

Monthly Report on the Electricity System December 2024



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Energy Balance Sheets

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In the month of December, electricity demand was 25,672 GWh, up compared to last December (+2.8%) and to December 2022 (+4%). There was also a drop in foreign exchange (-3.6%) compared to the same month of 2023. In 2024, electricity demand (312,285 GWh) was higher compared to the same period in 2023 (+2.2%) but slightly lower compared to the cumulative figure for 2022 (-0.9%).

The value of electricity demand was achieved with two more working days (20 vs 18), and with an average temperature that was 1.6 °C lower compared to December of last year. When adjusted for calendar and temperature effects, the figure represents a +1.1% variation.

The annual trend for December 2024 (compared to December 2023) for the industrial electricity consumption index was negative (-6.5%) with raw data.



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Electricity System

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In December 2024, 51.3% of electricity demand was met via production from Non-Renewable Energy Sources, 31.7% via Renewable Energy Sources, and the remainder via foreign exchange. In December, production from Renewable Energy Sources decreased (-4.7%) compared to the same month of the previous year. In 2024 the operating capacity of renewables increased by 7,480 MW. This value is 1,689 MW higher (+29%) compared to the same period of the previous year. In 2024, PV operating capacity increased by 6,795 MW. During the same period of 2023 the increase was 5,234 MW, recording an increase of 1,561 MW (+30%). In 2024, wind operating capacity increased by 685 MW. During the same period of 2023, the increase was 487 MW, which is an increase of 198 MW (+41%).



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Electricity Market

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The December total for withdrawal programmes on the DAM was approximately €3.3 Bn (+8% compared to the previous month and +22% compared to December 2023).

In December 2024, the spread between average bid-up and bid-down prices on the MSD was €120/MWh, (+13% compared to the previous month and +30% compared to December 2023). Total volumes increased compared to the previous month (+18%).

In December 2024, the spread between bid-up and bid-down prices on the Balancing Market was €168/MWh (+21% compared to the previous month and +15% compared to December 2023). Total volumes increased compared to the previous month (+19%).



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Monthly Summary and Short-Term Analysis

In the month of December, electricity demand was 25,672 GWh, up compared to last December (+2.8%) and December 2022 (+4%). There was also a drop in foreign exchange (-3.6%) compared to the same month of 2023.

In 2024, electricity demand (312,285 GWh) was higher compared to the same period in 2023 (+2.2%) but slightly lower compared to the cumulative figure for 2022 (-0.9%).

Demand breakdown – coverage by sources

[GWh]	Dec 2024	Dec 2023	% 24/23	Jan-Dec 24	Jan-Dec 23	% 24/23
Renewable Hydro	2,186	3,381	-35.4%	52,076	39,949	30.4%
Pumping Production ⁽²⁾	112	99	13.5%	1,451	1,530	-5.2%
Thermal	14,441	12,990	11.2%	146,452	156,156	-6.2%
of which Biomass	1,225	1,058	15.8%	13,184	14,571	-9.5%
of which Hard Coal	334	419	-20.3%	3,507	12,108	-71.0%
Geothermal	448	455	-1.5%	5,269	5,310	-0.8%
Wind	2,632	2,433	8.2%	22,068	23,373	-5.6%
Photovoltaic	1,659	1,226	35.3%	36,064	30,236	19.3%
Stand alone energy storage	38	1	4650.0%	120	8	1361.0%
Net Total Production	21,516	20,585	4.5%	263,500	256,562	2.7%
Stand alone energy storage absorption	44	1	3900.0%	141	12	1111.2%
Pumping	160	141	13.5%	2,073	2,186	-5.2%
Net Total Production for Consumption	21,312	20,443	4.3%	261,286	254,365	2.7%
of which RES ⁽³⁾	8,150	8,554	-4.7%	128,661	113,439	13.4%
of which not RES	13,162	11,889	10.7%	132,625	140,926	-5.9%
Import	4,814	4,924	-2.2%	55,904	54,568	2.4%
Export	454	402	12.9%	4,905	3,317	47.9%
Net Foreign Exchange	4,360	4,522	-3.6%	50,999	51,251	-0.5%
Electricity demand ⁽¹⁾	25,672	24,965	2.8%	312,285	305,616	2.2%

In December 2024, photovoltaic production (+35.3%), thermoelectric production (+11.2%) and wind production (+8.2%) were up, while hydroelectric production was down (-35.4%) compared to the same month the previous year.

