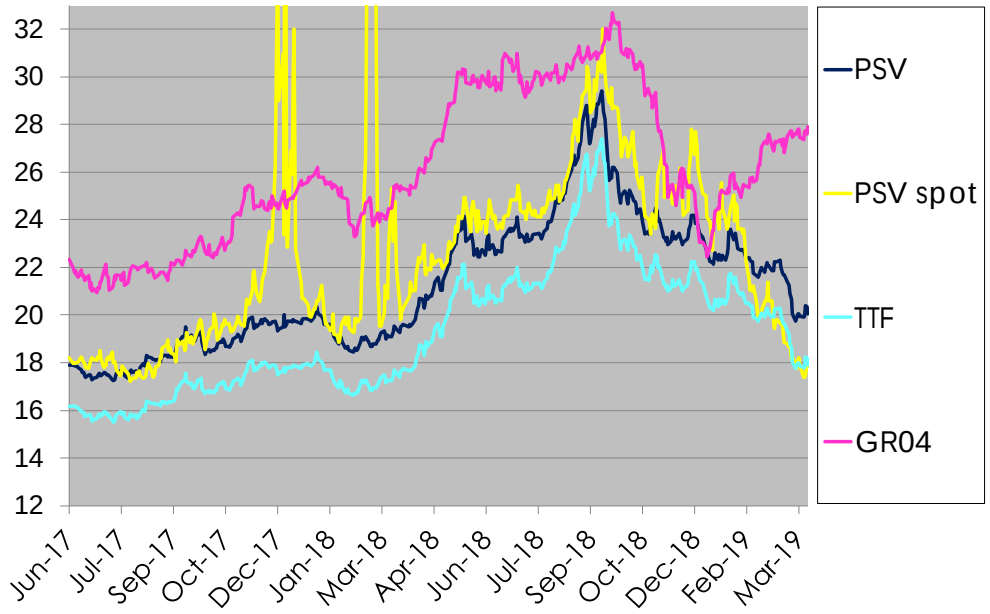
GeEO Italian Gas & Power
2019 Q1 review

Market developments

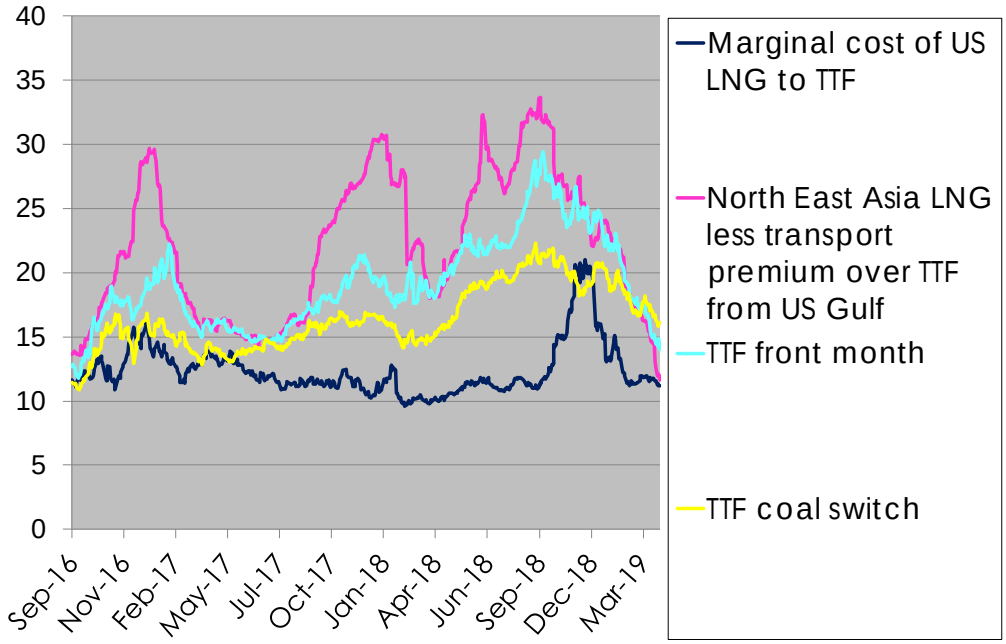
European gas

Temperatures at around seasonal normal levels in January saw a pause in the downward trend of European spot and balance of winter gas prices. However, as strong LNG imports continued, warmer weather in February saw the trend resume. LNG sendout from European terminals reached new highs at the end of March as spot Asian LNG prices fell below TTF in absolute terms, making Europe the highest value destination for Middle East as well as Atlantic basin LNG supply. The year on year gas stock surplus increased to about 25 bcm by the end of the quarter.

Gas Year ahead prices and PSV spot prices in €/MWh:



Recent reference prices in €/MWh:

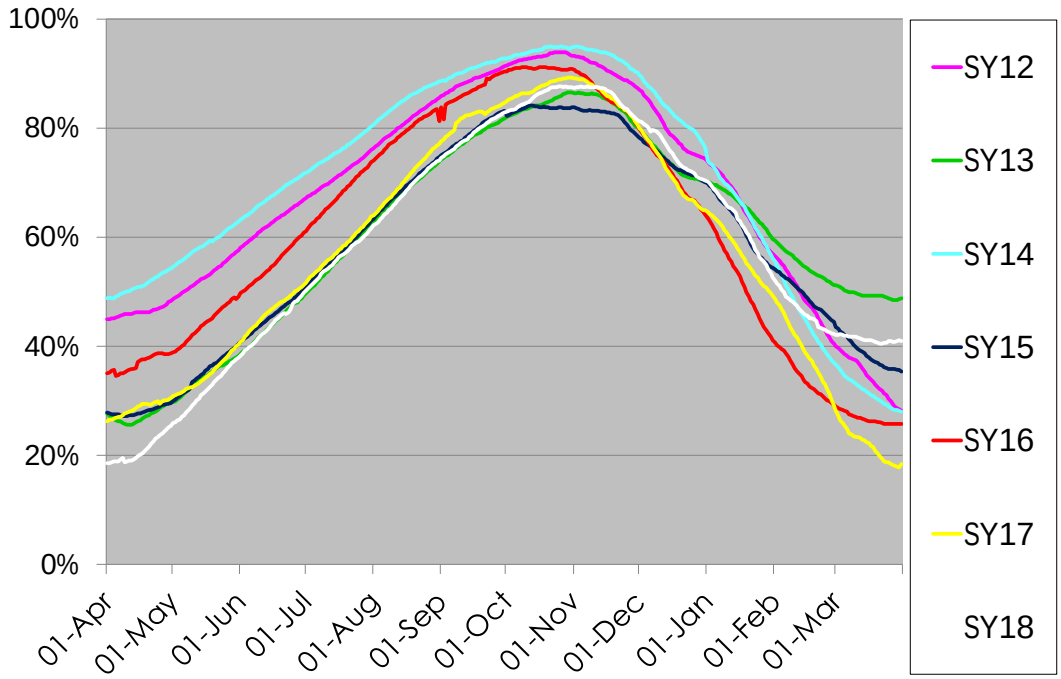


The spot price premium over Summer 19 vanished by mid-February, pushing CCGT variable costs below coal -fired generation to boost gas demand. The summer price weakness pushed winter/summer spreads to more than 4 euro by the end of March, resulting in record prices paid in storage auctions.

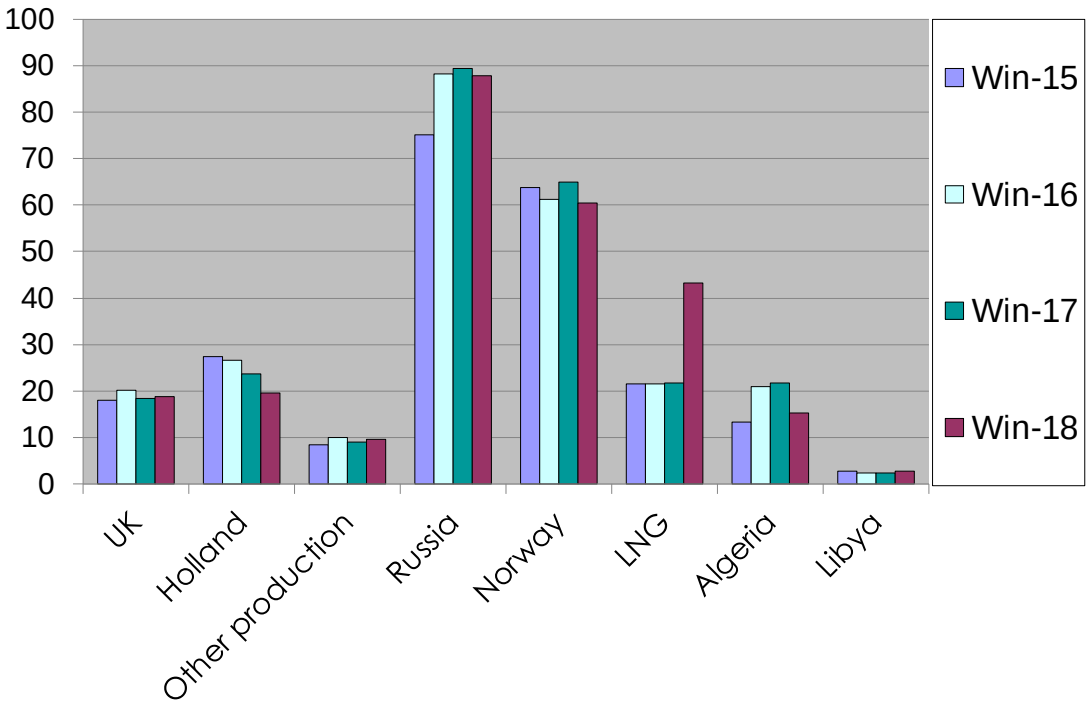
Preliminary data implies total EU production and imports for the year were up by 7 bcm as lower imports from Algeria, Norway and Russia and another Groningen-led drop in European production partly offset a 22 bcm surge in LNG supply.

