

Monthly Report on the Electricity System October 2023



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October 2023

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Energy Balance Sheets

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In 2023, electricity demand (258,233 GWh) increased compared to the same period in 2022 (-3.2%) and compared to the cumulative figure for 2021 (-2.9%).

The value of electricity demand was achieved with one more working day (22 vs 21), and with an average monthly temperature that was 1.0°C higher compared to October of last year. When adjusted for seasonal, temperature and calendar effects, the figure represents a +3.2% variation.

The annual trend for October 2023 (compared to October 2022) for the industrial electricity consumption index was negative by -3.3% with raw data.

In October 2023, 45.9% of the electricity demand was met by production from Non-Renewable Energy Sources, 35.6% from Renewable Energy Sources and the remainder via foreign exchange. In 2023, electricity demand was 258,233 GWh, 46.8% of which was met via production from Non-Renewable Energy Sources, 36.9% from Renewable Energy Sources and the remainder from the foreign balance. In October, production from Renewable Energy Sources increased (+34.6%) compared to the same month of the previous year. Specifically, there was an increase in renewable hydroelectric production (+87.2%), in wind production (+72.7%), and in photovoltaic production (+9.2%).

In 2023 the operating capacity of renewables increased by 4,434 MW. This value is 2,080 MW higher (+88%) compared to the same period of the previous year.

The October total for withdrawal programmes on the DAM was approximately €3.1 billion, up 13% compared to the previous month and down 37% compared to October 2022.

In October the spread between average bid-up and bid-down prices on the DSM was €96/MWh, up by 3% compared to the previous month and up 52% compared to October 2022. Total volumes decreased compared to the previous month (-31%).

In October 2023, the spread between bid-up and bid-down prices on the Balancing Market was €146/MWh, a slight increase compared to the previous month (€149/MWh) and compared to October 2022 (€236/MWh; -45%). Total volumes were down compared to the previous month (-10%).



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Monthly Summary and Short-Term Analysis

In October, electricity demand was 25,777 GWh, an increase compared to the same month of the previous year (+4.2%) and down compared to October 2021 (-2.2%). There was also a sharp increase in foreign exchange (+35.1%), compared to the same month in 2022.

In 2023, electricity demand (258,233 GWh) increased compared to the same period in 2022 (-3.2%) and compared to the cumulative figure for 2021 (-2.9%).

Demand breakdown – coverage by sources

[GWh]	Oct 2023	Oct 2022	%23/22	Jan-Oct 23	Jan-Oct 22	%23/22
Renewable Hydro	3,343	1,785	87.2%	31,299	23,416	33.7%
Pumping Production ⁽²⁾	137	148	-7.6%	1,306	1,513	-13.7%
Thermal	13,112	15,853	-17.3%	134,939	161,235	-16.3%
of which Biomass	1,219	1,401	-13.0%	13,634	14,311	-4.7%
of which Hard Coal	461	1,774	-74.0%	11,111	16,948	-34.4%
Geothermal	462	457	1.1%	4,447	4,542	-2.1%
Wind	1,865	1,080	72.7%	17,951	16,683	7.6%
Photovoltaic	2,278	2,087	9.2%	27,970	25,527	9.6%
Net Total Production	21,196	21,410	-1.0%	217,912	232,916	-6.4%
Pumping	195	211	-7.6%	1,866	2,161	-13.7%
Net Total Production for Consumption	21,001	21,199	-0.9%	216,046	230,755	-6.4%
of which RES ⁽³⁾	9,166	6,810	34.6%	95,301	84,480	12.8%
of which not RES	11,835	14,389	-17.8%	120,745	146,275	-17.5%
Import	4,987	4,008	24.4%	44,839	39,516	13.5%
Export	211	474	-55.5%	2,652	3,404	-22.1%
Net Foreign Exchange	4,776	3,534	35.1%	42,187	36,112	16.8%
Electricity demand⁽¹⁾	25,777	24,733	4.2%	258,233	266,867	-3.2%

In October 2023, a decrease in thermal production (-17.3%) was recorded, and there was an increase in photovoltaic production (+9.2%), in renewable hydroelectric production (+87.2%), and in wind production (+72.7%) compared to the same month of the previous year. In 2023, there was a change in exports, which dropped (-22.1%) compared to 2022. The trend in total net production for consumption in October was down slightly (-0.9%) compared to the same month in 2022.

(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 -

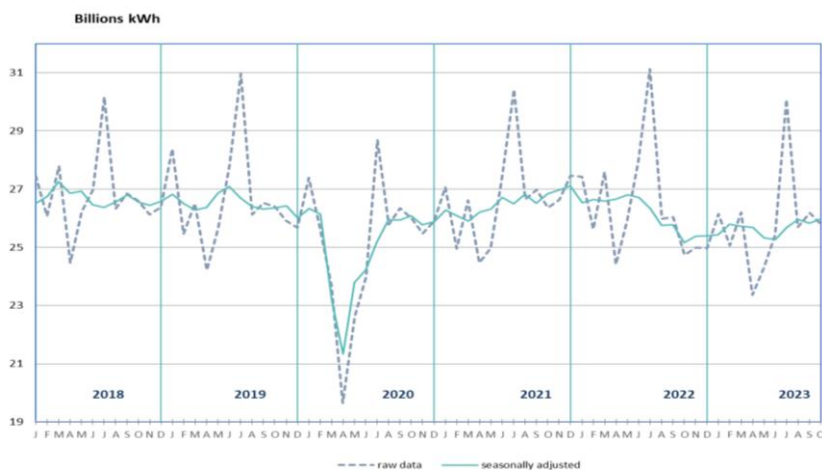
Source: Terna

The value of electricity demand was achieved with one more working day (22 vs 21), and with an average monthly temperature that was 1.0°C higher compared to October of last year. When adjusted for seasonal, temperature and calendar effects, the figure represents a +3.2% variation.

In the first ten months of the year, national demand decreased by 3.2% compared to the corresponding period in 2022 (-2.4% adjusted value).

The data for October 2023, adjusted for calendar and temperature effects, recorded a slight increase in electricity demand compared to September 2023 (+0.5%).

Demand – seasonality adjusted



The value, adjusted for seasonal, calendar and temperature effects, shows positive cyclical change (+0.5%)

Source: Terna

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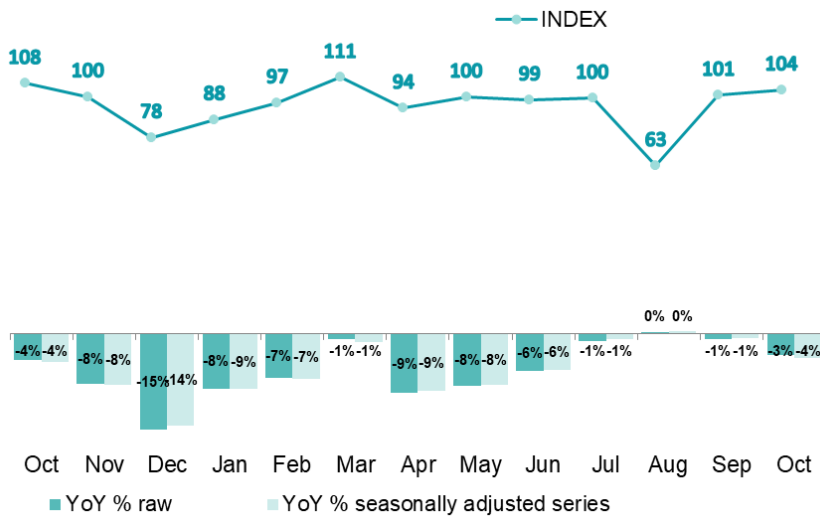
Energy Balance Sheets



IMCEI

The annual trend for October 2023 (compared to October 2022) was down (-3.3%) based on raw data. Using data adjusted for calendar differences, the change is -3.7%. In the first ten months of 2023, industrial electricity consumption decreased by 4.6% compared to the same period in 2022.

IMCEI short-term analysis (2015 base = 100)

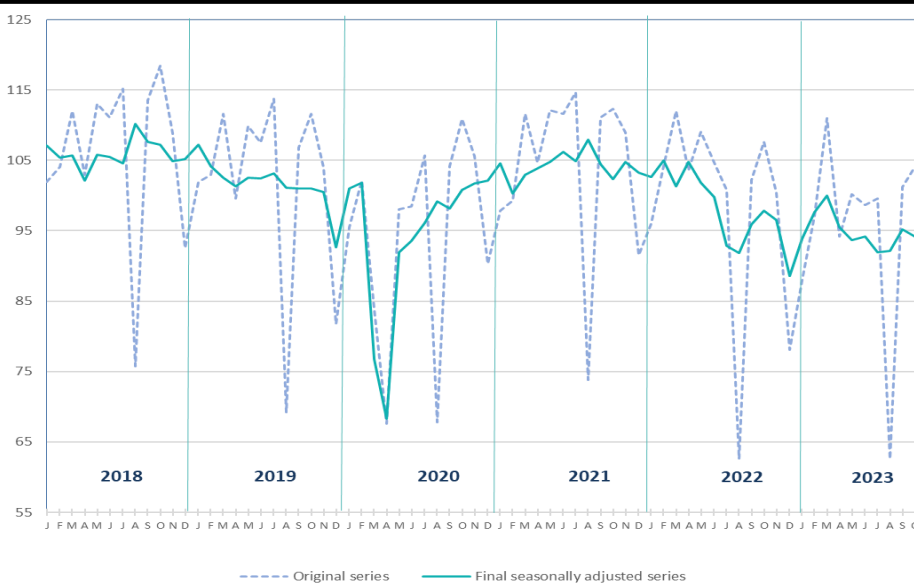


In October, the variation in the monthly index of Italian electricity consumption decreased compared to October 2022

Source: Terna

The short-term data adjusted for seasonal and calendar effects for the industrial electricity consumption index decreased by -1.0% in October 2023 compared to September.

