style="list-style-type: none"> BoM: Reduced LNG arrivals to NWE markets. Q1-18: N-E Asia LNG Spot prices above 7.50 \$/MMBtu WIN-17: Brent prices up to 60\$/bbl after the OPEC declarations
 NEUTRAL DRIVERS	<ul style="list-style-type: none"> BoM: Stable LNG send out compared to August WIN-17: Stogit storage level at about 92% of fullness before the end of September 	<ul style="list-style-type: none"> BoM: Resume of gas flow from Russia through Nord Stream
 BEARISH DRIVERS	<ul style="list-style-type: none"> BoW: End of the reduction of Russian flows after the 100% maintenance at Arnoldstein exit point. 	<ul style="list-style-type: none"> WIN-17: Approval of using Rough cushion gas as working gas WIN 17: Reduction of gas-to-power consumption due to hub prices above CSP at medium efficiency WIN-17: Allowance to Statoil to increase Troll output

REF-E OUTTURN

	PRICE Forecast [Euro/MWh]					DEMAND Forecast [Mcm/day]*			ESTIMATED SPOT VOLUMES [Mcm/day]*
	TTF	PSV	SPREAD PSV -TTF	$\Delta\%$ PSV vs FWD Monthly Avg	$\Delta\%$ Spread vs FWD Monthly Avg	LDZ	G2P	INDUSTRIAL	GRIES & TARVISIO
01-Oct-17	17.00	18.36	1.36	-3%	-30%	55	61	42	8.9
01-Nov-17	17.14	18.72	1.58	-4%	-16%	120	59	43	12.1
01-Dec-17	17.19	19.11	1.92	-3%	2%	171	60	39	17.8
01-Jan-18	16.95	19.12	2.17	-3%	15%	188	61	42	18.5
01-Feb-18	16.76	19.26	2.50	-2%	33%	184	63	46	44.5
01-Mar-18	16.33	18.37	2.04	-7%	9%	122	55	43	18.8
01-Apr-18	15.94	18.60	2.66	1%	40%	62	50	38	19.6
01-May-18	15.60	17.68	2.08	-4%	9%	40	47	39	18.0
01-Jun-18	15.61	16.69	1.08	-9%	-43%	32	53	37	18.7
01-Jul-18	15.70	18.03	2.33	0%	22%	30	63	37	19.6
01-Aug-18	15.68	16.95	1.27	-6%	-33%	23	52	28	3.5
01-Sep-18	16.03	17.86	1.83	-1%	-4%	35	63	42	28.4
01-Oct-18	16.39	18.34	1.95	0%	19%	55	58	41	43.2
01-Nov-18	16.76	18.62	1.86	1%	13%	119	58	43	36.6

*MONTHLY AVERAGE

REF-E Forecast is powered by in-house Gas Models: **I-GaMe** and **EU-GaMe**

See the Appendix for more details

<https://www.ref-e.com/it/what-we-offer/I-GaMe-EU-GaMe>

Market Pilot

North West Europe

Overview. After a decrease in levels during week 38 due to the return of normal flows from Russia and Norway, NWE gas prices have surged again from Monday 25th after the strong opening of Brent market that registered an upward trend of more than 2 \$/bbl intraday on the front month and the news regarding the possible closure of the Tricastin nuclear power plant. On the NBP hub, the effect of these bullish factors have been partially dampened after the confirmations that Statoil is allowed to increase the capacity of the Troll gas field by 3 bcm for the GY 17 (reaching a total production concession of 36 bcm), and that Centrica has received the approval for using the 0.87 bcm of cushion gas from Rough as working gas. However, as we see the upward trend of the last two weeks as a result of the recent series of contingencies, we forecast a decrease in TTF levels of about 1 €/MWh for WIN-17 compared to the last assessment.

Demand. The forecasted decline of the temperatures from the beginning of October will start to stimulate LDZ consumption, but for the total demand the week 40 will be characterized by strong wind blowing into NWE that could decrease the needs for gas-to-power. On the curve, coal-switching price for medium efficiency below NWE gas prices could reduce the gas-fired generation in case of a mild winter.

Supply. Pipeline flows from Russia and Norway into NWE returned to levels pre-maintenances (see Gas Market Watch n. 16), and LNG send-out in September remained almost stable compared to August arrivals (+5% m-o-m). However, for the coming winter strong LNG prices in S-E Asia could reduce the arrival of spot cargoes, inducing possible reloadings benefiting from a profitable market spread. NWE's storage levels are lower by about 7 bcm compared to last year, partially compensated by the possible upcoming of higher Troll production and the increase of UKCS production.

Italy

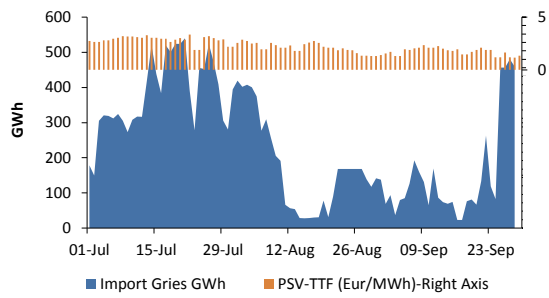
Overview. Italian gas market followed a similar path of other European hubs, continuing the upward trend started in the beginning of August and supported by rising coal prices. The temporary halt of the Russian flow due to the maintenance of the TAG pipeline (from 25th to 29th September) has been substituted by an increase of the deliveries from Mazara and Passo Gries. At the same time, LNG flows remained stable during September compared to previous month's arrivals, and storage levels have reached a fullness of about 92%. These factors, together with possible smoothing of the current contingencies that are affecting the market, bring our PSV forecast to reside in the range 18.3 - 19.3 for WIN-17.

Demand. Consumption will start to increase from the beginning of October with temperatures below normal levels that could trigger LDZ gas use. Storage gas injections are stopped compensating the reduction of the pipeline supply; nevertheless, total storage levels are already above the minimum percentage fullness required for the end of September. CSP of medium efficiency below PSV prices could give space for electricity production from coal instead of gas.

Supply. Russian flows reduction from Tarvisio for the TAG maintenance have been substituted both by pipeline flows from Mazara and Passo Gries, reaching respectively about 600 GWh/d and about 480 GWh/d. Given an increase of oil prices embedded in our model, in Q4-17 we forecast a possible increase of Mazara flows (whose LTCs can provide higher flexibility compared to Russian contracts), and a simultaneous reduction of the spot quote from North Europe.

Figure 1

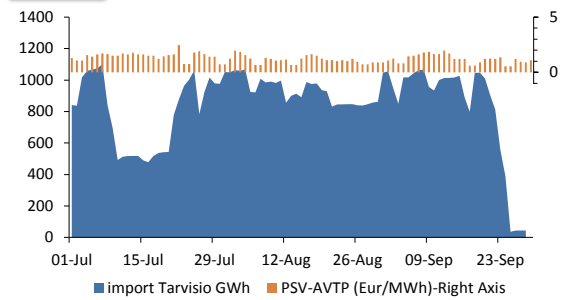
Import Gries & Spread PSV TTF



Source: Snam and Thomson Reuters Data 26-09-17. Powered by STREAM - REF-E Market Repository

Figure 2

Import Tarvisio & Spread PSV AVTP



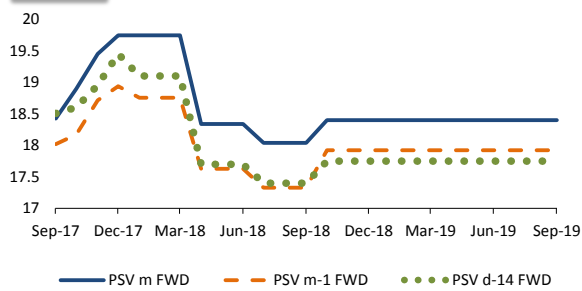
Source: Snam and Thomson Reuters Data 26-09-17. Powered by STREAM - REF-E Market Repository

Healthy flows from North Europe, roughly 430 GWh/d due to the maintenance of the TAG pipe.