Europe-wide consumption data is not yet available but 27 bcm less supply from storage implies consumption fell by 20 to 304 bcm on milder late winter weather.

European gas storage inventories according to GSE:



Winter gas supply to Europe by source (bcm):



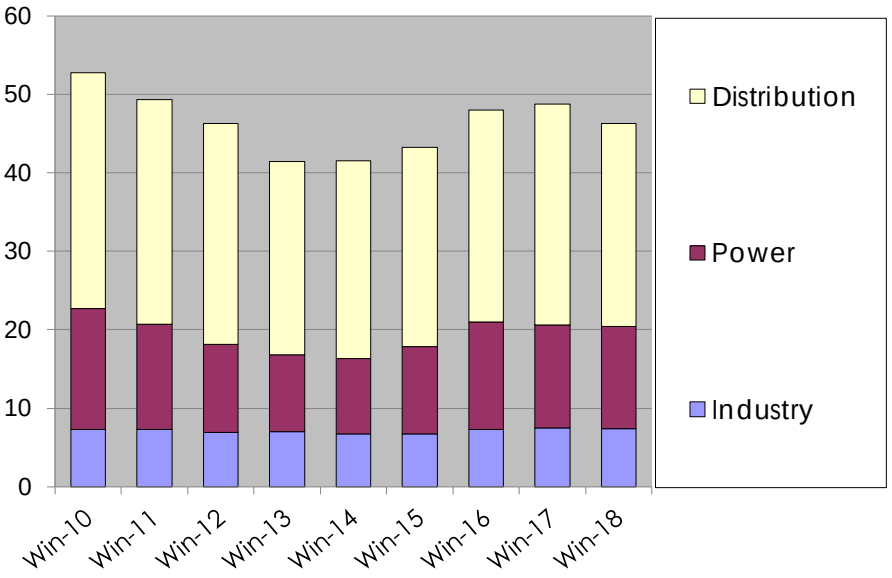
Italian gas

Italian winter gas consumption fell by 2.4 to 46.3 bcm as the warmer February and March weighed on distribution network demand. Power plant consumption was unchanged overall as higher demand due to coal and gas power generation economics in Q1 offset lower output due to stronger hydro in Q4.

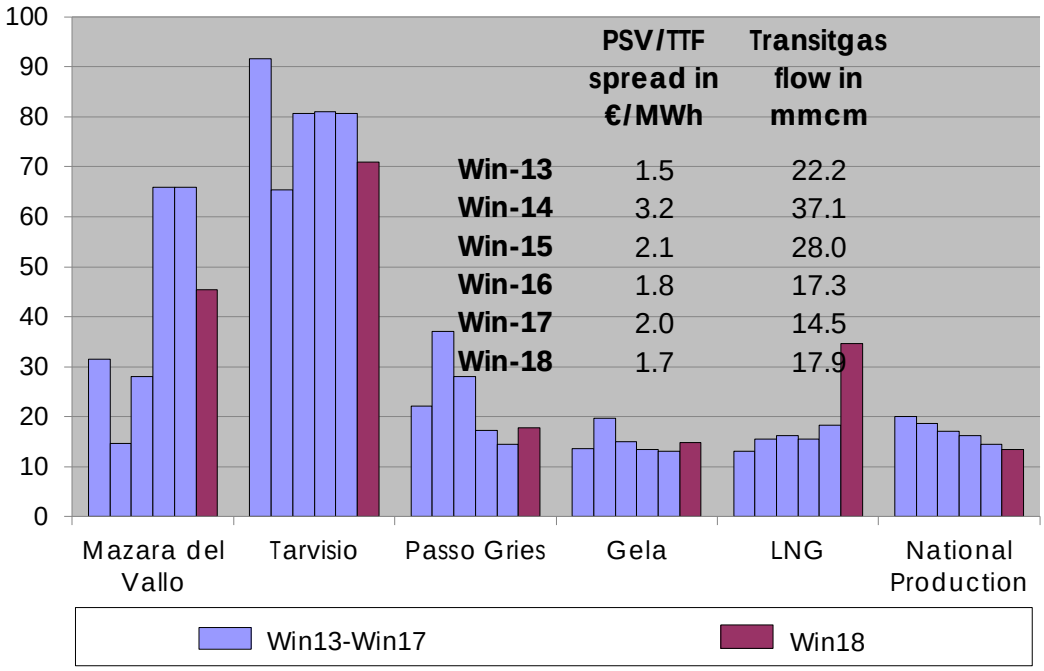
Total supply was down by around 1.8 bcm as reduced imports from Algeria – which capacity bookings suggest were partly planned in advance – and reduced imports at Tarvisio more than offset the jump in LNG supply.

The lower deficit between consumption and supply saw storage withdrawals ease by 0.5 to 9.3 bcm.

Aggregate demand in bcm:

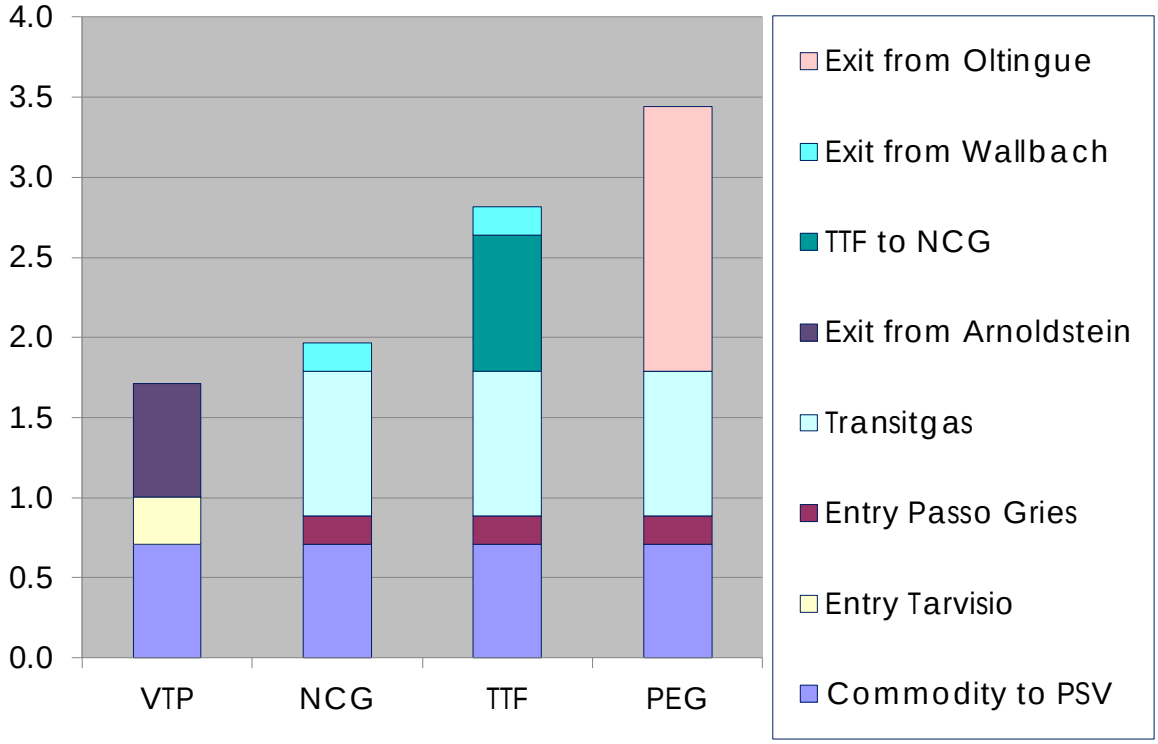


Average daily supply in mmcm/d and PSV premium over TTF in €/MWh:

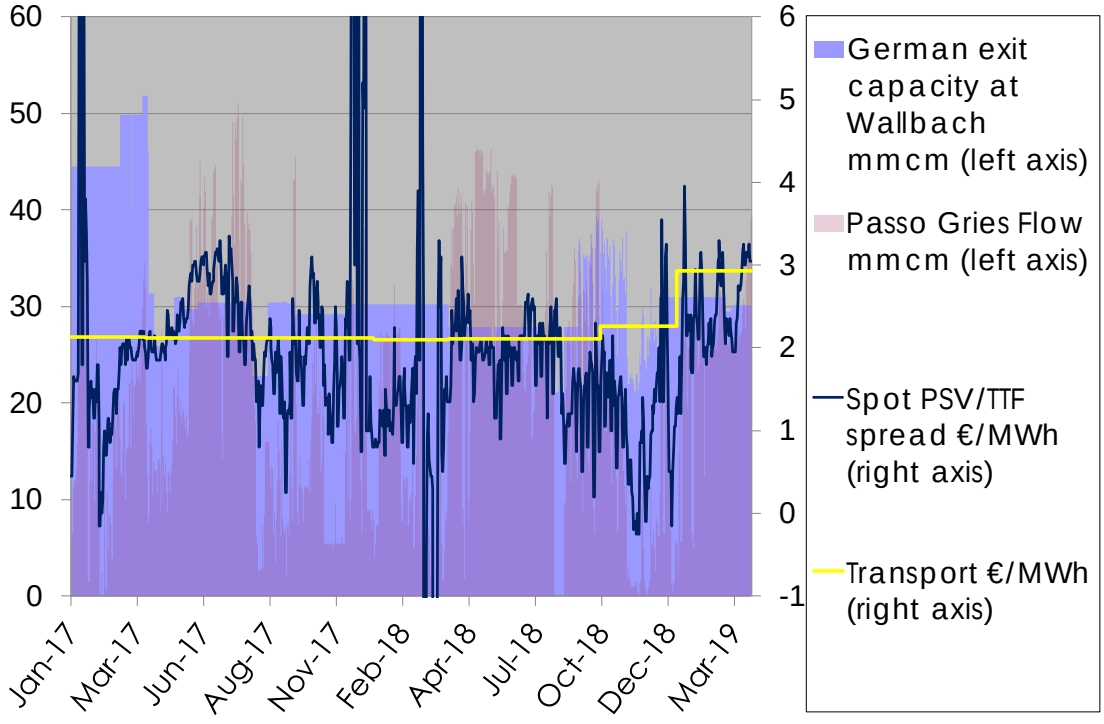


Despite a need for more imports at Passo Gries and increasing transportation costs from TTF to NCG which increased the total cost to PSV, the average spot PSV/TTF spread fell to 1.70 €/MWh. The drop was mainly due to negative spreads in November and December. Hedging of about 11 mmcm/d of Q4 capacity auctioned by Eni is thought to have created an underlying flow until negative spreads encouraged traders to unwind the hedges.

