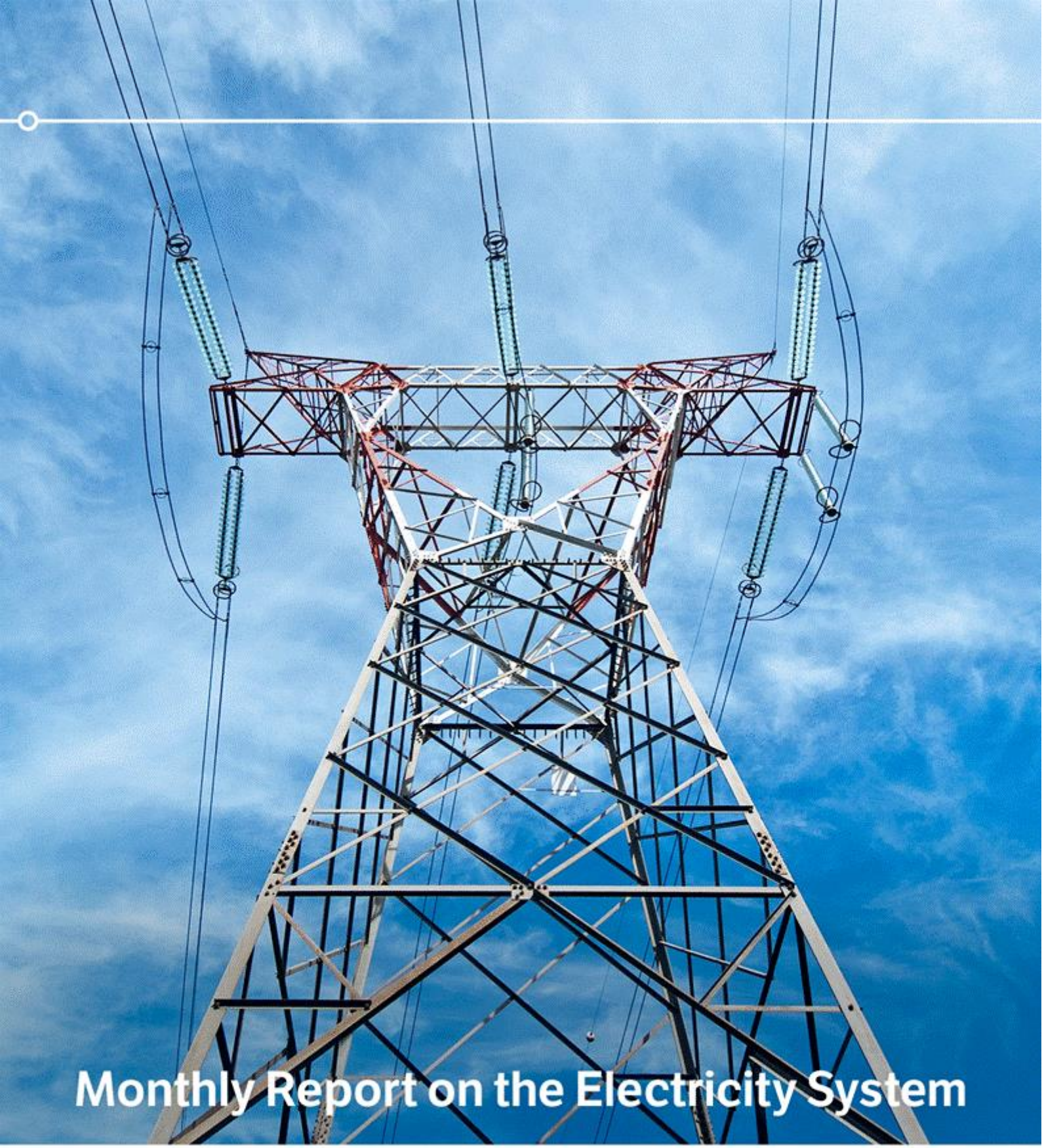


Monthly Report on the Electricity System

Terna

TERNA GROUP

Monthly Report on the Electricity System

Monthly Report on the Electricity System

01 Focus of the Month page 5

This Focus of the Month provides an overview of the "Seasonal Outlook" (SO). These reports are published by Entso-E twice a year, analysing the season ahead (1 December for the winter and 1 June for the summer), in line with article 8 of (EU) Regulation 714/2009 and article 106 of Regulation (UE) 2017/1485 ("System Operation Guidelines").

02 Energy Balance Sheets page 12

In June 2018, electricity demand in Italy (27.0 Bn kWh) recorded a decrease of 3.3% compared to the volumes of June 2017. This was achieved with the same number of working days but with an average monthly temperature of 1.2°C lower than June 2017. In the first six months of 2018, demand varied by +0.8% compared to the same period in 2017; in seasonally adjusted terms the change is +0.6%. Finally, in June 2018, electricity demand in Italy was covered 87.6% by national production, less pumping consumption, (-5.8% of net production compared to June 2017) and for the remainder by imports (foreign exchange +18.1% compared to June 2017).

03 Electricity System page 18

In June 2018, net national production was 23.810GWh, 51% from renewable sources (12.258GWh) and the remaining 49% from thermal sources. Focusing on monthly production from Renewables, an increase was recorded in wind production (+54.2%), and in hydroelectric production (+29.4%) and a decrease was recorded in photovoltaic production (-2.2%) compared to the previous year.

04 Electricity Market page 21

The June total for withdrawal programmes on the DAM was approximately €1.4 Bn, up 10% compared to the previous month and up 14% compared to June 2017.
In June, the spread between average bid-up and bid-down prices was €117.8/MWh, down compared to the previous month by 15% and up by 40% compared to June 2017.
The total volumes fell compared to the previous month (-13%), in particular upward volumes decreased by 15% and downward volumes decreased by 10%. The upward volumes increased by 12%, while the downwards volumes rose by 46% compared to the same month of the previous year.

05 Regulation page 29

This month, we present a selection of AEEGSI resolutions relevant for dispatching and transmission activities.

Monthly Report on the Electricity System

ENTSO-E "Seasonal Outlook" Report

EXECUTIVE SUMMARY

On 1 June, the European Network of Transmission System Operators for Electricity (ENTSO-E), published the "Summer Outlook Report" on the expected adequacy of the European electricity system for Summer 2018 (SOR).

The SOR summarises the evidence emerging from adequacy analysis conducted at a Pan-European level and aims to identify potential risks of being unable to cover electricity demand or excess renewable production (downward regulation) during the coming summer period.

The deterministic assessments carried out demonstrate low expected risk for Europe's security of supply. Furthermore, the capacity of the Italian electricity system to meet demand has increased compared to the previous summer, although imports remain fundamental to demand coverage in the case of above-average temperatures.

Specifically, simulations have highlighted that in the face of intense heat and low production from renewable sources, with the exception of the Southern zone, Italy's reserve margins are sufficient. However, it is also highlighted that this is reliant on imports of electricity from bordering countries for several weeks between June and the end of September (July being most critical), with the exception of the period around the 15 August national holiday.

Therefore, this study also demonstrates how electricity interconnections are becoming an increasingly important component not only in guaranteeing better integration between markets under normal conditions, but also ensuring mutual support between countries during energy crises; during periods and scenarios in which shortages are limited to only a few countries, these are able to cover their own energy demand by importing from adjacent areas with surplus generation.

This article describes what the SOR is, its results and the future steps to be taken to guarantee increasingly reliable adequacy analysis.

WHAT IS THE SEASONAL OUTLOOK?

Seasonal Outlooks (SO) are reports published by Entso-E twice a year, analysing the season ahead (1 December for the winter and 1 June for the summer), in line with article 8 of (EU) Regulation 714/2009 and article 106 of Regulation (UE) 2017/1485 ("System Operation Guidelines").

Seasonal adequacy analyses complete the long-term evaluation phase of the mid-term adequacy forecast that provides a complete and impartial overview of investment required in new elements for the grid, generation/demand, storage, market evolution, etc.

SOs analyse expected adequacy conditions for the season ahead, investigating the main risk factors, such as uncertain weather conditions (i.e. temperatures), solar and wind-power producibility, the availability of hydroelectric resources, and unavailability of plants/grid elements (thermoelectric generation facilities, interconnections, HVDC, etc.).

The report provides Stakeholders (European Commission, ACER, national authorities and policy makers, market players, producers, etc.) with a global view of expected adequacy conditions across Europe, and specific analysis of interconnection-system capacity in the face of possible local shortages utilising mutual support between countries.

The document also contains an overview of all adequacy conditions recoded for the previous season (in this case the Winter Review 2017-18). The review is based on the qualitative information provided by the TSOs, detailing the most significant events of the previous six months. This allows for the quality of the forecasts in the previous report to be verified on the basis of actual events, and for any improvements to be identified.

PURPOSE OF THE SEASONAL OUTLOOK REPORT

The purpose of the document is twofold:

- to compile information from each TSO and share it within the community, with the aim of allowing neighbouring Grid Operators to define and prepare countermeasures required to mitigate any critical issues identified.
- to inform stakeholders of potential risks to system adequacy with the aim of raising awareness and encouraging the interested parties to adopt positive actions aimed at containing risk, such as reviewing generation-plant maintenance programmes, reducing consumption during the most critical periods, and maximising availability of capacity on energy and services markets.

The adequacy analysis carried out within Entso-E, with the contribution of all 43 TSOs involved, can be classified based on the time frame of reference. The following table indicates, for each time frame, the reports produced by Entso-E and the main parameters of uncertainty and relative goals.

Tab 1: Forecasting studies regarding ENTSO-E

ENTSO-E Report	Time Horizon	Uncertancies	Target
Ten Year Network Development Plan	Long Term (up to 15-20 years)	Energy mix & technology, switching vs electricity, climate change	Assessment of network development projects in different scenarios
Mid Term Adequacy Forecast	Mid Term (3-5 years up to 10 years)	Regulatory framework & capacity evolution	Stakeholders support in the policy adoption
Seasonal Outlooks	6 months ahead	Climatic conditions & outages	Grid mantenance planning and stakeholder communication
Short Medium Term Adequacy	Week ahead	Forecasting errors and outages	Assessment of network's security of supply and evaluation of counter measures to scarcity events

Source: ENTSO-E

Specifically, shortening the time frame of analysis makes it possible to:

- improve forecasting accuracy compared to medium-term analysis (+3/5 years, e.g. MAF), thanks to greater availability and precision of data regarding unavailability, weather conditions, renewables producibility, etc. for the period in question;
- have access to a wider range of countermeasures to employ on the basis of seasonal analysis, in order to manage any critical issues in real-time.

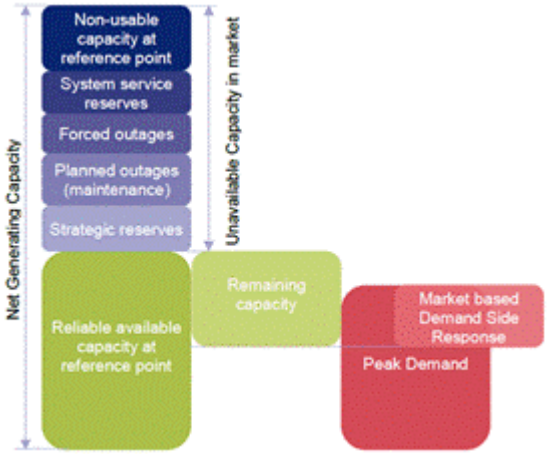
METHODOLOGY

The term “adequacy” indicates the capacity of the system to meet the expected electricity demand, in compliance with the requisites of service security and quality. The electricity system is held to be adequate if it is equipped with resources for production, storage, controls on demand and transport capacity able to satisfy the expected demand profile, with the required reserve margins at all times.

In the SOR, forecasts are made using a common methodology that is based on data collected from various TSOs, as well as from the Pan-European Climate Database (PECD). Analysis is first carried out for individual countries, assessing the capacity of internal resources to meet adequacy requirements (“upward margins”) without the contribution of interconnections, and then at a European level, considering the possibility of mitigating/resolving any local critical issues by using interconnections.

This analysis is carried out using a deterministic approach where, for each moment analysed(1), two distinctive scenarios are evaluated: “Normal conditions” where the weather and generation facilities availability are in line with seasonal averages; “Severe conditions” with unfavourable weather (intense heat) and reduced generation facilities availability (low production from non-programmable RES and high unavailability of conventional plants).