The start of the maintenance in the TAG, which its planned from to the 25th to 29th September, nullified the imports through Tarvisio.

Figure 3

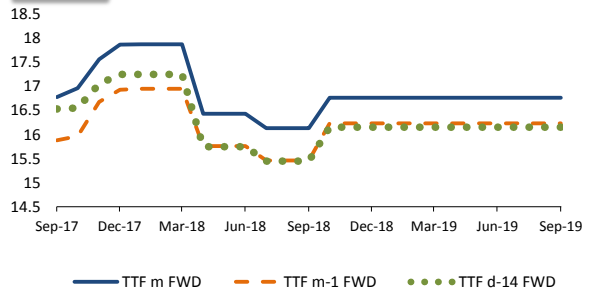
PSV (€/MWh)



Source: Snam and Thomson Reuters Data 26-09-17. Powered by STREAM - REF-E Market Repository

Figure 4

TTF (€/MWh)

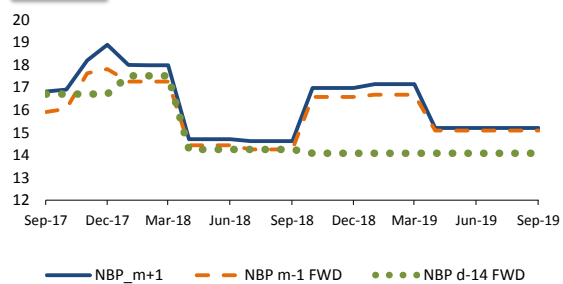


Source: Snam and Thomson Reuters Data 26-09-17. Powered by STREAM - REF-E Market Repository

The PSV forward curve is pushed up by the prompt TTF dynamics, which mainly affects the front season.

Figure 5

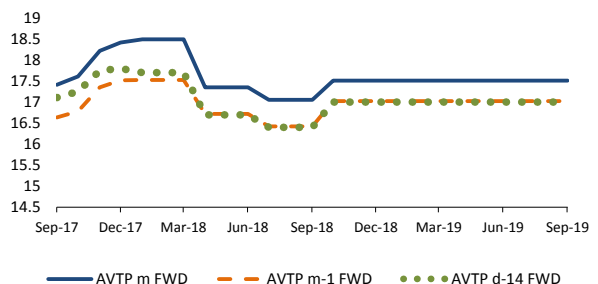
NBP (€/MWh)



Source: REF-E elaborations and Thomson Reuters Data 27-09-17. Powered by STREAM - REF-E Market Repository

Figure 6

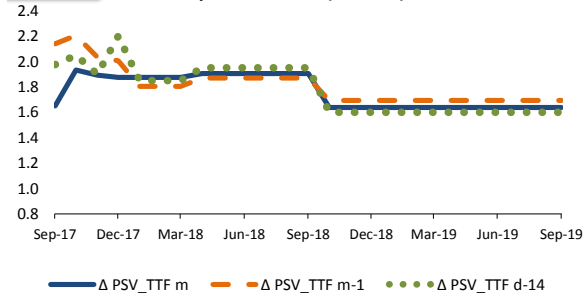
AVTP (€/MWh)



Source: REF-E elaborations and Thomson Reuters Data 27-09-17. Powered by STREAM - REF-E Market R

Figure 7

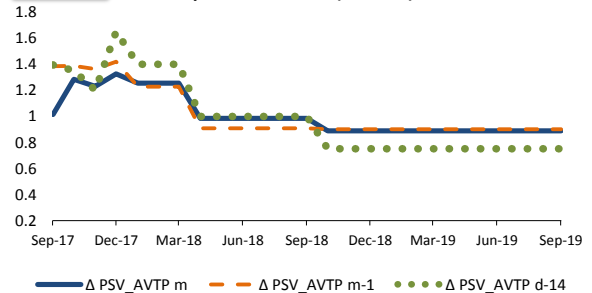
Spread PSV-TTF (€/MWh)



Source: REF-E elaborations and Thomson Reuters Data 27-09-17. Powered by STREAM - REF-E Market Repository

Figure 8

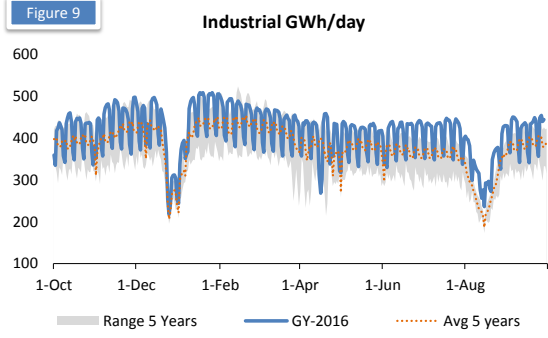
Spread PSV-AVTP (€/MWh)



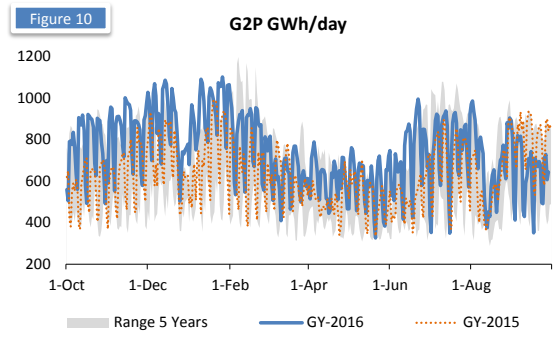
Source: REF-E elaborations and Thomson Reuters Data 27-09-17. Powered by STREAM - REF-E Market R

- (PSV-TTF) m: is the Avg of the daily forward spreads till the report date in the current month
 - (PSV-TTF) m-1: is the monthly average of the daily forward spreads in the previous Month
 - (PSV-TTF) d-14: is the forward spread of the last publication

- (PSV-AVTP) m: is the Avg of the daily forward spreads till the report date in the current month
 - (PSV-AVTP) m-1: is the monthly average of the daily forward spreads in the previous Month
 - (PSV-AVTP) d-14: is the forward spread of the last publication

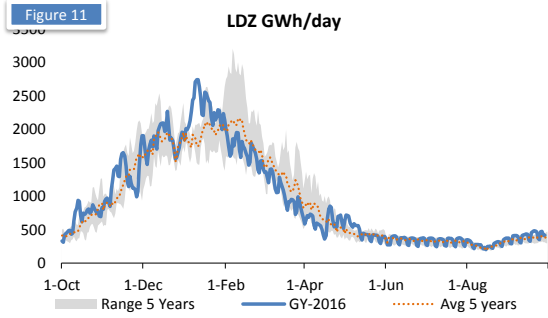


Source: Snam and Thomson Reuters Data 26-09-17. Powered by STREAM - REF-E Market Repository

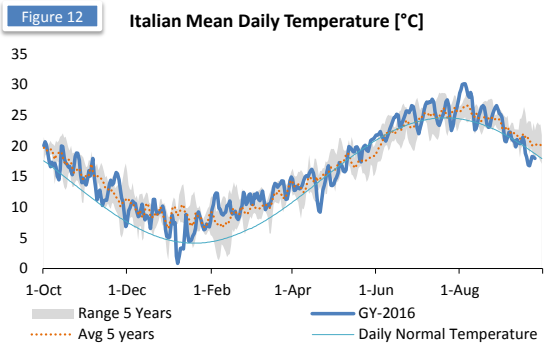


Source: Snam and Thomson Reuters Data 26-09-17. Powered by STREAM - REF-E Market Repository

In September, milder temperatures and the start of the growth of PSV above the CSP at medium efficiency has lowered the G2P consumption.

