Terna
Driving Energy

Monthly Report on the Electricity System
April 2023

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In April, electricity demand was 23,361 GWh, a decrease compared to the same month of the previous year (-4.3%) and compared to April 2021 (-4.5%). There was also a sharp increase in foreign exchange (+41.3%), compared to the same month in 2022. In 2023, electricity demand (100,780 GWh) increased compared to the same period in 2022 (-4.1%) and compared to the cumulative figure for 2021 (-2.2%).

The value of electricity demand was achieved with one less working day (18 vs 19) and with an average monthly temperature that was the same as April of last year. When adjusted for seasonal and calendar effects, the figure represents a -3.8% variation.

The annual trend of April 2023 (compared to April 2022) for the industrial electricity consumption index decreased by 9.1% with raw data.

In April 2023, 42.8% of the electricity demand was met via production from Non-Renewable Energy Sources, 36.5% via Renewable Energy Sources and the remainder via foreign exchange. In 2023, electricity demand was 100,780 GWh, 50.3% of which was met via production from Non-Renewable Energy Sources, 31.3% from Renewable Energy Sources and the remainder from the foreign balance.

In April, production from Renewable Energy Sources decreased (-2.8%) compared to the same month of the previous year. Specifically, there was a decrease in wind production (-9.5%) and renewable hydroelectric production (-6.9%) and an increase in solar production (+9.3%).

In 2023 the operating capacity of renewables increased by 1,501 MW. This value is 820 MW higher (+120%) compared to the previous year.

The April 2023 total for withdrawal programmes on the DAM was approximately €2.9 billion, down 13% compared to the previous month and down 49% compared to April 2022.

In April 2023, the spread between average bid-up and bid-down prices on the MSD was €108/MWh, down compared to the previous month by 7% and 35% compared to April 2022. Total volumes increased compared to the previous month (+13%).

In April 2023, the spread between bid-up and bid-down prices on the Balancing Market was €186/MWh, up by 6% compared to the previous month (€175/MWh) and down compared to April 2022 (€266/MWh; -30%). Total volumes were down compared to the previous month (-11%).

Monthly Summary and Short-Term Analysis

In April, electricity demand was 23,361 GWh, a decrease compared to the same month of the previous year (-4.3%) and compared to April 2021 (-4.5%). There was also a sharp increase in foreign exchange (+41.3%), compared to the same month in 2022.
In 2023, electricity demand (100,780 GWh) increased compared to the same period in 2022 (-4.1%) and compared to the cumulative figure for 2021 (-2.2%).

Demand breakdown – coverage by sources

[GWh]	Apr 2023	Apr 2022	%23/22	Jan-Apr 23	Jan-Apr 22	%23/22
Renewable Hydro	1,581	1,698	-6.9%	6,901	7,054	-2.2%
Pumping Production(2)	168	176	-4.4%	576	639	-9.9%
Thermal	11,307	13,688	-17.4%	56,454	66,107	-14.6%
of which Biomass	*1,245*	*1,395*	*-10.7%*	*5,547*	*5,915*	*-6.2%*
of which Hard Coal	*202*	*1,366*	*-85.2%*	*6,245*	*6,242*	*0.0%*
Geothermal	442	457	-3.3%	1,756	1,845	-4.8%
Wind	2,165	2,391	-9.5%	8,791	9,228	-4.7%
Photovoltaic	3,105	2,842	9.3%	8,599	8,127	5.8%
Net Total Production	**18,768**	**21,252**	**-11.7%**	**83,077**	**93,000**	**-10.7%**
Pumping	**240**	**251**	**-4.4%**	**823**	**913**	**-9.9%**
Net Total Production for Consumption	**18,528**	**21,001**	**-11.8%**	**82,254**	**92,087**	**-10.7%**
of which RES (3)	*8,538*	*8,783*	*-2.8%*	*31,594*	*32,169*	*-1.8%*
of which not RES	*9,990*	*12,218*	*-18.2%*	*50,660*	*59,918*	*-15.5%*
Import	5,003	3,832	30.6%	19,469	14,658	32.8%
Export	170	412	-58.7%	943	1,686	-44.1%
Net Foreign Exchange	**4,833**	**3,420**	**41.3%**	**18,526**	**12,972**	**42.8%**
Electricity demand(1)	**23,361**	**24,421**	**-4.3%**	**100,780**	**105,059**	**-4.1%**

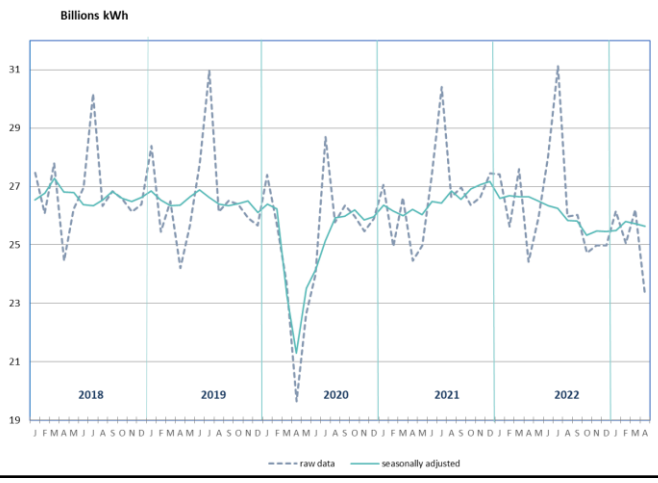
(1) Electricity Demand = Net Total Production for Consumption + Foreign Balance
(2) Pumping production is calculated assuming theoretical efficiency during the pumping phase
(3) RES Production = Renewable Hydro + Biomass + Geothermal + Wind + Photovoltaic

Source: Terna

In April 2023, thermal production was lower (-17.4%) compared to the same month in 2022.
This reduction is mainly due to a reduction in April 2023 of coal-fired plant production compared to the same period of 2022 (-85.2%). This reduction is justified by the lower competitiveness of these plants in 2023 compared to combined technology, also favoured by a general reduction in the DAM prices and by the higher prices of the CO^2.
There was also a reduction in wind production (-9.5%) and renewable hydroelectric production (-6,9%) and an increase in photovoltaic production (+9.3%) compared to the same month of the previous year.
In 2023 there was significant change in exports, which dropped (-44.1%) compared to 2022.
The trend of total net production allocated for consumption in April was down (-11.8%) compared to the same period in 2022.

The value of electricity demand was achieved with one less working day (18 vs 19) and with an average monthly temperature that was the same as April of last year. When adjusted for seasonal and calendar effects, the figure represents a -3.8% variation.
In the first four months of the year, national demand decreased by 4.1% compared to the corresponding period in 2022 (-3.7% adjusted value). The monthly data for April 2023 electricity demand, adjusted for seasonal and calendar effects, was essentially stable compared to March 2023 (-0.4%). The first four months of 2023 showed an increased of 0.6% compared to the last four months of 2022.

Demand – seasonality adjusted



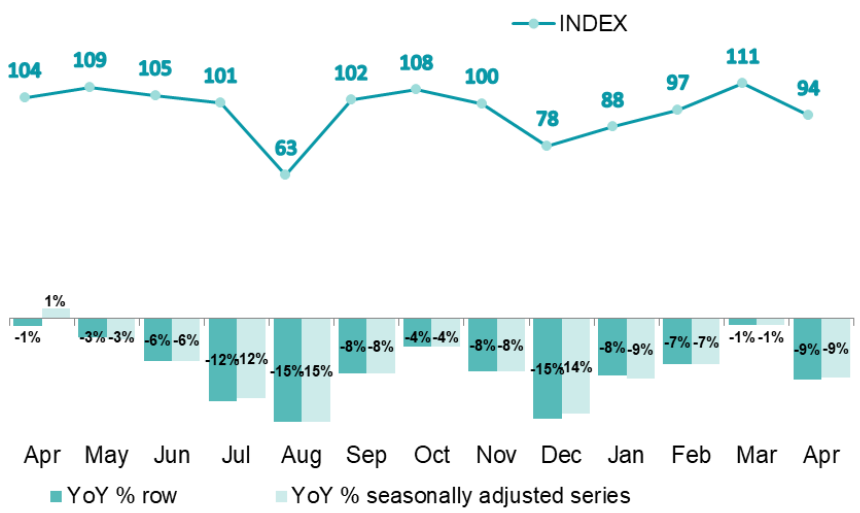
Source: Terna

The value, adjusted for seasonal, calendar and temperature effects, shows stable cyclical change (-0.4%)

IMCEI

The trend for April 2023 (compared to April 2022) was down by 9.1% based on raw data. Using data adjusted for calendar differences, the change is -8.7%. In the first four months of 2023, industrial electricity consumption decreased by 6.2% compared to the same period in 2022.

IMCEI short-term analysis (2015 base = 100)

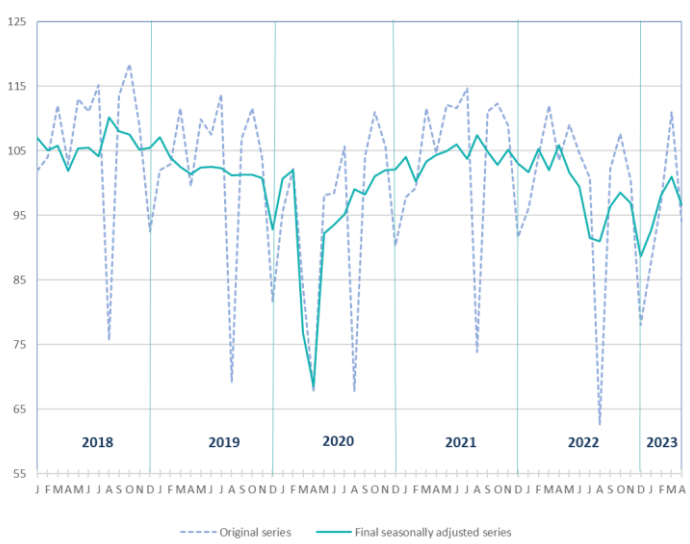


In April, the change in the monthly index of Italian electricity consumption decreased by 9.1% compared to April 2022

Source: Terna

The short-term data adjusted for seasonal and calendar effects for the industrial electricity consumption index decreased by 4.3% in April 2023 compared to March. The first four months of 2023 showed an increase of 2.1% compared to the last four months of 2022.