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



When adjusted for seasonal and calendar effects, the monthly figure for October 2023 decreased compared to the previous month

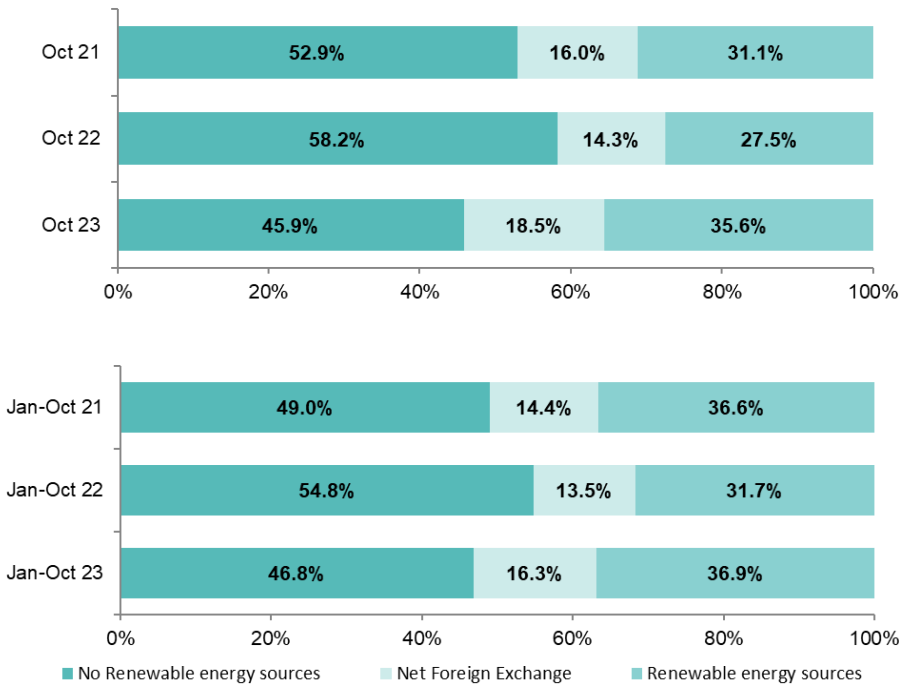
Source: Terna

Energy Demand Mix

In October 2023, 45.9% of the electricity demand was met by production from Non-Renewable Energy Sources, 35.6% from Renewable Energy Sources and the remainder via foreign exchange.

In 2023, electricity demand was 258,233 GWh, 46.8% of which was met via production from Non-Renewable Energy Sources, 36.9% from Renewable Energy Sources and the remainder from the foreign balance.

Demand breakdown – coverage by sources

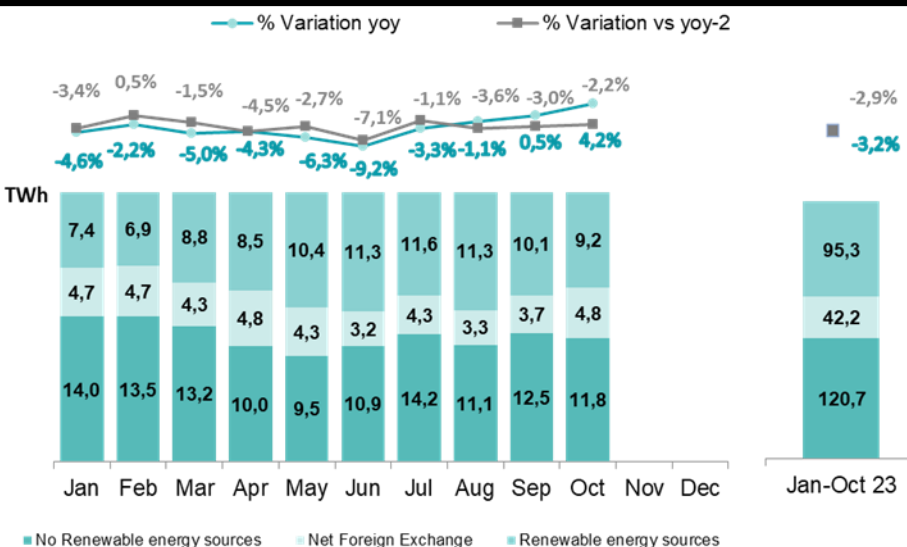


Coverage of demand from renewable sources grew from 27.5% in October 2022 to 35.6% in October 2023

In 2023 coverage of demand from non-renewables fell from 54.8% in 2022 to 46.8% in 2023

Source: Terna

2023 trend in demand breakdown and difference from 2022 and 2021



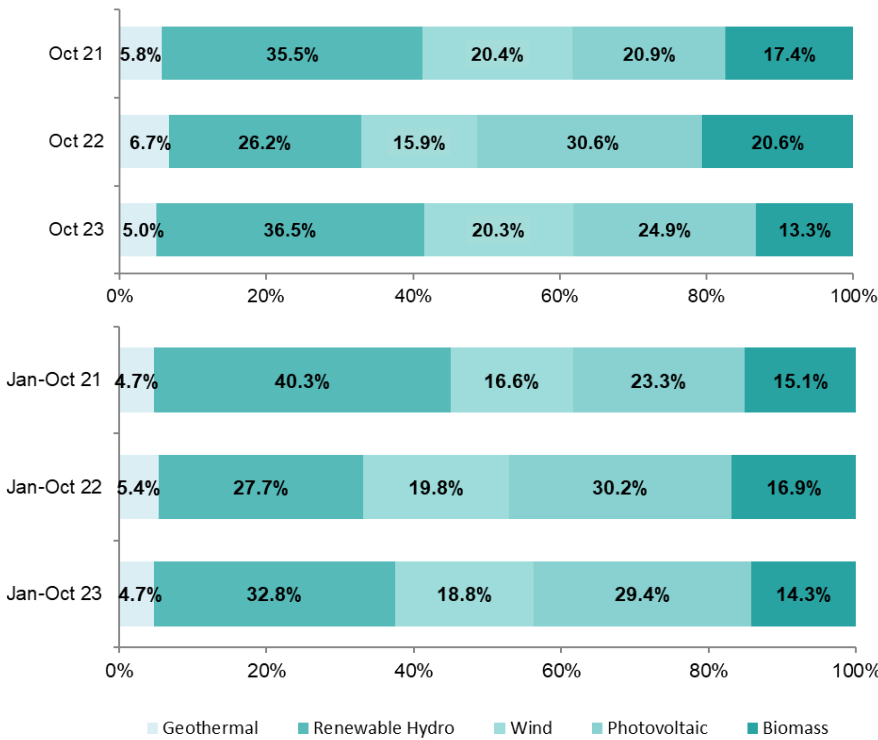
In 2023, electricity demand on the grid is lower than 2022 (-3.2%) and down compared to the cumulative figure for 2021 (-2.9%). In 2023, energy production from renewable sources totalled 95.3 TWh, an increase compared to 2022 (+12.8%)

Source: Terna

Details of Renewable Energy Sources

In October, production from Renewable Energy Sources increased (+34.6%) compared to the same month of the previous year. Specifically, there was an increase in renewable hydroelectric production (+87.2%), in wind production (+72.7%), and in photovoltaic production (+9.2%).

RES Production - Breakdown

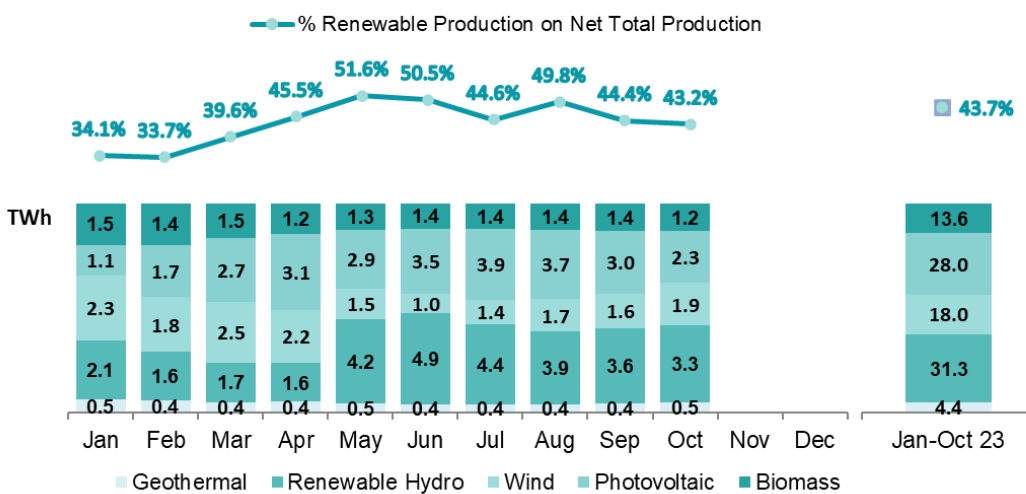


In October 2023, the greater contribution of renewable energy sources to the total is attributed to renewable hydroelectric production (36.5%) and photovoltaic production (24.9%)

In 2023 the proportion of renewable hydroelectric production increased while the that from the other sources decreased overall compared to 2022

Source: Terna

2023 trend in net production from RES and difference from 2022



In October 2023, production from RES represented 43.2% of total net national production, an increase compared to the same month in 2022 (31.8%). In 2023, production from RES represented 43.7% of total net national production, an increase compared to the cumulative figure for 2022 (36.3%)

Source: Terna

Historical Energy Balance Sheets

In 2023, total net production allocated for consumption (216,046 GWh) met 83.7% of national electricity demand (258,233 GWh).

2023 Historical Monthly Energy Balance Sheet

[GWh]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Renewable Hydro	2,081	1,581	1,658	1,581	4,190	4,902	4,445	3,908	3,610	3,343			31,299
Pumping Production ⁽²⁾	137	99	172	168	135	95	104	160	100	137			1,306
Thermal	15,569	14,866	14,712	11,307	10,915	12,330	15,667	12,602	13,859	13,112			134,939
of which Biomass	1,463	1,368	1,471	1,245	1,309	1,361	1,429	1,415	1,353	1,219			13,634
of which Hard Coal	2,295	1,868	1,881	202	561	1,226	1,041	662	914	461			11,111
Geothermal	458	414	442	442	462	436	447	439	445	462			4,447
Wind	2,277	1,802	2,547	2,165	1,515	1,036	1,354	1,742	1,648	1,865			17,951
Photovoltaic	1,095	1,734	2,665	3,105	2,929	3,537	3,886	3,746	2,995	2,278			27,970
Net Total Production	21,617	20,496	22,196	18,768	20,146	22,336	25,903	22,597	22,657	21,196			217,912
Pumping	195	142	246	240	193	136	148	228	143	195			1,866
Net Total Production for Consumption	21,422	20,354	21,950	18,528	19,953	22,200	25,755	22,369	22,514	21,001			216,046
of which RES ⁽³⁾	7,374	6,898	8,783	8,538	10,405	11,272	11,561	11,250	10,051	9,166			95,299
of which not RES	14,048	13,456	13,167	9,990	9,548	10,928	14,194	11,119	12,463	11,835			120,747
Import	5,080	4,944	4,445	5,005	4,616	3,546	4,651	3,657	3,908	4,987			44,839
Export	352	233	188	170	275	314	323	338	248	211			2,652
Net Foreign Exchange	4,728	4,711	4,257	4,835	4,341	3,232	4,328	3,319	3,660	4,776			42,187
Electricity demand ⁽¹⁾	26,150	25,065	26,207	23,363	24,294	25,432	30,083	25,688	26,174	25,777			258,233

In 2023, net total production was down (-6.4%) compared to the same period in 2022, and peak electricity demand was reached in July, with 30,083 GWh

Source: Terna

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	20,767
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

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

Source: Terna

- (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 October 2023, demand increased in the Northern zone (TO-MI-VE), on the Islands (PA-CA) and in the Southern zone (NA) while it decreased in the Centre (RM-FI) compared to the same period of the previous year.