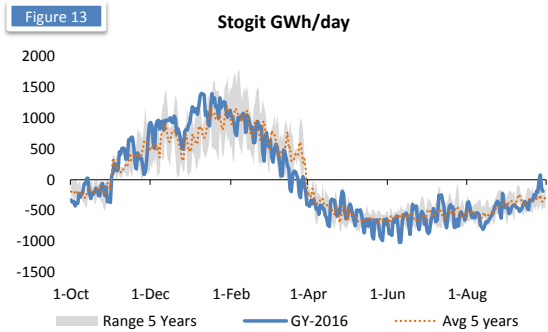


LDZ = Local Demand Zone/ Residential
Source: Snam and Thomson Reuters Data 26-09-17. Powered by STREAM - REF-E Market Repository

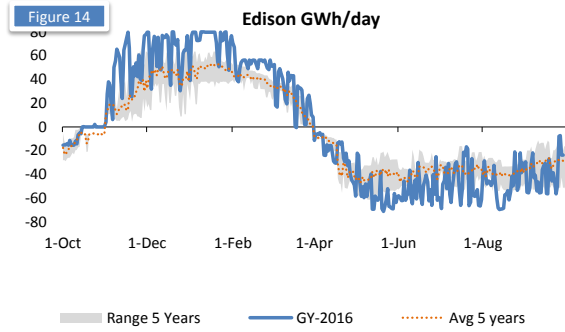


Source: Snam and Thomson Reuters Data 26-09-17. Powered by STREAM - REF-E Market Repository

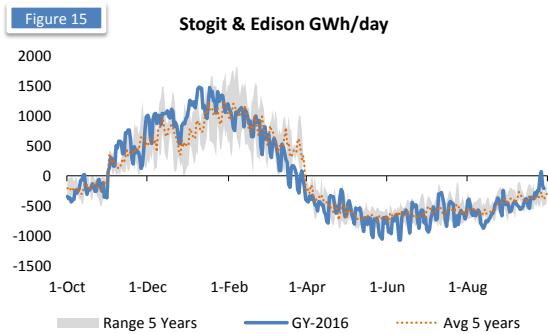
The temperatures below SNT could start to stimulate the LDZ demand.



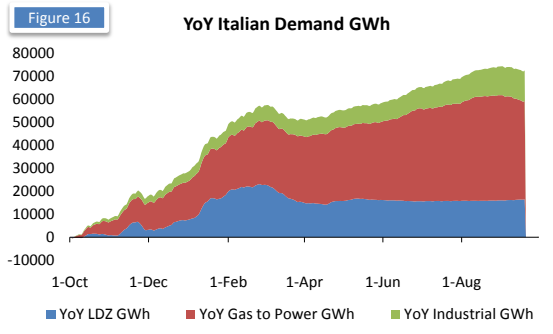
Source: Snam and Thomson Reuters Data 26-09-17. Powered by STREAM - REF-E Market Repository



Source: Snam and Thomson Reuters Data 26-09-17. Powered by STREAM - REF-E Market Repository

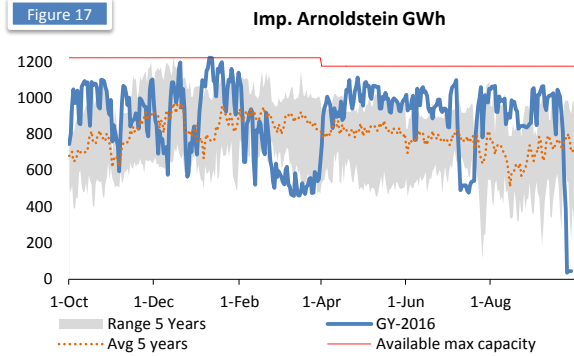


Source: Snam and Thomson Reuters Data 26-09-17. Powered by STREAM - REF-E Market Repository

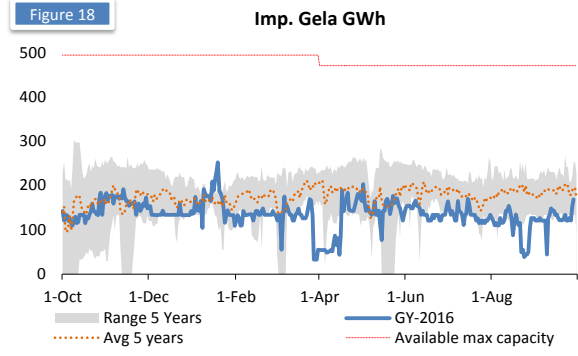


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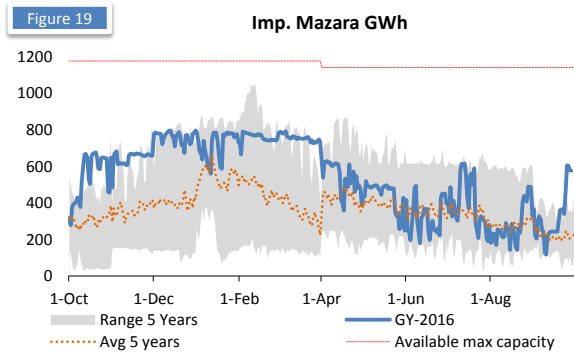
The Italian demand drops pushed down by the collapse of the G2P.



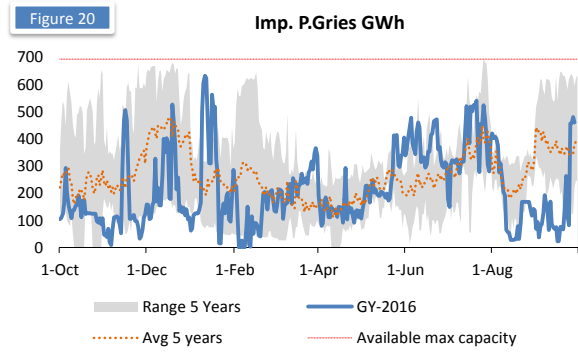
Source: Snam Data 26-09-17. Powered by STREAM - REF-E Market Repository
NE imports via Arnoldstein are currently interrupted since the planned maintenance of the TAG pipeline between the 25th and 29th September.



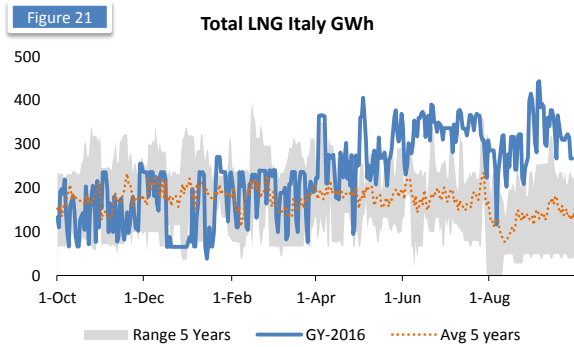
Source: Snam Data 26-09-17. Powered by STREAM - REF-E Market Repository
Libyan flows gets a relative stability in the last weeks but the strength of the ISIS in the Maghreb country, as seen with the attacks to Melita, intensify the risk of a possible flow reduction.



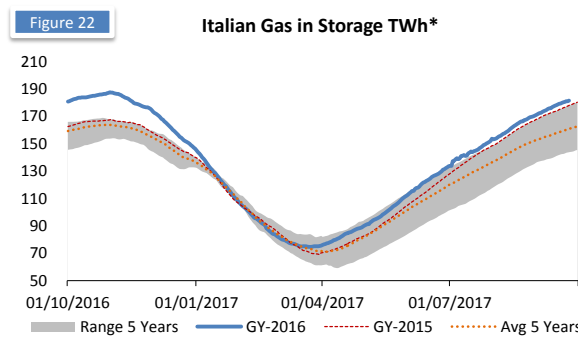
Source: Snam Data 26-09-17. Powered by STREAM - REF-E Market Repository
In relation to the last assessment, the Algerian flows climbed to 600 GWh/d, compensating the missing flow from Tarvisio.