In 2024, there was a change in exports, which increased (+47.9%) compared to 2023. The trend in total net production for consumption in December was up (+4.3%) compared to the same month in 2023

(1) Electricity Demand = Net Total Production for Consumption + Foreign Balance

(2) Pumping production is calculated assuming theoretical efficiency during the pumping phase

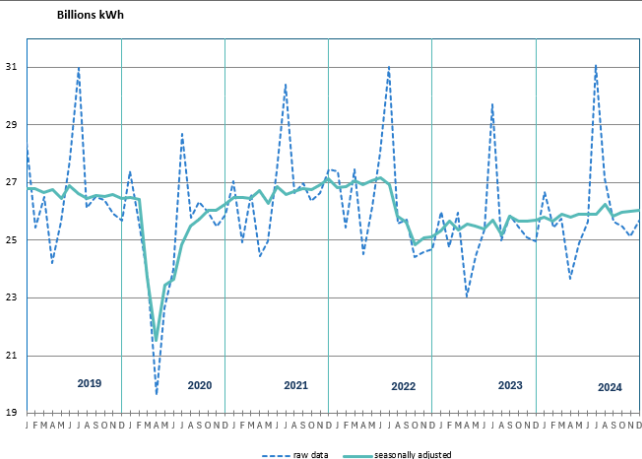
(3) RES Production = Renewable Hydro + Biomass + Geothermal + Wind + Photovoltaic -

Source: Terna

The value of electricity demand was achieved with two more working days (20 vs 18), and with an average temperature that was 1.6 °C lower compared to December of last year. When adjusted for calendar and temperature effects, the figure represents a +1.3% variation.

In 2024, national demand grew by 2.2% compared to 2023 (+1.5% adjusted value). The short-term data, adjusted for seasonal, calendar and temperature effects, remained stable between December and November 2024 (+0.1%).

Demand – seasonality adjusted



The value, adjusted for seasonal, calendar and temperature effects, remained stable (+0.1%)

Source: Terna

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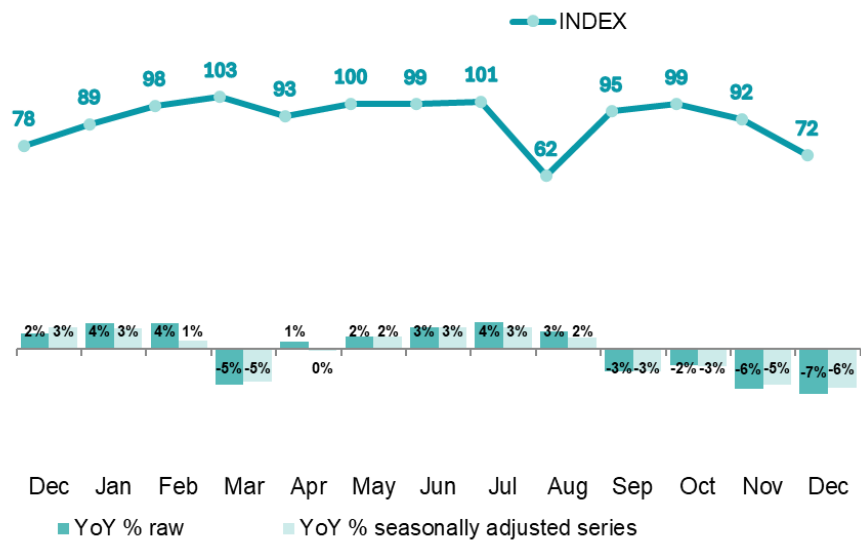
Energy Balance Sheets

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IMCEI

The annual trend for December 2024 (compared to December 2023) was down (-6.5%) based on raw data. Using data adjusted for calendar differences, the change is -5.7%. In 2024, the index remained stable (-0.3%).