Transportation costs for day ahead capacity assuming full utilisation (€/MWh):



Since April 2017, France has been marginal supply whenever Passo Gries imports plus Swiss demand (between 4-15 mmcm/d taking account of seasonality) have been above about 30 mmcm/d:



Power

The average spot clean PSV spark spread of 7.89 €/MWh in Q1 was up 49% on Q118 outturn but 23% below the last quoted Q119 forward quotation of 10.25 €/MWh. Most of the increase came in Q1 due to higher demand and lower imports due to capacity reductions from France and Switzerland.

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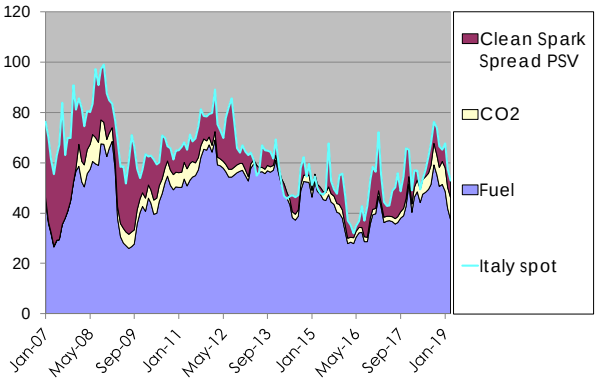
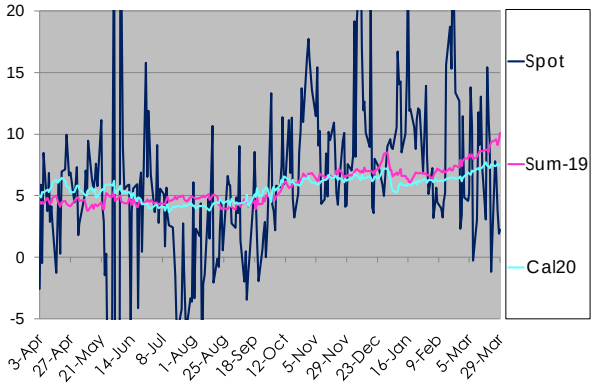
Average monthly spot clean PSV spark spreads in €/MWh:



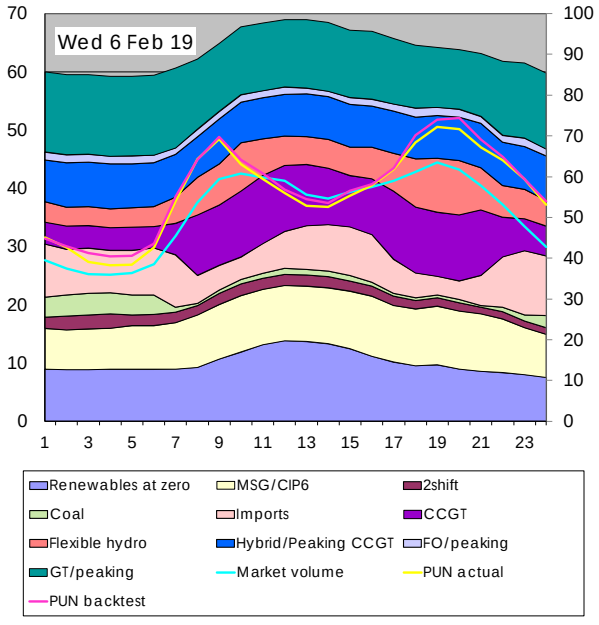
Clean spark spread *PSV in €/MWh (working days only):*



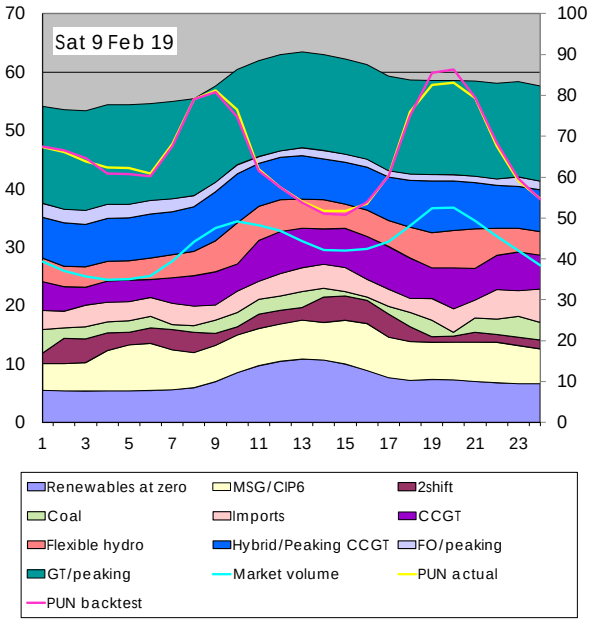
In February, the average daily PUN and the spot clean PSV spark spread both peaked on a Saturday as low wind output and a sharp reduction in thermal plant offers tightened the market. Three days earlier, demand was 5.7 GW higher but an extra 4 GW of wind and about 5 GW more thermal capacity offering minimum stable generation at near zero prices saw a clean PSV spark spread almost 12 euro lower

AlbaStack: hourly Italian imports, renewable, and thermal power plant offers by price band and demand in MW, left axis) and hourly actual and modelled PUN prices (in €/MWh, right axis):

Clean PSV spark spread 3.82 €/MWh



15.76 €/MWh



Capacity bands reflect price ranges rather than source technology – eg "2-shift" is aggregate of offers of all types of capacity from 10-25 €/MWh, import from 25 € to CCGT variable cost-3 €/MWh. CCGT band is at around the variable cost of CCGT. Flexible hydro runs from CCGT + 7 to CCGT + 22 €/MWh, Hybrid/peaking CCGT from CCGT + 22 to CCGT + 58 €/MWh

Warmer weather and stronger renewables in February and March were offset by continued import capacity reduction and generation economics which increased the call on CCGT production as coal plants reduced output in favour of less expensive gas.

Strong spot spreads, below average Alpine snow cover and expectation of coal-gas plant switching over the summer saw the

Summer 19 clean PSV spark spread climb from its opening level of 7.10 €/MWh to a contract high of 10.10 €/MWh at the end of the quarter.

The Cal 20 clean PSV spark spread dipped sharply at the start of the quarter but recovered to close to its starting point by the end of March.

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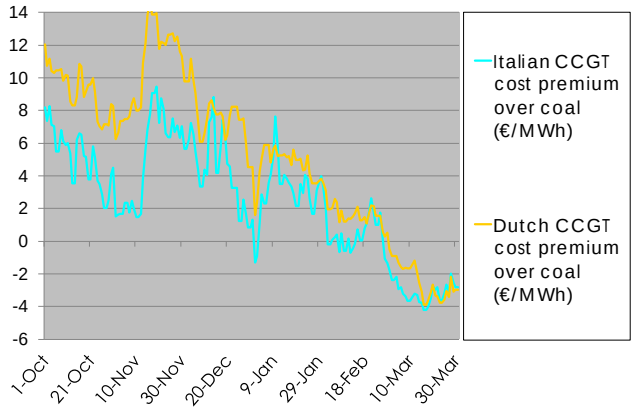
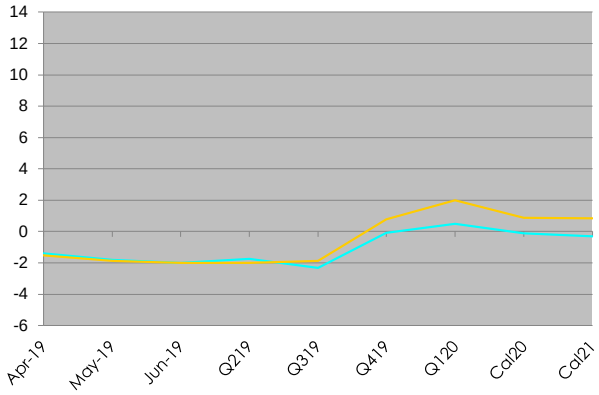
Generation cost differentials in €/MWh:

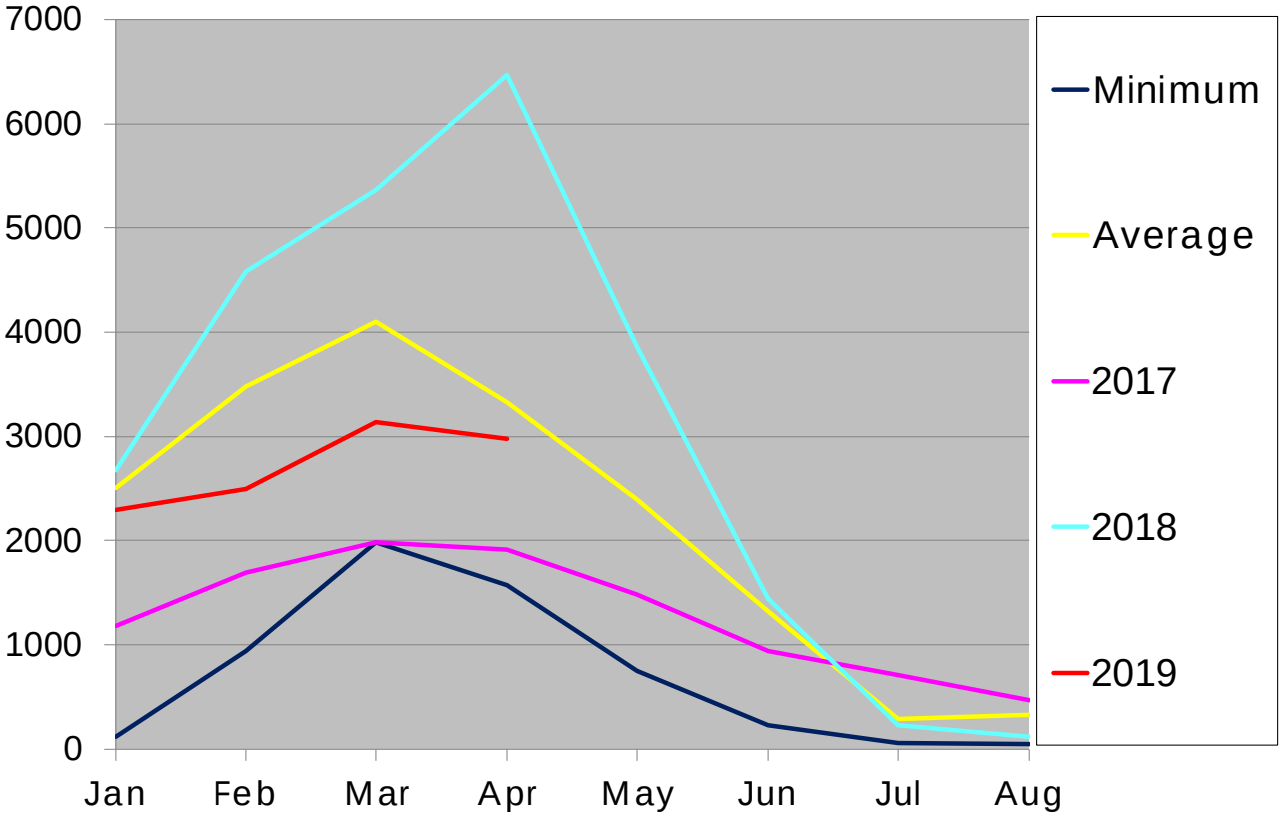
W18 spot values



Curve values on 29 March 2019



Aggregate SWE reported at start of month in Piemonte, Lombardia and Veneto (in mmcm):



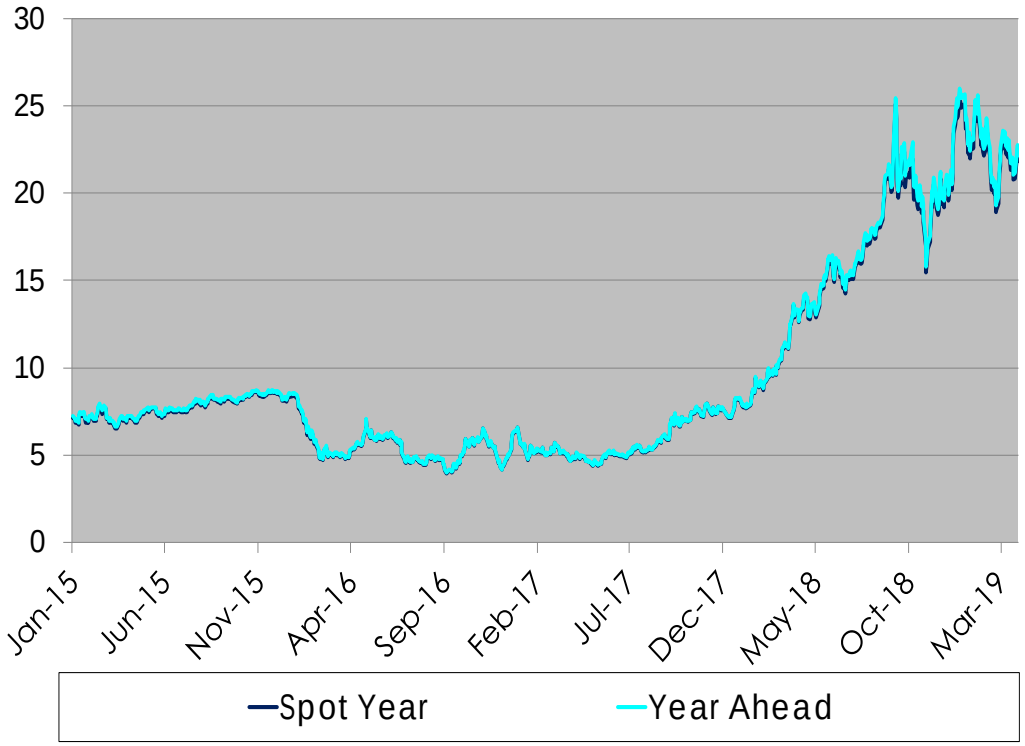
CO_2 allowances

EUA CO_2 hit new multi-year highs as auctions were suspended over the Christmas break, starting the first quarter above 25 €/T. The volatility seen in Q4 continued with prices falling to a low of 18.930 €/T by mid-February bouncing back above 23 and then closing the quarter at 21.835 €/T. The large swings in prices may be due to algorithm trading which is said to have increased dramatically since the 2018 price surge.

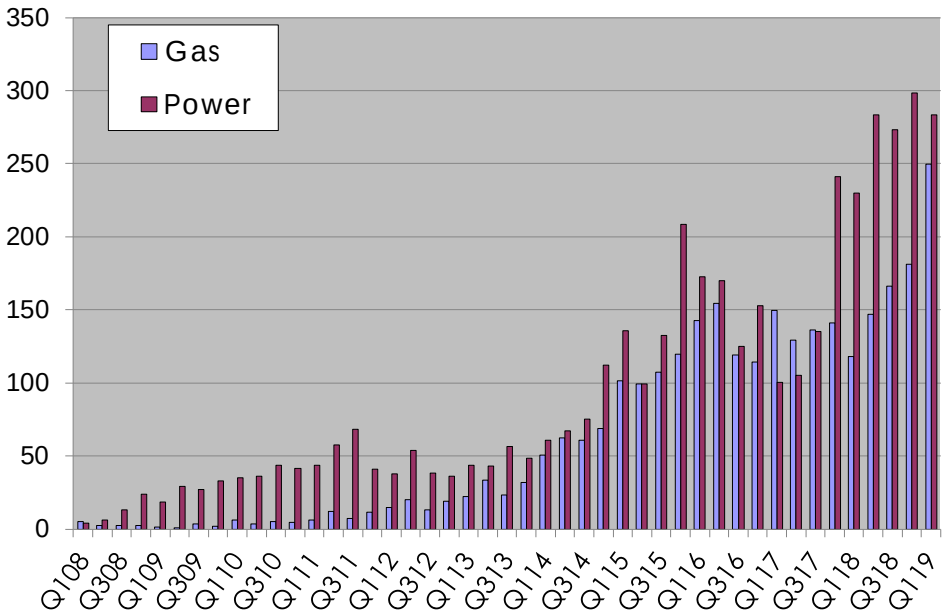
Liquidity

Q1 saw PSV gas trading volumes more than double year on year to a record 250 TWh. Power volumes eased from a new quarterly high in Q4 but gained 23% year on year to 284 TWh.

CO_2 allowance prices in €/T:



Reported trading volume in TWh:



Political and regulatory developments

Global and European issues

The extension of EU gas market rules to offshore pipelines to third countries was provisionally agreed by negotiators from the European Parliament, the Council and the European Commission. The proposal will apply the principles of EU energy legislation on third-party access, tariff regulation, ownership unbundling and transparency to all gas pipelines to and from third countries.

The text of the Directive was prepared and approved by the European Parliament but still needs approval from the Council. The Directive will have to be transposed into national law within 9 months.

Although there are probably easy ways for Nord Stream 2 to comply with gas directive rules without unduly affecting Gazprom's ability to deliver Russian gas to Europe, the potential threat of the gas directive rules may give the EU some negotiating power to secure a post 2019 transit agreement for Ukraine in trilateral talks.