Demand by Operational Area

[GWh]	Turin	Milan	Venice	Florence	Rome	Naples	Palermo	Cagliari
October 2023	2,571	6,032	4,053	3,564	3,627	3,683	1,586	661
October 2022	2,552	5,488	3,863	3,784	3,416	3,509	1,467	654
% October 23/22	0.7%	9.9%	4.9%	-5.8%	6.2%	5.0%	8.1%	1.1%
Cumulated 2023	25,461	55,212	39,506	39,514	36,682	38,323	16,377	7,158
Cumulated 2022	26,589	56,587	41,043	42,154	37,857	39,048	16,025	7,564
% Cumulated 23/22	-4.2%	-2.4%	-3.7%	-6.3%	-3.1%	-1.9%	2.2%	-5.4%

In 2023, the Y-o-Y percentage change in demand was -3.3% in the North, -4.8% in the Centre, -1.9% in the South and -0.2% on the Islands

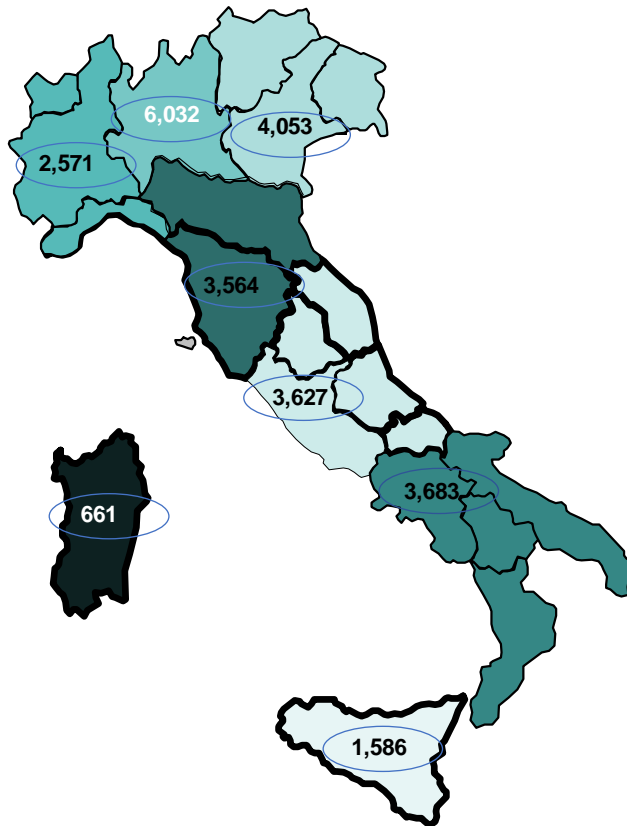
Source: Terna

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



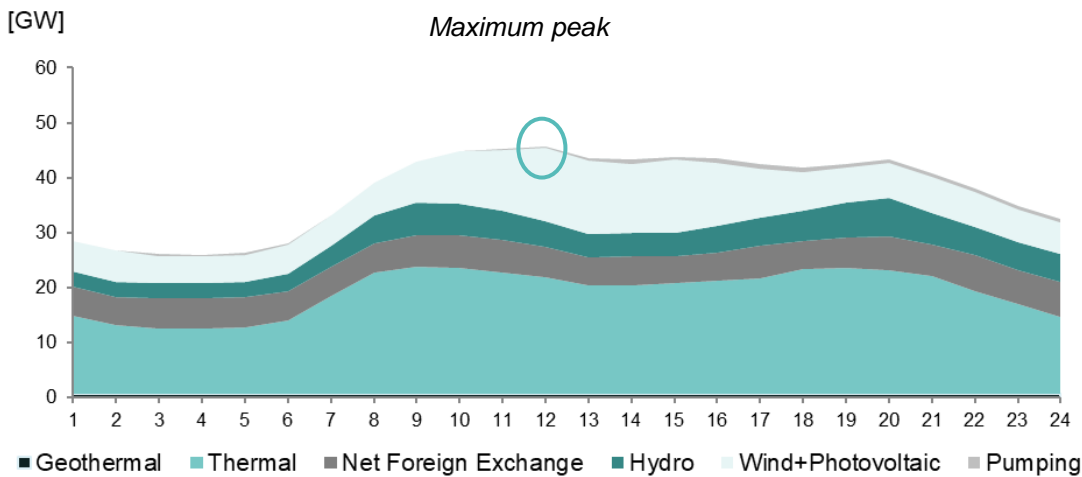
Source: Terna

(*) 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 October 2023, peak demand was recorded on **Friday 20 October between 11:00 and 12:00** and was 45,375 MW (+3.3% Y-o-Y). The hourly demand diagram of the peak day is presented below.

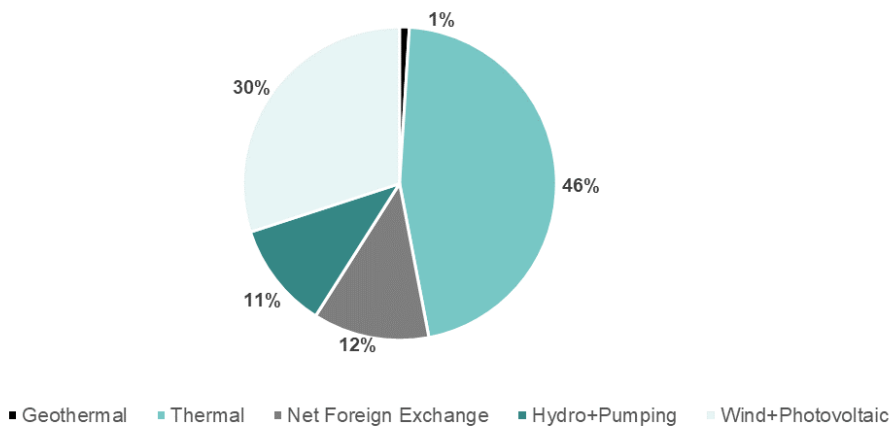
Peak Demand



At peak, the contribution from thermal production was 21,293 MW, down (-26.0%) compared to the contribution from thermal production at the October 2022 peak (28,782 MW)

Source: Terna

Coverage of demand - 20 October 2023 11:00-12:00



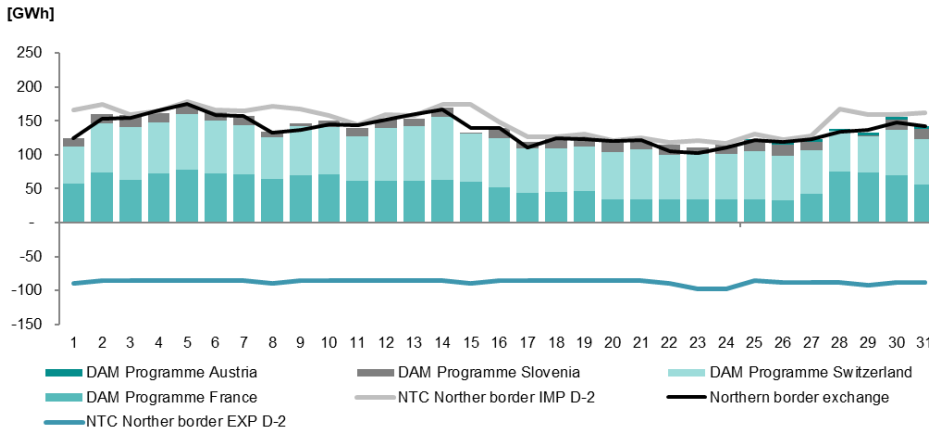
At its peak, production from wind and photovoltaic sources contributed to covering 29.8% of demand, with thermal production covering 46.9% and foreign balance covering 11.9%

Source: Terna

Net Foreign Exchange – October 2023

In October, there was good saturation of the planned figure for imported NTC compared to the exchange programmes on the Northern border.