IMCEI short-term analysis (2015 base = 100)

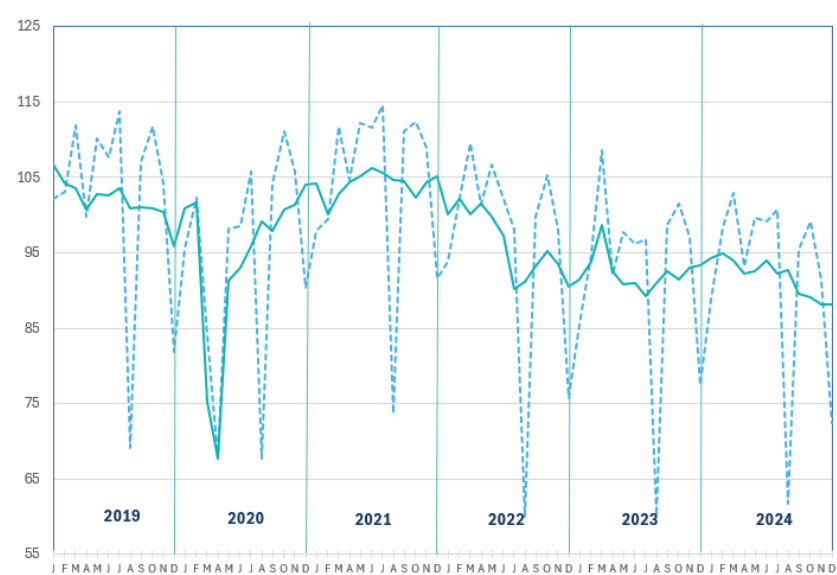


In December, the variation in the monthly index of Italian electricity consumption decreased compared to December 2023

Source: Terna

The short-term data, adjusted for seasonal and calendar effects, recorded a decrease in December compared to November (-0.1%).

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



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

Source: Terna

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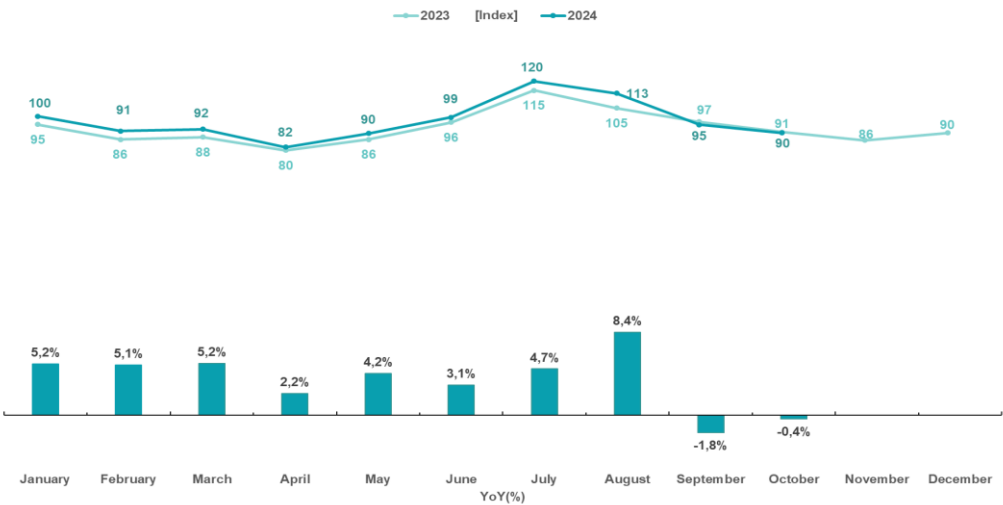
Energy Balance Sheets

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IMSER

The trend change for October 2024 (compared to October 2023) was down -0.4% with raw data. In the period January-October 2024, electricity consumption in the services sector had increased overall by +3.7% compared to 2023.