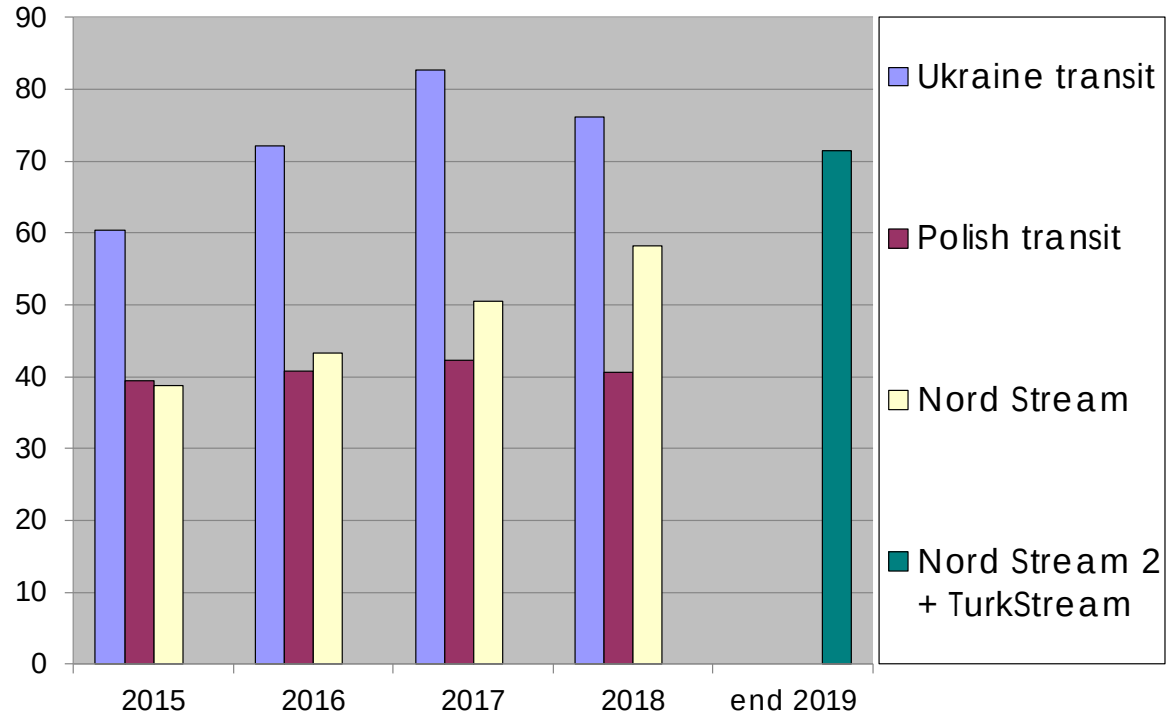
January saw the second high level EU-Russia-Ukraine trilateral meeting at which European Commission Vice President for Energy Union Maroš Šefčovič tabled a proposal for a future Russia/Ukraine transit agreement at the end of this week's trilateral talks covering the three main parameters

- Duration
- Volumes
- Tariffs

Šefčovič said it was a "fair" proposal but declined to provide details. Expert level trilateral meetings are to review the proposal prior to the next ministerial level talks in May.

Gazprom pressed on with Nord Stream 2 pipelaying using 3 vessels, despite ongoing regulatory uncertainties. The project still requires environmental authorisation in Denmark and is the subject of a Polish antitrust investigation.

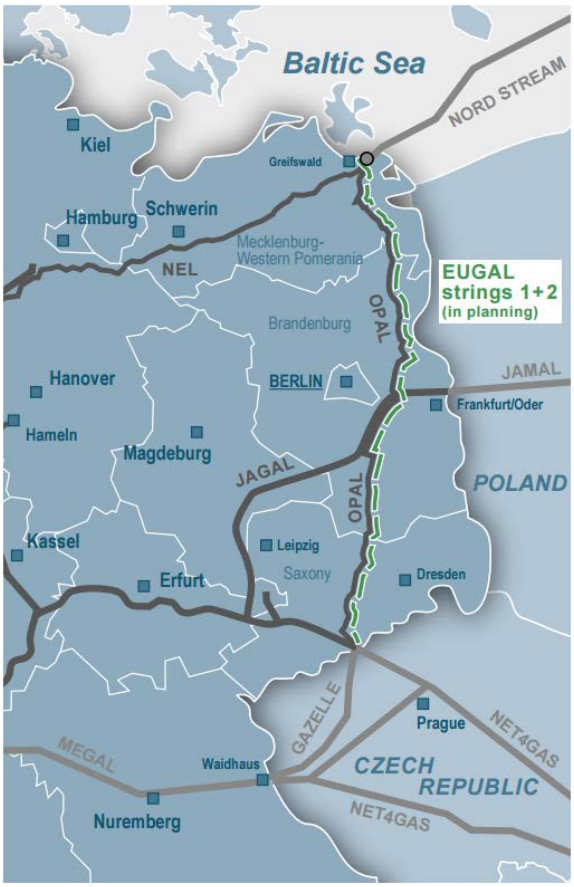
European imports of Russian gas by source v combined capacity of Nord Stream 2 and the 16.5 bcm TurkStream line intended for European deliveries (bcm)



Although they would not provide as much capacity as the current 400 mmcm/d of supply capacity via Ukraine, combined Nord Stream 2 and TurkStream annual capacity of 71 bcm pa could provide almost as much gas as transited Ukraine in 2016 if onward transit is available from Greifswald and the Turkish border respectively. (See Infrastructure Development section.

Start-up of Nord Stream 2 - which will increase North-South flows, resulting in entry/exit capacity models producing higher northern entry and higher southern exit charges – may have been one of the drivers of a German proposal to increase Wallbach exit charges flagged by ARERA in March. The regulator estimates an additional cost of almost 0.4 €/MWh.

In Holland, the Dutch Council of State ruled that Gas extraction from the Groningen field did not have to be further reduced prior to a hearing in the second half of April, during which it will deal with demands that production be stopped immediately.



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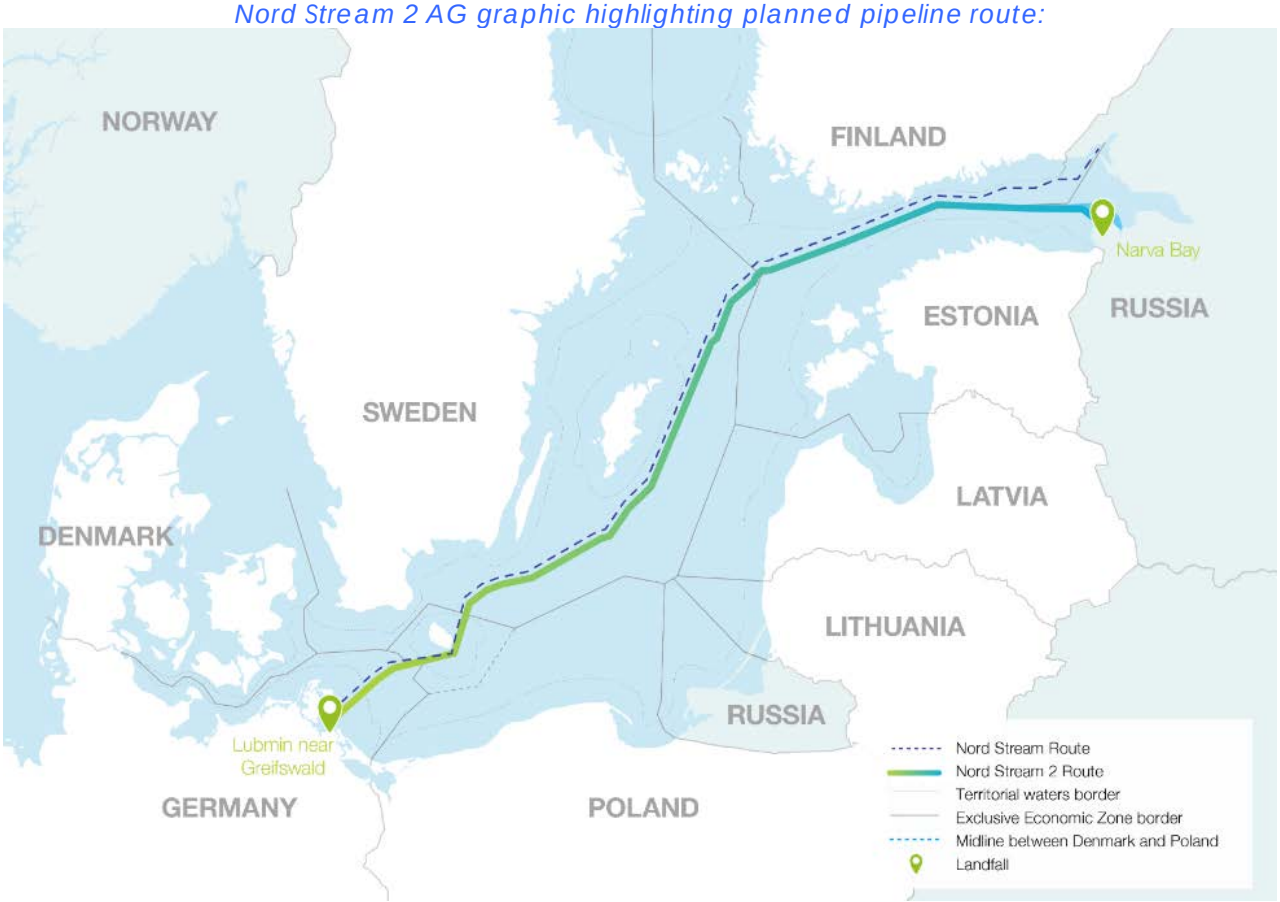
Nord Stream 2 AG graphic highlighting planned pipeline route:

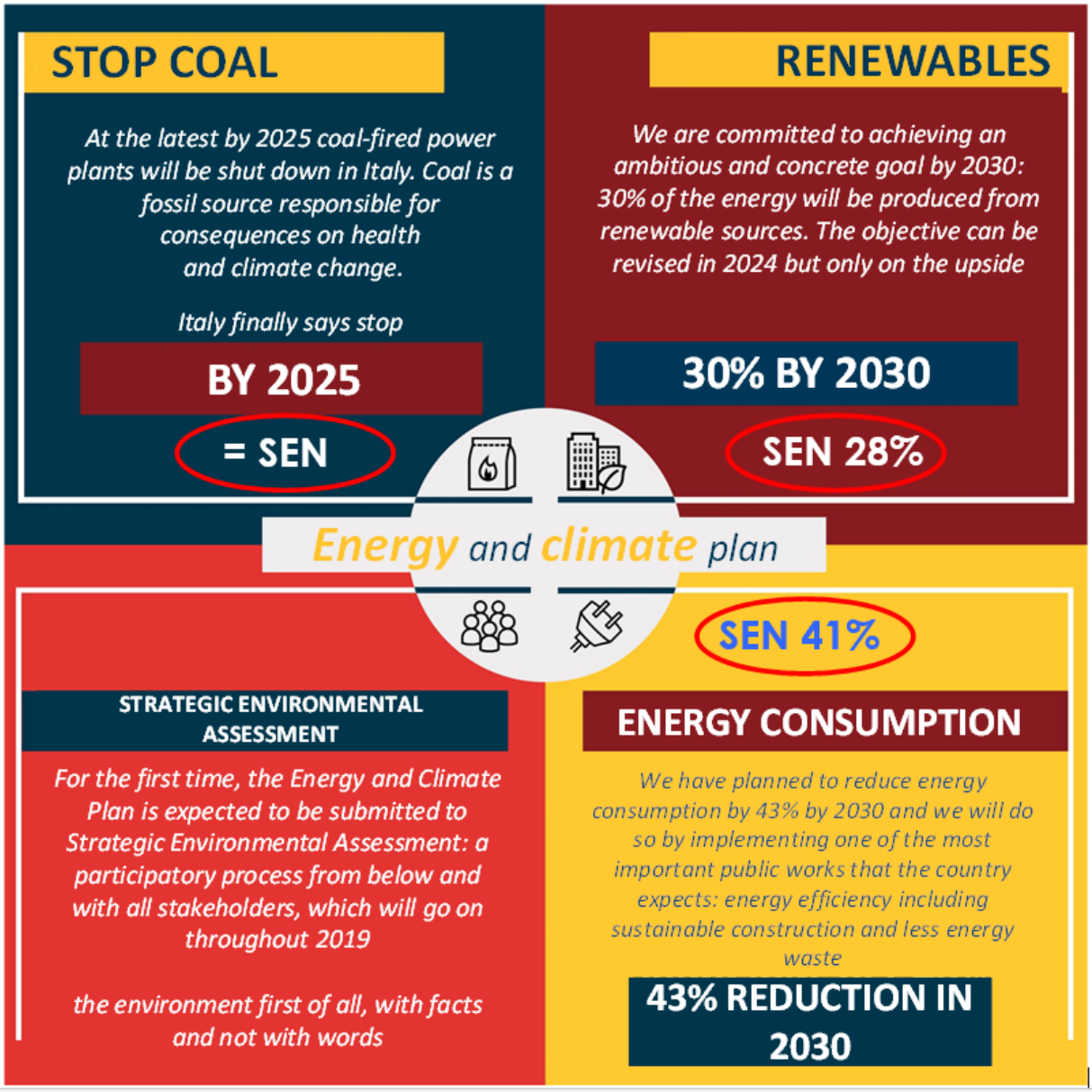


Italy

The Ministry of Economic Development sent the Proposal for an integrated National Plan for Energy and Climate (PNIEC) to the European Commission. The plan shows modest increases in the targets for renewables and energy efficiency compared to the 2017 National Energy Strategy whilst sticking with the 2025 coal phase out deadline. The renewable production target is unchanged from the SEN in TWh but meets a higher share of total energy consumption which is targeted to be 4 Mtoe lower.

A revised draft of the renewable decree designed to promote new capacity development to meet the PNIEC target was sent to the European Commission for state aid approval too late to get approval in time for the first tenders which were scheduled to open on 31 January and close 30 days later.

The renewable decree envisages a series of tenders for new capacity with PV and wind in direct competition selected according to the highest discount offered to a 70 €/MWh base price. It also proposes measures to develop a PPA trading platform on which Public Authorities would be encouraged to source energy.



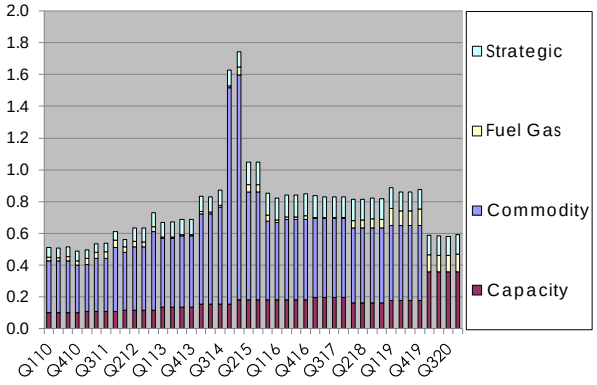
The government also introduced a moratorium on hydrocarbon exploration activity and the processing of exploration permit requests in an amendment to the "Simplification law". Drilling is to be suspended until the approval of the Plan for the Sustainable Energy Transition of the Eligible Areas ("PTESAI) subject to a limit of 18 months. The PTESAI will identify suitable and non-suitable areas for hydrocarbon exploration in Italy.

As gas producers called for compensation over the drilling moratorium, Enel protested at the Environment Ministry's demands on coal phase out (see timeline).

On the regulatory front, ARERA published 2020 gas transportation tariffs to "harmonise" with the European Network Code on Tariffs ("TAR NC") on the last day of the quarter. The tariffs show increases in capacity costs at Northern entry points and LNG terminals. However, the Snam commodity charge and the LNG smearing charge will be moved to PSV offtake to more than offset the capacity increase.

Assuming that losses and strategic storage continue to be charged on entry, the net effect at the Passo Gries entry point will be a 29 cent per MWh reduction which will partially offset the effect of the proposed increase in German exit charges of 0.39 €/MWh on the total NCG to PSV transportation cost.

Passo Gries entry cost in €/MWh based on 100% utilisation of capacity:



Coal phaseout timeline

Nov-17	2017 National Energy Strategy approved - planning coal phase out by end of 2025
Jun-18	M5S - Lega coalition forms government
Nov-18	Environment Ministry asks operators of coal power plants to present plans for permanent cessation of the use of coal by 2025 in AIA review by 31 January 2019
Jan-19	In its response, Enel says - AIA legislation does not give the power to ban use of a specific fuel - the National Energy Strategy does not constitute a legal basis for ordering closures - phase out will require new generation, storage and interconnectors - generation plants can only be retired with clearance from the MSE
Feb-19	Minambiente response to Enel: "...the integrated environmental authorisation (AIA) cannot impose the choice of raw materials to be used... However, the competent authority can deny the AIA where the use of such raw materials ... is not compatible with the need to guarantee a high level of environmental protection" MSE and Minambiente agree to initiate a political and technical co-ordination to monitor the progress of the various authorisation processes and the state of progress of new infrastructure to enable phase out by 2025

Time line for renewable incentive tenders

Year		2019			2020			2021
Tender		**Jan-19**	**May-19**	**Sep-19**	**Jan-20**	**May-20**	**Sep-20**	**Jan-21**
PV/wind	**MW**	500	500	700	700	800	800	800
	€/MWh	70	70	70	66.5	66.5	66.5	66.5
Hydro/geothermal/ biomass	**MW**	20	20	20	20	20	20	20
	€/MWh	80	80	80	78.4	78.4	78.4	78.4
Refurbishments	**MW**	70	70	70	70	70	70	70

Company news

Uniper concluded an agreement to sell its 48.2% stake in **OLT Offshore LNG Toscana** to **First State Investments** for 400 €M. OLT's other shareholders are **Iren Group**, which has a 49.1% stake, and **Golar LNG**, which has a 2.7% stake.

Eni started construction of a 31 MW photovoltaic plant at the Porto Torres industrial site in Sassari in Sardinia. The plant is part of Progetto Italia, a series of Eni initiatives involving the development of 220 MW of mostly PV capacity at disused industrial areas.

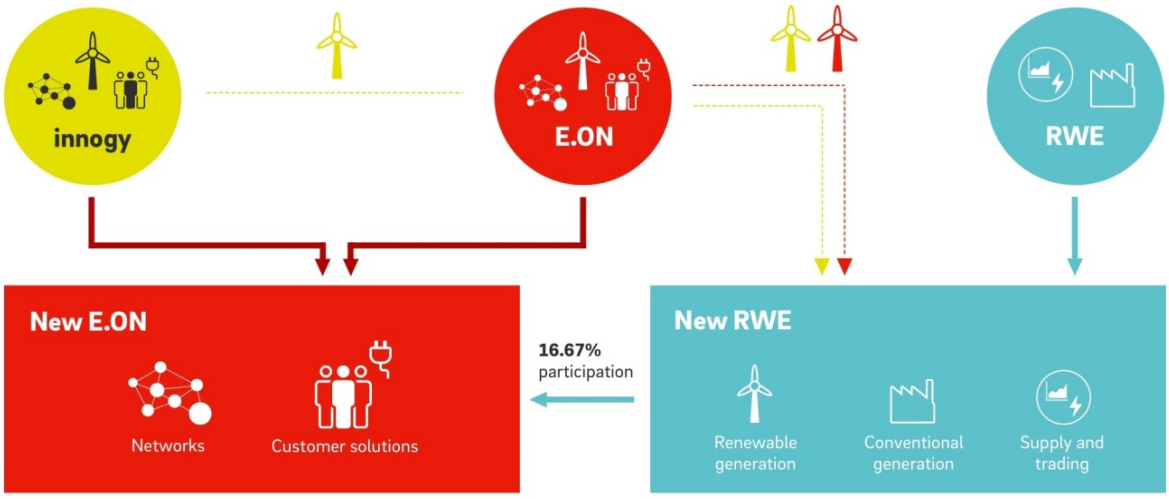
Shell announced the first commercially carbon free gas deal in Italy with the sale of natural gas and voluntary carbon offsets to **CLN Group**, a metalworking and component manufacturer. The carbon offsets will be acquired from forest conservation projects in Indonesia and Peru.

A2A CEO Valerio Camerano confirmed that a process for the sale of **Sorgenia** was expected to be launched and that A2A would participate. In November 2018, the Board of Directors of **Nuova Sorgenia Holding**, which owns 99.97% of Sorgenia and is controlled by the banks that took part of the restructuring of Sorgenia debt in 2014, mandated **Lazard Colombo & Associati** as financial adviser to study measures to enhance the value of the company, including through possible partnerships.