Net Foreign Exchange on the Northern border



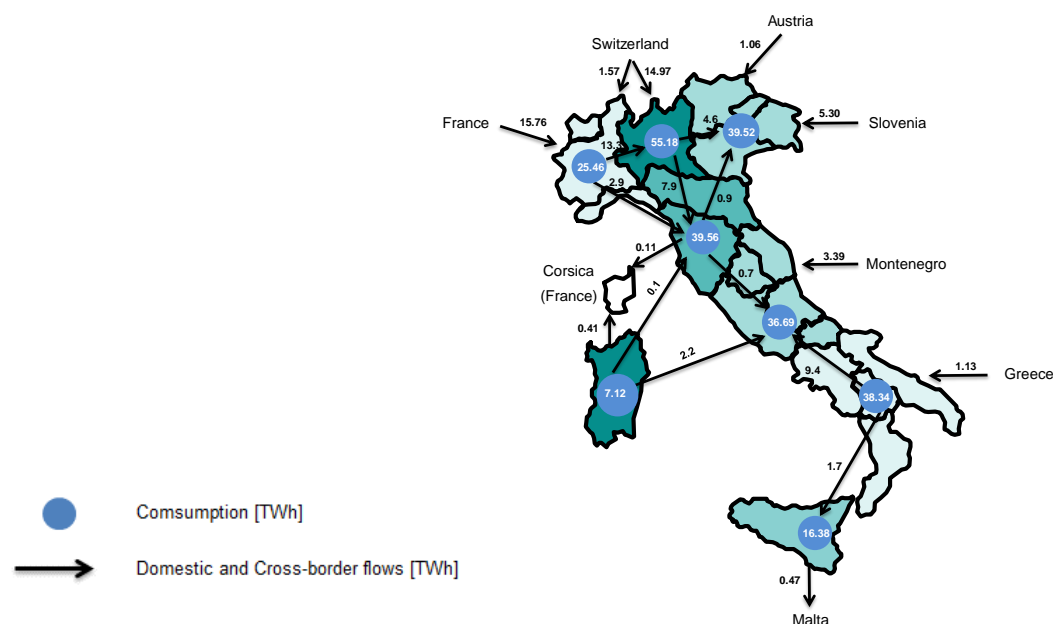
In October 2023 imports increased slightly Y-o-Y (+24.4%) amounting to 4,987 GWh and exports declined Y-o-Y (-55.5%) amounting to 211 GWh

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



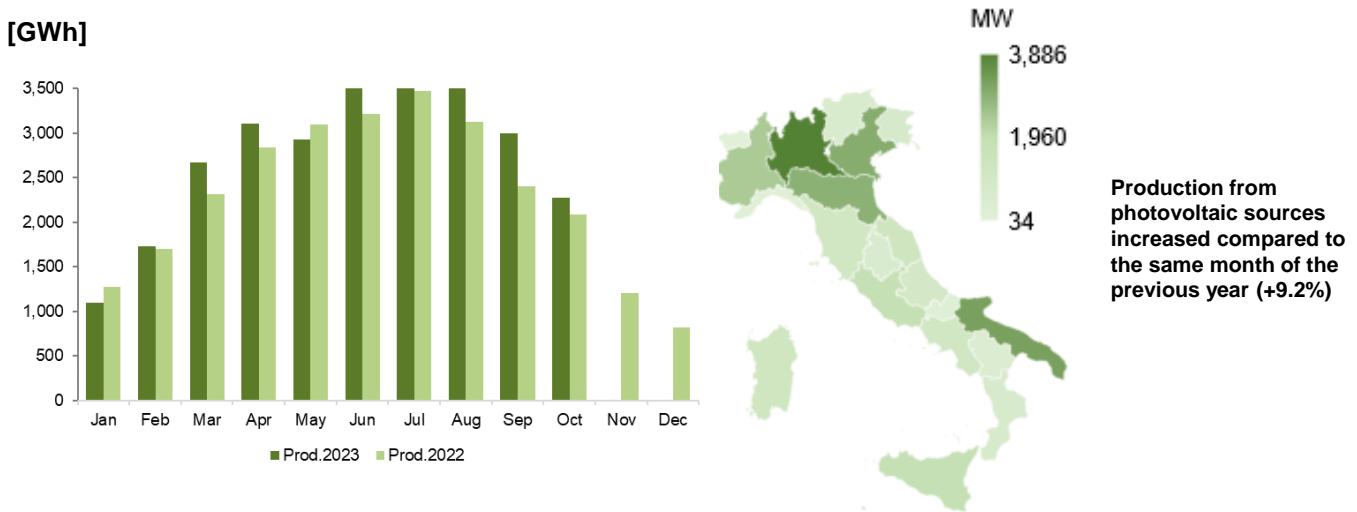
In 2023, a net exchange was recorded from the Northern zone to Emilia Romagna and Tuscany of 9.9 TWh. The mainland recorded a net exchange towards Sicily of 1.7 TWh

Source: Terna

Production and Installed Capacity

Energy produced from photovoltaic sources in October 2023 reached 2,278 GWh, an increase compared to the same month of the previous year (+191 GWh).

Photovoltaic production (left) and distribution of operating capacity¹ (right)

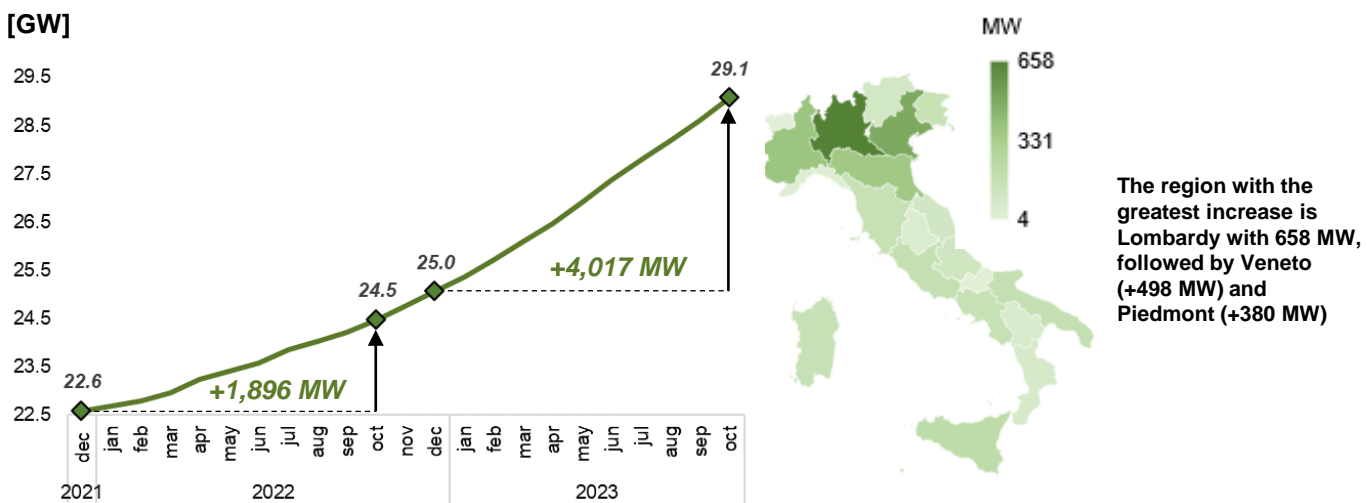


1. The operating capacity takes into account new activations, upgrades and decommissioning of plants

Source: Terna

In the first ten months of 2023, operating capacity increased by 4,017 MW. During the same period of 2022 the increase was 1,896 MW, recording an increase of 2,121 MW (+112%).

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



Source: Terna

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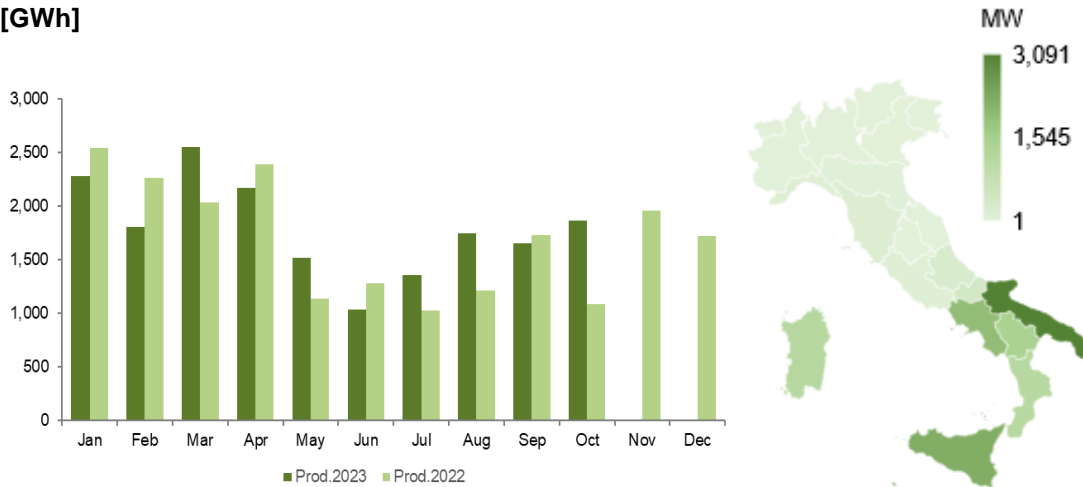
Electricity System



Energy produced from wind production sources in October 2023 reached 1,865 GWh, an increase compared to the same month of the previous year (+785 GWh).

Wind production (left) and distribution of operating capacity¹ (right)

[GWh]



Production from wind sources increased compared to the same month of the previous year (+72.7%)

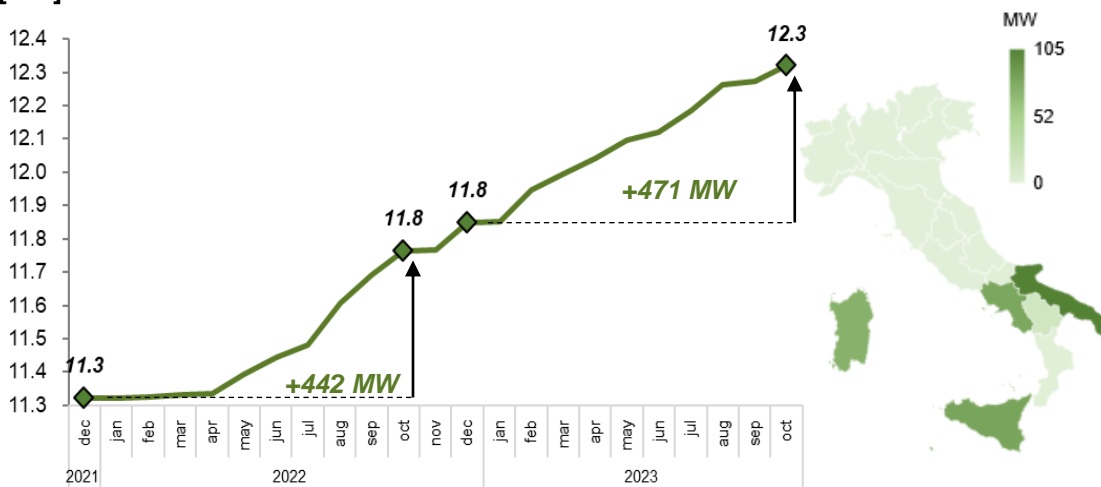
1. The operating capacity takes into account new activations, upgrades and decommissioning of plants

Source: Terna

In the first ten months of 2023, operating capacity increased by 471 MW. During the same period of 2022 the increase was 442 MW, recording an increase of 29 MW (+7%).