Monthly Service Sector Consumption Index (basis 2019 = 100)



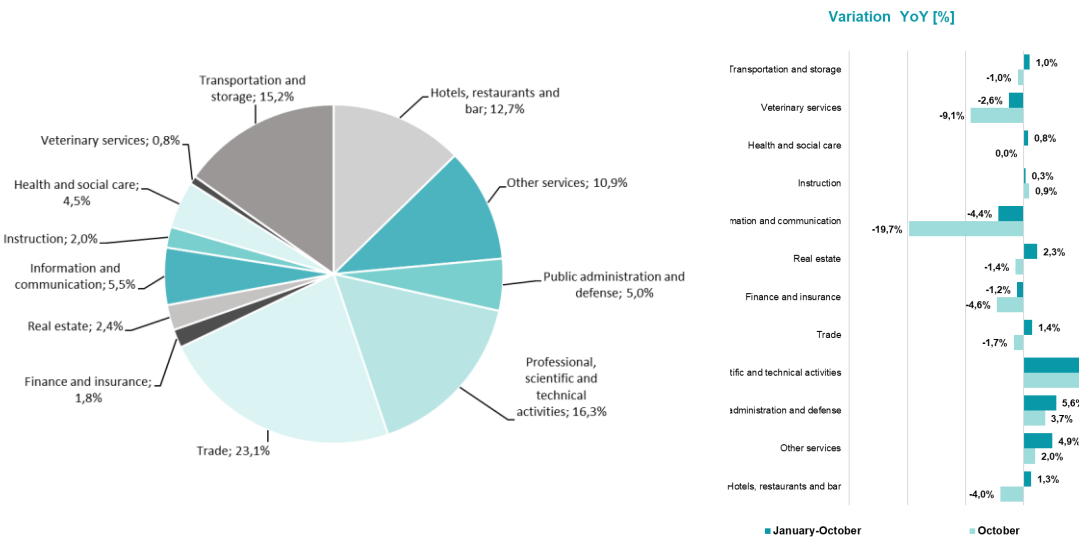
In October, the change in the monthly index of electricity consumption for the services sector was negative (-0.4%) compared to September 2023

Source: Terna elaboration of data based on a sample of distributors

Specifically, the following categories saw a decrease in October 2024: hotels, restaurants and bars; trade; finance and insurance; real estate; information and communication; financial services; transportation and storage. The other categories increased.

In the first ten months of the year 2024, the categories of finance and insurance, information and communication and veterinary services decreased compared to 2023. All other categories increased.

IMSER sector analysis (basis 2019 = 100) - YOY change and annual cumulative contribution of the sectors



The cumulative figure for January-October 2024 was up by +3.7% compared to the same period in 2023