Monthly Industrial Electrical Consumption Index - IMCEI (2015 base = 100)



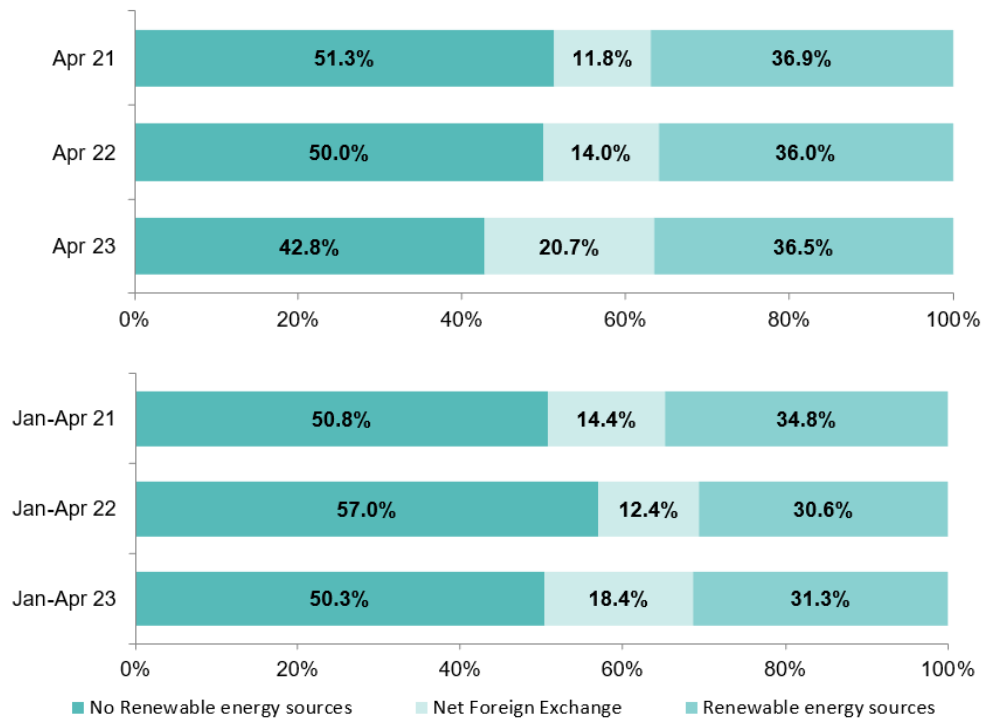
When adjusted for seasonal and calendar effects, the figure for April 2023 is down 4.3% compared to the previous month

Source: Terna

Energy Demand Mix

In April 2023, 42.8% of the electricity demand was met via production from Non-Renewable Energy Sources, 36.5% via Renewable Energy Sources and the remainder via foreign exchange.
In 2023, electricity demand was 100,780 GWh, 50.3% of which was met via production from Non-Renewable Energy Sources, 31.3% from Renewable Energy Sources and the remainder from the foreign balance.

Demand breakdown – coverage by sources

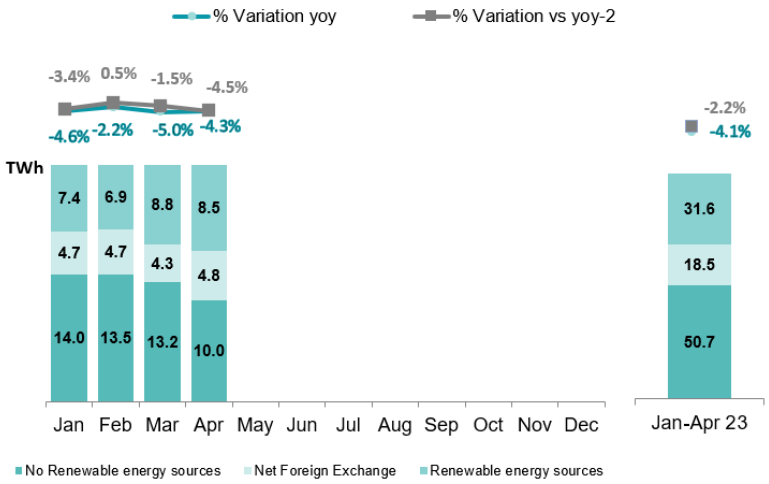


Coverage of demand from renewable sources grew slightly from 36.0% in April 2022 to 36.5% in April 2023

In 2023 coverage of demand from non-renewables fell from 57.0% in 2022 to 50.3% in 2023

Source: Terna

2023 trend in demand breakdown and difference from 2022 and 2021



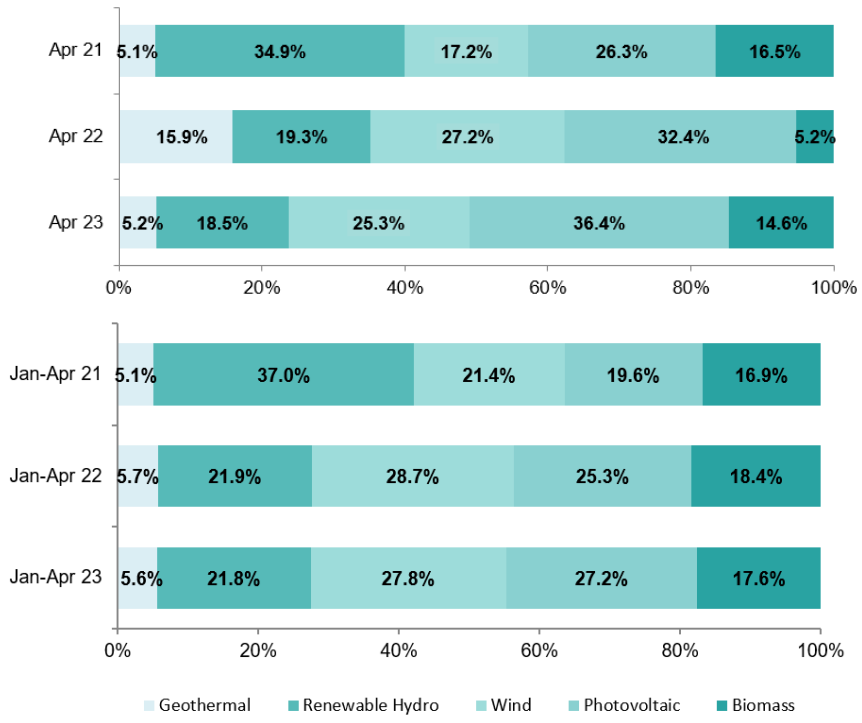
In 2023, electricity demand on the grid is lower than 2022 (-4.1%) and down compared to the cumulative figure for 2021 (-2.2%). In 2023, energy production from renewable sources totalled 31.6 TWh, down compared to 2022 (-1.8%).

Source: Terna

Details of Renewable Energy Sources

In April, production from Renewable Energy Sources decreased (-2.8%) compared to the same month of the previous year. Specifically, there was a decrease in wind production (-9.5%) and renewable hydroelectric production (-6.9%) and an increase in solar production (+9.3%).

RES Production - Breakdown

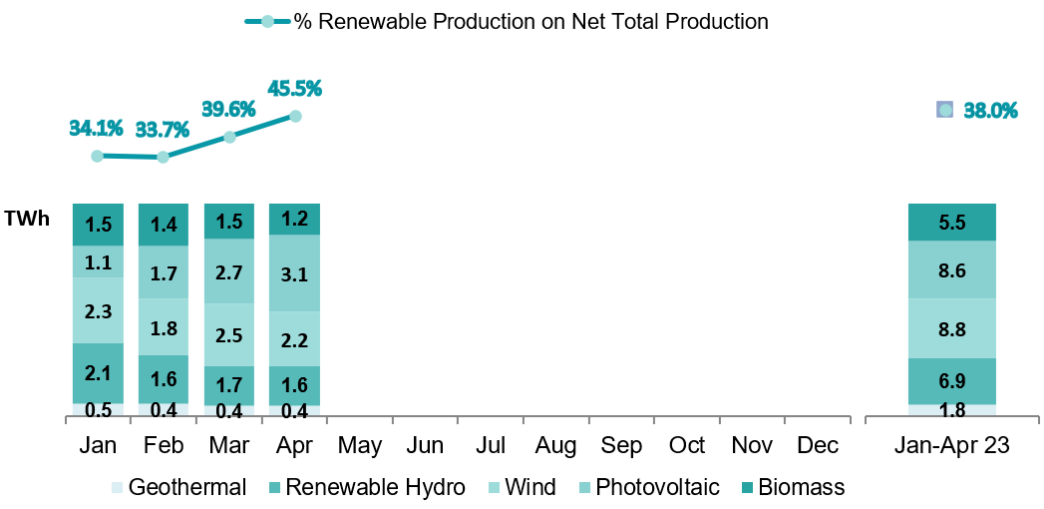


In April 2023, the greater contribution of renewable energy sources to total production is attributed to photovoltaic production (36.4%) and wind production (25.3%).

In 2023, the contribution from photovoltaic production increased, while the contribution from the other sources decreased compared to 2022.

Source: Terna

2023 trend in net production from RES and difference from 2022



In April 2023, production from RES represented 45.5% of total net national production, an increase compared to the same month in 2022 (41.3%). In 2023, production from RES represented 38.0% of total net national production, an increase compared to the cumulative figure for 2022 (34.6%).

Source: Terna

Historical Energy Balance Sheets

In 2023, total net production allocated for consumption (82,254 GWh) met 81.6% of national electricity demand (100,780 GWh).