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

[GW]



The region with the greatest increase is Apulia with 105 MW, followed by Sicily (+82 MW) and Campania (+81 MW)

Source: Terna

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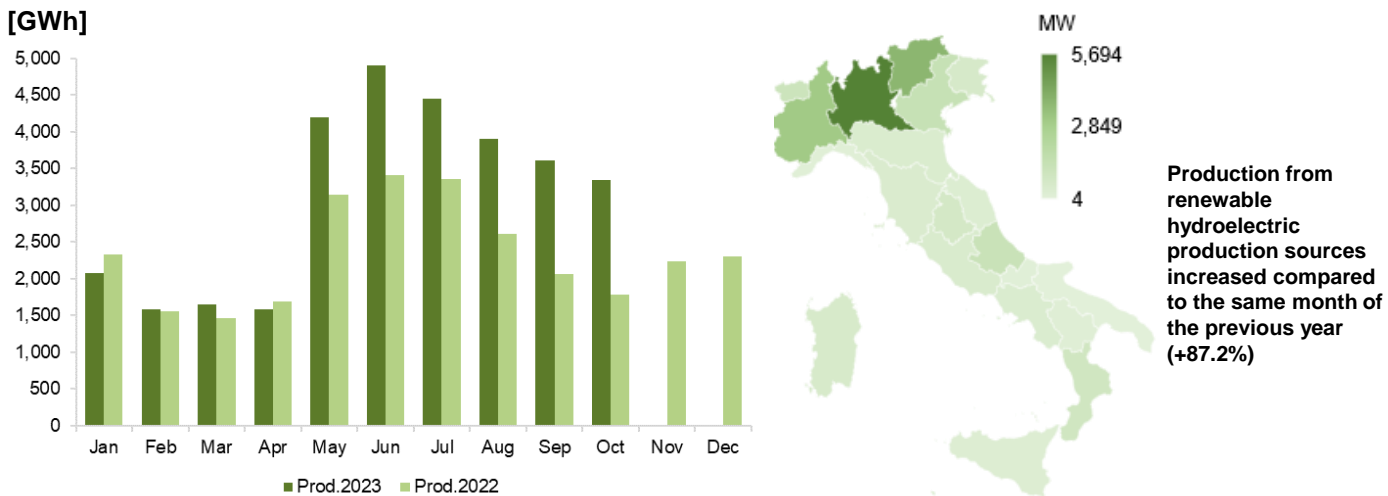
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Energy produced from renewable hydroelectric production sources in October 2023 reached 3,343 GWh, an increase compared to the same month of the previous year (+1,557 GWh).

Renewable hydroelectric production (left) and distribution of operating capacity¹ (right)

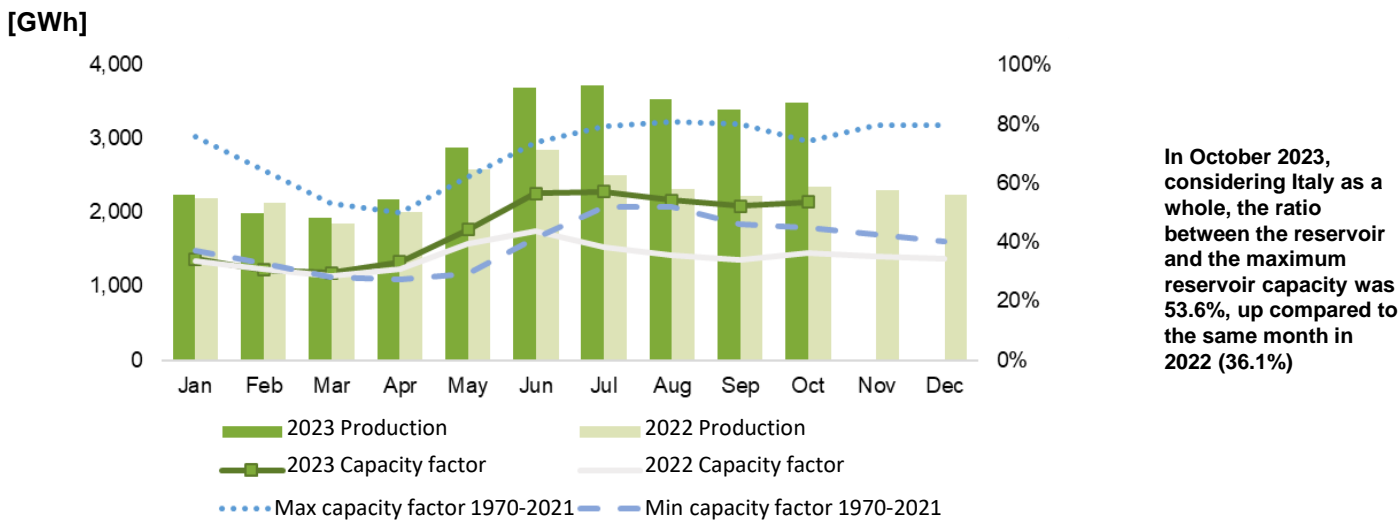


1. The operating capacity takes into account new activations, upgrades and decommissioning of plants.

Source: Terna

In October, hydroelectric producibility grew (+48.3%) compared to the same month of the previous year.

Hydroelectric Producibility and Reservoir Percentage

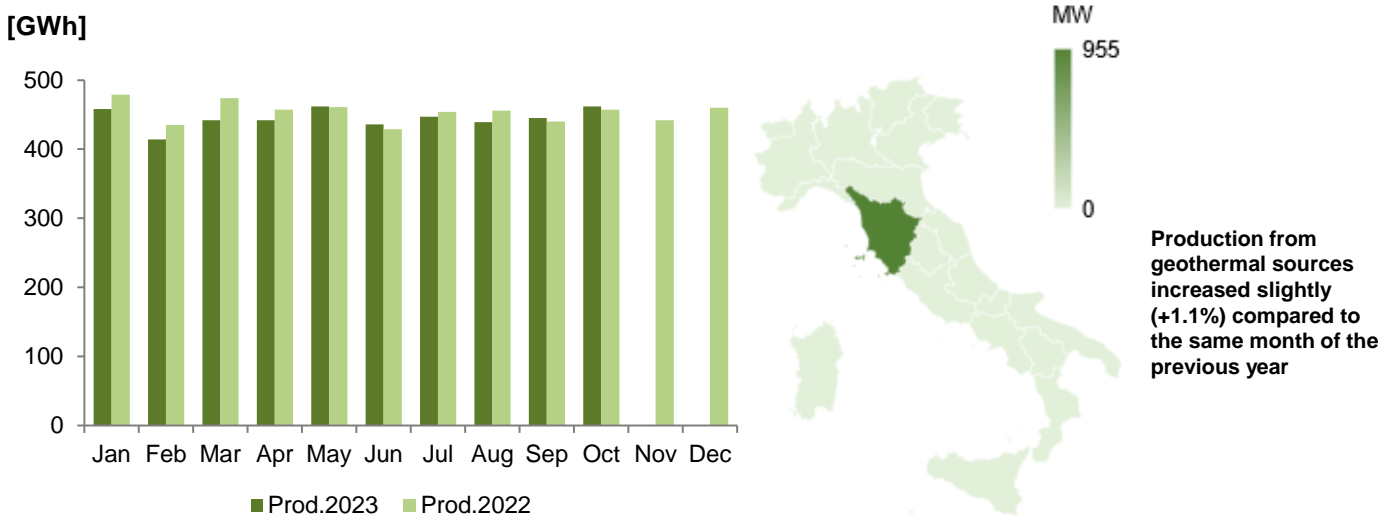


	Reservoir Capacity	NORTH	CENTRE SOUTH	ISLANDS	TOTAL
Oct	[GWh]	2,593	793	109	3,495
	% (capacity/max capacity)	59.9%	43.7%	28.5%	53.6%
	[GWh]	1,603	617	136	2,356
	% (capacity/max capacity)	37.1%	34.0%	35.7%	36.1%

Source: Terna

Energy produced from geothermal production sources in October 2023 reached 462 GWh, a slight increase compared to the same month of the previous year (+5 GWh).

Geothermal production (left) and distribution of operating capacity¹ (right)

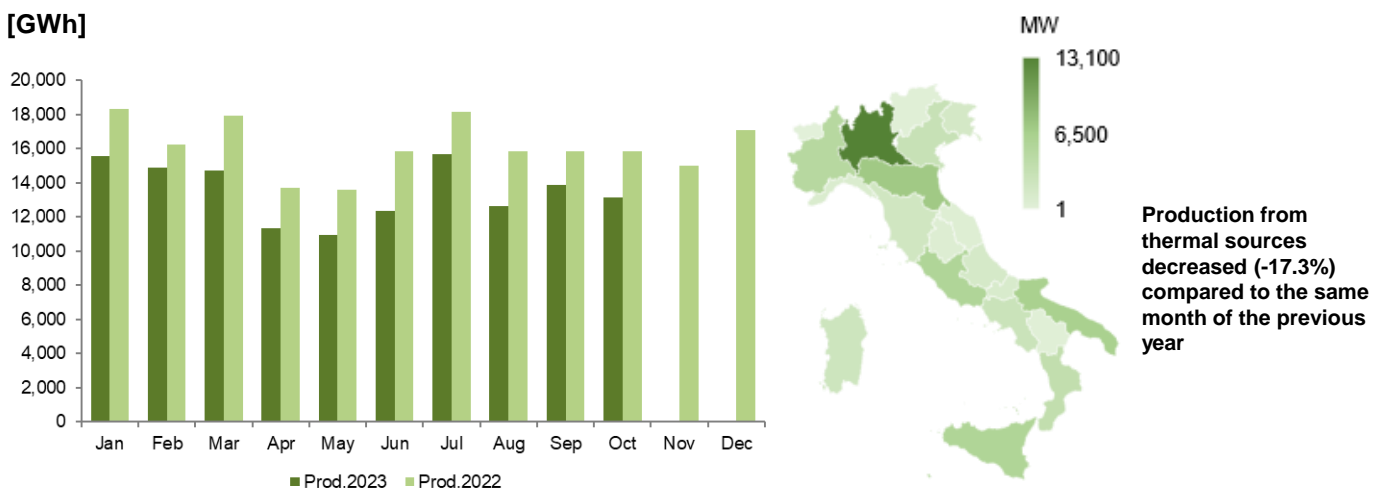


1. The operating capacity takes into account new activations, upgrades and decommissioning of plants

Source: Terna

Energy produced from thermal production sources in October 2023 reached 13,112 GWh, down compared to the same month of the previous year (-2,741 GWh).