Source: Terna elaboration of data based on a sample of distributors

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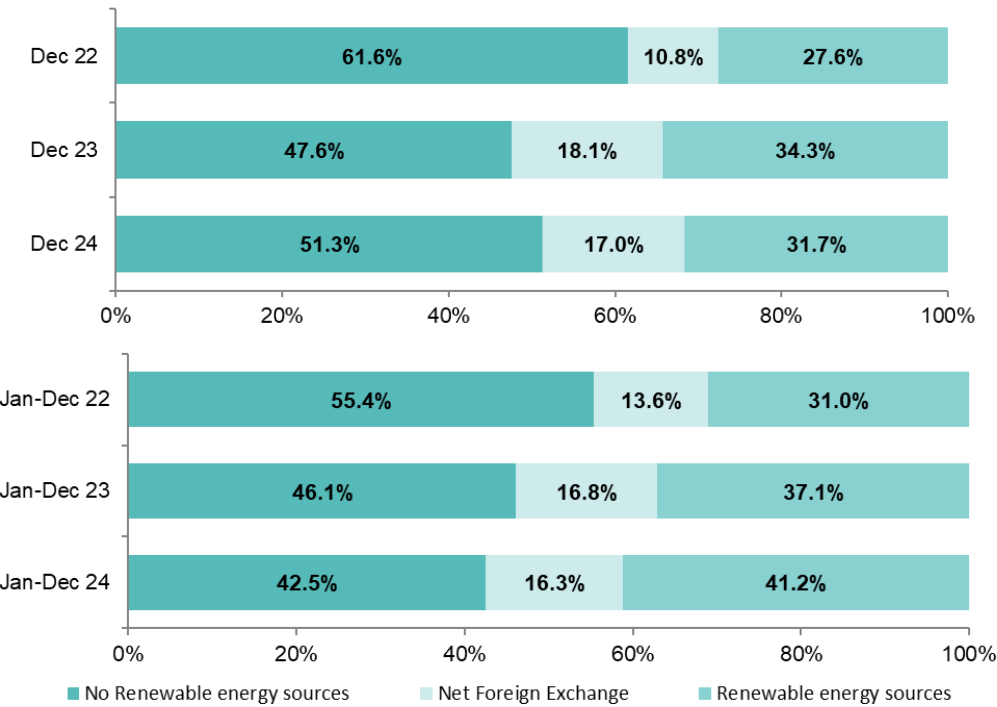
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Energy Demand Mix

In December 2024, 51.3% of the electricity demand was met via production from Non-Renewable Energy Sources, 31.7% via Renewable Energy Sources and the remainder via foreign exchange.

In 2024, electricity demand was 312,285 GWh, 42.5% of which was met via production from Non-Renewable Energy Sources, 41.2% from Renewable Energy Sources and the remainder from the foreign balance.

Demand breakdown – coverage by sources

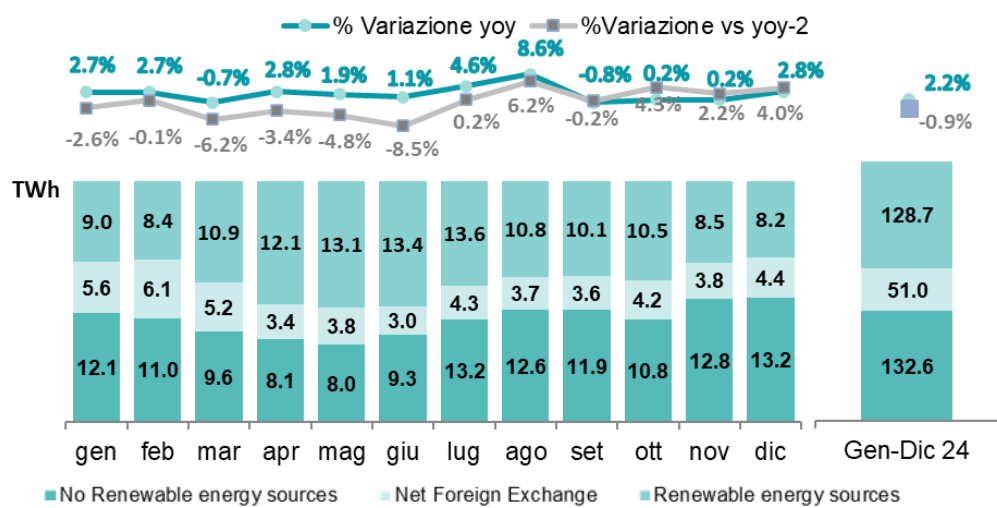


The coverage of demand by renewable sources fell from 34.3% in December 2023 to 31.7% in December 2024

In 2024 coverage of demand from non-renewables fell from 46.1% in 2023 to 42.5% in 2024