2023 Historical Monthly Energy Balance Sheet

[GWh]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Renewable Hydro	2,082	1,581	1,658	1,581									6,901
Pumping Production (2)	137	99	172	168									576
Thermal	15,569	14,866	14,712	11,307									56,454
of which Biomass	*1,463*	*1,368*	*1,471*	*1,245*									*5,547*
of which Hard Coal	*2,295*	*1,868*	*1,881*	*202*									*6,245*
Geothermal	458	414	442	442									1,756
Wind	2,277	1,802	2,547	2,165									8,791
Photovoltaic	1,095	1,734	2,665	3,105									8,599
Net Total Production	**21,617**	**20,496**	**22,196**	**18,768**									**83,077**
Pumping	**195**	**142**	**246**	**240**									**823**
Net Total Production for Consumption	**21,422**	**20,354**	**21,950**	**18,528**									**82,254**
of which RES (3)	*7,374*	*6,898*	*8,783*	*8,538*									*31,594*
of which not RES	*14,048*	*13,456*	*13,167*	*9,990*									*50,660*
Import	5,080	4,941	4,445	5,003									19,469
Export	352	233	188	170									943
Net Foreign Exchange	**4,728**	**4,708**	**4,257**	**4,833**									**18,526**
Electricity demand (1)	**26,150**	**25,062**	**26,207**	**23,361**									**100,780**

Source: Terna

In 2023, net total production was down (-10.7%) compared to the same period in 2022, and peak electricity demand was reached in March, with 26,207 GWh.

The developments in the monthly balance sheet for 2022 are provided below.

2022 Historical Monthly Energy Balance Sheet

[GWh]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Renewable Hydro	2,335	1,562	1,459	1,698	3,140	3,405	3,357	2,609	2,067	1,785	2,243	2,299	27,959
Pumping Production (2)	117	165	181	176	146	102	165	156	158	148	139	122	1,773
Thermal	18,298	16,210	17,911	13,688	13,608	15,813	18,138	15,857	15,859	15,853	14,986	17,066	193,287
of which Biomass	*1,537*	*1,435*	*1,548*	*1,395*	*1,404*	*1,361*	*1,429*	*1,440*	*1,362*	*1,401*	*1,397*	*1,412*	*17,120*
of which Hard Coal	*1,315*	*1,729*	*1,833*	*1,366*	*1,566*	*1,827*	*2,130*	*1,547*	*1,861*	*1,774*	*1,659*	*2,161*	*20,768*
Geothermal	479	435	474	457	461	429	454	456	440	457	442	460	5,444
Wind	2,544	2,261	2,032	2,391	1,132	1,281	1,027	1,211	1,724	1,080	1,955	1,720	20,358
Photovoltaic	1,272	1,697	2,316	2,842	3,097	3,216	3,471	3,127	2,402	2,087	1,207	818	27,552
Net Total Production	**25,045**	**22,330**	**24,373**	**21,252**	**21,584**	**24,245**	**26,611**	**23,416**	**22,650**	**21,410**	**20,972**	**22,485**	**276,373**
Pumping	**167**	**236**	**259**	**251**	**208**	**145**	**235**	**223**	**226**	**211**	**198**	**174**	**2,533**
Net Total Production for Consumption	**24,878**	**22,094**	**24,114**	**21,001**	**21,376**	**24,100**	**26,376**	**23,193**	**22,424**	**21,199**	**20,774**	**22,311**	**273,840**
of which RES (3)	*8,167*	*7,390*	*7,829*	*8,783*	*9,234*	*9,692*	*9,737*	*8,843*	*7,995*	*6,810*	*7,244*	*6,709*	*98,433*
of which not RES	*16,711*	*14,704*	*16,285*	*12,218*	*12,142*	*14,409*	*16,639*	*14,350*	*14,429*	*14,389*	*13,530*	*15,602*	*175,407*
Import	3,184	3,923	3,719	3,832	4,774	4,064	4,956	3,159	3,897	4,008	4,552	3,323	47,391
Export	643	392	239	412	214	159	211	371	289	474	339	661	4,404
Net Foreign Exchange	**2,541**	**3,531**	**3,480**	**3,420**	**4,560**	**3,905**	**4,745**	**2,788**	**3,608**	**3,534**	**4,213**	**2,662**	**42,987**
Electricity demand (1)	**27,419**	**25,625**	**27,594**	**24,421**	**25,936**	**28,005**	**31,121**	**25,981**	**26,032**	**24,733**	**24,987**	**24,973**	**316,827**

Source: Terna

In 2022, the month with the highest demand for electricity was July, with 31,121 GWh.

(1) Electricity Demand = Net Total Production for Consumption + Foreign Balance
(2) Pumping production is calculated assuming theoretical efficiency during the pumping phase
(3) RES Production = Renewable Hydro + Biomass + Geothermal + Wind + Photovoltaic

Demand by Operational Area

In April 2023, there was a decrease in demand in the Northern zone (TO, MI, VE), the Centre (RM, FI), the Southern zone (NA) and an increase in demand on the Islands (PA, CA) compared to the same period of the previous year.

Demand by Operational Area

[GWh]	Turin	Milan	Venice	Florence	Rome	Naples	Palermo	Cagliari
April 2023	2,320	4,978	3,588	3,609	3,388	3,371	1,456	651
April 2022	2,473	5,303	3,803	3,857	3,472	3,464	1,362	687
% April 23/22	-6.2%	-6.1%	-5.7%	-6.4%	-2.4%	-2.7%	6.9%	-5.2%
Cumulated 2023	10,322	21,585	15,674	15,673	14,216	14,494	6,034	2,782
Cumulated 2022	10,745	22,689	16,451	16,504	14,681	15,095	6,036	2,858
% Cumulated 23/22	-3.9%	-4.9%	-4.7%	-5.0%	-3.2%	-4.0%	0.0%	-2.7%

Source: Terna

In 2023, the Y-o-Y percentage change in demand was -4.6% in the North, -4.2% in the Centre, -4,0% in the South and -0,9% on the Islands.

Demand by Operational Area – 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 - April
- NAPLES: Campania - Apulia - Basilicata - Calabria
- PALERMO: Sicily
- CAGLIARI: Sardinia

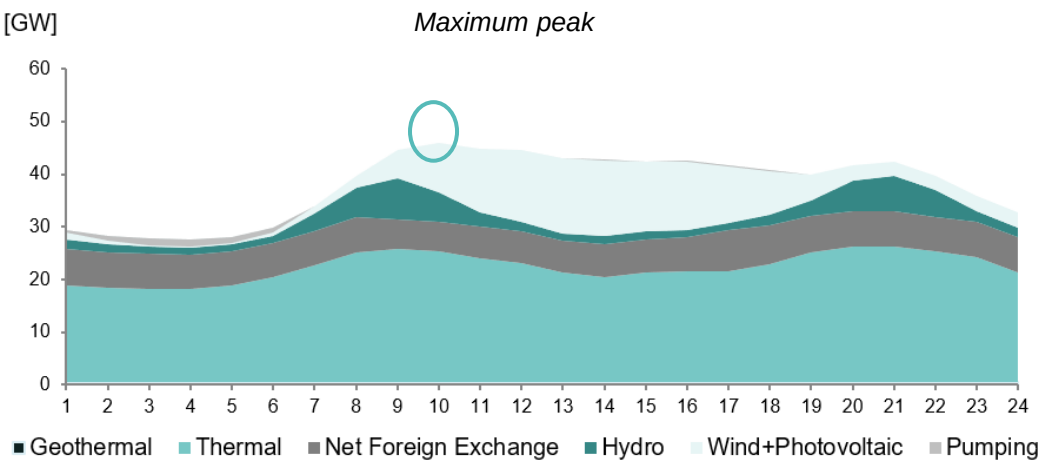
Source: Terna

(*) 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 April 2023, Peak Demand was recorded on **Wednesday 05 April, 09:00-10:00** and was 45,975 MW (+0.1% Y-o-Y). The hourly demand diagram of the peak day is presented below.

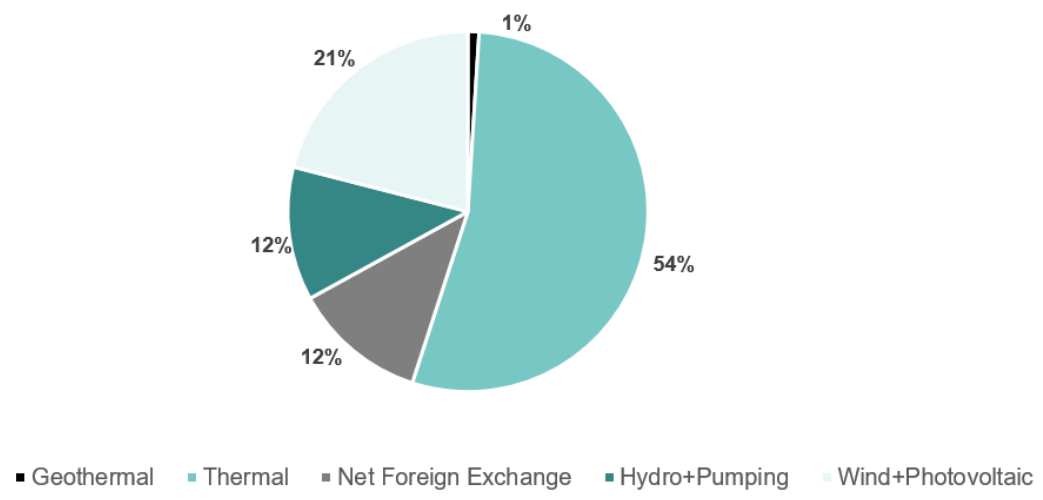
Peak Demand



At peak, the contribution from thermal production was 24,690 MW, down (-1.4%) compared to the contribution from thermal production at the April 2022 peak (25,046 MW).

Source: Terna

Coverage of demand – 05 April 2023 09:00-10:00



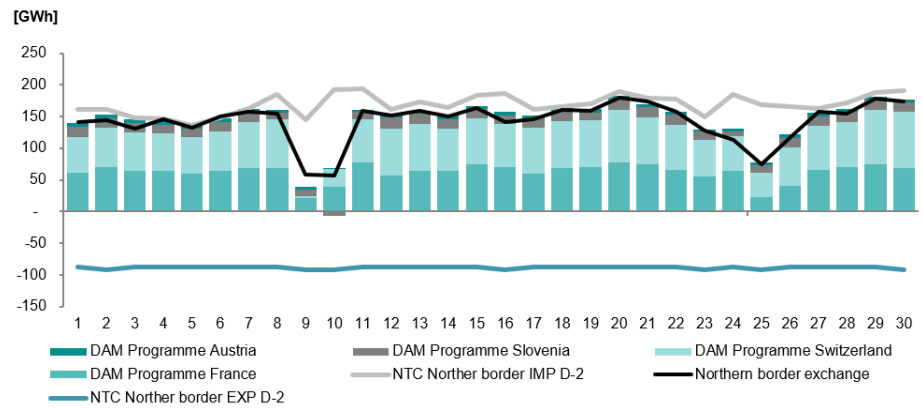
At its peak, production from wind and photovoltaic sources contributed to covering 21% of demand, with thermal production covering 54% and foreign exchange covering 12%.