Source: Snam Data 26-09-17. Powered by STREAM - REF-E Market Repository
Flows from NE are surging in order to balance the decline of the imports via Tarvisio.

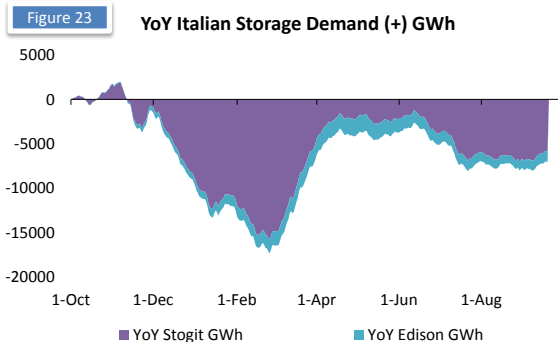


Source: Snam Data 26-09-17. Powered by STREAM - REF-E Market Repository
The spread L-MED-PSV encourages the arrival of flexible and spot cargoes to Italy, being remarkable the arrival of the first tank from the United States.

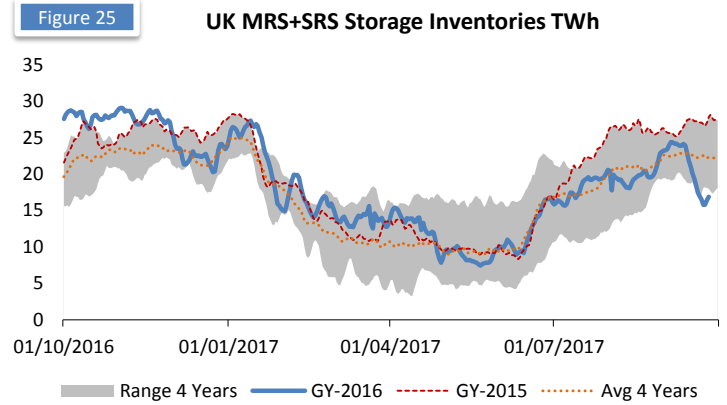
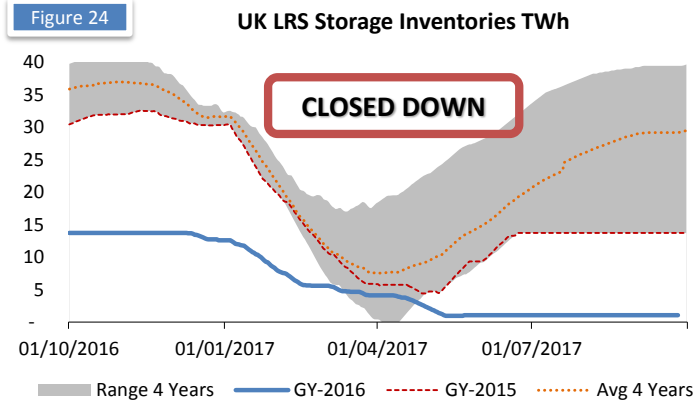


Source: Snam Data 26-09-17. Data powered by STREAM - REF-E Market Repository
Italian gas in storage is currently at its maximum level, supported by average injections of 360 GWh/d.

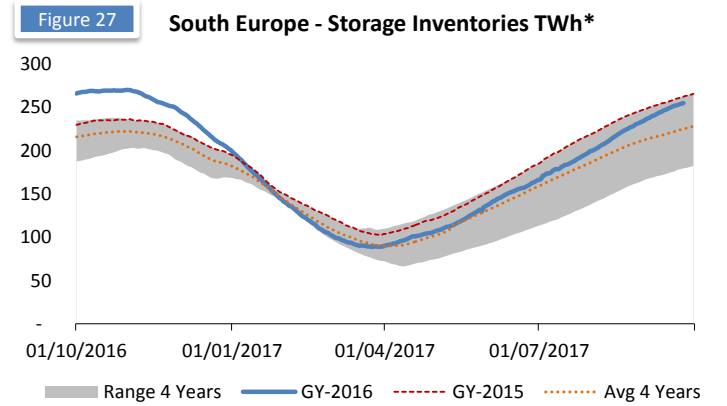
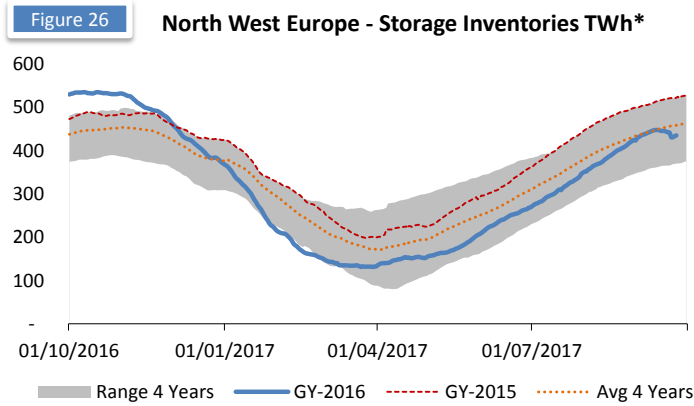
*Italian Storage: strategic storage not included.



Source: Snam Data 26-09-17. Powered by STREAM - REF-E Market Repository
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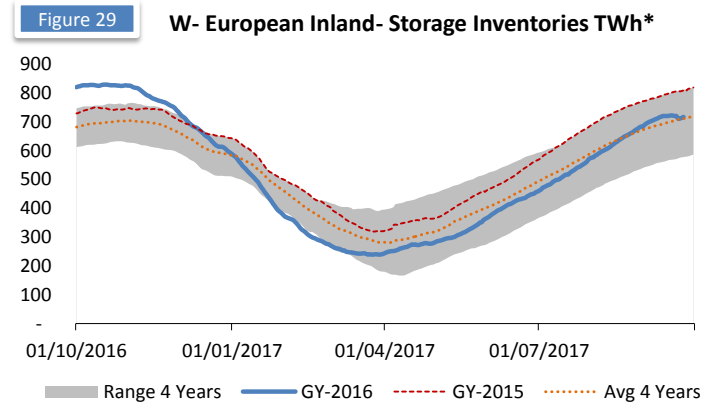
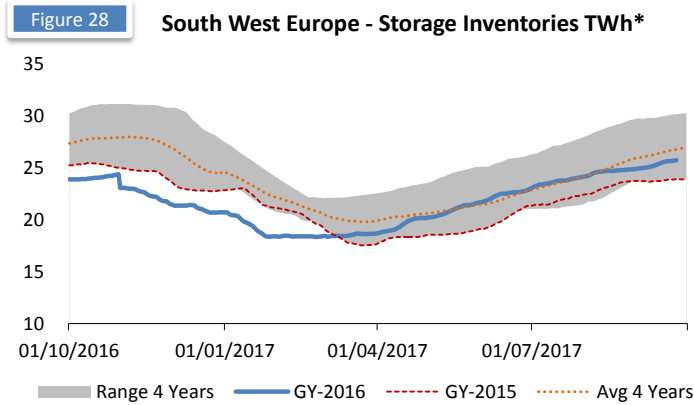


*Not included strategic storage which could be available in Q1-18, according to the latest Centrica requests.