Source: Terna

2024 trend in demand breakdown and difference from 2023 and 2022



In 2024, electricity demand on the grid is higher than 2023 (+2.2%) and down compared to the cumulative figure for 2022 (-0.9%). In 2024, energy production from renewable sources totalled 128.7 TWh, up compared to 2023 (+13.4%)

Source: Terna

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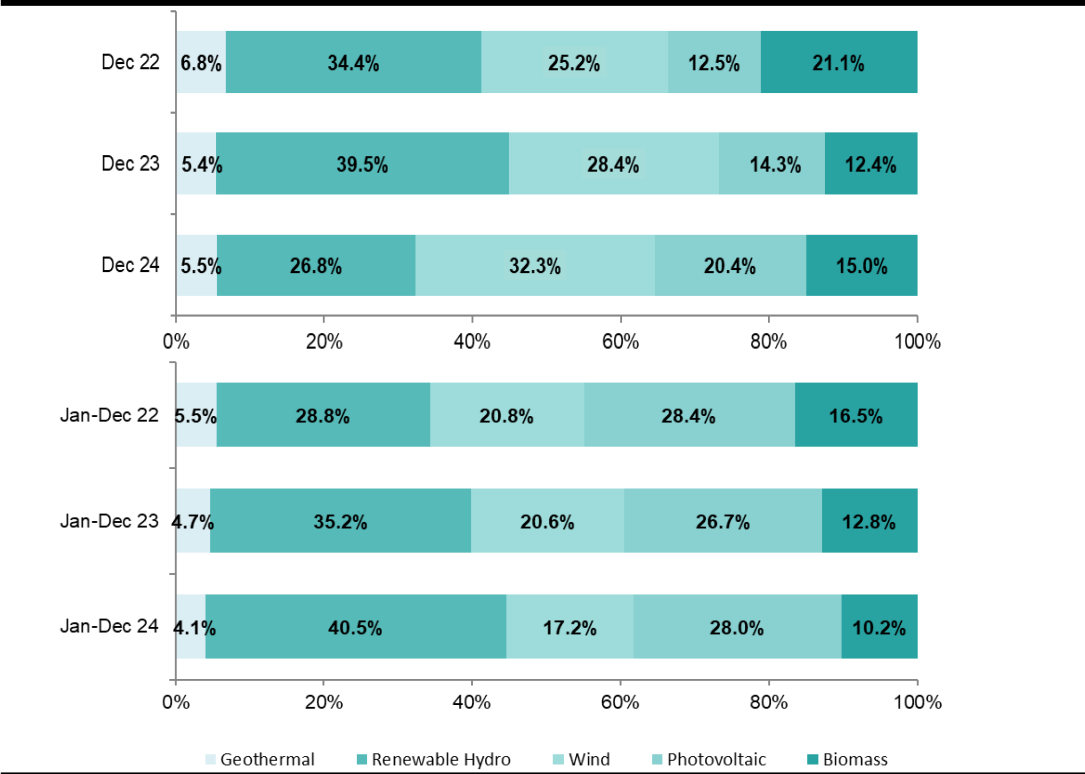
Energy Balance Sheets



Details of Renewable Energy Sources

In December, production from Renewable Energy Sources decreased (-4.7%) compared to the same month of the previous year. Specifically, there was a decrease in renewable hydroelectric production (-35.4%) and an increase in production from photovoltaic (35.3%) and wind sources (8.2%).