Fig 1: Net Generation Capacity and Remaining Capacity



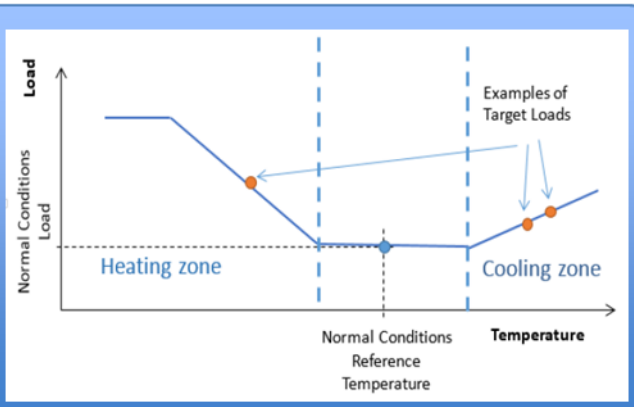
Source: ENTSO-E Summer Outlook 2018

When the deterministic analysis shows that there is a shortage risk or in any case in areas under the most pressure, the probability of this critical event occurring is quantified using probabilistic simulations that reproduce the weather conditions recorded across Europe in the last 34 years in terms of temperature (and thus, demand – see fig. 2) and expected renewable producibility.

Fig 2: Dependence of Electricity Demand on Ambient Temperature

Electricity demand is usually dependant on temperature:

- Below the *Tcold* threshold, demand increases as the temperature decreases (“Heating Zone”) caused by central heating systems.
- Above the *Thot* threshold, demand increases as the temperature increases (“Cooling Zone”) caused by air conditioning systems.
- Within the range between these two thresholds (“Comfort Zone”), demand does not change with temperature.



Source: ENTSO-E Summer Outlook 2018

(1) For each week of the analysed period (28 May 2018 – 30 September 2018) the capacity of the generation facilities to meet electricity demand is assessed, with adequate reserve margins, at 19:00 on Wednesday.

Seasonal Outlook reports also contain evaluations to identify any problems of “downward margins”.

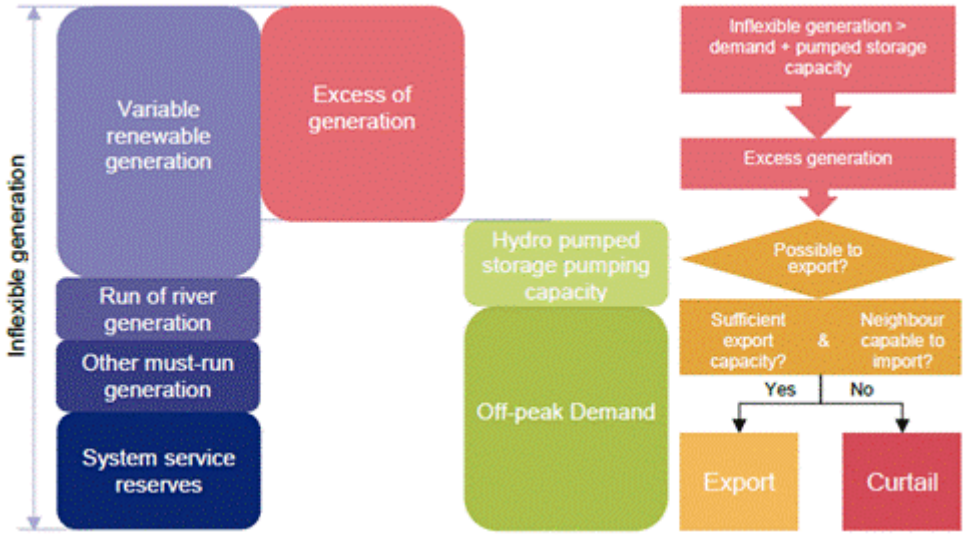
In particular, these assessments aim to identify potential “over generation” conditions where the “inflexible” generation quantity exceeds energy demand for the area considered.

“Inflexible” refers to the amount of inputs from:

- Plants that cannot be controlled directly by the TSO;
- Non-programmable renewable sources (mainly from wind and solar);
- Plants which must be operational for the electricity system to function within set security limits (essential plants).

Whenever there are market areas in which “inflexible” generation exceeds internal demand, the possibility of exporting this surplus to neighbouring areas is verified. If this is not possible (due to insufficient transport capacity or because neighbouring areas are experiencing similar conditions), renewable production must be curtailed (see figure 3).

Fig 3: Methodology for analysis of downward regulation



Source: ENTSO-E Summer Outlook 2018

The time periods analysed included:

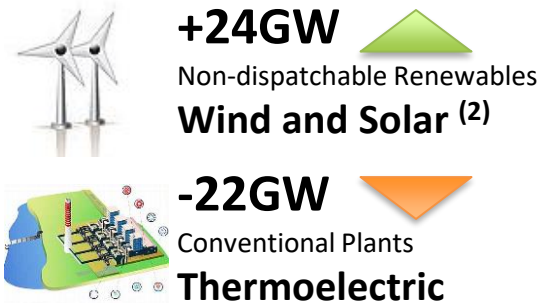
- 5:00 on Sundays when a minimum weekly demand value is recorded that, combined with increased wind production could cause “downward margin” problems;
- 11:00 on Sundays when lower demand (although higher than night-time values), combined with increased wind production and input from photovoltaic production typical in the middle of the day, could lead to “downward margin” problems.

DEVELOPMENT OF THE GENERATION FACILITIES

On the basis of the data gathered in the 43 countries that contributed to the report, total generation capacity is overall in line with last summer.

However, a substantial change in the energy mix can be seen, with a decrease in conventional facilities (-22GW) in favour of increased installed capacity of non-programmable plants (+24GW) compared to the data in SOR2017 (Figure 4). However, it must be noted that, with the same installed capacity, despite 8.5GW more gas plants in the last two years, the contribution of non-programmable plants (characterised by highly uncertain availability) to adequacy is significantly lower than that provided by conventional plants. In Italy specifically, between 2012 and 2017, 16GW were shut down and total capacity dropped from 77GW to 61GW, without taking into account a further 3.1GW of conventional generation unavailable due to legal obstacles or temporary shut-down. Nevertheless, for the first time since 2011, there has not been a reduction in capacity on the previous year, thanks to restarting of 1.2GW of thermoelectric plants.

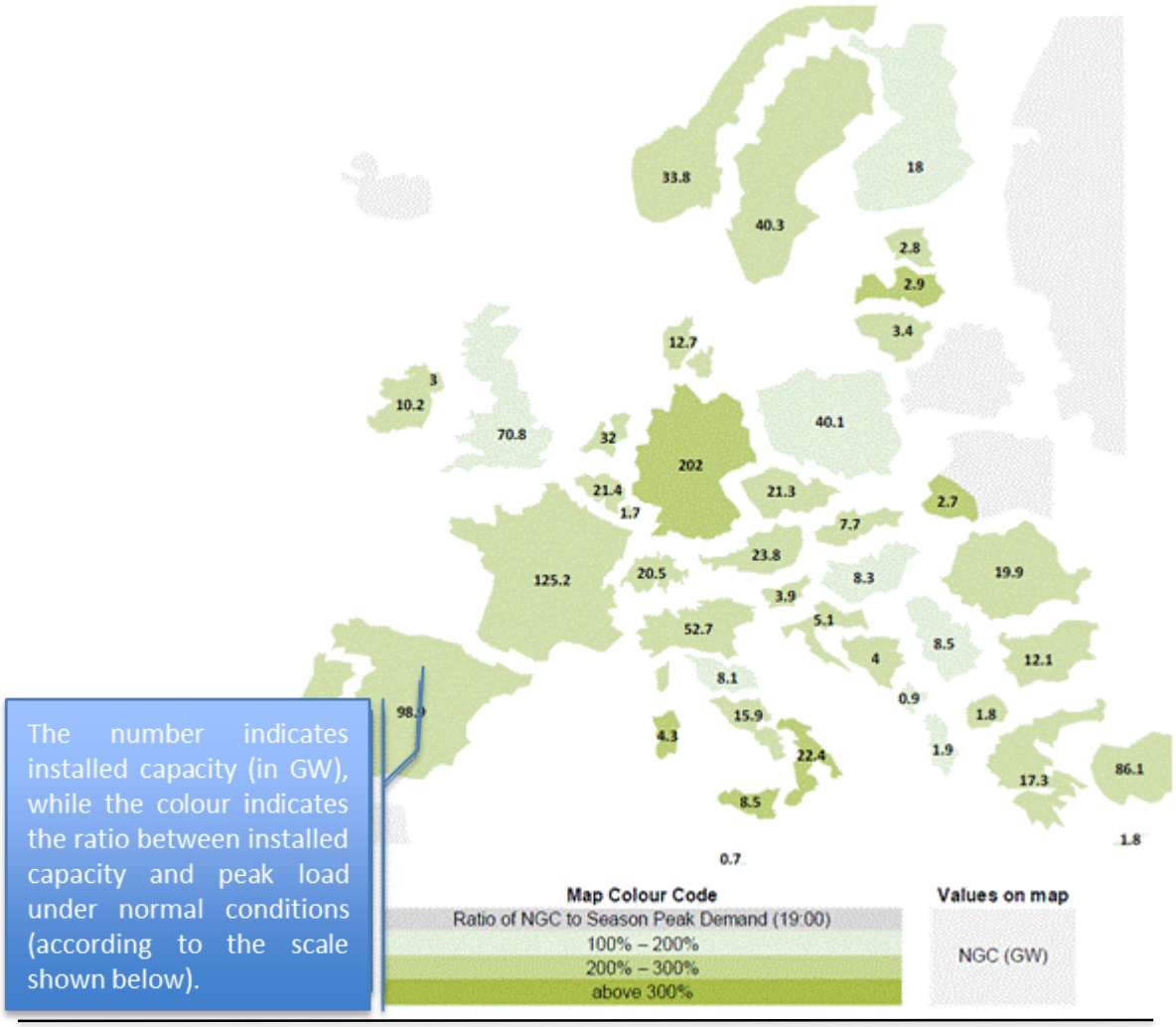
Fig 4: Development of production capacity – SOR18 vs SOR17



Source: ENTSO-E Summer Outlook 2018

The 2018 edition of the Outlook places particular focus on Italy, given "some important warning signals in terms of adequacy at the national level were already registered in the past: in summer 2015 and in winter 2016/2017". The Entso-E scenario in fact proposes a new, more accurate subdivision of the Italian electricity system in six bidding zones: Northern (IT01), Central-Northern (IT02), Central-Southern (IT03), Southern (IT04), Sicily (IT05) and Sardinia (IT06). Analysis of the installed capacity at expected peak demand (see figure 5) for the summer (under normal conditions) highlights how in Europe, as well as in Italy, there are areas with a potential capacity excess (e.g. Southern zone in Italy) and structural deficit areas (e.g. Centre-North zone in Italy).

Fig 5: Installed Capacity (GW) per Country



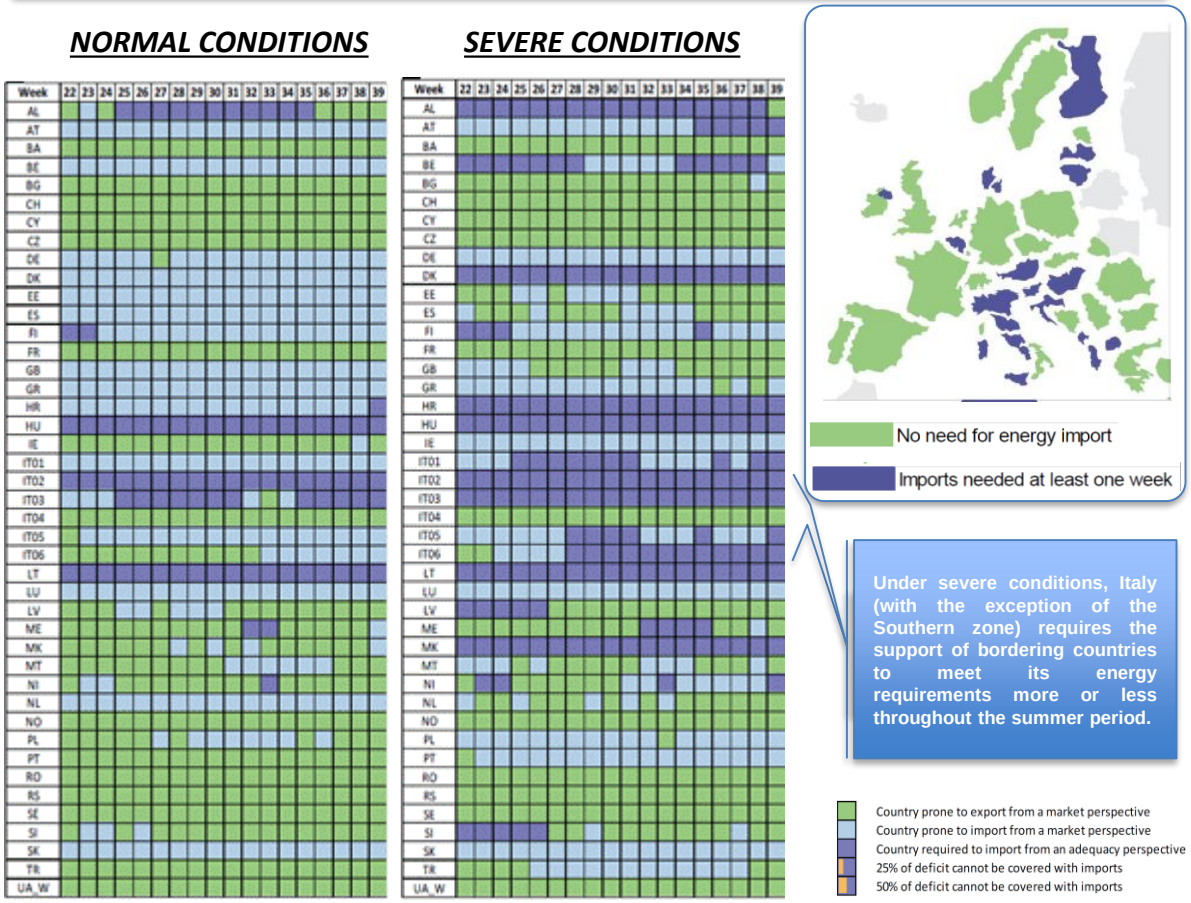
Source: ENTSO-E Summer Outlook 2018

(2) A small part of the increase (3GW) is also attributable to hydroelectric or other renewable sources

RESULTS

The deterministic analysis regarding adequacy margins has highlighted that (see Figure 6) both under normal conditions and severe conditions, the European system is able to meet electricity demand in each zone also thanks to mutual support between areas. Focusing on Italy, simulations show that in the case of intense heat and low generation from renewables, margins are sufficient only with imports from bordering countries. For this reason, Entso-E and Terna felt it was appropriate to carry out further more detailed analysis using probabilistic methodology (Monte Carlo).