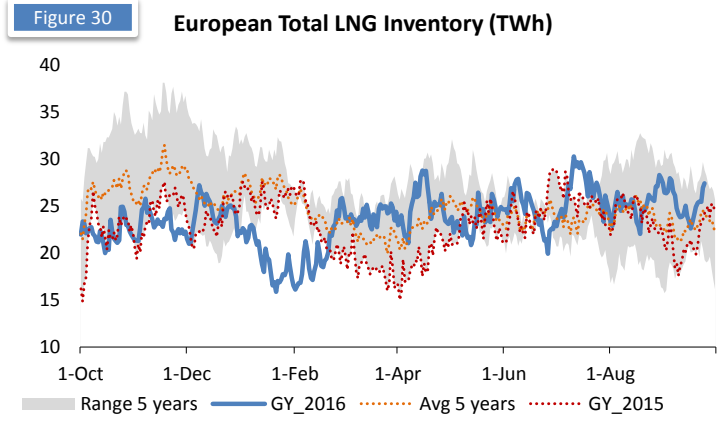


Storage in NWE goes down led by NWE withdrawals of the last two weeks.

SE storage gets closer to last year levels, with an injection flow of about 0.7 TWh/d.

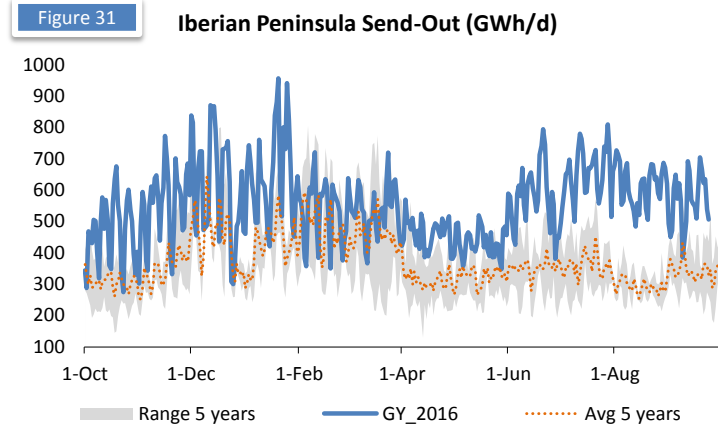


The SWE storage hikes to 25.75 TWh being, however, under the historical average.



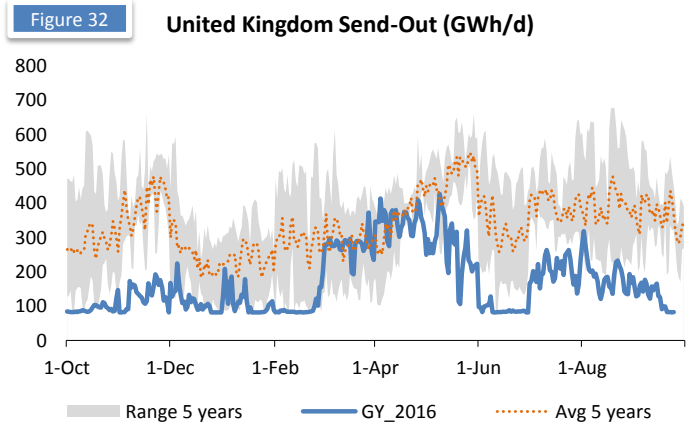
Source: ALSI 26-09-17. Powered by STREAM - REF-E Market Repository

In September the number of arrivals collapsed in relation to the previous month mainly driven by a cut down in the LNG send-out of Spain and Turkey.



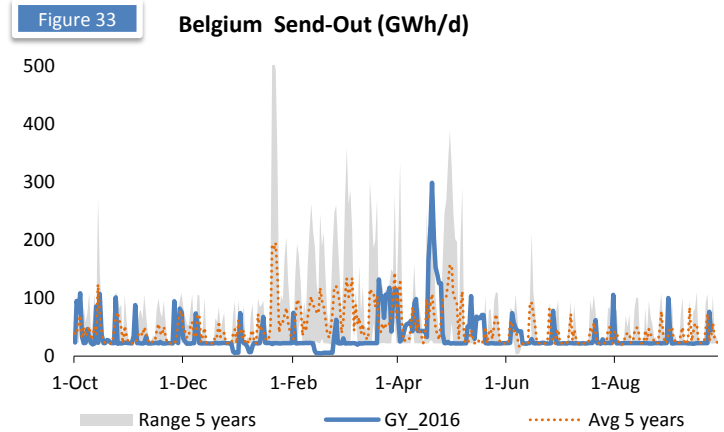
Source: ALSI 26-09-17Spain + Portugal. Powered by STREAM - REF-E Market Repository

Strong flows through Tarifa and Almeria in September together with a restrained demand pushed down the arrival of tankers to the Iberian Peninsula.

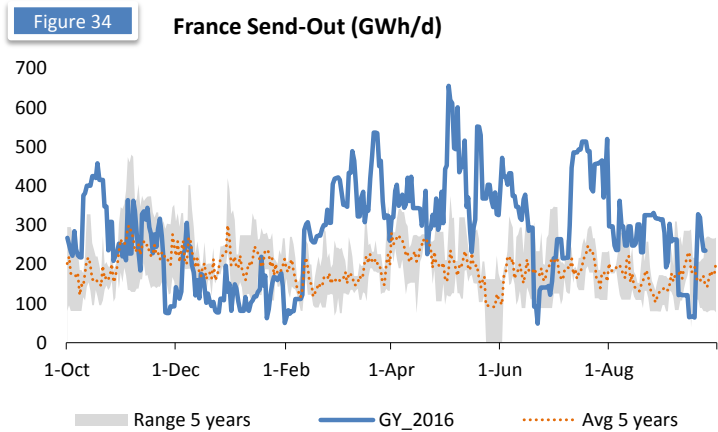


Source: ALSI 27-09-17. Powered by STREAM - REF-E Market Repository

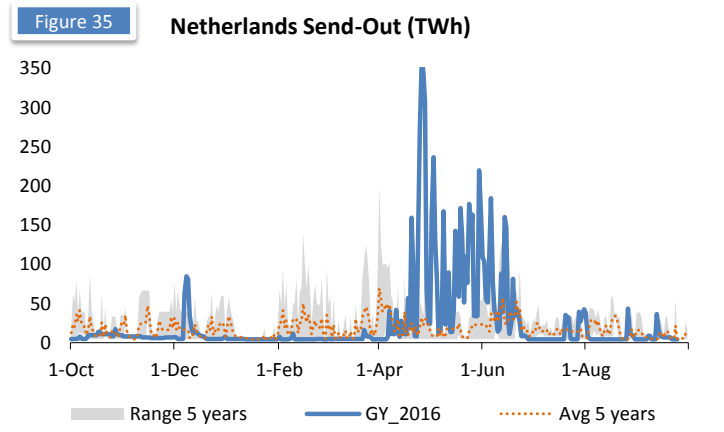
The current weakness of the NBP compared to other LNG markets is causing a lack of attractiveness, declining the number of spot and flexible volumes that the island receives.



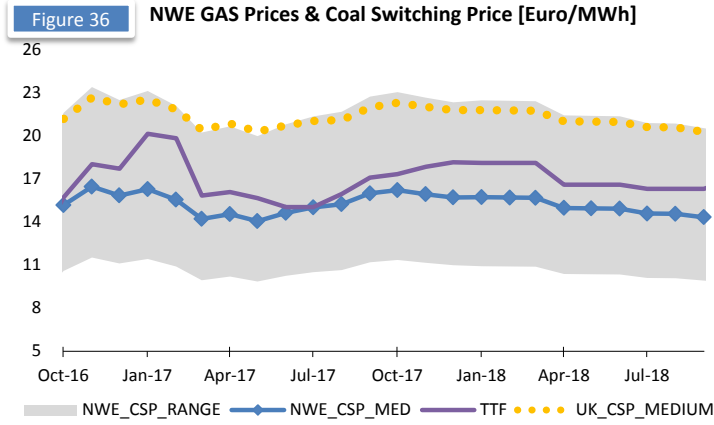
Source: ALSI 27-09-17. Powered by STREAM - REF-E Market Repository