Source: Terna

Net Foreign Exchange – April 2023

In April, there was generally high saturation of the planned figure for imported NTC compared to the exchange programmes on the northern border.

Net Foreign Exchange on the Northern border



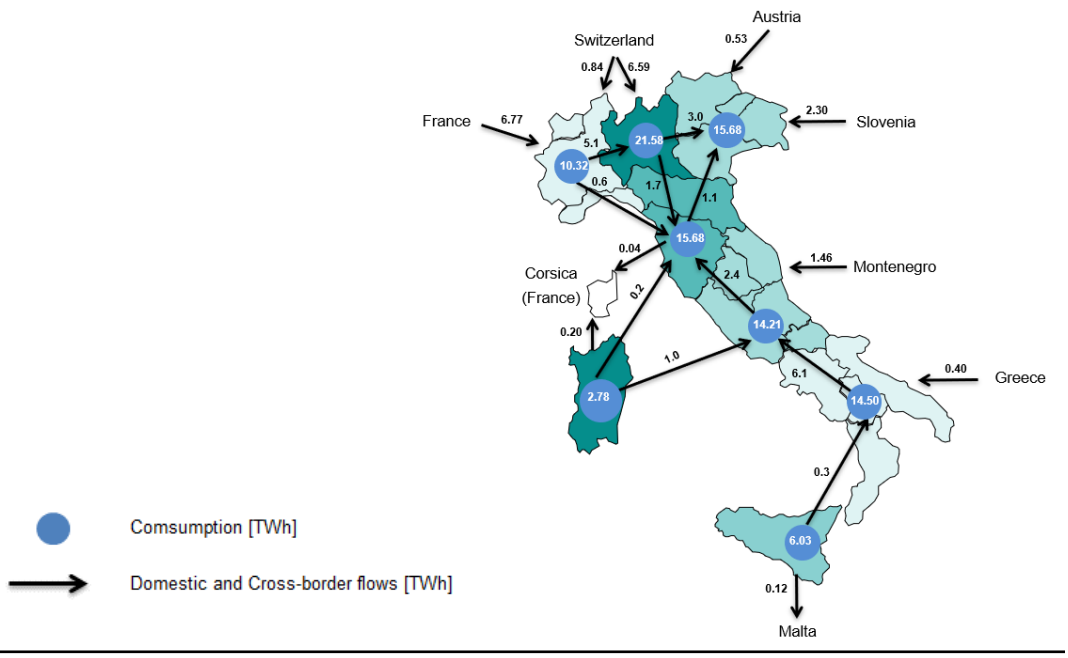
In April 2023, imports increased Y-o-Y (+30.6%), amounting to 5,003 GWh, and exports decreased Y-o-Y (-58.7%), amounting to 170 GWh.

Source: Terna

Balance of Physical Exchanges – Annual Cumulative Figure

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

Balance of physical electricity exchanges: map



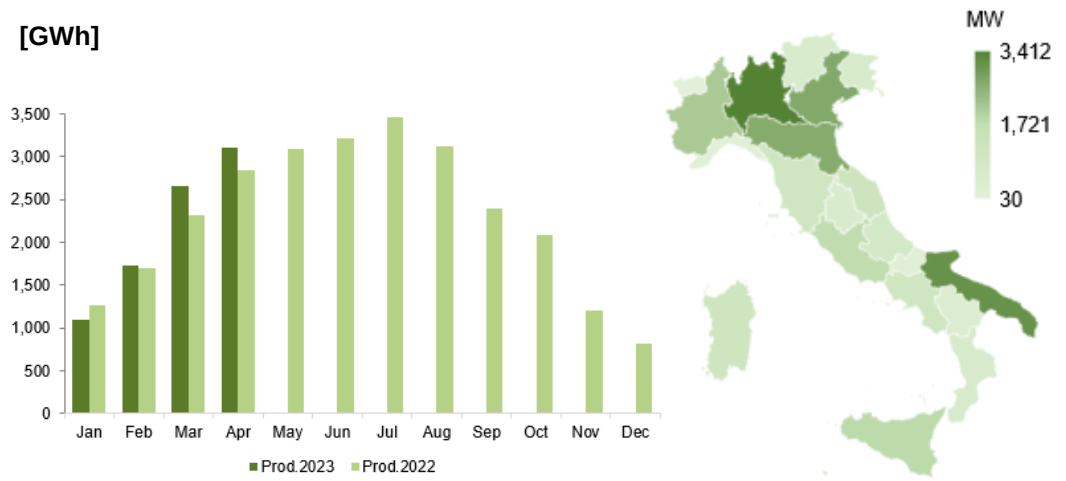
In 2023, a net exchange was recorded from the Northern zone to Emilia Romagna and Tuscany of 1.2 TWh. Sicily recorded a net exchange towards the mainland of 0.3 TWh.

Source: Terna

Production and Installed Capacity

Energy produced from photovoltaic sources in April 2023 reached 3,105 GWh, an increase compared to the same month of the previous year (+263 GWh).

Photovoltaic production (left) and distribution of operating capacity[1] (right)



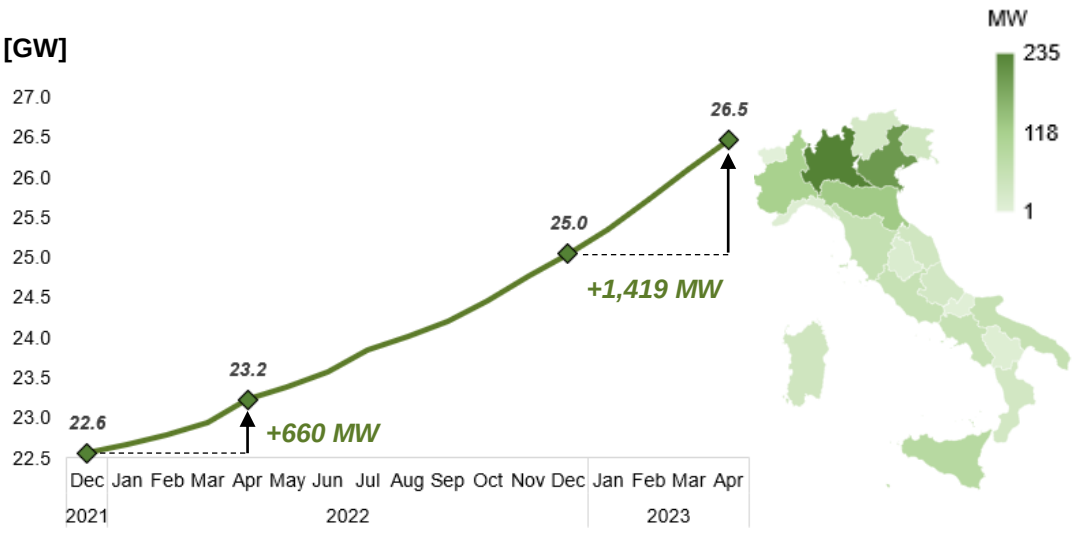
1. The operating capacity takes into account new activations, upgrades and decommissioning of plants

Source: Terna

Production from photovoltaic sources increased compared to the same month of the previous year (+9.3%)

In the first four months of 2023, operating capacity increased by 1,418 MW. During the same period of 2022 the increase was 660 MW, recording an increase of 758 MW (+115%).

Cumulative operating capacity (left) and distribution of new activations 2023 (right)

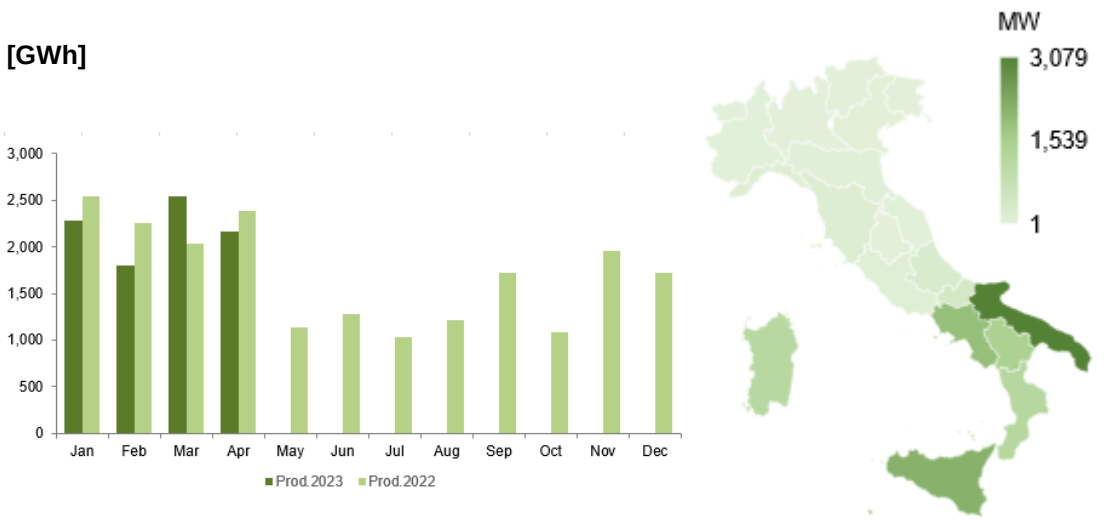


Source: Terna

The region with the greatest increase is Lombardy with 235 MW, followed by Veneto (+201 MW) and Emilia Romagna (+128 MW)

Energy produced from wind production sources in April 2023 reached 2,165 GWh, down compared to the same month of the previous year (-226 GWh).