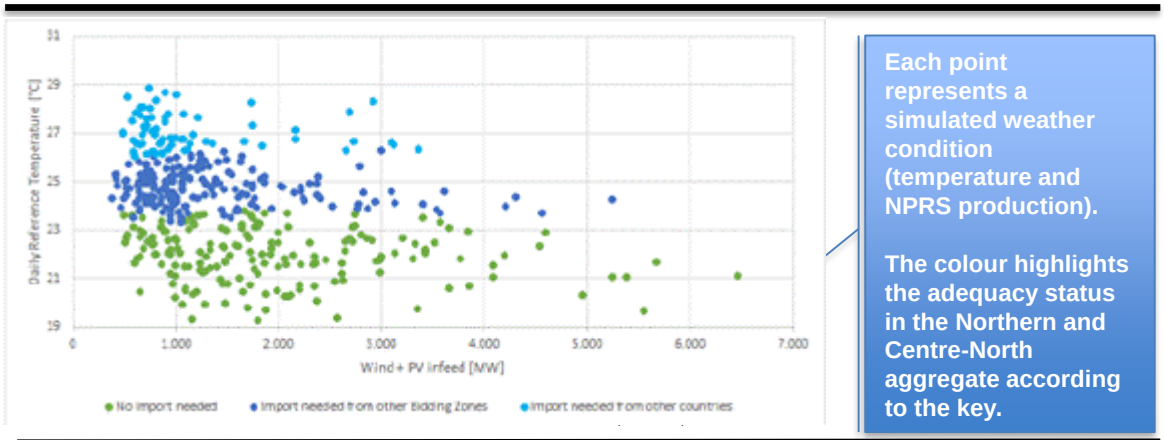
Fig 6: Analysis Results on Adequacy Margins Under Normal and Severe Conditions



Source: ENTSO-E Summer Outlook 2018

The probabilistic simulations conducted on week 30 (potentially the most critical week, from 23 to 29 July) identified a critical average daily temperature threshold of 26°C for the North and Centre-North together: above this temperature, foreign imports become essential to guarantee a positive adequacy margin (Figure 7).

Fig 7: Probabilistic Simulations Results - Northern and Centre-North Aggregate

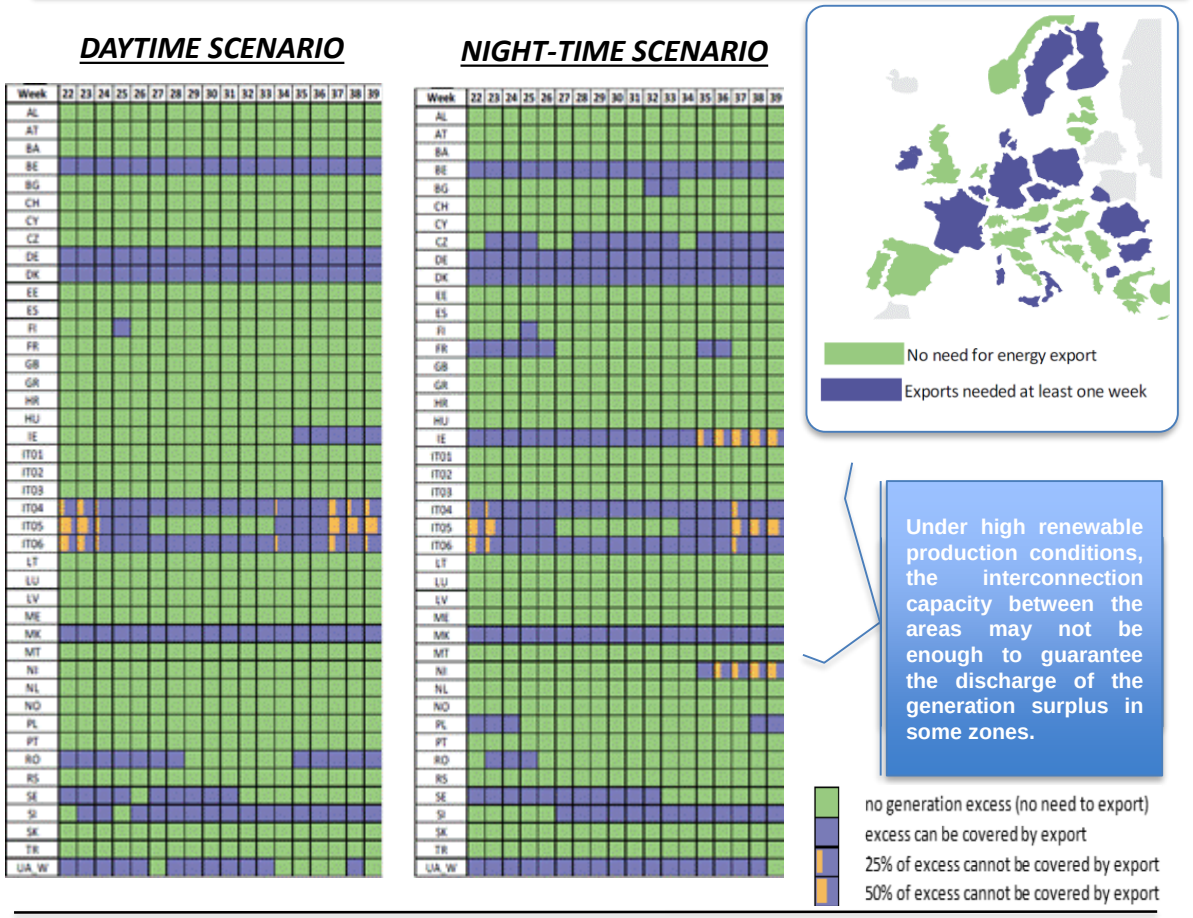


Source: ENTSO-E Summer Outlook 2018

Deterministic analysis on “downward” margins demonstrated (Figure 8) how:

- In the first weeks of June, the middle of August and the last weeks of September, during day and night it may be necessary to reduce wind production in the Southern area and the islands (Sicily and Sardinia) to guarantee electricity system security.
- limited to certain scenarios, these critical issues could also emerge in Ireland at the end of the season.

Fig 8: Analysis Results on Downward Margins in the Night-time and Daytime Scenario



Source: ENTSO-E Summer 2018

Entso-E notes that Italy’s hydroelectric reserves were at record lows at the beginning of the year, but in March and April ongoing growth was seen with melting snow. Calculating the potential still contained in snow (Snow Water Equivalent Index), hydroelectric availability on the Italian side of the Alps is forecast to reach “maximum historical values”.

The Entso-E Summer Outlook 2018 is available for download from the Entso-E website: Summer Outlook 2018.

FUTURE IMPROVEMENTS

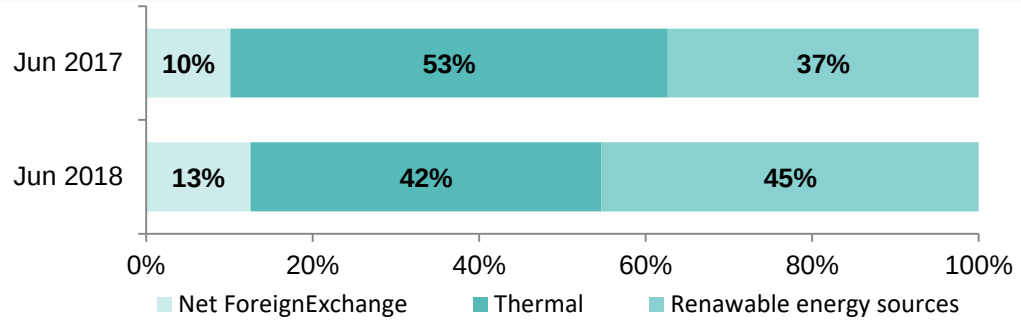
In the context of ENTSO-E’s goal of constant improvement in recent years, the following developments are expected for future Seasonal Outlooks:

- Evolution towards full probabilistic hourly analysis based on the MAF approach, with the goal of introducing a new market modelling tool for WOR 2019/2020.
- Methodology and process preparation required by the Risk Preparedness Regulation of the Clean Energy Package, with particular attention to prevention, preparation and management of situations characterised by simultaneous energy crises.

Monthly Summary

In June 2018, electricity demand was 27.013GWh, a decrease compared to the same month of the previous year (-3.3%). In particular, an increase in renewable production (+17.4%), and net foreign exchange (+18.1%) and a decrease in thermoelectric production (-20.1%) was recorded compared to the same month of the previous year.

Demand breakdown – coverage by sources

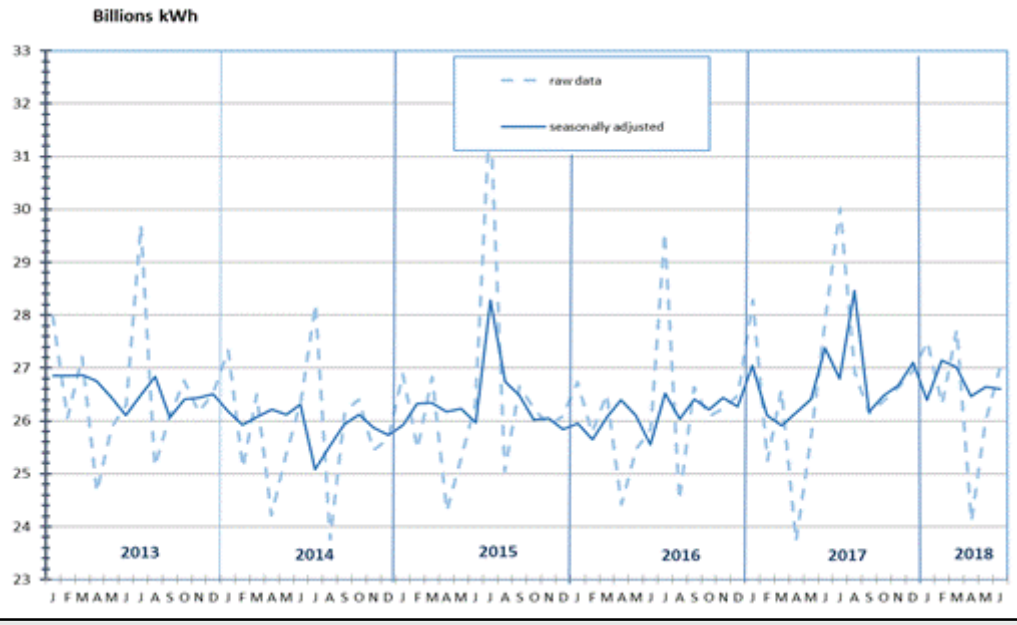


Source: Terna

In June, energy demand on the grid was down -3.3% compared to the same month of 2017.

In June 2018, electricity demand in Italy (27.0 Bn kWh) recorded a decrease of 3.3% compared to the volumes of June 2017. This was achieved with the same number of working days but with an average monthly temperature of 1.2°C lower than June 2017. In the first six months of 2018, demand varied by +0.8% compared to the same period in 2017; in seasonally adjusted terms the change rises to +0.6%. At a regional level, in June 2018 the trend was negative in all areas: in the North (-2.5%), in Central Italy (-4.3%), and in the South (-4.5%). Regarding short-term variation, the seasonally adjusted value for electricity demand in June 2018 was effectively unchanged from May: -0.2%. The stationary trend continues. Finally, in June 2018, electricity demand in Italy was covered 87.6% by national production, less pumping consumption, (-5.8% of net production compared to June 2017) and for the remainder by imports (foreign exchange +18.1% compared to June 2017).