Thermal production (left) and distribution of operating capacity¹ (right)



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

Source: Terna

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In 2023 the operating capacity of renewables increased by 4,434 MW. This value is 2,080 MW higher (+88%) compared to the same period of the previous year.

Variation in monthly operating capacity and number of plants per Source in Italy 2023¹

[MW]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Photovoltaic	296	376	386	360	435	468	406	396	424	470			4,017
Wind	4	93	48	50	53	25	63	80	11	45			471
Hydroelectric	1	2	-111 ²	1	2	3	-6	-1	6	7			-96
Geothermal & Biomass	-4	0	1	-2	9	1	-5	39	0	1			42
Total	297	471	324	409	499	498	458	514	441	523	0	0	4,434

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	35,485	33,722	29,478	25,845	27,249	30,145			315,658
Wind	0	17	7	3	3	3	5	9	5	18			70
Hydroelectric	6	3	8	3	12	6	3	2	8	6			57
Geothermal & Biomass	2	7	3	6	9	6	0	8	7	5			53
Total	29,659	35,834	37,604	30,702	35,509	33,737	29,486	25,864	27,269	30,174			315,838

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 2022¹

[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

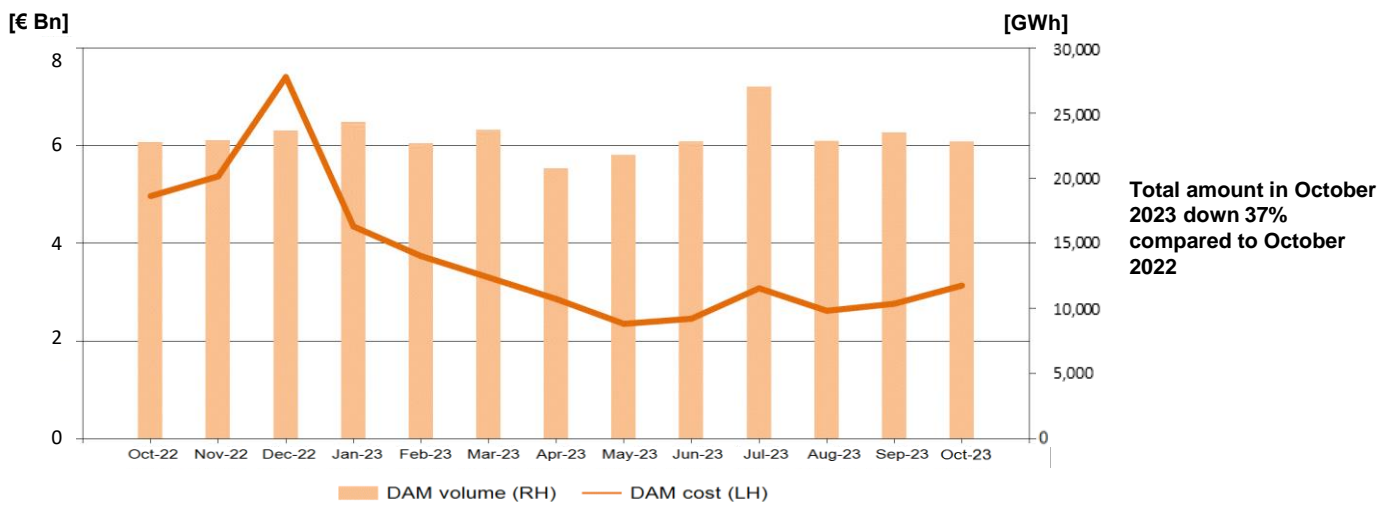
1. The operating capacity and the number of plants take into account new activations, upgrades and decommissioning of plants
2. The decrease in renewable hydroelectric capacity is due to a change in the master data on the technical sub-type of a plant, changed from mixed pumping (Renewable) to pure pumping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

Day-Ahead Market

The September total for withdrawal programmes on the DAM was approximately €3.1 billion, up 13% compared to the previous month and down 37% compared to October 2022.

The increase compared to September is due to an increase in the average PUN, while the decrease over the previous year is mainly due to a drop in average PUN from €211.5/MWh (October 2022) to €134.3/MWh (October 2023).

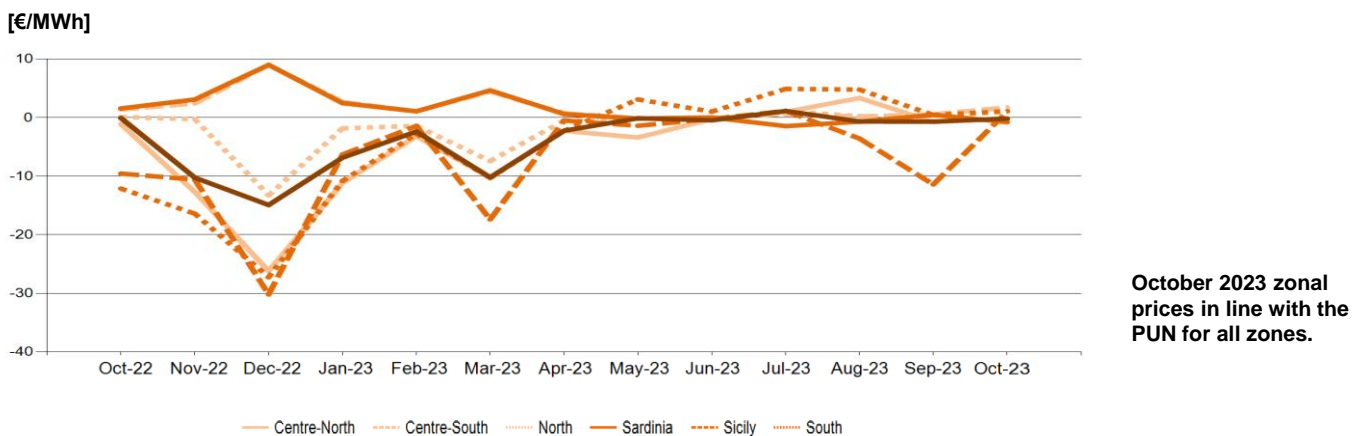
Day Ahead Market – amounts and volumes



Source: Terna calculation on GME data

In October, the zonal prices were essentially in line with the PUN.

Spread compared to the PUN



Source: Terna calculation on GME data

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The spread between the peak and off-peak prices in October was, on average, €21.1/MWh. The highest spread was recorded in the Centre-North zone, where it was €23.6/MWh.

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

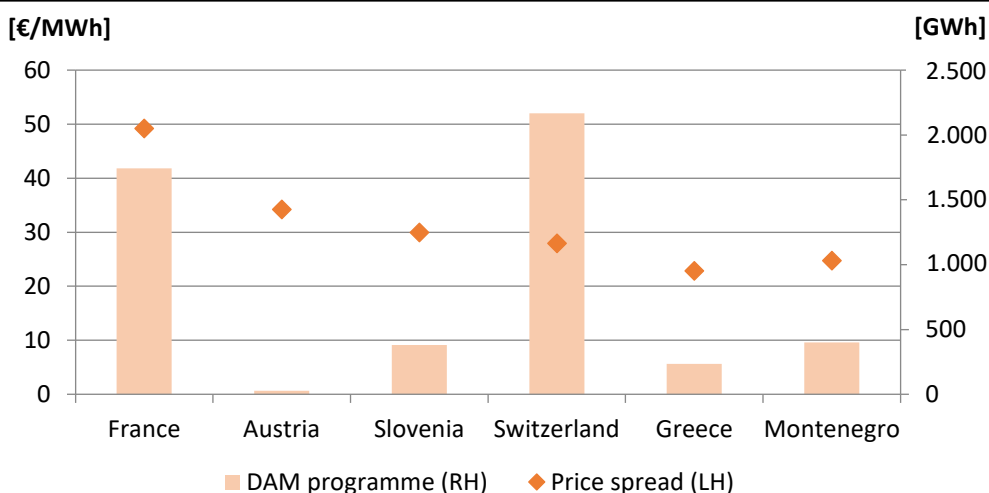
€/MWh	PUN	North	Centre-North	Centre-South	South	Sicily	Sardinia	Calabria
Average	134.3	133.5	136	135.3	134.1	135.3	135.3	134.1
Y-o-Y	-77.2	-79.6	-76.9	-76.3	-77.3	-64	-66.7	-76.3
Δ vs PUN	-	-0.8	1.7	1	-0.2	1.1	1	-0.2
Δ vs PUN 2021	-	1.5	1.4	0.1	-0.1	-12.1	-9.6	-1.1
Peak	148.8	148.7	150.3	149.7	146.4	147.6	149.7	146.4
Off-Peak	126.3	125.1	128.1	127.3	127.3	128.6	127.3	127.3
Δ Peak vs Off-Peak	22.5	23.6	22.2	22.4	19.1	19	22.4	19.1
Minimum	15	15	15	10	9	9	10	9
Average	240	240	249.9	249.9	249.9	268.1	249.9	249.9

Peak-off peak spread up on average compared to the previous month.

Source: Terna calculation on GME data

October 2023 saw an increase in price spreads on the northern border compared to the previous month. Imports totalled 5.0 TWh, up compared to the previous month (+28%), with France accounting for 35% of the total and Switzerland 43%. Total exports were 0.1 TWh, with Slovenia accounting for 32% and Greece 33%.

Price spread with foreign exchanges and day ahead programmes



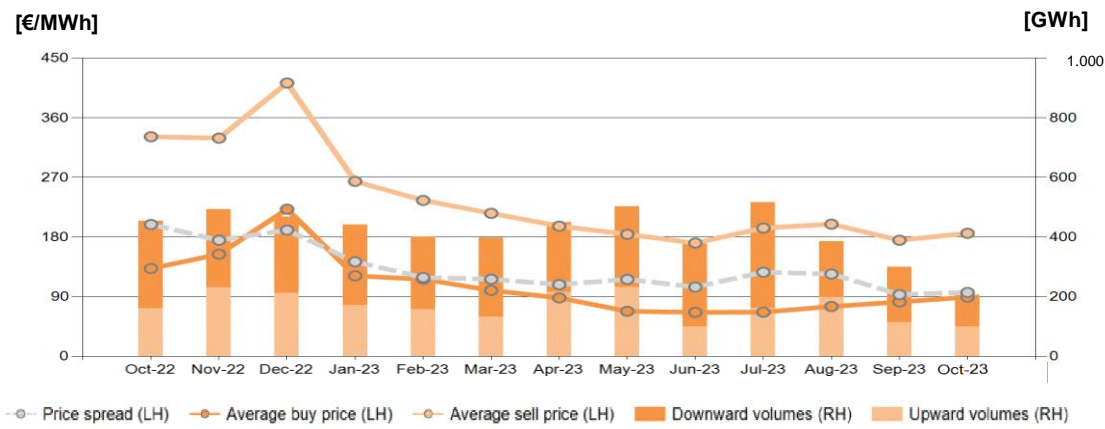
Net imports on the northern border of 4.3 TWh.