Wind production (left) and distribution of operating capacity[1] (right)



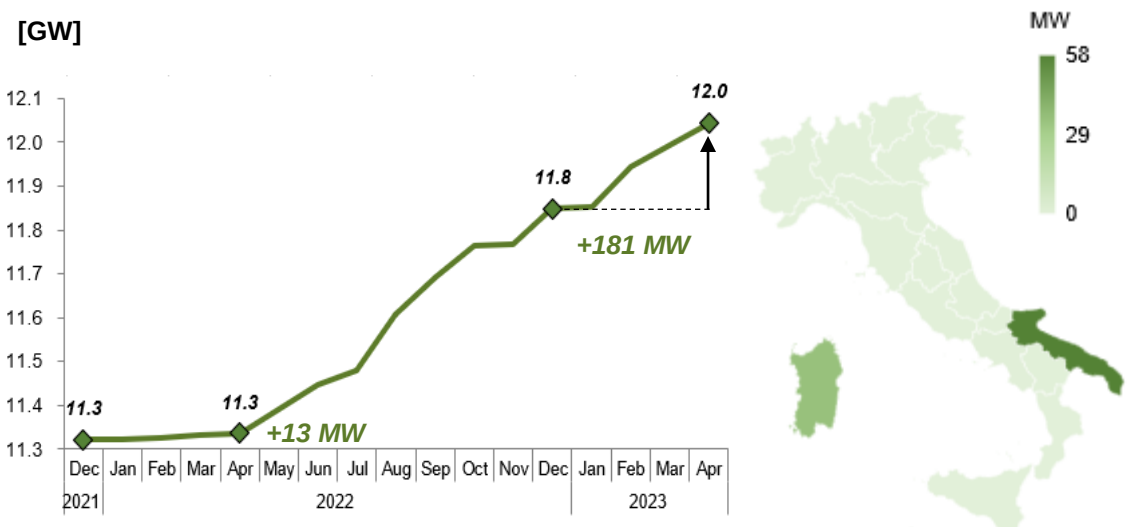
Production from wind sources decreased compared to the same month of the previous year (-9.5%)

1. The operating capacity takes into account new activations, upgrades and decommissioning of plants

Source: Terna

In the first four months of 2023, operating capacity increased by 195 MW. During the same period of 2022 the increase was 13 MW, recording an increase of 182 MW (+1400%).

Cumulative operating capacity (left) and distribution of new activations 2023 (right)

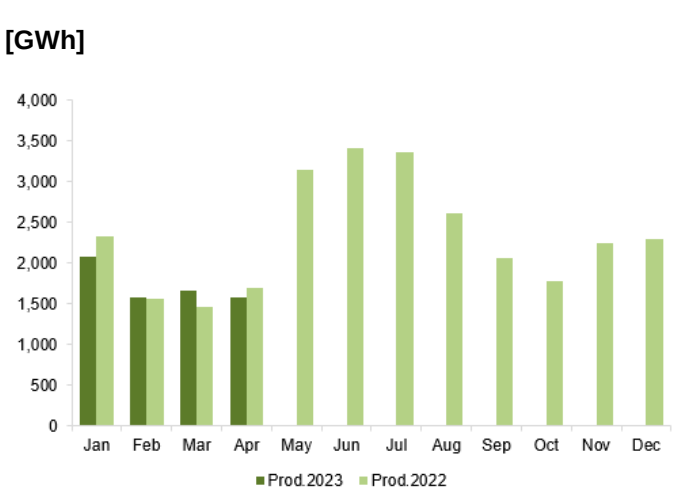


The region with the greatest increase is Apulia with 79 MW, followed by Sardinia (+35 MW) and Campania (+29 MW)

Source: Terna

Energy produced from renewable hydroelectric production sources in April 2023 reached 1,581 GWh, down compared to the same month of the previous year (-117 GWh).

Renewable hydroelectric production (left) and distribution of operating capacity[1] (right)



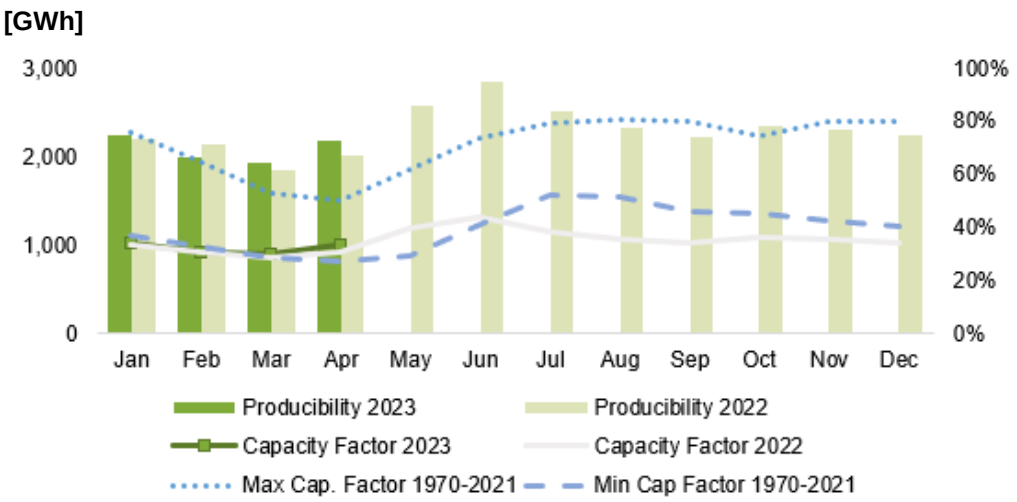
Production from renewable hydroelectric production sources decreased compared to the same month of the previous year (-6.9%)

1. The operating capacity takes into account new activations, upgrades and decommissioning of plants.

Source: Terna

In April, hydroelectric producibility grew (+8.3%) compared to the same month of the previous year.

Hydroelectric Producibility and Reservoir Percentage



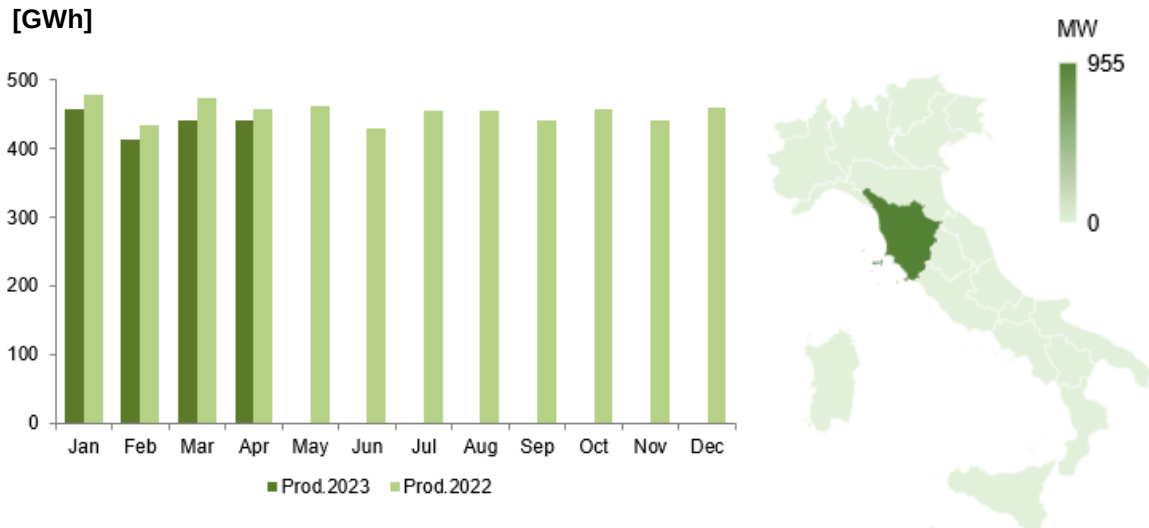
In April 2023, considering Italy as a whole, the ratio between the reservoir and the maximum reservoir capacity was 33.3%, up compared to the same month in 2022 (30.8%).

	Reservoir Capacity	NORTH	CENTRE SOUTH	ISLANDS	TOTAL
Apr 22 Apr 23	[GWh]	908	1,057	209	2,174
	% (capacity/max capacity)	21.0%	58.3%	54.9%	33.3%
	[GWh]	712	1.018	279	2.009
	% (capacity/max capacity)	16.5%	56.1%	73.3%	30.8%

Source: Terna

Energy produced from geothermal production sources in April 2023 reached 442 GWh, down compared to the same month of the previous year (-15 GWh).

Geothermal production (left) and distribution of operating capacity[1] (right)



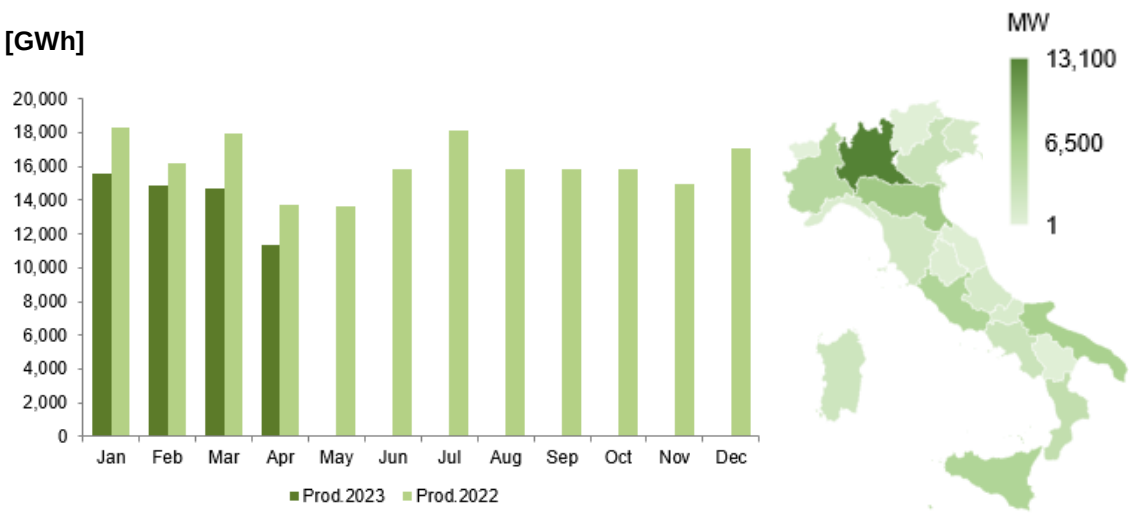
Production from geothermal sources decreased (-3.3%) compared to the same month of the previous year

1. The operating capacity takes into account new activations, upgrades and decommissioning of plants

Source: Terna

Energy produced from thermal production sources in April 2023 reached 11,307 GWh, down compared to the same month of the previous year (-2,381 GWh).