Seasonally-adjusted demand

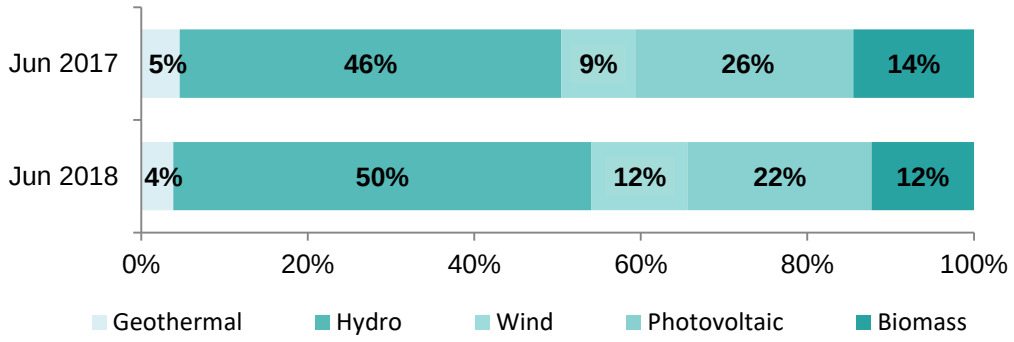


Source: Terna

The seasonally adjusted value for electricity demand in June 2018 was effectively unchanged from May: -0.2%.

Focusing on monthly production from Renewables, an increase was recorded in wind production (+54.2%), and in hydroelectric production (+29.4%) and a decrease was recorded in photovoltaic production (-2.2%) compared to the previous year.

RES Production - Breakdown



In June 2018, the detailed breakdown of production from renewable energy sources recorded a M-o-M percentage increase (+3.0%).

Source: Terna

Energy Balance Sheet

In 2018, cumulative electricity demand (158,622GWh) increased (+0.8%) compared to 2017.

In June 2018, net national production was 23,810GWh, 51% from renewable sources (12,258GWh) and the remaining 49% from thermal sources.

Energy Balance Sheet

[GWh]	Jun 2018	Jun 2017	%18/17	Jan-Jun18	Jan-Jun17	%18/17
Hydro	6.104	4.718	29,4%	26.045	19.074	36,5%
Thermal	13.047	16.333	-20,1%	86.181	96.879	-11,0%
of which Biomass	1.495	1.489	0,4%	8.821	8.876	-0,6%
Geothermal	466	473	-1,5%	2.861	2.899	-1,3%
Wind	1.411	915	54,2%	9.615	8.803	9,2%
Photovoltaic	2.782	2.845	-2,2%	11.413	12.749	-10,5%
Net Total Production	**23.810**	**25.284**	**-5,8%**	**136.115**	**140.404**	**-3,1%**
Import	3.607	3.290	9,6%	25.523	21.400	19,3%
Export	265	461	-42,5%	1.676	3.086	-45,7%
Net Foreign Exchange	**3.342**	**2.829**	**18,1%**	**23.847**	**18.314**	**30,2%**
Pumping	**139**	**172**	**-19,2%**	**1.340**	**1.290**	3,9%
Electricity demand(1)	**27.013**	**27.941**	**-3,3%**	**158.622**	**157.428**	**0,8%**

(1) *Electricity Demand = Production + Net Foreign Exchange – Pumping Consumption.*

In 2018, a decrease in exports (-45.7%) was recorded compared to the previous year.
In June 2018, a reduction was recorded in production from thermal sources (-20.1%) and photovoltaic (-2.2%), and an increase from hydroelectric (+29,4%) and wind power (+54.2%), compared to the previous year.

Source: Terna

In 2018, net total production (136.115GWh) met 86% of national electricity demand (158.622GWh).

Monthly Energy Balance Sheet

[GWh]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Hydro	2.747	2.606	3.231	4.746	6.611	6.104							26.045
Thermal	16.907	16.287	15.623	11.872	12.445	13.047							86.181
Geothermal	495	446	492	476	486	466							2.861
Wind	1.972	1.708	2.409	1.214	901	1.411							9.615
Photovoltaic	1.026	1.052	1.693	2.428	2.432	2.782							11.413
Net Total Production	**23.147**	**22.099**	**23.448**	**20.736**	**22.875**	**23.810**							**136.115**
Import	4.899	4.610	4.732	4.004	3.671	3.607							25.523
Export	326	199	179	337	370	265							1.676
Net Foreign Exchange	**4.573**	**4.411**	**4.553**	**3.667**	**3.301**	**3.342**							**23.847**
Pumping	223	192	286	299	201	139							1.340
Electricity demand(1)	**27.497**	**26.318**	**27.715**	**24.104**	**25.975**	**27.013**							**158.622**

In June, net total production decreased (-5.8%) compared to 2017. In 2018, the month with the maximum demand for electricity was March, with 27,715GWh.

Source: Terna

(1) Electricity Demand = Production + Net Foreign Exchange – Pumping Consumption.

The evolution of the monthly statement for 2017 is given below.

Monthly Energy Balance Sheet

[GWh]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Hydro	2.804	2.249	2.648	2.759	3.896	4.718	4.434	3.860	3.485	2.226	2.101	2.350	37.530
Thermal	21.089	16.850	14.618	13.803	14.186	16.333	17.292	16.079	15.243	17.081	19.032	17.894	199.500
Geothermal	504	454	501	479	488	473	492	478	462	480	476	498	5.785
Wind	1.797	1.536	1.935	1.369	1.251	915	1.255	1.079	1.353	1.265	1.509	2.228	17.492
Photovoltaic	1.081	1.193	2.322	2.492	2.816	2.845	3.023	2.920	2.195	1.918	1.074	932	24.811
Net Total Production	**27.275**	**22.282**	**22.024**	**20.902**	**22.637**	**25.284**	**26.496**	**24.416**	**22.738**	**22.970**	**24.192**	**23.902**	**285.118**
Import	2.073	3.568	5.155	3.613	3.701	3.290	4.161	3.012	3.887	3.782	2.991	3.662	42.895
Export	803	383	404	537	498	461	508	372	347	203	308	310	5.134
Net Foreign Exchange	**1.270**	**3.185**	**4.751**	**3.076**	**3.203**	**2.829**	**3.653**	**2.640**	**3.540**	**3.579**	**2.683**	**3.352**	**37.761**
Pumping	265	211	190	248	204	172	130	144	140	172	250	315	2.441
Electricity demand(1)	**28.280**	**25.256**	**26.585**	**23.730**	**25.636**	**27.941**	**30.019**	**26.912**	**26.138**	**26.377**	**26.625**	**26.939**	**320.438**

In 2017, the month with the maximum demand for electricity was July with 30,019GWh.

Source: Terna

Demand by Geographical Areas

In June 2018, there was a decrease in demand in the Northern zone (TO-MI-VE), in the Centre (RM-FI), in the Southern zone (NA) and on the Islands (CA-PA) compared to the same period of the previous year.

Demand by Geographical Areas

[GWh]	Turin	Milan	Venice	Florence	Rome	Naples	Palermo	Cagliari
Jun 2018	2.818	5.910	4.208	4.323	3.762	3.721	1.554	717
Jun 2017	2.936	6.074	4.221	4.468	3.922	3.985	1.588	747
% Jun 2018/2017	-4,0%	-2,7%	-0,3%	-3,2%	-4,1%	-6,6%	-2,1%	-4,0%
Cumulated 2018	16.427	34.973	24.457	25.024	21.826	22.374	9.129	4.412
Cumulated 2017	16.355	34.610	23.930	24.507	21.931	22.625	9.153	4.317
% Cumulated 18/17	0,4%	1,0%	2,2%	2,1%	-0,5%	-1,1%	-0,3%	2,2%

In 2018, the Y-o-Y percentage change in demand was +1.3% in the Northern zone, +0.9% in the Centre, -1.1% in the South and +0.5% in the Islands.

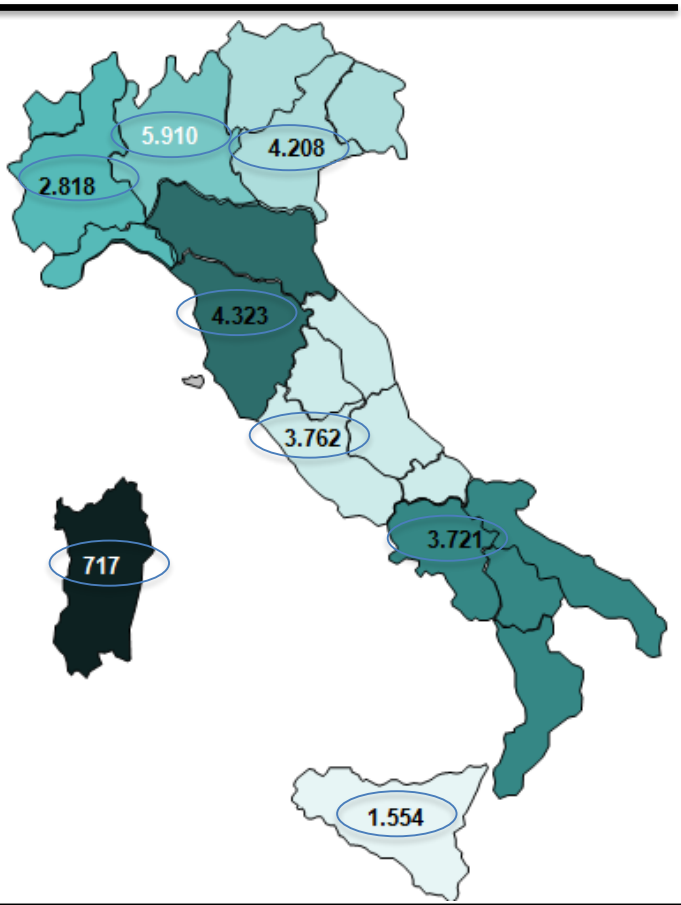
Source: Terna

Demand by Geographical Areas: map chart

[GWh]

The regions are combined in clusters on the basis of production and consumption:

- TURIN: Piedmont - Liguria - Valle d'Aosta
- MILAN: Lombardy (*)
- VENICE: Friuli Venezia Giulia - Greater Venice - Trentino Alto Adige
- FLORENCE: Emilia Romagna (*) - Tuscany
- ROME: Lazio - Umbria - Abruzzo - Molise - Marche
- NAPLES: Campania - Apulia - Basilicata - Calabria
- PALERMO: Sicily
- CAGLIARI: Sardinia



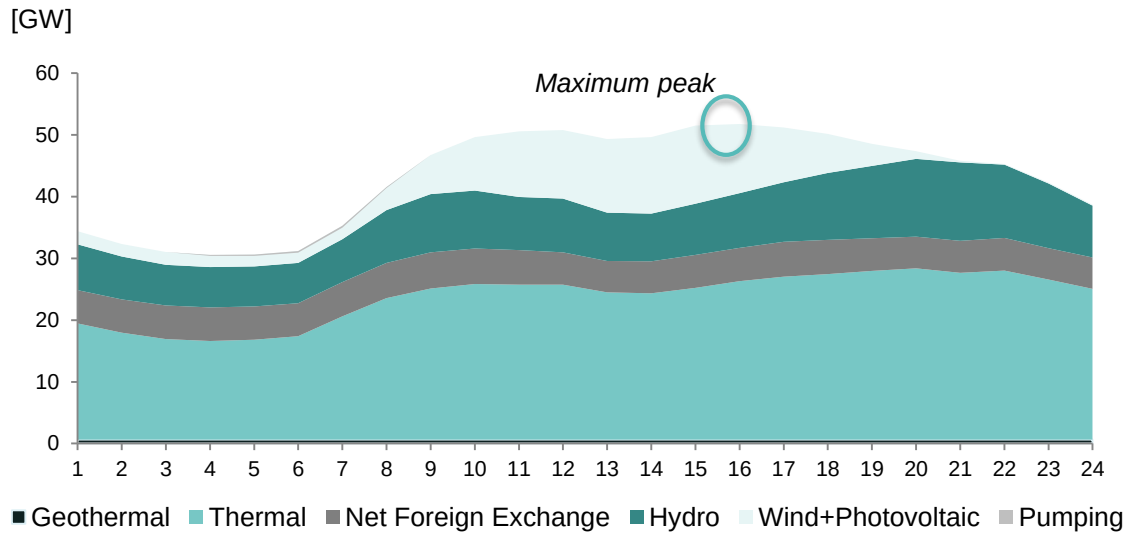
Source: Terna

(*) In these two regions the geographical borders do not correspond to the electrical borders. Lombardy includes production plants that are part of the geographical-administrative territory of Emilia Romagna.