The European Commission opened an in-depth investigation to assess the proposed acquisition of **Innogy** by **E.ON** under the EU Merger Regulation. E.ON, **RWE** and Innogy announced an asset swap deal in March 2018 under which E.ON would take Innogy's networks and customer solutions businesses and RWE would take Innogy and E.ON's renewable generation capacity. The Commission approved RWE's acquisition of E.ON generation assets on 26 February but will investigate the retail merger due to the parties' strong combined market position in several retail markets.

Eni Project Italia sites:

Structure of E.ON – RWE asset swap:



Simplified illustration – Nuclear assets and some minor assets and participations are disregarded

Infrastructure

Thermal power capacity

The resurgence of activity in development at thermal power plants in connection with new flexibility service tenders, the proposed capacity market and coal-fired generation phase out continued from 2018.

The region of Lazio published its assent for final authorisation of **Enel's** proposal to add another 50 MW of battery storage at its 2 GW **Torrevaldaliga Nord coal plant** in addition to the 10 MW system currently in development at the site's unit 4.

Edison and **Ansaldo Energia** signed a contract for a new, latest-generation combined cycle gas turbine to replace the existing plant at **Marghera Levante** using the most advanced Italian technology to make it the most efficient in Europe. The 780 MW CCGT unit will be composed of a 530 MW GT36 gas turbine, a steam recovery generator, and a 250 MW steam turbine with an overall efficiency of 57% (gross calorific value basis).

GE reported on continuing work with **A2A** and **Sorgenia** to modernise their power plants with GE's services, hardware and software solutions. GE worked to improve reliability, flexibility and efficiency at A2A's **Chivasso, Cassano and Sermide CCGTs**, A2A's **Monfalcone coal plant** and Sorgenia's **Termoli CCGT**.

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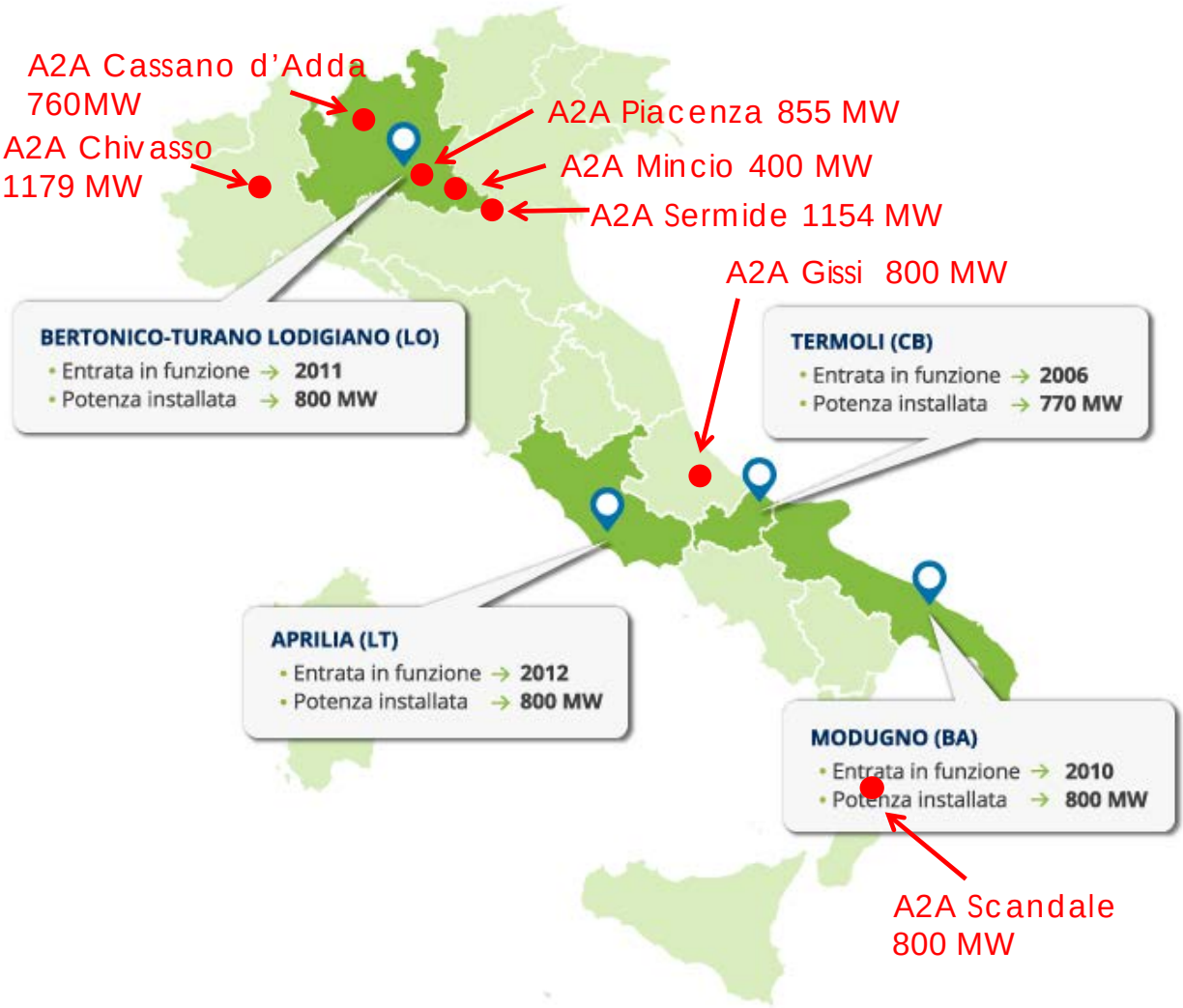

Interconnectors

Expected start dates for the new **Montenegro** and **France** interconnectors – which are both scheduled for some time this year 2019 had still not been published by the end of the quarter.

In January, however ARERA approved target transmission capacities which will be the basis of an output-based incentive mechanism for Terna.

Terna's original proposal did not link the proposed capacity increases to specific projects but the 900 MW Sardinia-mainland and Sicily-mainland projects may relate to its strategic plan and ten year development plan proposal to develop a **Mainland-Sicily-Sardinia line** which it says is necessary to provide network security in Sardinia on closure of the island's 1230 MW of coal capacity at **Fiume Santo (EPH)** and **Sulcis (Enel).**

However, ARERA said that specifics of the mainland Sardinia and mainland Sicily connections are not agreed and approved incentive for 900 MW of increased capacity in both directions between the central nord and central sud zones and Sardinia.

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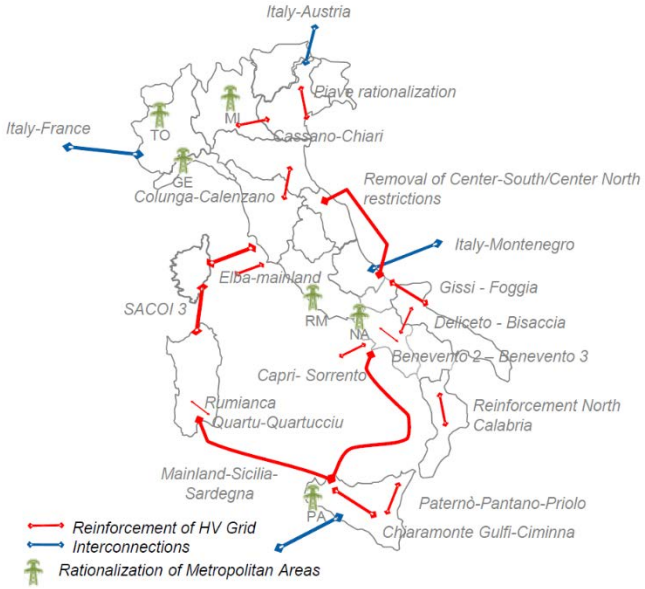
Terna 2018-2022 industrial plan main projects:



Target additional capacities approved by ARERA (MW):

Border	Terna proposal Target additional capacity	Delibera Arera		
		Target additional capacity	Starting capacity (MW)	Target capacity (MW)
Northern border	4500	4100	7705	11805
East border	500	300	1230	1530
N. Africa border	1200	0	0	0
Nord-C.Nord		500	4000	4500
C.Nord-Nord	500	500	1300	1800
C.Nord-C.Sud		0	1300	1300
C.Sud-C.Nord	1100	1100	2700	3800
Sud-C.Sud	900	900	4600	5500
C.Nord-Sardinia		500	0	500
Sardinia-C.Nord		500	0	500
Sardinia-C.Sud		400	900	1300
C.Sud-Sardegna	900	400	720	1120
Mainland-Sicily	900	0	1100	1100

Terna's proposal was not specific about direction of capacity between zones: Northern border refers to the borders of France, Switzerland, Austria and Slovenia; East border refers to the borders of Serbia, Croatia, Montenegro, Albania and Greece; North Africa border refers to the Tunisia border; ARERA moved Slovenia from Northern to East border

Renewables

The latest **GSE** Contatore data published during the quarter suggested 2018 wind installations of around 300 MW and data from **Terna**'s GAUDI database published by **ANIE Rinnovabili** suggested PV installations of about 400 MW.

A presentation on the new Energy and Climate plan suggests the need for about 1.2 GW pa of new wind capacity and about 4 GW pa of new PV capacity from 2020 to 2030. Even with expected backloading of PV installations, more than 3.2 GW of wind and PV is projected to 2025.

The draft renewable decree (see last week's regulatory review) proposes only about 2 GW pa of new incentives but lower costs have created expectations of significant additional development for autoconsumption and for utility scale development based on commercial PPAs without incentives.

In January, **Axpo** signed a long-term framework agreement for the purchase of electricity from Danish developer **European Energy**. The agreement covers European Energy's future industrial solar PV farms in Italy with a combined capacity up to 300MW. The duration of the agreement is more than 12 years.