Thermal production (left) and distribution of operating capacity[1] (right)



Production from thermal sources decreased (-17.4%) compared to the same month of the previous year

1. The operating capacity takes into account new activations, upgrades and decommissioning of plants

Source: Terna

In 2023 the operating capacity of renewables increased by 1,501 MW. This value is 820 MW higher (+120%) compared to the previous year.

Variation in monthly operating capacity and number of plants per Source in Italy 2023[1]

[MW]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Photovoltaic	296	376	386	360									1,418
Wind	4	93	48	50									195
Hydroelectric	1	2	-111[2]	1									-107
Geothermal & Biomass	-4	0	1	-2									-5
Total	**297**	**471**	**324**	**409**									**1,501**

Number of Plants	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Photovoltaic	29,651	35,807	37,586	30,690									133,734
Wind	0	17	7	3									27
Hydroelectric	6	3	8	3									20
Geothermal & Biomass	2	7	3	6									18
Total	**29,659**	**35,834**	**37,604**	**30,702**									**133,799**

Source: Terna

The evolution of operational capacity by source in 2022 is shown below.

Variation in monthly operating capacity and number of plants per Source in Italy 2022[1]

[MW]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Photovoltaic	106	117	155	282	163	189	269	171	186	257	299	287	**2.482**
Wind	1	1	7	5	57	53	34	129	83	72	3	82	**526**
Hydroelectric	3	2	-3	4	-6	3	2	-5	5	11	12	3	**31**
Geothermal & Biomass	0	1	0	1	-5	0	0	1	0	3	1	-4	**-2**
Total	**110**	**121**	**159**	**292**	**210**	**245**	**305**	**296**	**274**	**343**	**314**	**368**	**3,037**

Number of Plants	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Photovoltaic	9,003	10,033	13,394	10,489	14,371	14,661	15,667	15,616	18,901	26,003	28,514	**29,154**	**205,806**
Wind	6	6	18	10	7	19	18	14	18	76	6	**10**	**208**
Hydroelectric	14	6	12	10	8	12	7	7	13	33	11	**10**	**143**
Geothermal & Biomass	3	4	0	7	-3	6	2	5	6	6	5	**2**	**43**
Total	**9,026**	**10,049**	**13,424**	**10,516**	**14,383**	**14,698**	**15,694**	**15,642**	**18,938**	**26,118**	**28,536**	**29,176**	**206,200**

Source: Terna

1. *The operating capacity and the number of plants take into account new activations, upgrades and decommissioning of plants*
2. *The decrease in renewable hydroelectric capacity is due to a change in the master data on the technical sub-type of a plant, changed from mixed pumping (Renewable) to pure pumping (Non-Renewable). Therefore, the plant has not been decommissioned, but excluded from renewables*

Commodities – Spot Market

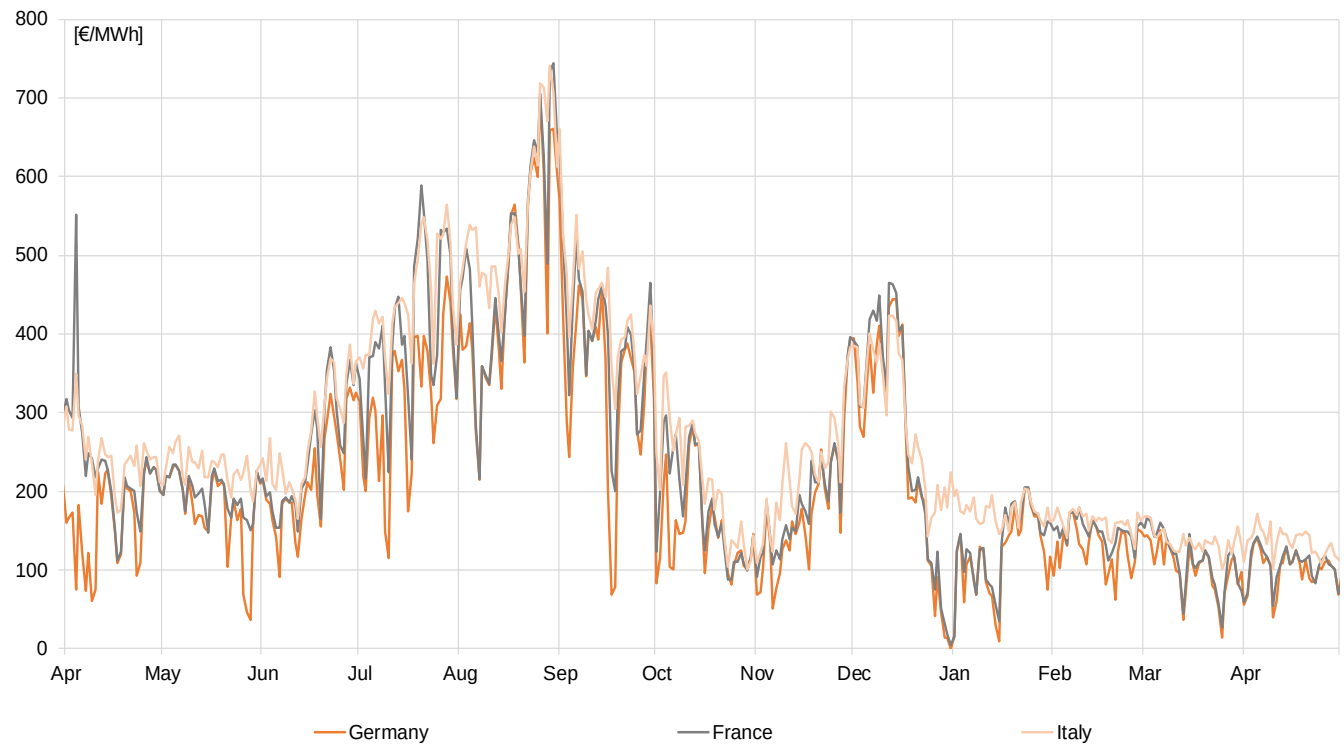
In April, Brent prices increased compared to March, recording an average value of $83.8/bbl (6.8%).

Coal prices (API2) stood at $137.8/t, an increase compared to the previous month (2.2%).

Gas prices in Europe (TTF) decreased in April to a monthly average of €43.7/MWh (-2.1% compared to the previous month). The PSV was substantially consistent and settled at €46.2/MWh (-0.2%).

Electricity prices in Italy fell in April compared to the previous month, with a monthly average of €135.0/MWh (-1.0%). The French power exchange was down, with the price of electricity at €106.4/MWh (-5.0%), as did the German exchange, priced at €100.8/MWh (-1.7%).

Spot electricity prices



Source: Terna calculation on GME and EPEX data

Gas & Oil spot prices

Monthly average change PSV-TTF = +€2.5/MWh

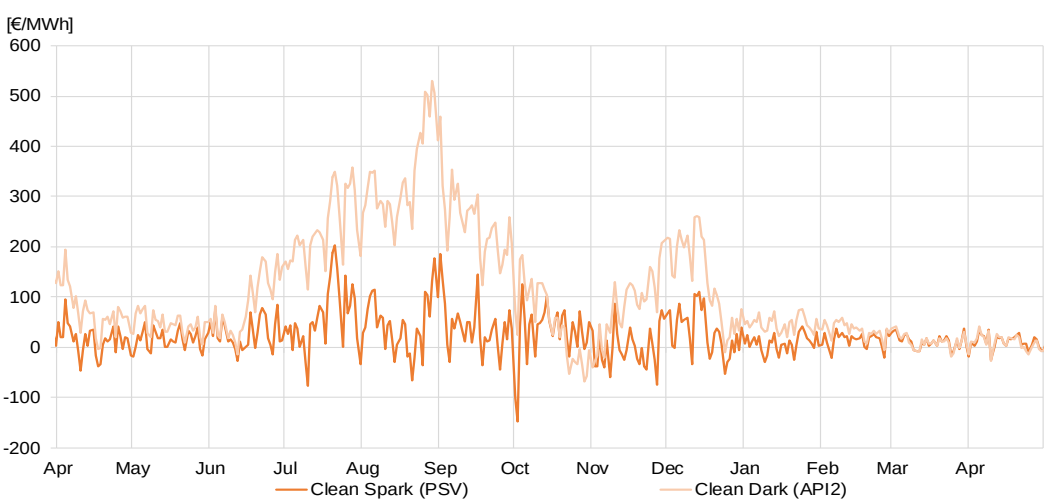
Source: Terna calculation on Bloomberg data

Coal & Carbon spot prices

Monthly average change API2-API4 = +$7.6/t

Source: Terna calculation on Bloomberg data

Clean Dark & Spark spreads Italy



Clean spark spread PSV monthly average = +€10.8/MWh

Clean dark spread API2 monthly average = +€9.8/MWh

Source: Terna calculation on Bloomberg data

Commodities – Forward Market

In April, Brent forward prices recorded an average value of $80.3/bbl, up compared to March (4.6%).

The average forward prices of coal (API2) were up compared to March, settling at around $136.5/t (1.2%).