Peak Demand

In June 2018, peak demand was recorded on **Wednesday 20 at 16:00** and was 51,748MW (-6.7% Y-o-Y). The hourly demand diagram of the peak day is presented below.

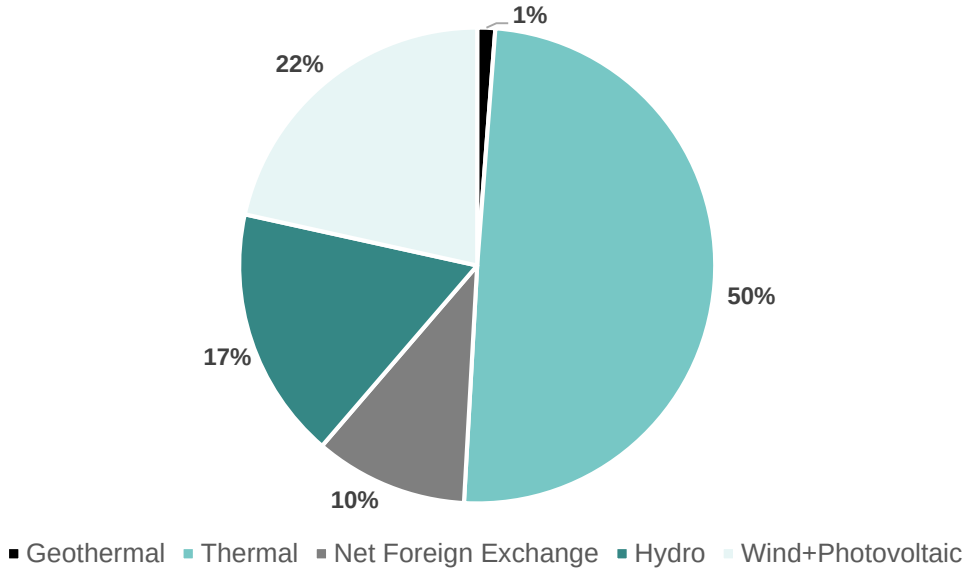
Peak Demand



At peak, the contribution of thermal production was 25,650 MW.

Source: Terna

Coverage at Peak demand – 20 June 2018, 16:00



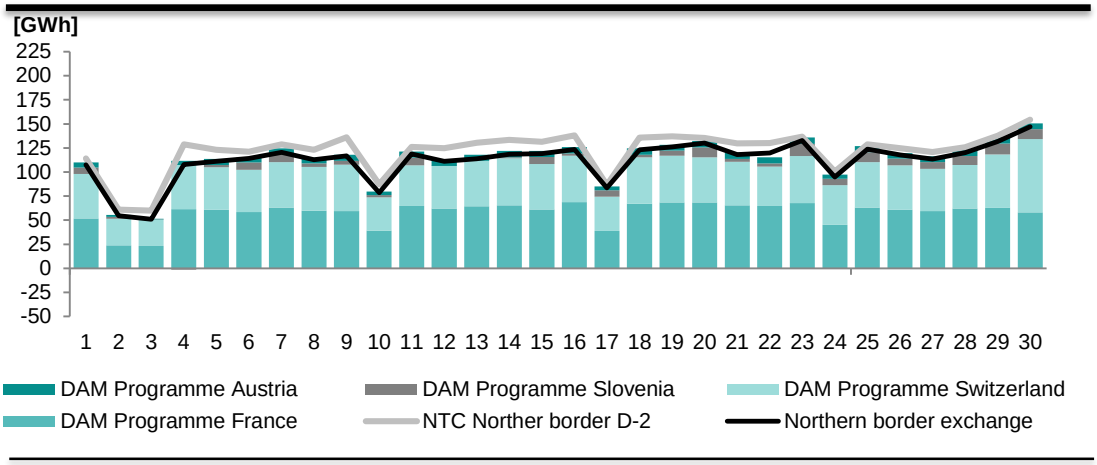
At peak, production from renewable sources contributed to covering demand for 40%, thermal production for 50% and the remainder was the net foreign exchange.

Source: Terna

Net Foreign Exchange – March 2018

In June, there was good saturation of the planned figure for NTC (Net Transfer Capacity) calculated in D-2 compared to the exchange programmes on the Northern border.

Net Foreign Exchange on the Northern border



In June 2018, there were imports of 3,607GWh and exports of 265GWh.

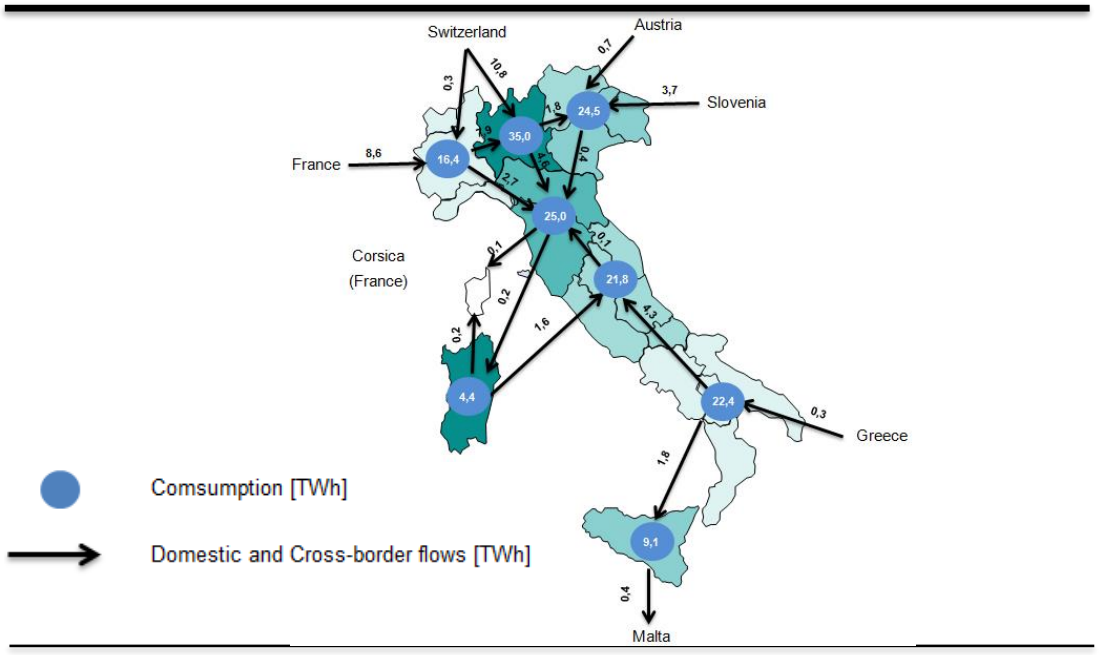
Source: Terna

Balance of Physical Exchanges – Annual Cumulative Figure

The balance of physical exchanges of electricity mainly shows the energy flows among the various areas identified in the Italian electricity system.

The 380kV connection between Sicily and the Continent ensures secure management of the electricity system in Sicily and Calabria.

Balance of physical electricity exchanges: map chart



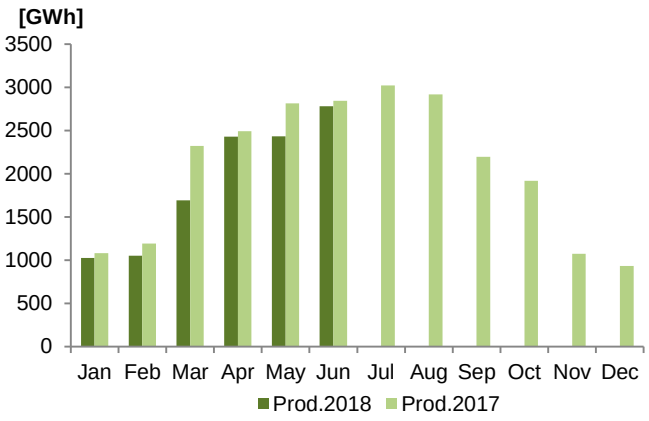
In 2018, a net exchange was recorded from the Northern zone to Emilia Romagna and Tuscany of around 7.7TWh. The Continent recorded a net exchange towards Sicily of 1.8TWh.

Source: Terna

Production and Installed Capacity

Energy produced by photovoltaic sources in June 2018 was 2,782GWh, up compared to the previous month by 350GWh. The annual cumulative figure fell compared to the previous year (-10.5%).

Photovoltaic Production and Capacity

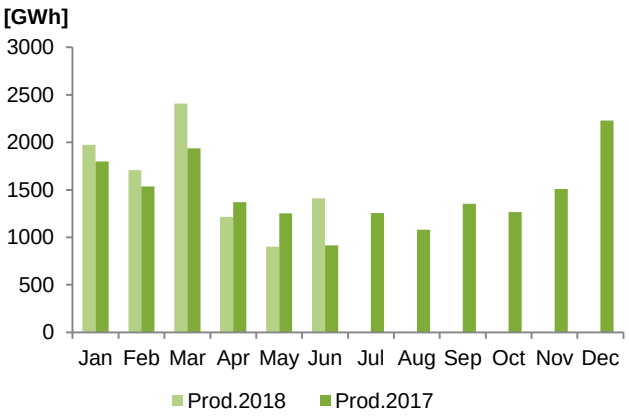


Production from photovoltaic sources up by +14.4% compared to the previous month.

Source: Terna

Energy produced by wind power in June 2018 was 1,411GWh, up compared to the previous month by 510GWh. The annual cumulative figure increased compared to the previous year (+9.2%).

Wind Production and Capacity

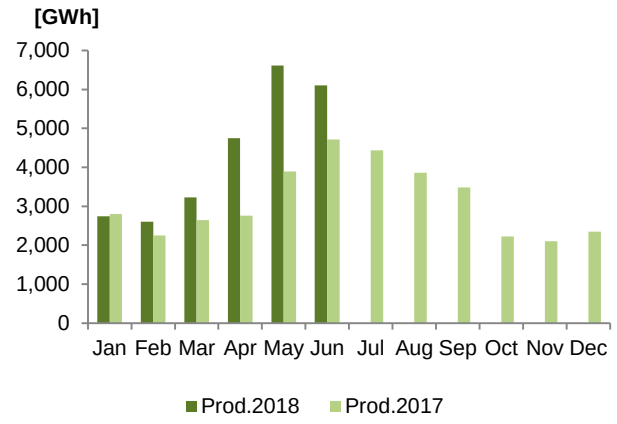


Production from wind sources up compared to the previous month by +56.6%.

Source: Terna

☐Hydroelectric energy (from reservoirs, storage and run-of-river) in June 2018 was 6,104GWh, down compared to the previous month by 507GWh. The annual cumulative figure was up (+36.5%) compared to the previous year.

Hydroelectric Production and Capacity

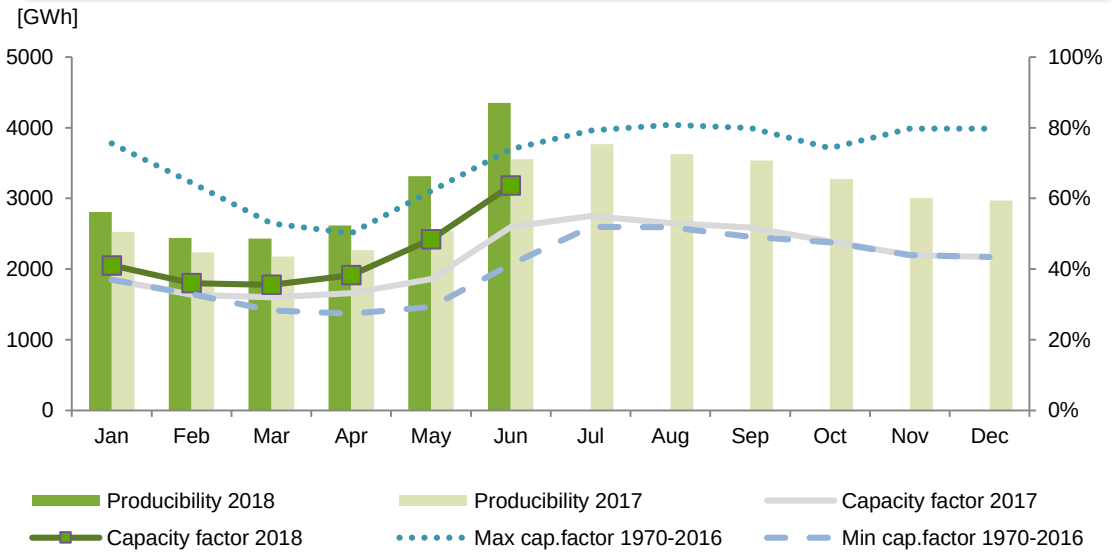


Production from hydroelectric sources down compared to the previous month (-7.7%).