RES Production - Breakdown

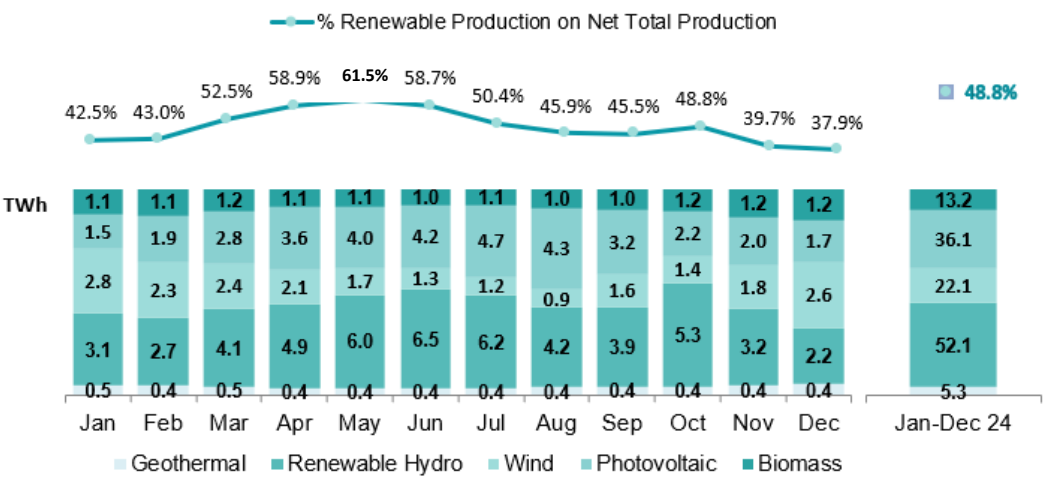


In December 2024, the main contributors to production from renewable energy sources were wind production (32.3%) and renewable hydroelectric production (26.8%)

In 2024 the ratio of renewable hydroelectric and photovoltaic production increased while the contribution from the other sources decreased overall compared to 2023

Source: Terna

2024 trend in net production from RES and difference from 2023



In December 2024, production from RES represented 37.9% of total net national production, a decrease compared to the same month in 2023 (41.6%). In 2024, production from RES represented 48.8% of total net national production, an increase compared to the cumulative figure for 2023 (44.2%)

Source: Terna

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Energy Balance Sheets



Historical Energy Balance Sheets

In 2024, total net production allocated for consumption (261,286 GWh) met 83.7% of national electricity demand (312,285 GWh).

2024 Historical Monthly Energy Balance Sheet

[GWh]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Renewable Hydro	3,117	2,702	4,094	4,871	5,964	6,483	6,151	4,188	3,876	5,282	3,162	2,186	52,076
Pumping Production ⁽²⁾	64	106	158	213	172	130	99	111	114	106	68	112	1,451
Thermal	13,193	12,071	10,872	9,303	9,143	10,368	14,352	13,668	12,983	12,037	14,021	14,441	146,452
of which Biomass	1,082	1,071	1,173	1,080	1,094	1,048	1,086	1,002	998	1,163	1,162	1,225	13,184
of which Hard Coal	345	467	243	268	245	254	263	240	270	322	256	334	3,507
Geothermal	459	433	460	438	442	424	448	429	422	438	428	448	5,269
Wind	2,814	2,293	2,405	2,069	1,679	1,324	1,190	916	1,621	1,368	1,757	2,632	22,068
Photovoltaic	1,536	1,872	2,759	3,648	3,967	4,159	4,724	4,300	3,199	2,234	2,007	1,659	36,064
Stand alone energy storage	1	2	2	3	6	7	6	6	12	14	23	38	120
Net Total Production	21,184	19,479	20,750	20,545	21,372	22,894	26,970	23,618	22,227	21,479	21,466	21,516	263,500
Stand alone energy storage absorption	1	2	3	4	7	8	7	6	16	17	26	44	141
Pumping	92	151	226	304	245	185	141	158	163	151	97	160	2,073
Net Total Production for Consumption	21,091	19,326	20,521	20,238	21,120	22,701	26,822	23,454	22,048	21,311	21,343	21,312	261,286
of which RES ⁽³⁾	9,008	8,371	10,891	12,106	13,146	13,438	13,599	10,835	10,116	10,485	8,516	8,150	128,661
of which not RES	12,083	10,955	9,631	8,131	7,975	9,264	13,223	12,619	11,932	10,826	12,827	13,162	132,625
Import	5,868	6,258	5,424	3,805	4,183	3,570	4,862	4,362	3,961	4,535	4,262	4,814	55,904
Export	279	145	188	363	406	615	600	665	346	370	474	454	4,905
Net Foreign Exchange	5,589	6,113	5,236	3,442	3,777	2,955	4,262	3,697	3,615	4,165	3,788	4,360	50,999
Electricity demand ⁽¹⁾	26,680	25,439	25,757	23,680	24,897	25,656	31,084	27,151	25,663	25,476	25,131	25,672	312,285

Source: Terna

In 2024, net total production was up (+2.7%) compared to the same period in 2023, and peak electricity demand was reached in July, with 31,084 GWh.