Source: Terna calculation

Ex-ante Ancillary Services Market

In October, the spread between average bid-up and bid-down prices was €96/MWh, up compared to the previous month by 3% and down by 52% compared to October 2022. Total volumes fell compared to the previous month (-31%). More specifically, upward volumes decreased by 12% and downward volumes decreased by 43%. Upward volumes fell by 38%, while downward volumes fell by 64% compared to the same month of the previous year.

Ex-ante Ancillary Services - prices and volumes

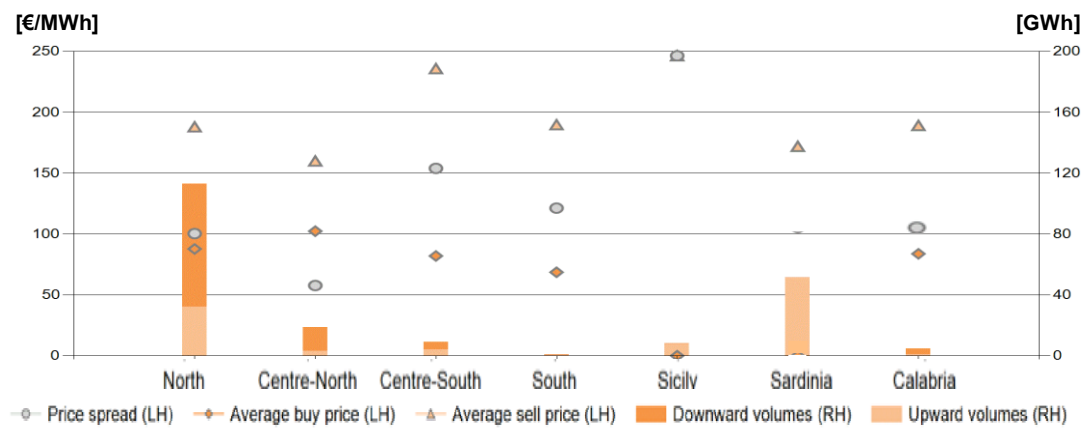


Average bid-up price in October 2023 of €186/MWh
 Average bid-down price in October 2023 of €90/MWh

Source: Terna

The market zone with the highest spread (€246/MWh) was Sicily. This spread recorded an increase compared to the previous month, due to an increase in the average bid-up price of 6% (from €233/MWh in September to €246/MWh in October) and to a reduction in the average bid-down price.

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



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

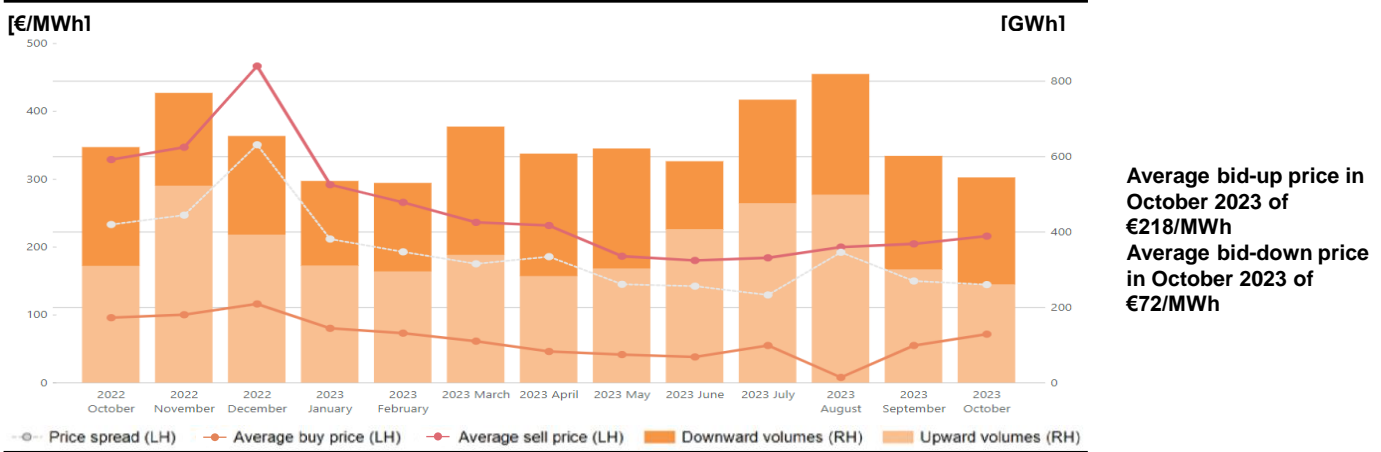
Source: Terna

Balancing Market

In October 2023, the spread between bid-up and bid-down prices was €146/MWh, a slight decrease compared to the previous month (€149/MWh) and compared to October 2022 (€236/MWh; -45%).

Total volumes decreased compared to the previous month (-10%), in particular, both upward and downward volumes fell by 10%. Compared to October 2022, both upward and downward volumes fell by 13%.

Balancing market – prices and volumes

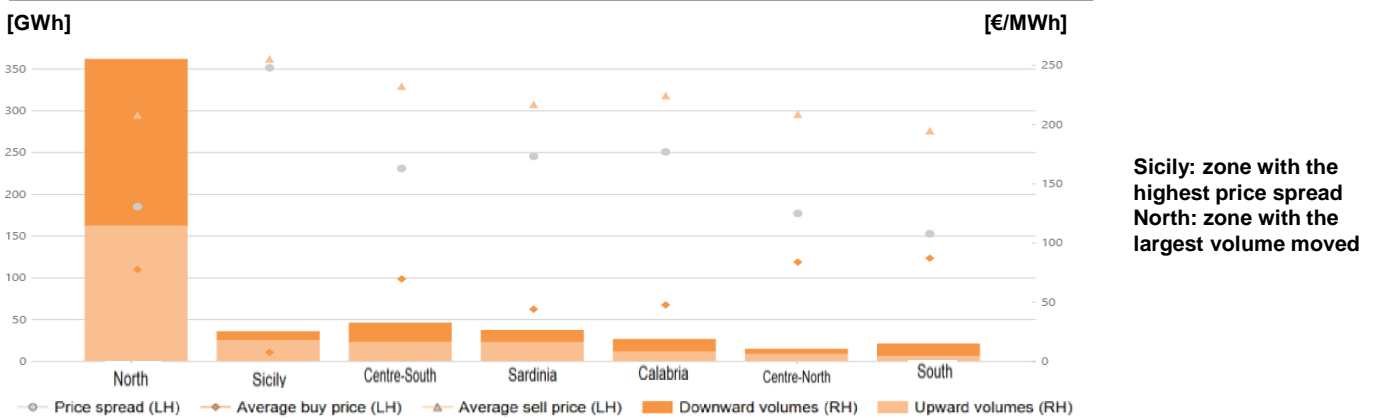


Source: Terna

The market zone with the highest spread (€ 249/MWh) was Sicily, in line with the previous month (spread of € 217/MWh).

In October, the Northern zone was confirmed as the zone featuring the highest upward volumes (168 GWh) and the highest downward volumes (207 GWh).

Balancing market – prices and volumes by market zone



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

Source: Terna

Commodities – Spot Market

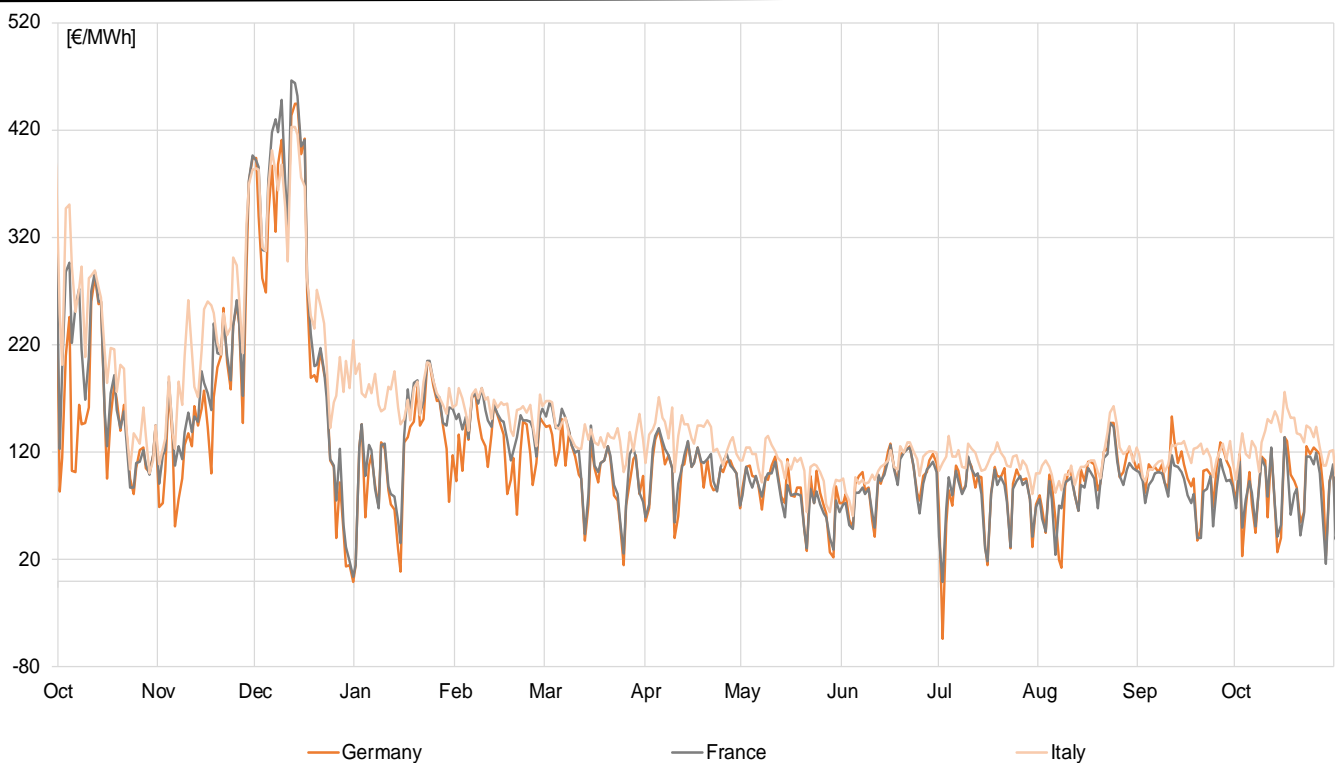
In October, Brent prices recorded an average value of \$91.3/bbl, down compared to September (-2.6%).