Source: Terna

☐In June, hydroelectric producibility increased compared to the previous month.

Hydroelectric Producibility and Reservoir Percentage

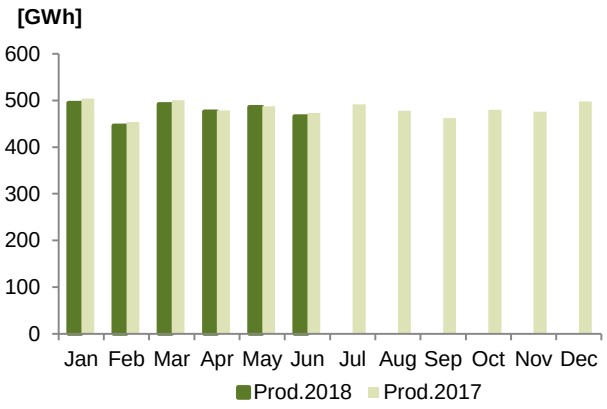


In June 2018, considering Italy as a whole, the current reservoir percentage compared to the maximum reservoir capacity was +63.6%, an increase compared to the same month in 2017.

Source: Terna

Energy produced by geothermal sources in June 2018 was 466GWh, down compared to the previous month by 20GWh. The annual cumulative figure was down (-1.3%) compared to the previous year.

Geothermal Production and Capacity



[MW]

$P_{inst} = 0$

$0 < P_{inst} \leq 500$

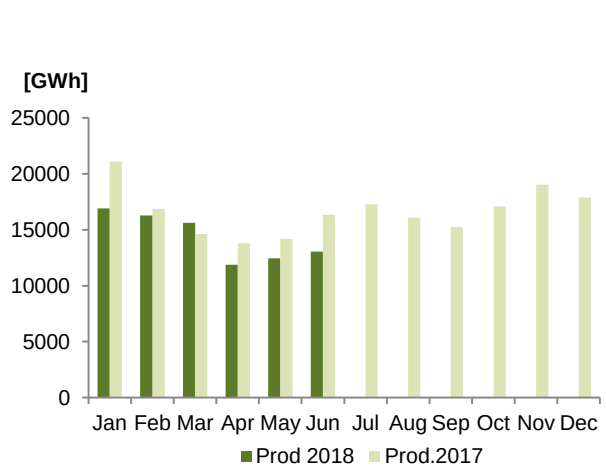
$500 < P_{inst} \leq 1000$

Geothermal production decreased (-4.1%) compared to the previous month.

Source: Terna

Energy produced by thermal sources in June 2018 was 13,047GWh, up compared to the previous month by 602GWh. The annual cumulative figure was down (-11.0%) compared to the previous year.

Thermal Production and Capacity



[MW]

$P_{inst} \leq 5000$

$5000 < P_{inst} \leq 10000$

$10000 < P_{inst} \leq 15000$

$15000 < P_{inst} \leq 20000$

$P_{inst} > 20000$

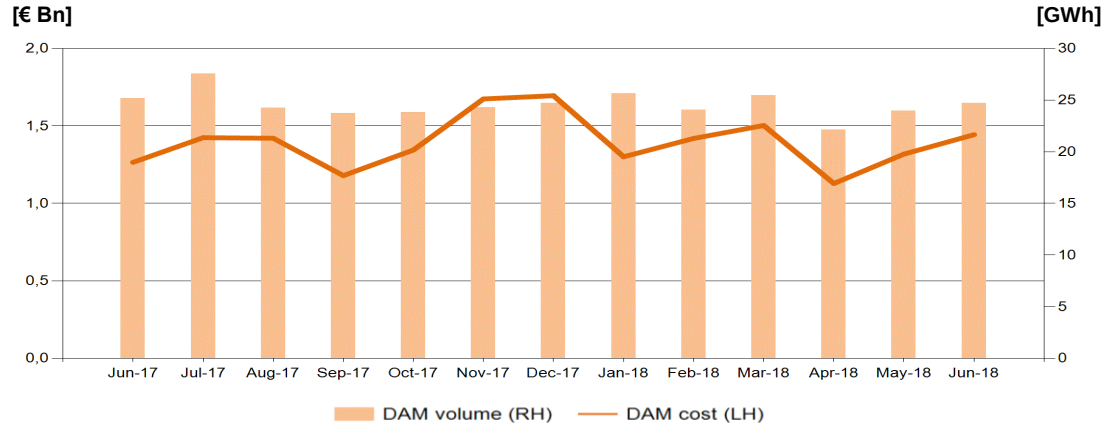
Thermal production was down (+4.6%) compared to the previous month.

Source: Terna

Day-Ahead Market

The June total for withdrawal programmes on the DAM was approximately €1.4 Bn, up 10% compared to the previous month and up 14% compared to June 2017.
The increase compared to May is due to growth in both average PUN and demand, while the increase on the previous year is due to growth in past average PUN from €48.9/MWh (June 2017) to €57.3/MWh (June 2018).

Day Ahead Market – amounts and volumes

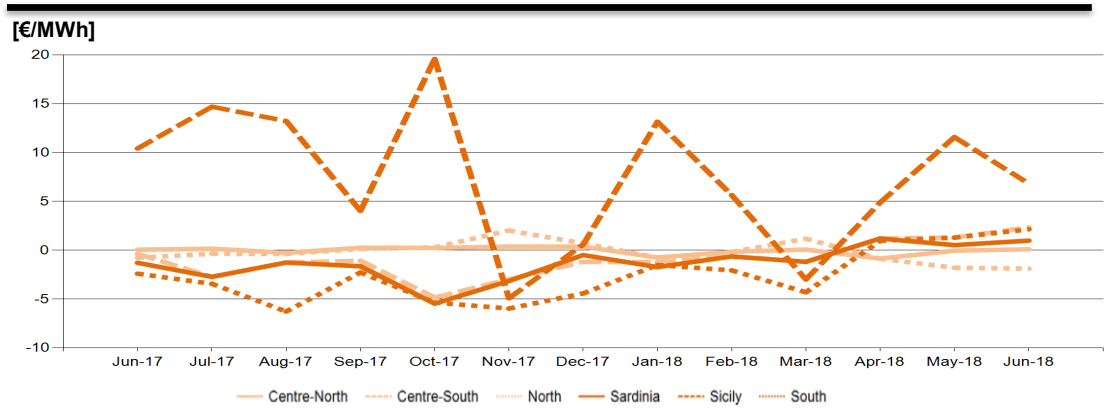


Total amount in June 2018 up by 14% compared to June 2017

Source: Terna calculation on GME data

In June, zonal prices were basically in line with the PUN, with the exception of the Sicily zone, which recorded a spread of +€6.8/MWh.
Compared to June 2017, the price for the Sicily zone recorded an average increase of €4.8/MWh, while for the other zones there was an average increase of €10.1/MWh.

Spread compared to the PUN



June 2018 zonal prices in line with the PUN for all zones with the exception of Sicily

Source: Terna calculation on GME data

In June, the spread between the peak and off-peak prices was €11.7/MWh for the Northern zone, €5.6/MWh on average for the Centre-North, Centre-South and Southern zones, and €1.8/MWh on average for Sicily and Sardinia.
In May, the spread between the peak and off-peak prices was €10.4/MWh for the North and Centre-North and €6.7/MWh for the other zones.

Day Ahead Market – PUN and zonal prices [€/MWh]

€/MWh	PUN	North	Centre-North	Centre-South	South	Sicily	Sardinia
Average	57.3	55.4	57.3	59.6	59.4	64.1	58.2
Y-o-Y	8.4	7.3	8.4	11.1	12.9	4.8	10.7
Δ vs PUN	-	-1.9	0.1	2.3	2.1	6.8	1.0
Δ vs PUN 2017	-	-0.8	0.0	-0.4	-2.4	10.4	-1.3
Peak	62.8	62.9	63.0	62.4	61.8	64.4	60.2
Off Peak	54.3	51.3	54.3	58.1	58.1	63.9	57.2
Δ Peak vs Off Peak	8.5	11.7	8.7	4.3	3.7	0.5	3.1
Minimum	24.4	24.4	24.4	24.4	24.4	24.4	10.0
Maximum	84.8	84.8	84.8	84.8	84.8	118.0	107.8

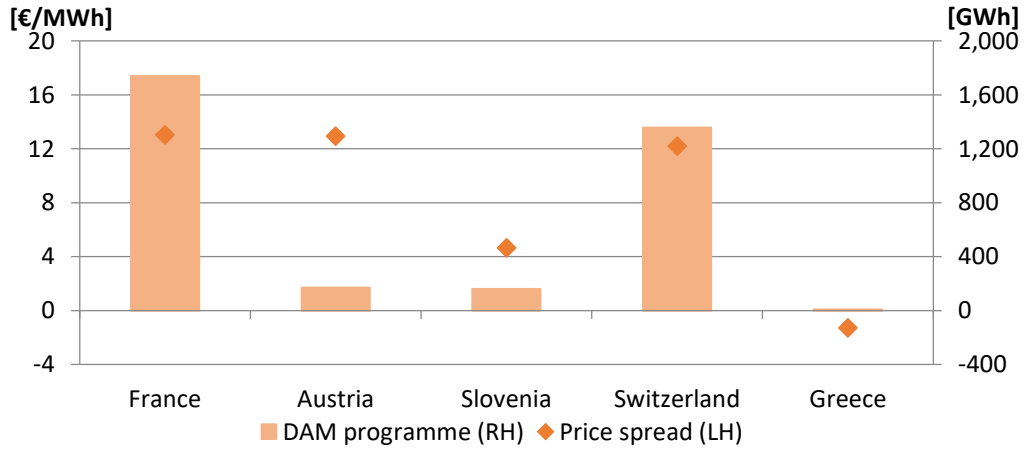
Source: Terna calculation on GME data

The spread between peak and off-peak prices compared to the previous month decreased in all zones except for the North which saw no change

In June, a decrease in the price spread compared to the previous year was recorded on all borders except for that with Greece.

In June, imports totalled 3.5TWh, with France and Switzerland accounting for 50% and 39% of the total, respectively. Total exports were 0.1TWh, with Slovenia accounting for 84%.

Price spread with foreign exchanges and day-ahead programmes



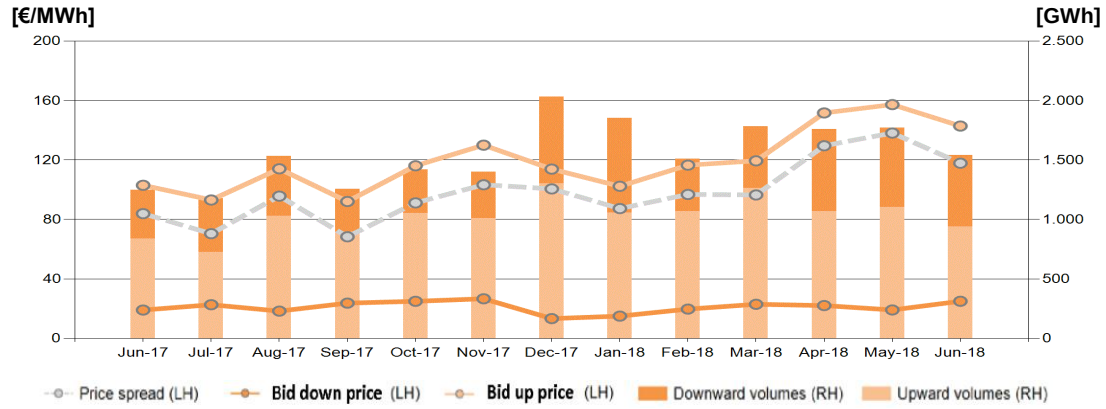
Source: Terna calculation

Net imports on the Northern border of 3.4TWh

Ex-ante Ancillary Services Market

In June, the spread between average bid-up and bid-down prices was €117.8/MWh, down compared to the previous month by 15% and up by 40% compared to June 2017.
The total volumes fell compared to the previous month (-13%), in particular upward volumes decreased by 15% and downward volumes decreased by 10%.
The upward volumes increased by 12%, while the downwards volumes rose by 46% compared to the same month of the previous year.