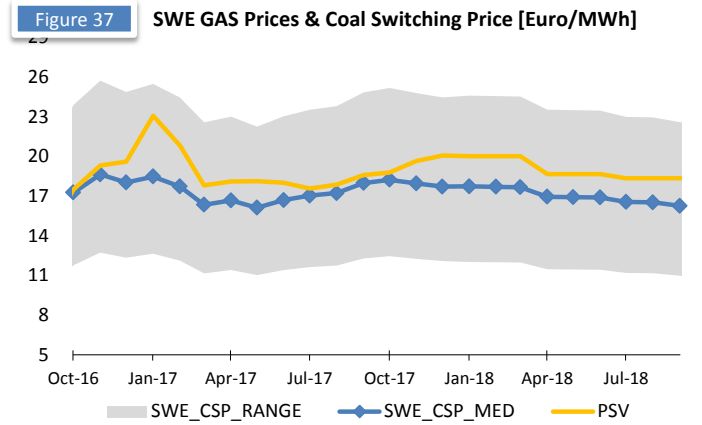
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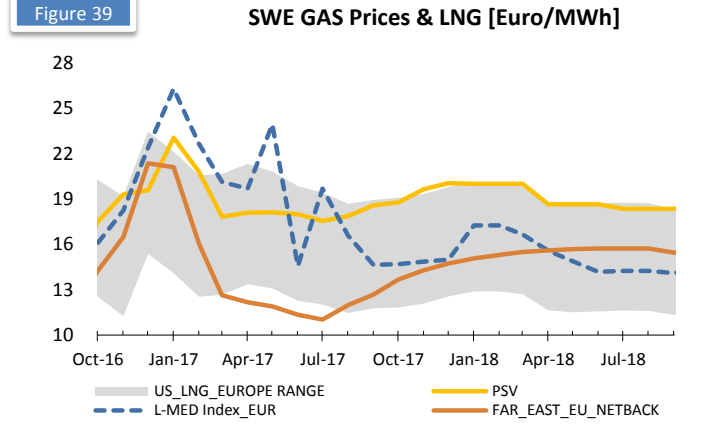
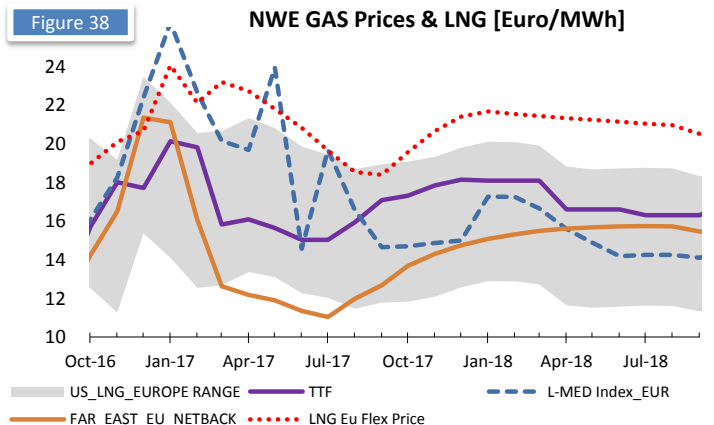
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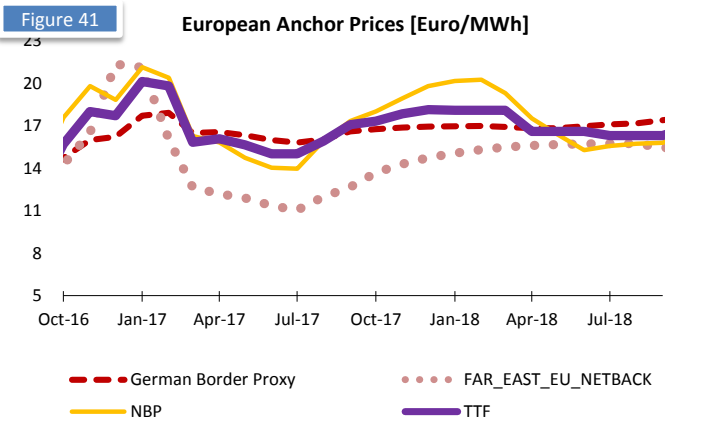
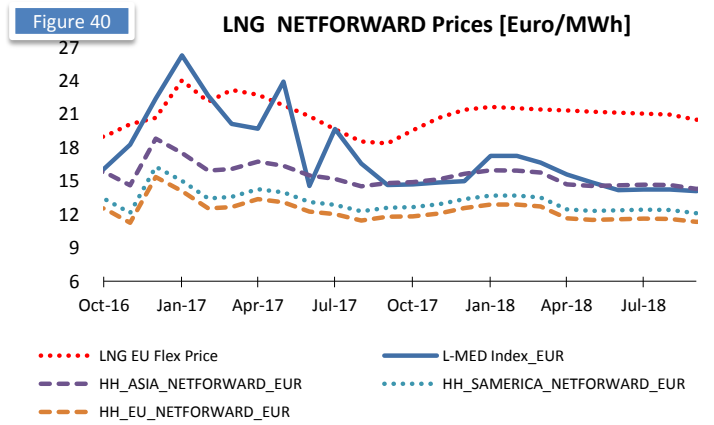
Gas needs to be more competitive with coal as the actual spread TTF-CSP could support a rise in the coal-to-power demand.

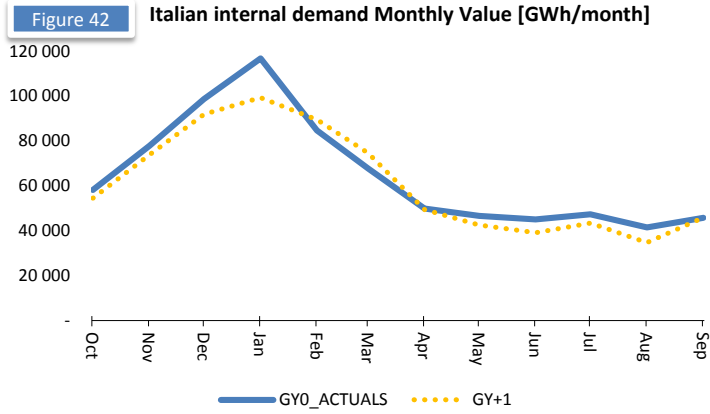


The current strength of gas prices compared to CSP at medium efficiency makes coal attractive as fuel for electricity production.

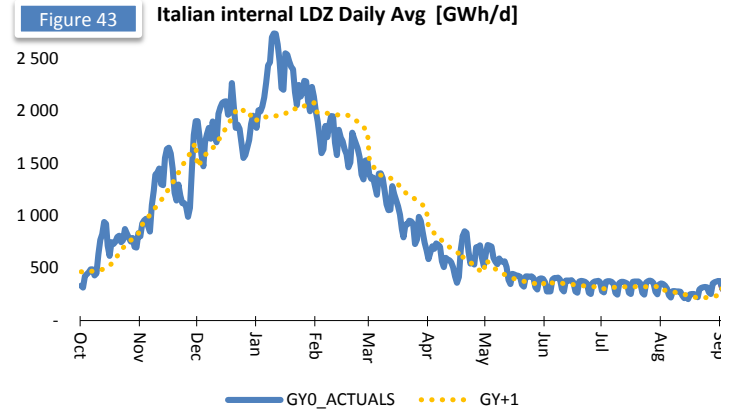


The reinforcement of the PSV widens the spread L-MED-PSV which might stimulate flexible and spot volumes to the Mediterranean region.