The average prices of coal (API2) were up compared to September, settling at around \$131.8/t (+9.5%).

European gas prices (TTF) in October increased compared to September, with a monthly average of €43.0/MWh (+19.0% compared to the previous month). The PSV recorded an increase, settling at €44.1/MWh (+16.1%).

Electricity prices in Italy rose in October compared to the previous month, with a monthly average of €133.8/MWh (+15.7%). The French power exchange was down, with the price of electricity at €84.4/MWh (-4.9%), as was the German exchange at €87.5/MWh (-13.2%).

Spot electricity prices



Source: Terna calculation on GME and EPEX data

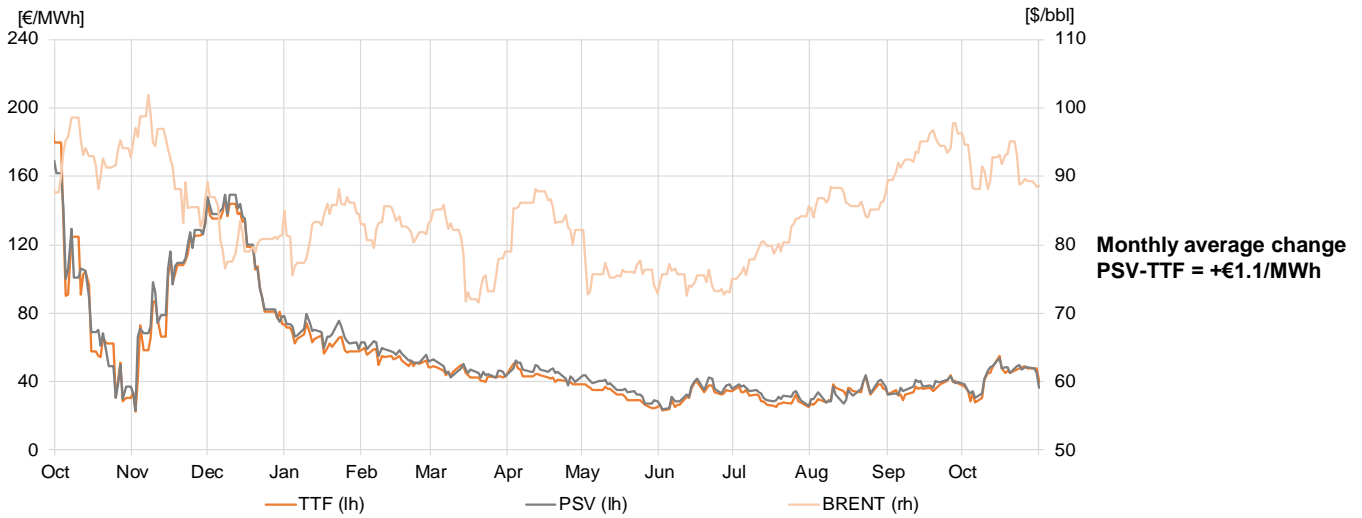
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Gas & Oil spot prices



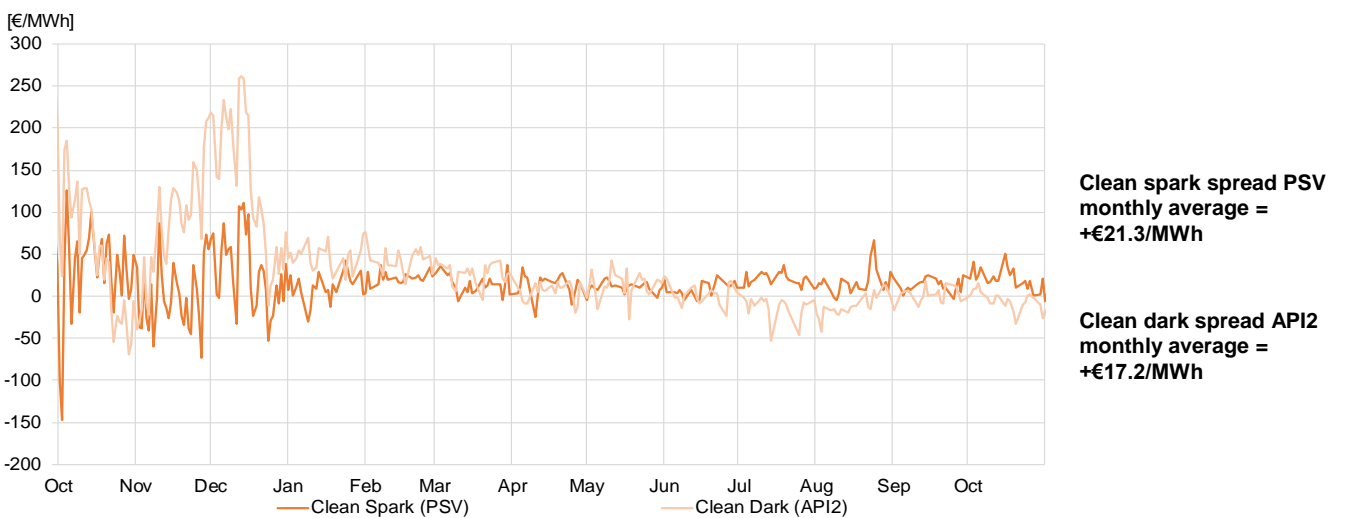
Source: Terna calculation on Bloomberg data

Coal & Carbon spot prices



Source: Terna calculation on Bloomberg data

Clean Dark & Spark spreads Italy



Source: Terna calculation on Bloomberg data

Commodities – Forward Market

In October, Brent forward prices recorded an average value of \$89.0/bbl, up from September (-2.4%).

The average forward prices of coal (API2) were up compared to September, settling at around \$132.0/t (+1.1%).

Forward prices of gas in Europe (TTF) were up compared to the previous month (+1.9%), settling at around €51.8/MWh. Forward prices in Italy (PSV) were also up, which showed an average figure of €52.7/MWh (+1.3%).

The average forward prices of electricity in Italy stood at around €146.7/MWh, down compared to the previous month (-0.6%). The French power exchange was down, where the price stood at around €134.6/MWh (-0.8%), as was the German power exchange, where the price was €126.5/MWh (-1.0%).

Forward Electricity Prices – Year+1



Source: Terna calculation on Bloomberg data

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Year+1 Forward Gas & Oil Prices



Monthly average change
PSV-TTF = +€0.9/MWh

Source: Terna calculation on Bloomberg data

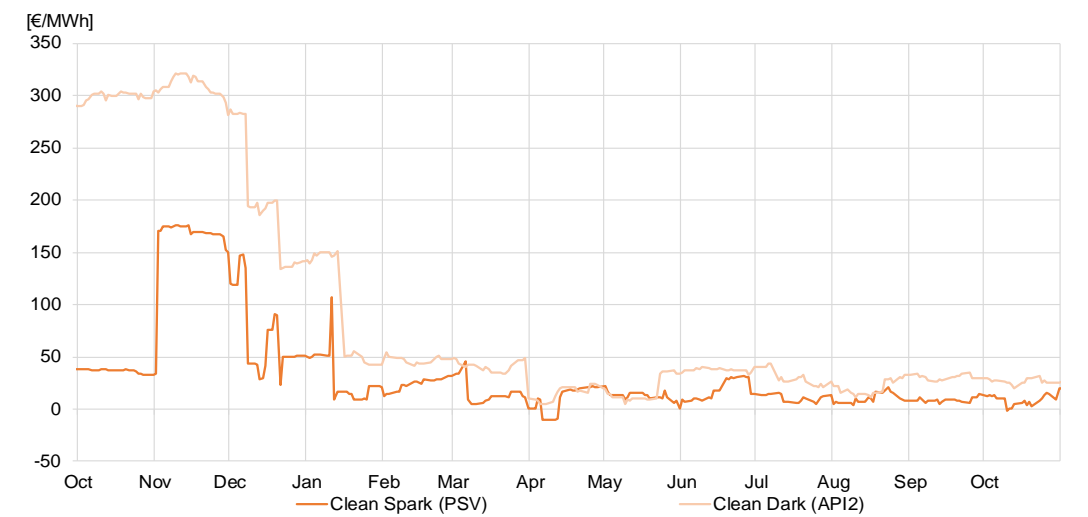
Year+1 Forward Coal & Carbon Prices



Monthly average change
API2-API4 = -\$2.0/t

Source: Terna calculation on Bloomberg data

Clean Year+1 Forward Dark & Spark spreads Italy



Clean spark spread PSV
monthly average =
+€9.0/MWh

Clean dark spread API2
monthly average =
+€24.2/MWh

Source: Terna calculation on Bloomberg data

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 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 - Puglia - 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.

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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), the hours between 8:00 and 20:00 of working days only. **Off-peak hours** are all hours that are not in the peak.

CO₂ 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 – Indice Mensile Consumi Elettrici Industriali: L'indice IMCEI mensile è stato costruito partendo dalle misure dei prelievi mensili dei circa 530 clienti direttamente connessi in alta tensione e di cui Terna è responsabile della misura. Tali clienti sono stati riclassificati in base ai Codici Ateco2007 e aggregati per classi merceologiche significative dal punto di vista elettrico. L'indice adimensionale è stato costruito prendendo come base 100 l'anno 2015.

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Disclaimer

1. The monthly electricity balances for 2022 and 2023 are provisional
2. In particular, the monthly electricity reports of the year 2023 – prepared at the end of each month – are subject to further and precise verification or recalculation in the following months on the basis of 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.