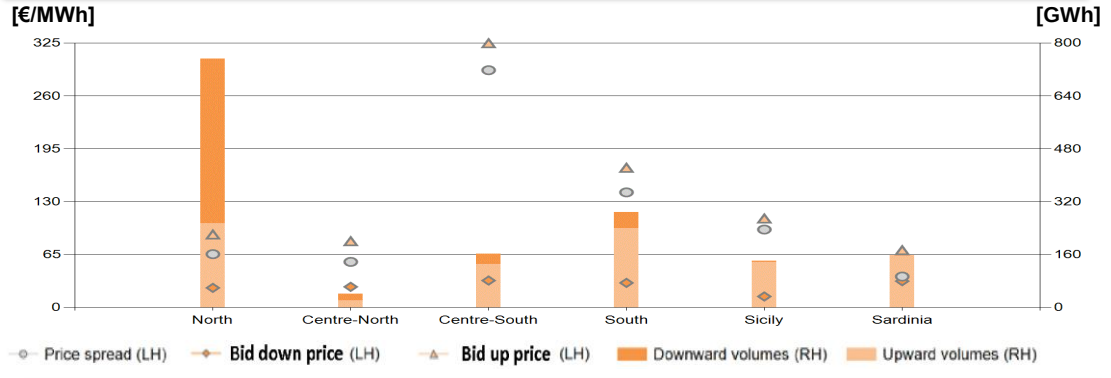
Ex-ante Ancillary Services - prices and volumes



Average bid-up price in June 2018 of €142.8/MWh
Average bid-down price in June 2018 of €25.0/MWh

The market zone characterised by the highest spread (€291.6/MWh) is the Centre-South, as in the previous month.
This spread recorded a 15% reduction compared to the previous month due to a reduction in the average bid-up price of 9% (from €357.7/MWh in May to €324.7/MWh in June) and an increase in the average bid-down price of 127% (from €14.6/MWh in May to €33.1/MWh in June).

Ex-ante Ancillary Services - prices and volumes by market zone



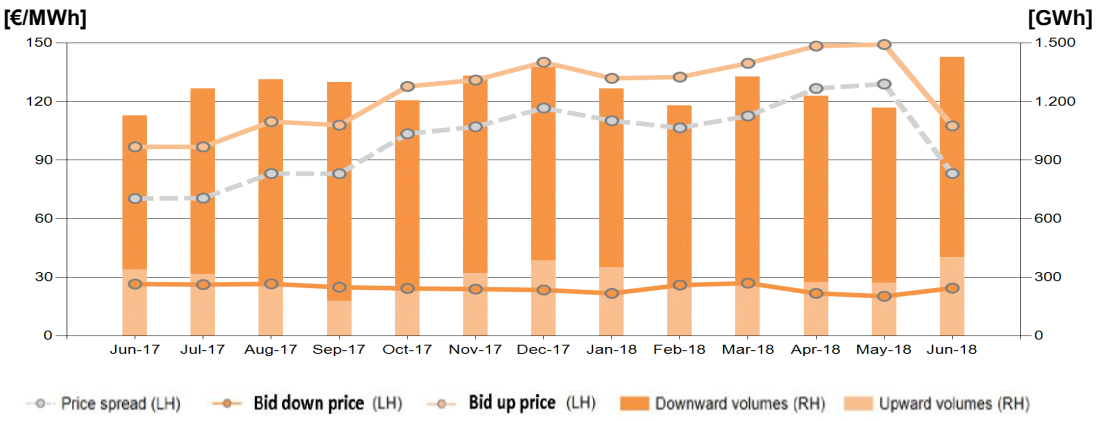
Centre-South: zone with the highest price spread
North: zone with the most volumes moved

Source: Terna

Balancing Market

In June, the spread between bid-up and bid-down prices was €83.1/MWh, down on the previous month (€128.9/MWh) and up on June 2017 (€70.3/MWh; 18%).
Total volumes increased compared to the previous month (+22%), in particular upward volumes increased by 49% and downward volumes increased by 14%. Compared to June 2017, upward volumes increased by 19% and downward volumes fell by 30%.

Balancing market – prices and volumes

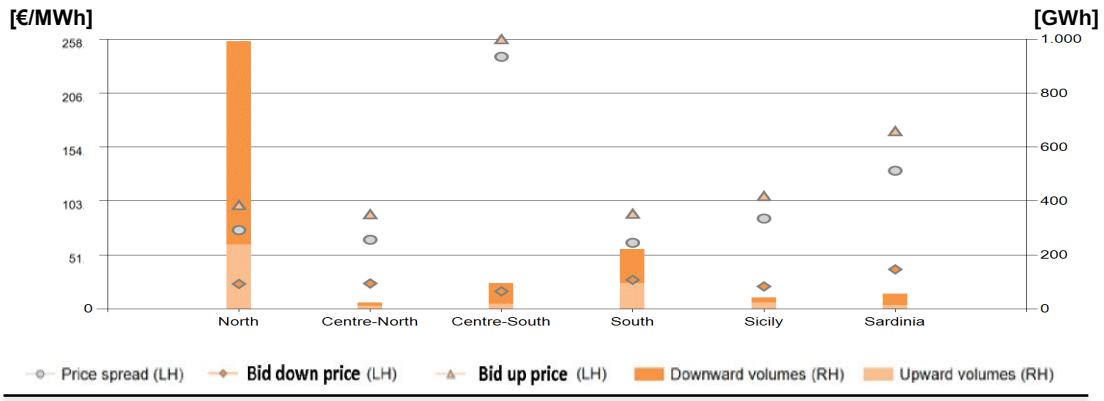


Average bid-up price in June 2018 of €107.5/MWh
Average bid-down price in June 2018 of €24.4/MWh

Source: Terna

The market zone characterised by the highest spread (€241.3/MWh) is the Centre-South, like the previous month (spread of €408.7/MWh).
In June, the Northern zone was confirmed as the zone showing the highest downward volumes (753GWh), as for the previous month, followed by the Southern zone (125GWh)
The price spread decreased across all zones, with the exception of Sardinia.
The Centre-South was the zone with the greatest decrease compared to the previous month (€167.3/MWh, -41%).

Balancing market – prices and volumes by market zone



Centre-south: zone characterised by the highest price spread
North: zone with the most volumes moved

Source: Terna

Spot Commodities Market

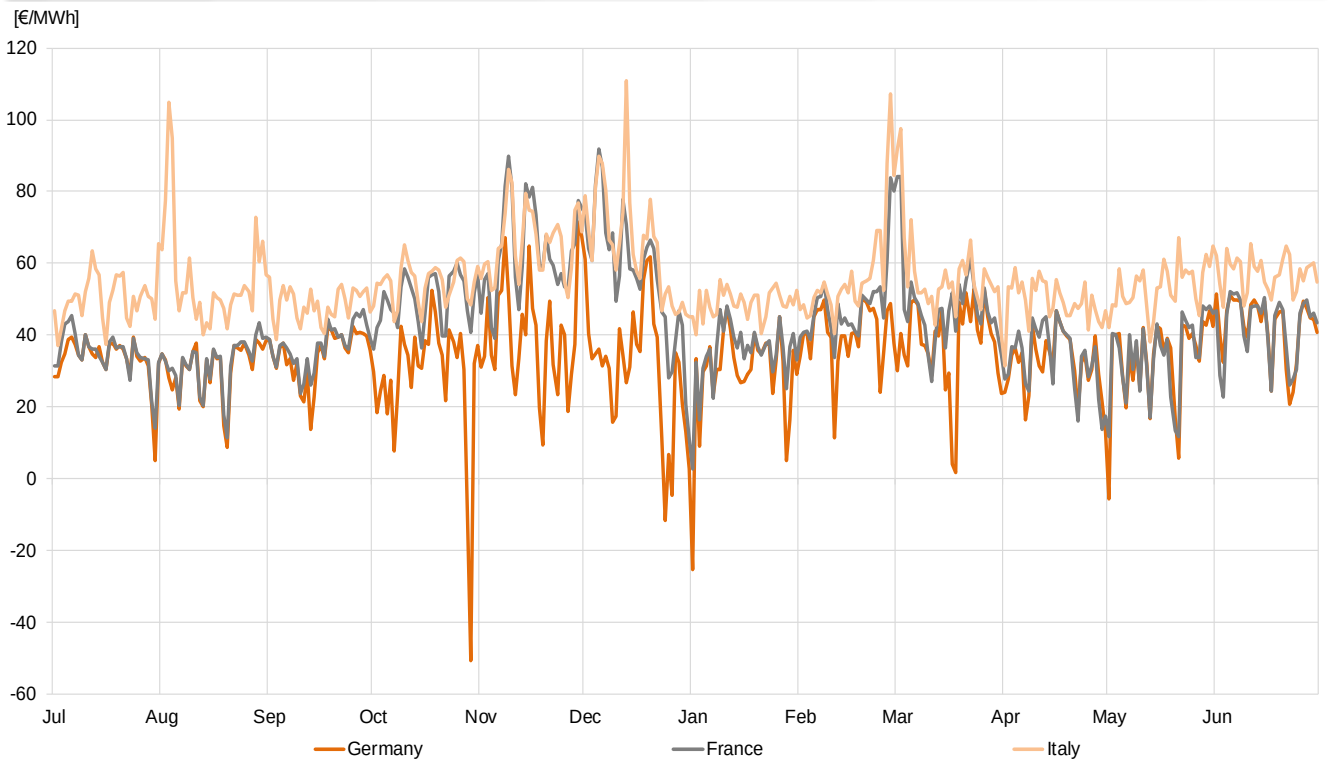
In June the prices of Brent stood at around $75/bbl, down compared to the $77/bbl of May (-2%).

Coal prices (AP12) came out at approximately $96/t, an increase compared to the prices in May which were around $89/t (+8%).

Gas prices in Europe increased in June, compared to the previous month, reaching €22/MWh; the PSV recorded an average of €24/MWh, up compared to May.

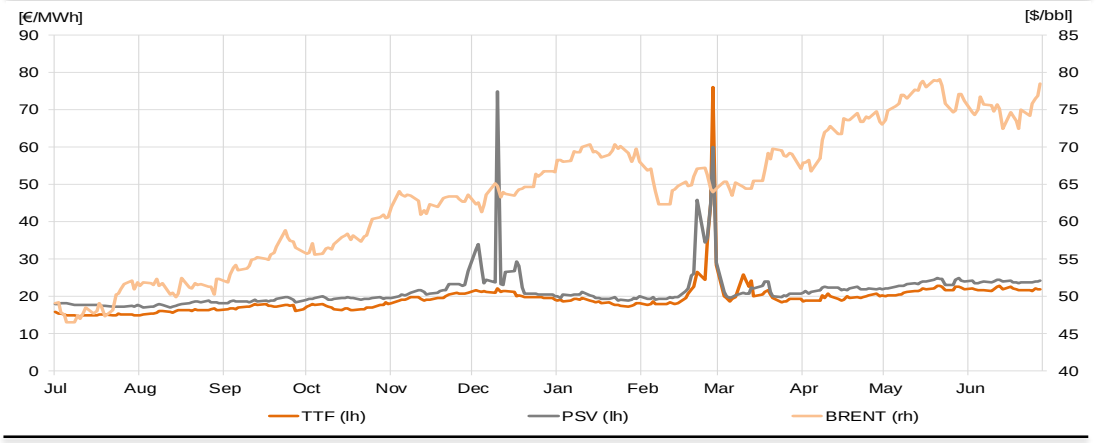
Electricity prices in Italy increased in June compared to May with a monthly average of €60/MWh (+8%).