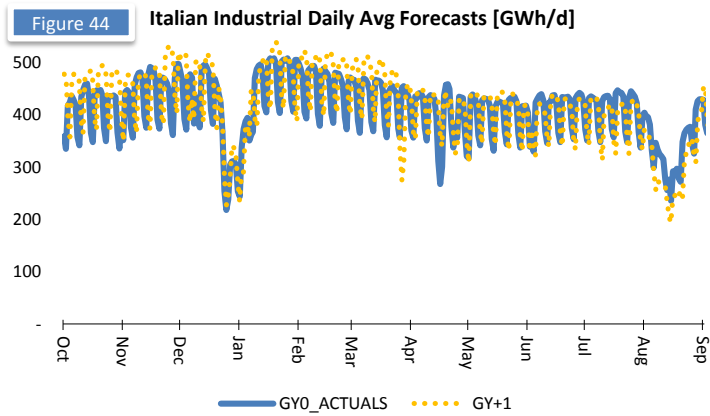




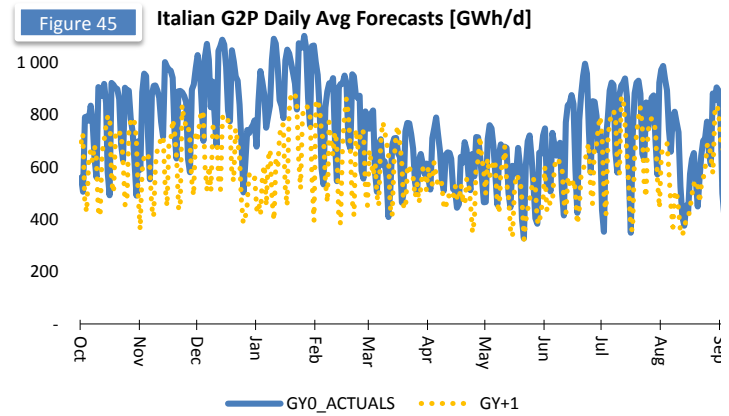
Source: REF-E I-Game in-house forecasting 27-09-17 Powered by I-GaMe and IDEM



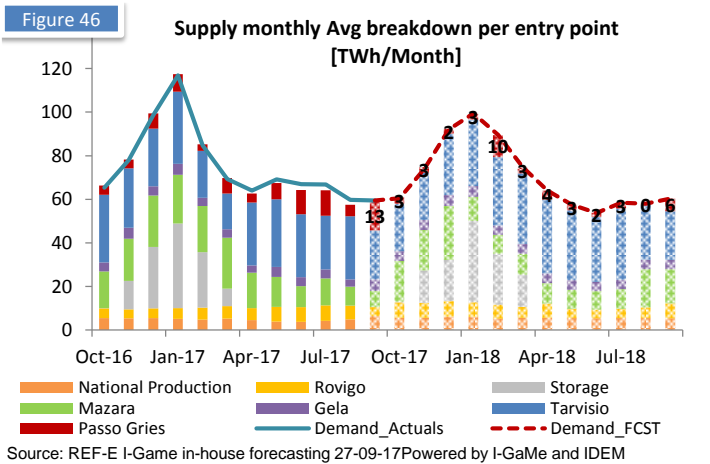
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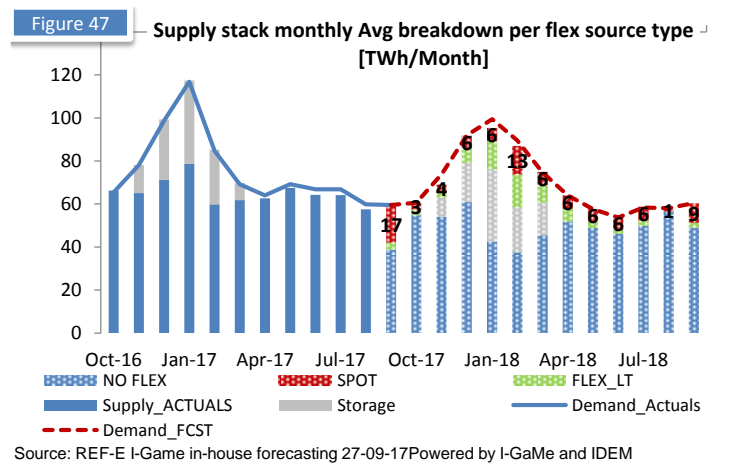
Source: REF-E I-Game in-house forecasting 27-09-17 Powered by I-GaMe and IDEM



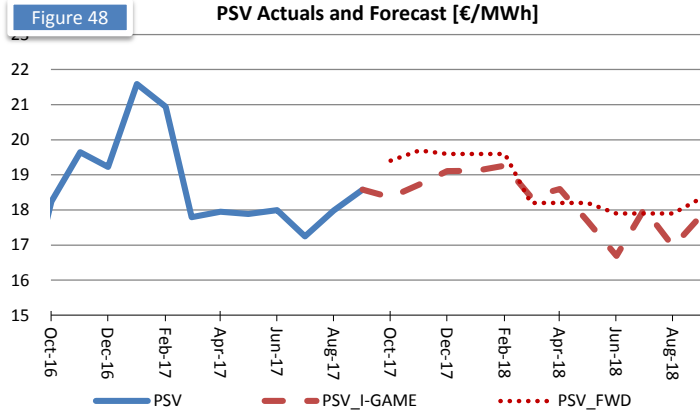
Source: REF-E I-Game in-house forecasting 27-09-17 Powered by I-GaMe and IDEM



Source: REF-E I-Game in-house forecasting 27-09-17 Powered by I-GaMe and IDEM

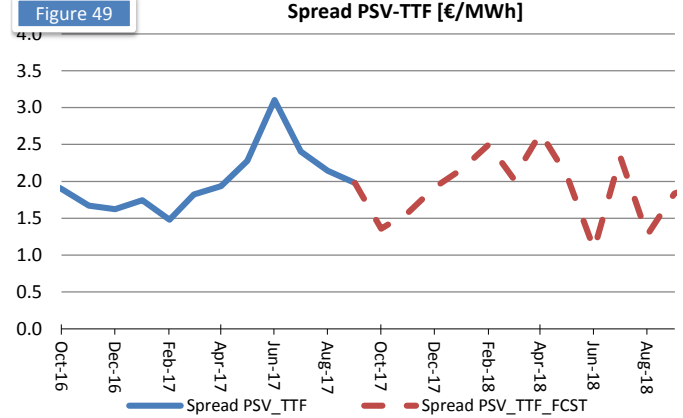


Source: REF-E I-Game in-house forecasting 27-09-17 Powered by I-GaMe and IDEM



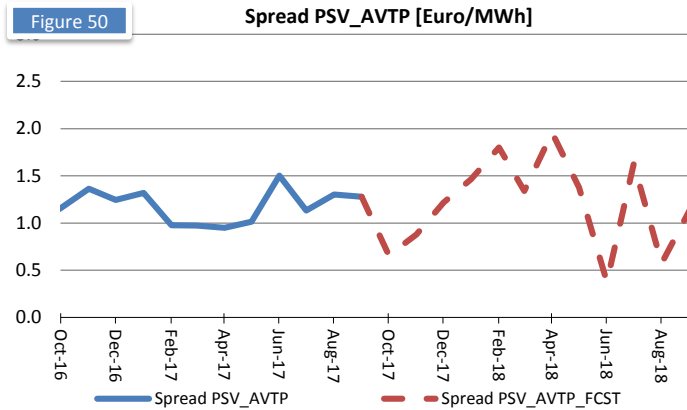
Source: REF-E Analysis on Thomson Reuters Data 27-09-17

According to our model, PSV could move down below the current forward curve of roughly 1 €/MWh.