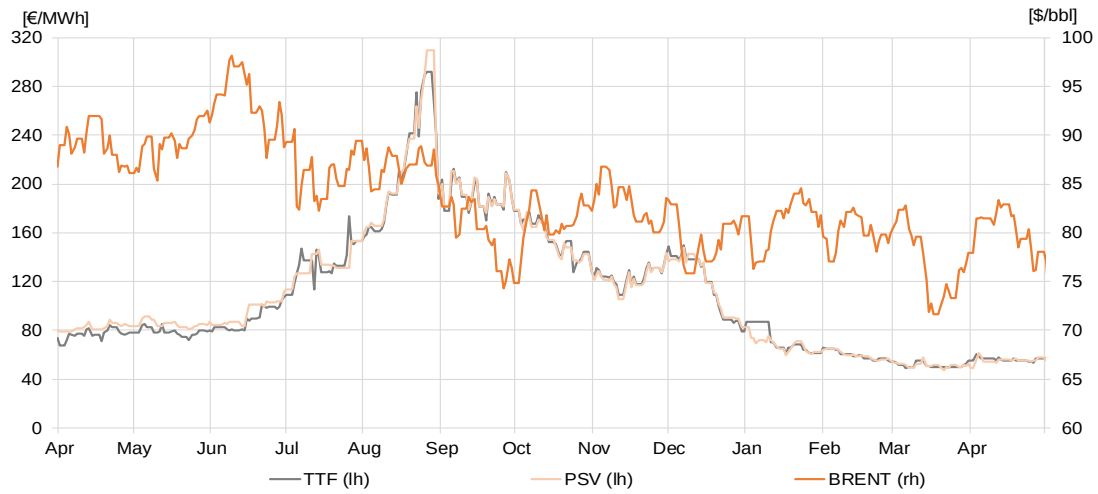
Forward prices of gas in Europe (TTF) were up compared to the previous month (9.1%), settling at around €56.1/MWh. Forward prices in Italy (PSV) were also up, which showed an average figure of €55.9/MWh (9.6%).

The average forward prices of electricity in Italy stood at around €161.2/MWh, up compared to the previous month (8.7%). The German stock exchange followed the same upward trend, where the price was €148.1/MWh (5.7%), as did the French stock exchange, where the price was around €212.9/MWh (17.0%).

Forward Electricity Prices – Year+1

Source: Terna calculation on Bloomberg data

Year+1 Forward Gas & Oil Prices



Monthly average change PSV-TTF = €0.2/MWh

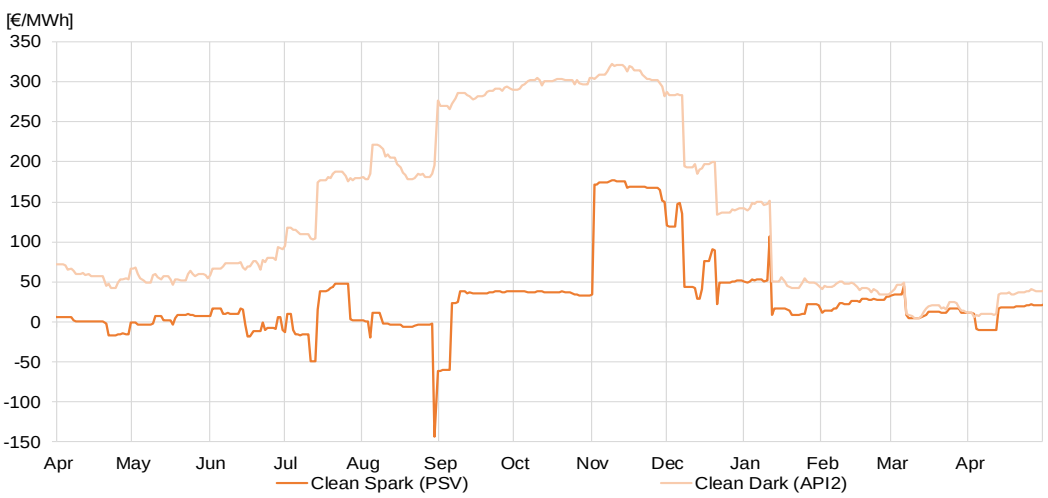
Source: Terna calculation on Bloomberg data

Year+1 Forward Coal & Carbon Prices

Monthly average change API2-API4 = -$1.3/t

Source: Terna calculation on Bloomberg data

Clean Year+1 Forward Dark & Spark spreads Italy



Clean spark spread PSV monthly average = +€10.0/MWh

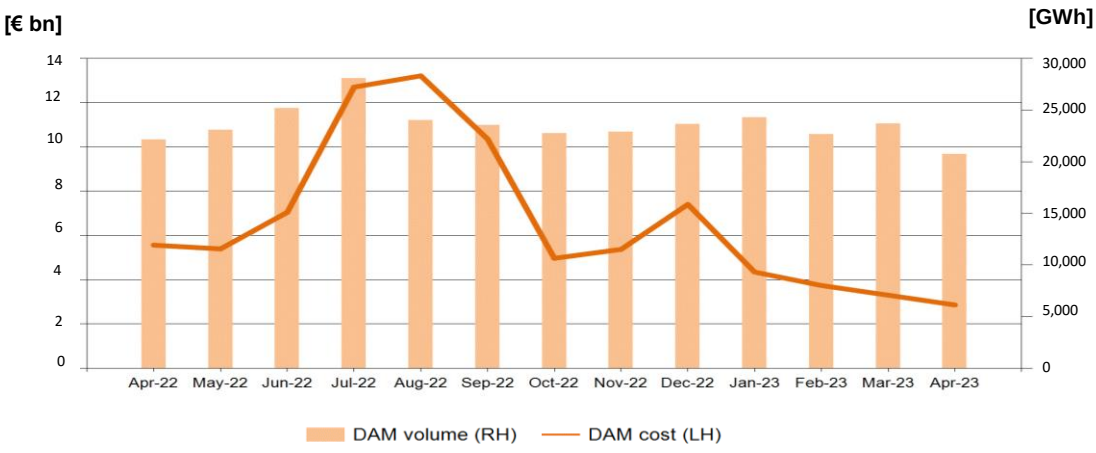
Clean dark spread API2 monthly average = +€26.0/MWh

Source: Terna calculation on Bloomberg data

Day-Ahead Market

The April 2023 total for withdrawal programmes on the DAM was approximately €2.9 billion, down 13% compared to the previous month and down 49% compared to April 2022.
The decrease compared to March is due to a drop in average PUN and demand, while the decrease compared to the previous year is mainly due to a drop in average PUN from €246/MWh (April 2022) to €135/MWh (April 2023).

Day Ahead Market – amounts and volumes

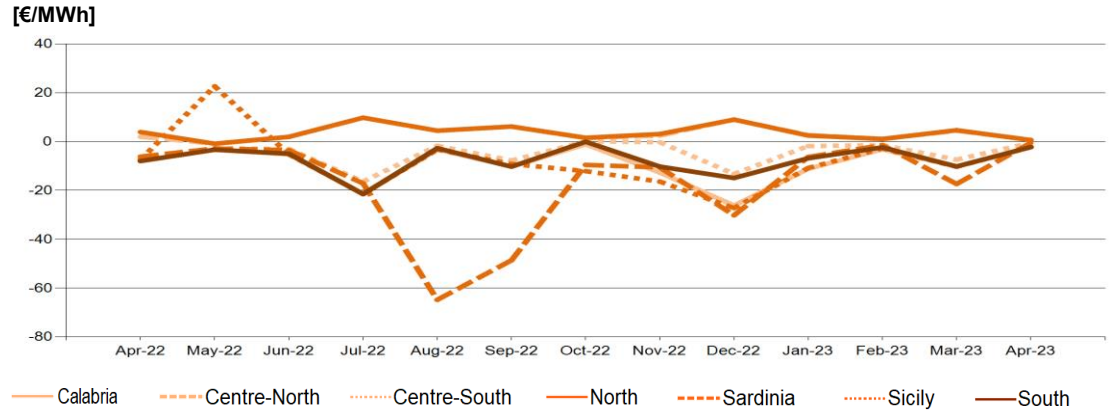


Total amount in April 2023 down by 49% compared to April 2022

Source: Terna calculation on GME data

In April, the zonal prices were essentially in line with the PUN. In particular, the zones — Sicily, Sardinia, South, Centre-South and Calabria — saw an average spread of -€1.6/MWh while the Northern zones and the Centre-North saw an average spread of +€0.7/MWh.

Spread compared to the PUN



April 2023 zonal prices in line with the PUN

Source: Terna calculation on GME data

The spread between the peak and off-peak prices in April 2023 was, on average, equal to €3.2/MWh. This spread was, on average, €15/MWh in the North, Centre-North and Centre-South and equal to -€5.6/MWh in the South, Calabria, Sicily and Sardinia.

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

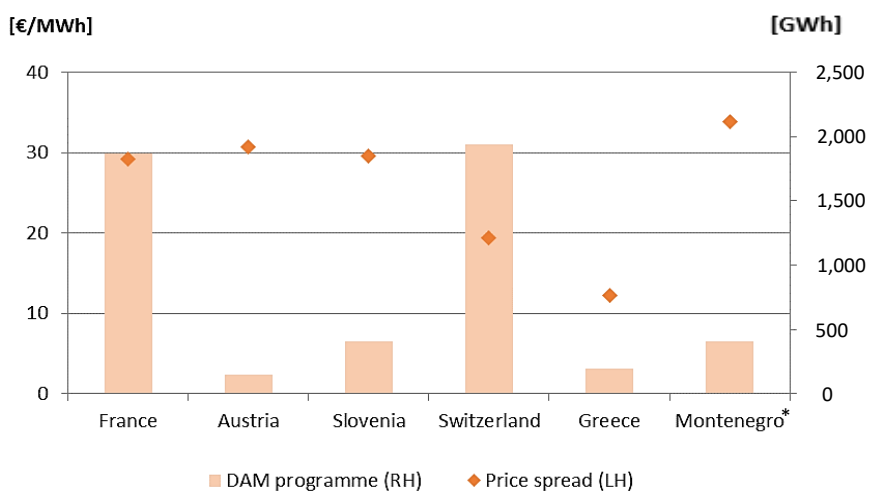
€/MWh	PUN	North	Centre-North	Centre-South	South	Sicily	Sardinia	Calabria
Average	135	135.6	135.7	134.4	132.7	132.7	134.4	132.7
Y-o-Y	-111	-114.3	-112.2	-105.3	-105.3	-105.9	-105.3	-105.3
Δ vs PUN	-	0.6	0.7	-0.5	-2.3	-2.3	-0.5	-2.3
Δ vs PUN 2021	-	3.9	1.9	-6.2	-8	-7.4	-6.2	-8
Peak	140.1	142	141.8	138.6	133	132.9	138.6	132.9
Off-Peak	132.8	132.8	133.1	132.7	132.6	132.6	132.7	132.6
Δ Peak vs Off-Peak	7.30	9.20	8.70	5.90	0.40	0.30	5.90	0.30
Minimum	10	10	10	10	10	10	10	10
Maximum	260	260	260	260	260	260	260	260

Source: Terna calculation on GME data

Peak-off peak spread down compared to the previous month across all zones

April 2023 saw an increase in price spreads on the northern border compared to the previous month. Imports totalled 5.1 TWh, up compared to the previous month (+13%), with France accounting for 37% of the total and Switzerland 39%. Total exports were 0.12 TWh, with Greece accounting for 31%.