Spot electricity prices



Source: Terna calculation on GME and EPEX data

Gas & Oil spot prices



Monthly average change PSV-TTF = €2.0/MWh

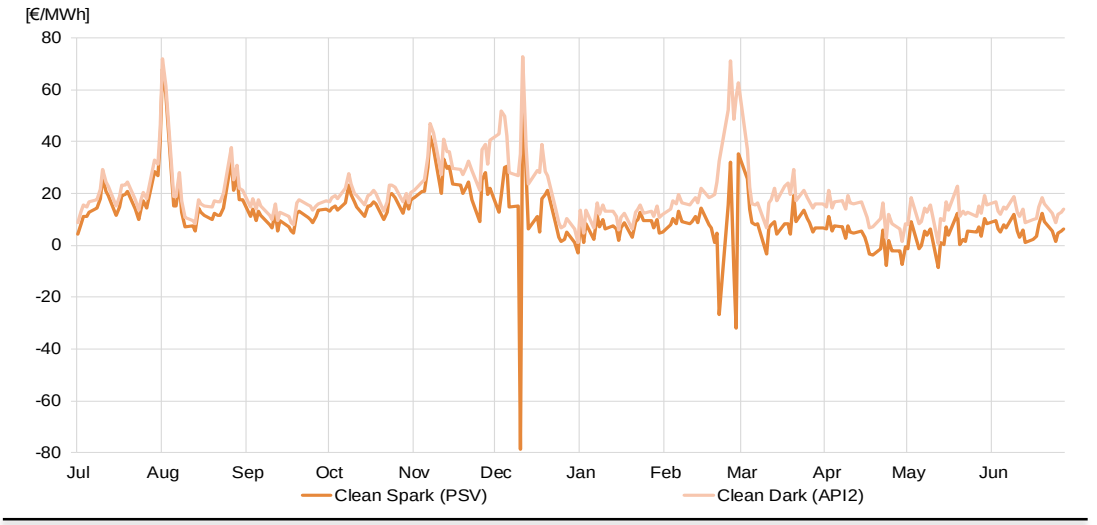
Source: Terna calculation on Bloomberg data

Coal & Carbon spot prices

Monthly average change API2-API4 = -$9.0/tn

Source: Terna calculation on Bloomberg data

Clean Dark & Spark spreads Italy



Clean spark spread PSV monthly average = €6.1/MWh (120% M-o-M)

Clean dark spread API2 monthly average = €13.3/MWh (11% M-o-M)

Source: Terna calculation on Bloomberg data

Forward Commodities Market

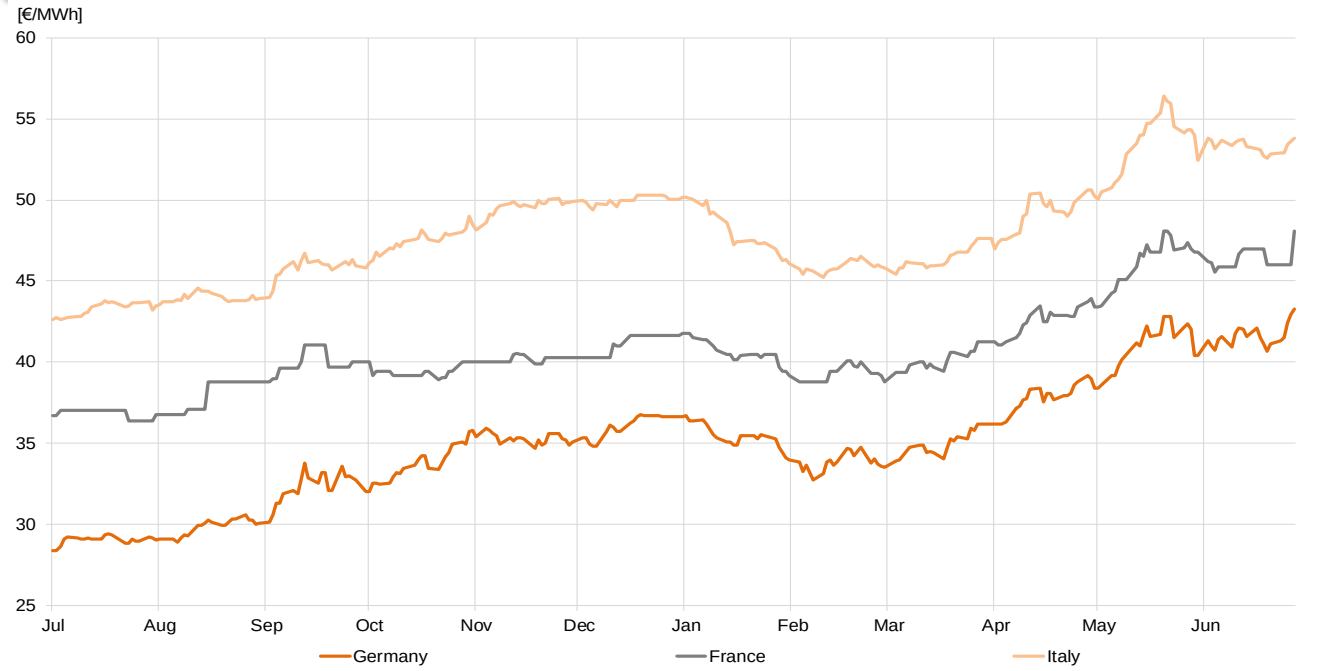
In June, the 2019 Brent forward prices were around $72/bbl in line with the $72/bbl recorded in May.

The 2019 average forward prices of coal (API2) increased to approximately $88/t (+1%) compared to the $87/t recorded in May.

The 2019 average forward prices of gas in Italy (PSV) remained stable between June and the previous month, at around $22/MWh.

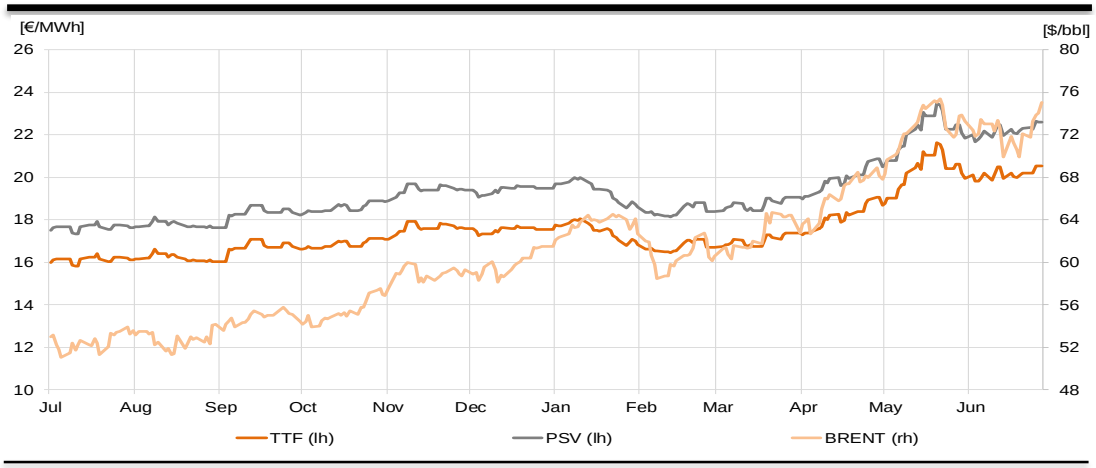
The 2019 average forward prices of electricity in Italy stood at around €53/MWh, in line with the previous month (+0%). A slight positive trend was recorded for the French exchange where the price was approximately €46/MWh, while in Germany it came out at approximately €42/MWh.

2019 Forward Electricity Prices



Source: Terna calculation on Bloomberg data

2019 Forward Gas & Oil prices



Monthly average change PSV-TTF = +€2.0/MWh

Source: Terna calculation on Bloomberg data

2019 Forward Coal & Carbon prices

Monthly average change API2-API4 = -$3.1/t

Source: Terna calculation on Bloomberg data

Clean 2019 Forward Dark & Spark Spreads Italy

Clean spark spread PSV monthly average = €3.1/MWh (+2% M-o-M)

Clean dark spread API2 monthly average = €9.9/MWh (-10% M-o-M)

Source: Terna calculation on Bloomberg data

Below is a selection of ARERA provisions of major interest for dispatching and transmission activities in June 2018. This selection is not exhaustive with respect to the regulatory framework.

Provisions for a reduction in the recognised variable cost of the Brindisi Sud essential plant of Enel Produzione S.p.A.

Resolution 319/2018/R/EEL

The Authority has accepted the change request for a reduction in one of the relevant parameters for determination of the recognised variable cost (standard values), submitted by Enel Produzione S.p.A. with reference to the essential plant of Brindisi Sud. The Authority has also ordered that Enel Produzione S.p.A. must promptly update the Authority and Terna in the event in which the conditions that justified the variation in the standard values no longer exist or change, within the terms represented in the relative application.

Decisions on essential production plant of Augusta, of Enel Produzione S.p.A., for the year 2015

Decisions on the essential production plant of Milazzo, of Edison Trading S.p.A., for the year 2015

Decisions on the essential production plants available to A2A Energiefuture S.p.A.

Decisions on the production plants of Assemini, Portoferraio and Sulcis, essential plants for 2015 as per Authority resolution 111/06

Decisions on essential production plants available to Isab S.r.l., for the year 2015

Resolution 332/2018/R/EEL
Resolution 333/2018/R/EEL
Resolution 334/2018/R/EEL
Resolution 335/2018/R/EEL
Resolution 348/2018/R/EEL

With these resolutions, the Authority has established that Terna pay Enel Produzione S.p.A., Edison Trading S.p.A., A2A Energiefuture S.p.A. and Isab S.r.l. the balance of fees relative to 2015, supplementing the costs for the essential plants of Augusta, Assemini, Portoferraio, Sulcis, Milazzo, San Filippo del Mela, Impsud and Isab Energy, respectively.

Update of Authority opinion 701/2016/I/EEL issued to the Ministry of Economic Development for the granting of an exemption to a portion of the Italy-Montenegro direct-current interconnection.

Resolution 338/2018/I/EEL

The Authority has confirmed its positive appraisal regarding issue of an exemption to the company Monita Interconnector S.r.l. for a duration of 10 years from the rules on access of third parties for an import and export capacity of 150MW on the Italy-Montenegro Interconnection. This interconnection contributes for the relative portion to creation of foreign-interconnection infrastructure in the form of an interconnector under the terms of Italian Law 99/09.

Update, in the form of a reduction to the fee to cover costs for remuneration of the load interruptibility service and the fee supplementing default provision charges, from 1 July 2018.

Resolution 363/2018/R/EEL

The Authority has proceeded with an update, from 1 July 2018, reducing two fees paid by withdrawal dispatch users:

- the fee covering the costs upon Terna for remuneration of the load interruptibility service (art. 73 of Resolution 111/06)
- the fee supplementing default provision charges covering otherwise non-recuperable charges upon default providers for defaulting final clients who cannot be disconnected (art. 25-*bis* of Integrated Text of Physical and Economic Elements of the Dispatching Service – TIS)

Key

Ancillary Services Market: the trading venue of the resources for the dispatching service.

API2 – CIF ARA: the reference index for the coal price (with PCI of 6,000 kcal/kg) imported from north-west Europe. It is calculated on the basis of an assessment on the CIF (Cost, Insurance and Freight) prices of coal contracts, with delivery to the ports of Amsterdam – Rotterdam – Antwerp (ARA).

API4 – FOB Richard Bay: the reference index for the coal price (with PCI of 6,000 kcal/kg) exported from Richards Bay in South Africa. It is calculated on the basis of an assessment on the FOB (Free On Board) prices of contracts excluding transport starting from the port of Richards Bay.

Balancing Market (BM): the set of activities for selecting the offers presented on the market to resolve the congestions and establish secondary and tertiary reserve power margins, carried out on the same day as that to which the offers refer.

Brent: the oil price as global reference for the crude oil market. Brent Crude is the result of a mixture deriving from the union of different types of oil extracted from the North Sea.

Clean Dark Spread: the difference between the price of electricity and the cost of the fuel of a coal power station and the cost of the CO2 emission quotas.

Clean Spark Spread: the difference between the price of electricity and the cost of the fuel of a gas power station and the cost of the CO2 emission quotas.

Dirty Dark Spread: the difference between the price of electricity and the cost of the fuel of a coal power station.

Dirty Spark Spread: the difference between the price of electricity and the cost of the fuel of a gas power station.

Day-Ahead Market (DAM): the trading venue of offers to buy and sell electricity for each relevant period of the day after that of trading.

Ex-Ante Ancillary Services: the set of activities performed for selecting the offers presented on the Ancillary Services Market to resolve the congestions and establish secondary and tertiary reserve power margins, carried out in advance with respect to real time.

NET TRANSFER CAPACITY - NTC: the maximum transfer capacity of the grid for interconnection with other countries. NTC D-2 indicates the same capacity defined in day D-2.

Peak hours: are the hours between 8:00 and 20:00 of working days only. **Off-peak hours**: all the other hours.

PSV - Punto Scambio Virtuale: the price at the virtual exchange point for the buying and selling of gas in Italy.

PUN - Prezzo Unico Nazionale: the electricity national price calculated as a result of the Day-Ahead Market.

TTF - Title Transfer Facility: the price at the virtual exchange point for the buying and selling of natural gas in the Netherlands.

Territorial Areas: these consist of one or more adjacent regions and are aggregated as indicated:

TURIN: Piedmont - Liguria - Valle d'Aosta;
MILAN: Lombardy (*);
VENICE: Friuli Venezia Giulia - Greater Venice - Trentino Alto Adige;
FLORENCE: Emilia Romagna (*) - Tuscany;
ROME: Lazio - Umbria - Abruzzo - Molise - Marche;
NAPLES: Campania - Apulia - Basilicata – Calabria;
PALERMO: Sicily;
CAGLIARI: Sardinia

(*) In these two regions the geographical borders do not correspond to the electrical borders. The Lombardy region includes production plants that are part of the geographical-administrative territory of Emilia Romagna.

The data related to the reservoirs table of tanks are aggregated by **ZONE** as indicated:
NORTH – includes the Territorial Areas TURIN, MILAN and VENICE;
CENTRE and SOUTH – includes the Territorial Areas FLORENCE, ROME and NAPLES;
ISLANDS – includes the Territorial Areas PALERMO and CAGLIARI.

Zonal Price: the price of each zone calculated as a result of the Day-Ahead Market (DAM).

Disclaimer

Data reported for 2017 (Energy Balance Sheets) and 2018 are reported on a provisional basis.

Provisional data can be subject to adjustments and recalculations.