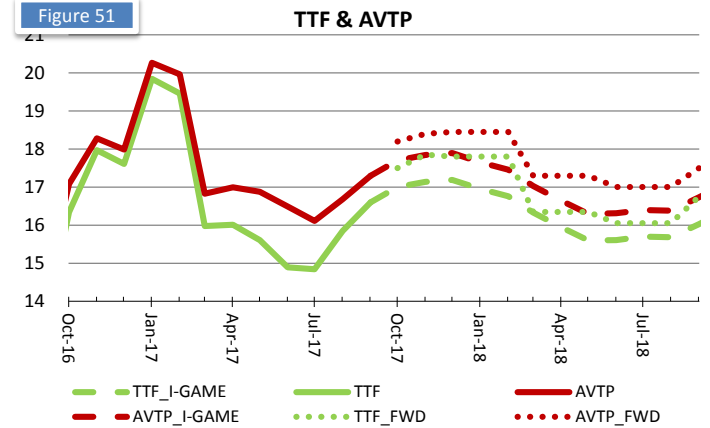


Source: REF-E Analysis on Thomson Reuters Data 27-09-17

The forecasted spread seems steady, showing just a climbing during Q1-18 in which period the spread could hike around 2.5 €/MWh.

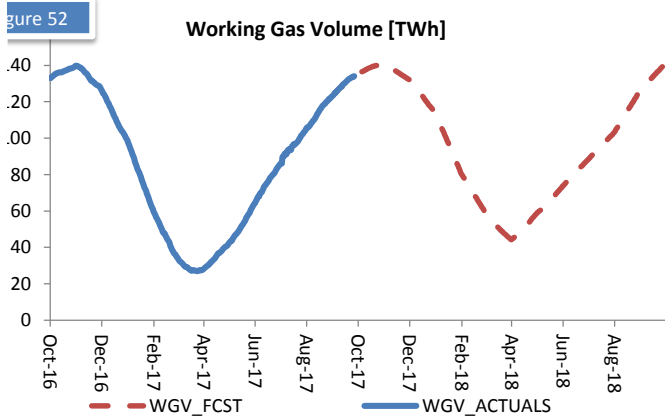


Source: REF-E Analysis on Thomson Reuters Data 27-09-17

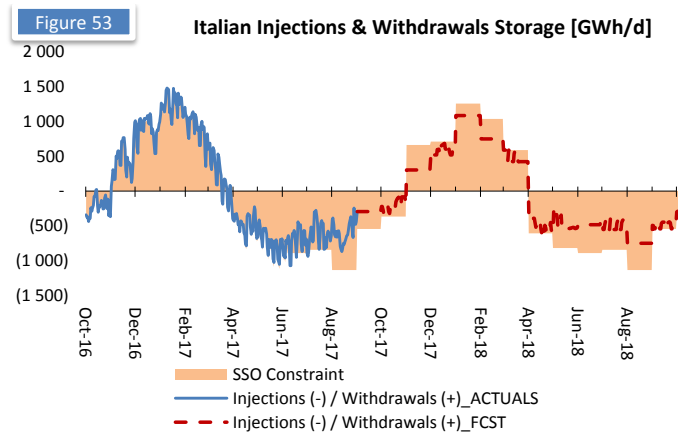


Source: REF-E Analysis on Thomson Reuters Data, L-MED PROPRIETARY INDEX 27-09-17

We forecast TTF attaining 17.2 €/MWh and AVTP reaching 17.9 €/MWh during Q4-17, below the current forward curve, since the upside registered is mainly affected by short-term outages and contingencies.



Source: REF-E I-Game in-house forecasting 27-09-17 and REF-E elaborations on SNAM data (ACTUALS). WGV does not include strategic storage



Source: REF-E I-Game in-house forecasting 27-09-17 and REF-E elaborations on SNAM data (ACTUALS)

ACRONYMS

AMQ: Annual Minimum Quantity

ACQ: Annual Contracted Quantity

AVTP: Austrian Virtual Point = **CEGH**

BoGY: Balance of the Gas Year

BoM: Balance of the Month

BoSUM: Balance of the Summer

CSP: Coal Switching Price - Estimation of the gas and coal fired power station switching channel in Italy

HH: Henry Hub (USA)

ITM: In the Money

LDZ: Local Demand Zone

LRS: Long Range Seasonal-storage

G4P: Gas For Power Demand

MA: Month Ahead

M-o-M: Month on month variation

MRS: Medium Range Storage

NBP: National Balancing Point (UK)

NCS: North Continental Shelf production

NWE: North West Europe

OTM: Out of the Money

PSV: Punto di Scambio Virtuale - Italian Virtual Point (ITA)

SND: Seasonal Normal Demand

SNT: Seasonal Normal Temperature

SWE: South West Europe

TTF: Title Transfer Facility (NL)

WDNW: Working Days Next Week

WEND: Weekend

WGV: Storage Working Gas Volume

W-o-W: Week on Week variation

Y-o-Y: Year on Year variation

GLOSSARY

CSP: Ref-E estimation of the gas and coal fired power station switching channel in Italy (SWE-CSP) and in northern Europe (NWE-CSP)

FAR EAST EU NETBACK: Minimum price to incentive a reload from Europe to Asian Markets

HH NETFORWARD: US LNG price at regasification plants (in Europe, Asia or South America)

GERMAN BORDER PROXY: Ref-E estimation for Russian gas price at German cross-borders

L-MED: The L-MED Index is an initiative by REF-E for spot Liquefied Natural Gas (“LNG”) price assessment in the Mediterranean Basin. It is a trademark owned by REF-E srl.

Please look at www.ref-e.com for further details.

GAS WATCH IS POWER BY REF-E GAS MODELS

EU-GaMe (European Gas Market Model), is the REF-E in-house structural model which provides clients with **analysis** and **forecasts** of European and regional gas market **flows** and **prices** throughout Europe. It is based on the long REF-E experience gained by modeling both Italian and European Gas and Power systems², in an integrated approach, interacting with LNG and power (**Elfo++**, **Elfo++ Europe**) simulators and **STREAM**, our market intelligence data-warehouse for Gas, Power and LNG.

EU-GaMe design benefitted from the fruitful interactions with Gas Infrastructure Europe (GIE) and the DG Energy of the European Commission, undertaken within the context of a DG Energy commissioned project managed by REF-E under the review of the European Regulation for the security of supply in the gas sector, and the expertise of our analysts gained on **trading** and **gas market strategy**.

EU-GaMe, as a fundamentals-based model, is designed to cover from short to long term time-horizon, incorporating fundamental economic relationships between natural gas prices, supply, storage, pipeline transport and demand, **including portfolio optimization strategies** of several players under the existing and future long and medium term contracts.

EU-GaMe is able to simulate 18 market areas within North and South West Europe, and adaptable till 33 market locations, including South East Europe, taking into account technical, contractual and cost constraints.

Weather, alternative fuel prices, pipeline capacity, and economic patterns are just few of the key drivers of the model that can be changed also for sensitivity analysis.



I-GaMe (Italian Gas Market Simulator) I-GaMe (Italian Gas Market Simulator) is the tool specifically designed by REF-E in order to simulate and forecast the Italian gas wholesale market, PSV. It is aimed to predict and to define the import / export flows and the PSV price, taking into account constraints and rigidity, both of contractual and infrastructural nature typical of the Italian system, playing with economic and energy variables (exchange rates, GDP, Brent, coal, electricity prices, etc.) or/and fundamental hypothesis.

I-GaMe is a unique and peculiar market tool based on:

- **Deterministic and quantitative** approach enforced by our market intelligence dataset available through our **STREAM** data-warehouse
- **Integrated** apparatus connecting all of our in-house models (**EU-GaMe**, **Elfo++**, **Elfo Short Term**)
- **Adhering**, as much as possible, **to the peculiarity of the Italian market** by replicating possible bid and/or optimization strategies of the main shippers.

I-GaMe is the fundamental tool by which REF-E provides in-depth gas market outlook on the Italian wholesale market, as well as the key behind strategic evaluations of the main market players and investors.

<https://www.ref-e.com/en/what-we-offer/I-GaMe-EU-GaMe>



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