Price spread with foreign exchanges and day ahead programmes



Net imports on the northern border of 4.4 TWh

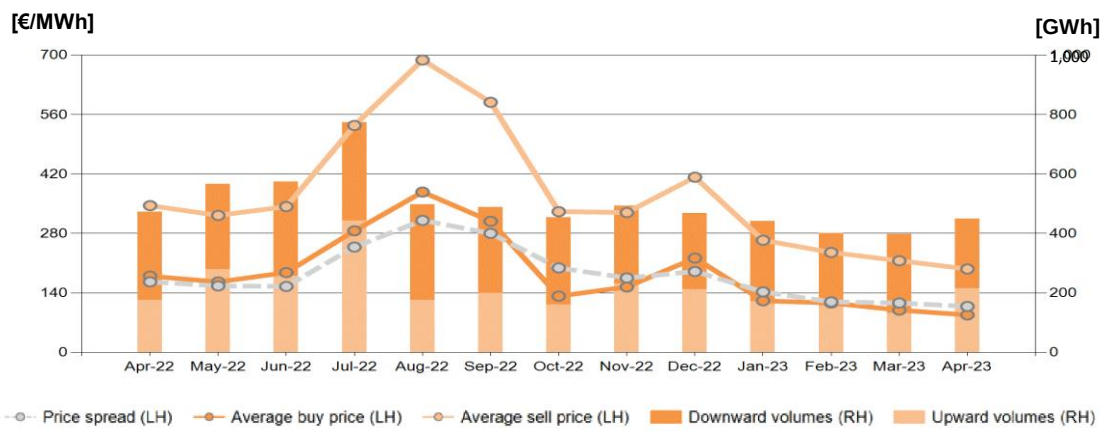
Source: Terna calculation

*From 26 April 2023, launch of the Day Ahead Market in Montenegro, with delivery date 27 April 2023

Ex-ante Ancillary Services Market

In April 2023, the spread between average bid-up and bid-down prices was €108/MWh, down compared to the previous month by 7% and 35% compared to April 2022. Total volumes increased compared to the previous month (+13%), in particular, upward volumes increased by 61% and downward volumes fell by 12%.
Upward volumes increased by 22%, while downward volumes fell by 21% compared to the same month of the previous year.

Ex-ante Ancillary Services - prices and volumes

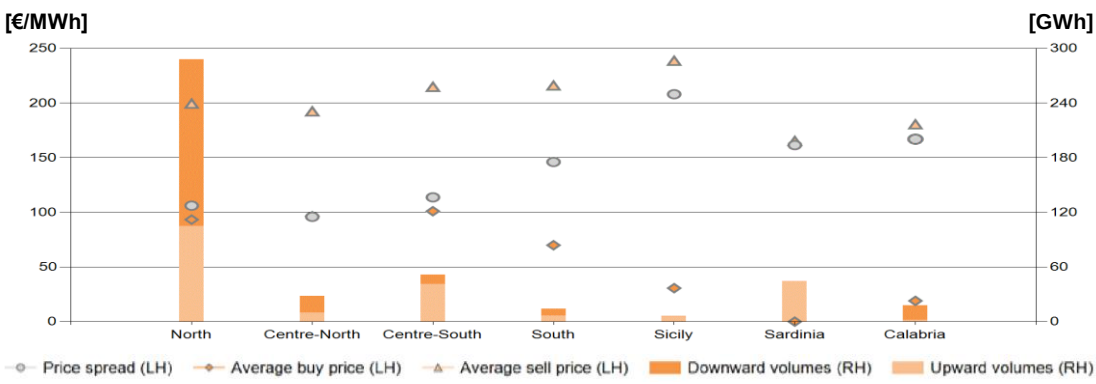


Average bid-up price in April 2023 of €196/MWh
Average bid-down price in April 2023 of €88/MWh

Source: Terna

The market zone characterised by the highest spread (€208/MWh) is Sicily.
This spread recorded a 369% increase compared to the previous month, due to a decrease in the average bid-up price of 6% (from €254/MWh in March to €239/MWh in April) and also due to the average bid-down price of 85% (from €210/MWh in March to €31/MWh in April).

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



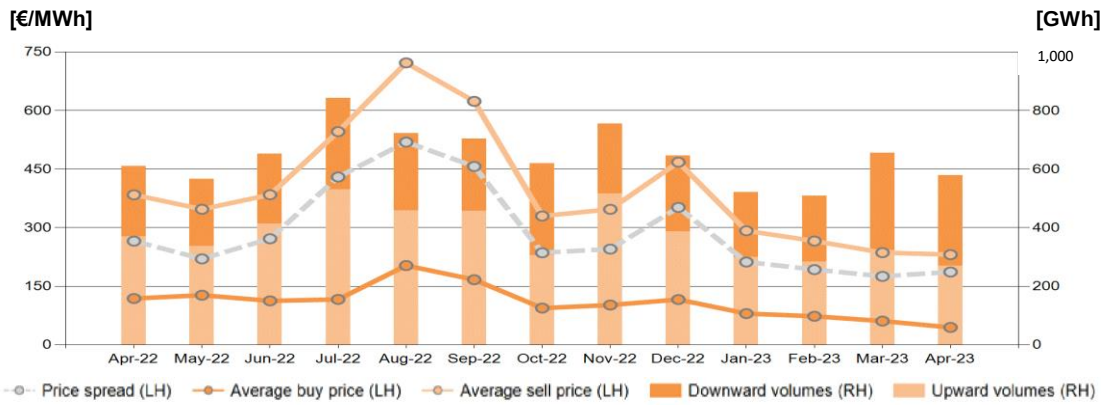
Sicily: zone with the highest price spread
North: zone with the largest volume moved

Source: Terna

Balancing Market

In April 2023, the spread between the bid-up and bid-down prices was €186/MWh, up by 6% compared to the previous month (€175/MWh) and down compared to April 2022 (€266/MWh; -30%).
Total volumes fell compared to the previous month (-11%). In particular, upward volumes were down 17%, and downward volumes were up 7%. Upward volumes fell 27%, while downwards volumes rose 29% compared to the same month of the previous year.

Balancing market – prices and volumes

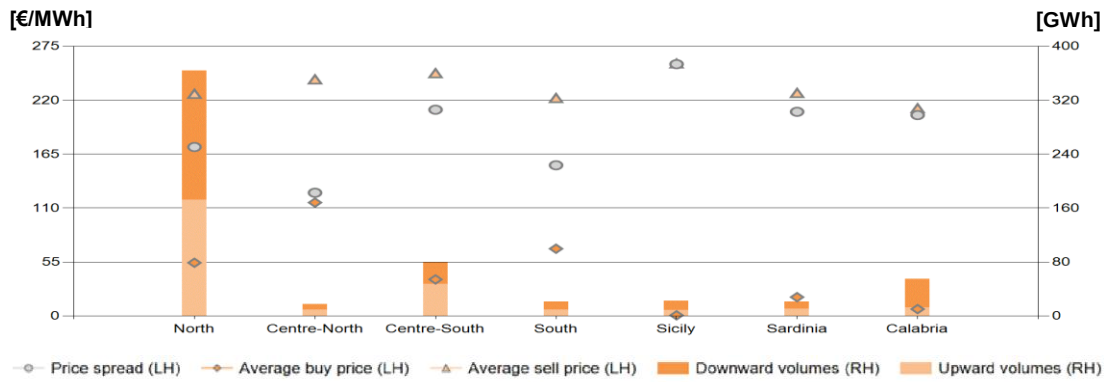


Average bid-up price in April 2023 of €231/MWh
Average bid-down price in April 2023 of €45/MWh

Source: Terna

The market zone characterised by the highest spread (€257/MWh) is Sicily.
The price spread, on average 190 €/MWh, increased in all zones, with the exception of the Centre-North, Calabria and Centre-South, where an average reduction of -15 €/MWh was recorded.

Balancing market – prices and volumes by market zone



Sicily: zone with the highest price spread

Source: Terna

Key

API2 – CIF ARA: the reference index for the coal price (with PCI of 6,000 kcal/kg) imported from north-west Europe. It is determined 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.

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 - Veneto - 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. Lombardy 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;

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.

Balancing Market (MB): the set of activities performed by the Operator for selecting the offers presented on the Dispatching Services 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.

Dispatching Services Market (MSD): the trading venue of the resources for the dispatching service.

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

M-o-M - Month on Month: percentage change of the difference between the reference month and the previous month.

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: these, according to the agreement with the electricity market operator (Gestore del Mercato Elettrico - GME), are the hours between 8:00 and 20:00 of working days only. **Off-peak hours** are all hours that are outside of peak hours.

CO_2 Price: determined by the European Union Emissions Trading Scheme (EU ETS), a system for the trading of greenhouse gas emission quotas in Europe aimed at reducing emissions.

Single National Price - PUN: the Single National Price calculated as a result of the Day-Ahead Market (DAM).

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

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

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

Y-o-Y – Year on Year: percentage change of the difference between the period of the current year and the same period of the previous year

IMCEI - Monthly Industrial Electrical Consumption Index: the monthly IMCEI index was constructed based on the size of the monthly withdrawals of the approximately 530 customers directly connected to the high voltage grid and for which Terna is responsible. These customers have been reclassified pursuant to the Ateco2007 Codes and aggregated by electrically relevant product class. The adimensional index has been created taking 2015 as a basis 100.

Disclaimer

1. The 2022 and 2023 monthly electricity balances are provisional.
2. More specifically, the monthly electricity reports for 2023 – prepared at the end of each month – are subject to further and precise verification or recalculation in the following months based on additional information. This operation to refine the monthly figures translates into a higher degree of precision compared to the sum of the data processed in the single Monthly Reports published on the website www.terna.it.