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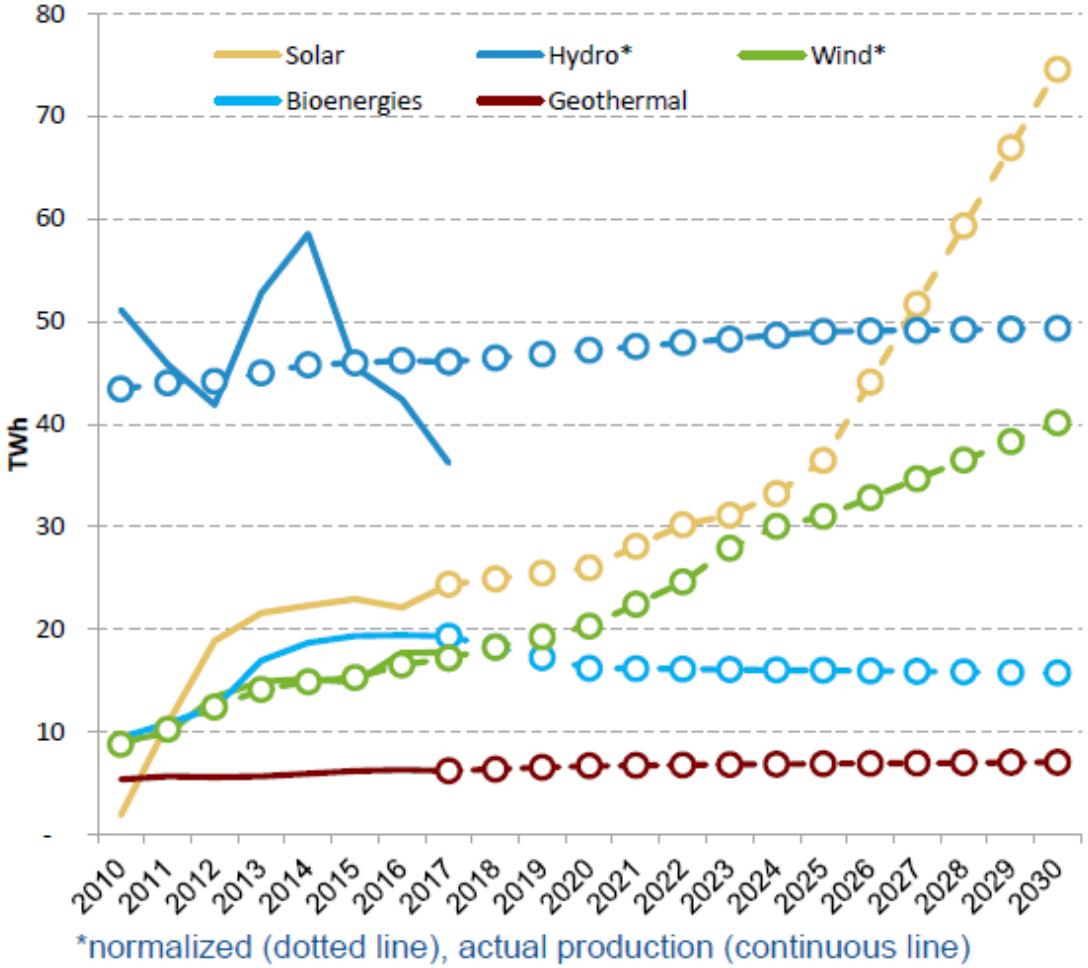
Italian PPAs

Date announced	Buyer	Seller	Duration (years)	Expected start	Capacity	
					MW	Type
Mar-18	EGO	Octopus	5	Q318	40	PV
Dec-18	Shell Energy Europe	Octopus	5	Early 2019	71	PV
Dec-18	Centrica	Glennmont	NA	NA	315	Wind
Dec-18	Trailstone	Canadian Solar	10	Q219	18	PV
Jan-19	Axpo Italia	European Energy	>12	NA	300	PV
Total					743	

Renewable production graphic from PNIEC presentation



Gas

Annual storage auctions showed 190 mmcm more space on offer as **Stogit** offered more capacity, and **Ital Gas Storage** offered 100 mmcm from the new **Cornegliano** storage field which is expected to ramp up to a full capacity of 1.3 bcm over the next few years.

TAP continued pipelaying in Greece and Albania and works in Italy at the Pipeline Receiving Terminal ("PRT"), the micro-tunnel site and the offshore exit point of the micro-tunnel. It also announced completion of a 3.9 €b financing arrangement with 17 commercial banks, the EBRD and the European Investment Bank (EIB).

Snam awarded further contracts for the construction of the **TAP connection pipeline** to link the TAP PRT to the Snam network at Brindisi.

OGE and **Fluxys TENP** decided to build new **TENP I pipeline sections** between Mittelbrunn-Schwanheim and Hügelheim-Tannenkirch connecting to TENP II to provide the required capacity for security of supply for the Baden-Württemberg area. The investment will also secure exit capacity of 30 mmcm/d to Switzerland at Wallbach from 1 October 2020. Exit capacity to the **Transitgas** pipeline at Wallbach has been reduced from its previous level of 52 mmcm/d since April 2017 due to maintenance and the discovery that a coating to protect welded joints from corrosion had partially disbonded from the pipe causing the 1st string to be closed.

As newspapers reported that signature of an Intergovernmental agreement on the **East Med pipeline** may be blocked by Italy, energy ministers of Egypt, Cyprus, Greece, Israel, Italy, Jordan and Palestine agreed to establish the East Mediterranean Gas Forum (EMGF) based in Cairo. Its main objectives include ensuring "the efficient use of existing and new infrastructure" suggesting Cyprus's proposed evacuation route to Egypt could be higher priority than East Med.

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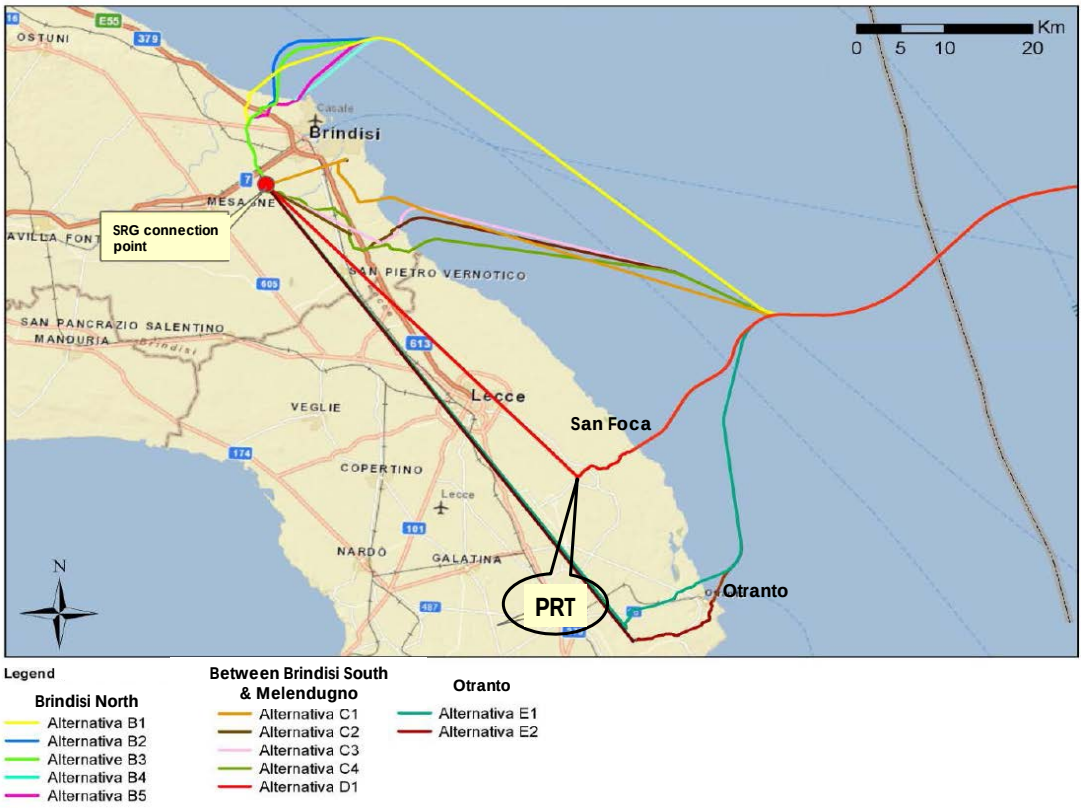
TAP landfall at San Foca in the Comune of Melendugno,
TAP pipeline to the Pipeline Receiving Terminal and Snam pipeline to Mesagne (in red),
and other potential landfall routes considered:



Onward **transit projects** for the **TurkStream** and **Nord Stream 2** projects made rapid progress during the quarter.

In January, Bulgartransgaz accepted binding offers from 3 bidders for 17 bcm of entry capacity at the Turkish/Bulgaria border point of Malkoclar and 11 bcm of exit capacity at the Bulgaria/Serbia border. It then issued a tender for construction in March.

Serbia's Gastrans held an open season for 14 bcm of entry at the Bulgarian border and 9 bcm of exit to Hungary. Both Bulgarian and Serbian projects envisage start-up at 4 bcm pa from 1 January 2020 with ramp up to full rates and exit into Hungary by 1 October 2021.

It was also announced that the first string of the **Eugal pipeline** to transit Nord Stream 2 gas from Greifswald, was expected by end of 2019, and the second string "about a year later". Construction of EUGAL began after the successful conclusion of all the planning approval processes in the third quarter of 2018.

This map has been reproduced from the ENTSOG system development map of Europe annotated by Alba Soluzioni to highlight proposed projects. The original of this map can be seen in full on the ENTSOG website: http://www.entsog.eu/maps/system-development-map