The developments in the monthly balance sheet for 2023 are provided below.

2023 Historical Monthly Energy Balance Sheet

[GWh]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Renewable Hydro	2,171	1,590	1,721	1,643	4,598	5,176	4,477	3,913	3,621	3,388	4,270	3,381	39,949
Pumping Production ⁽²⁾	137	100	172	169	132	99	103	161	100	133	125	99	1,530
Thermal	15,300	14,562	14,399	11,003	10,616	12,012	15,376	12,104	13,615	12,799	11,380	12,990	156,156
of which Biomass	1,358	1,242	1,391	1,029	1,127	1,228	1,351	1,357	1,326	1,080	1,024	1,058	14,571
of which Hard Coal	2,294	1,868	1,881	202	560	1,226	1,041	662	914	461	579	419	12,108
Geothermal	455	411	438	438	458	433	443	436	442	460	441	455	5,310
Wind	2,262	1,821	2,564	2,173	1,525	1,033	1,342	1,741	1,649	1,862	2,968	2,433	23,373
Photovoltaic	1,125	1,722	2,640	3,017	2,958	3,524	3,795	3,566	2,922	2,204	1,537	1,226	30,236
Stand alone energy storage	0	0	0	0	0	1	1	1	1	1	1	1	8
Net Total Production	21,450	20,206	21,934	18,443	20,287	22,278	25,537	21,922	22,350	20,847	20,722	20,585	256,562
Stand alone energy storage absorption	0	0	1	0	1	1	1	1	1	2	2	1	12
Pumping	196	143	246	242	188	141	147	230	143	190	179	141	2,186
Net Total Production for Consumption	21,254	20,063	21,688	18,201	20,099	22,136	25,389	21,691	22,206	20,656	20,542	20,443	254,365
of which RES ⁽³⁾	7,371	6,786	8,753	8,299	10,667	11,395	11,408	11,013	9,960	8,994	10,240	8,554	113,439
of which not RES	13,883	13,277	12,934	9,902	9,432	10,741	13,981	10,678	12,246	11,662	10,301	11,889	140,926
Import	5,080	4,943	4,445	5,004	4,615	3,546	4,651	3,656	3,908	4,986	4,810	4,924	54,568
Export	352	232	188	169	275	314	323	337	248	211	266	402	3,317
Net Foreign Exchange	4,728	4,711	4,257	4,835	4,340	3,232	4,328	3,319	3,660	4,775	4,544	4,522	51,251
Electricity demand ⁽¹⁾	25,982	24,774	25,945	23,036	24,439	25,368	29,717	25,010	25,866	25,431	25,086	24,965	305,616

Source: Terna

In 2023, the month with the highest demand for electricity was July, with 29,717 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

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Demand by Operational Area

In December 2024, there was an increase in demand in the Northern zone (TO, MI, VE), in the Centre (RM, FI), in the Southern zone (NA) and 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
December 2024	2,641	5,315	3,826	4,019	3,667	3,831	1,643	730
December 2023	2,589	5,277	3,822	3,824	3,474	3,704	1,575	700
% December 24/23	2.0%	0.7%	0.1%	5.1%	5.6%	3.4%	4.3%	4.3%
Cumulated 2024	31,840	66,774	48,352	48,125	43,627	46,044	19,052	8,472
Cumulated 2023	31,190	66,327	46,807	46,645	42,441	45,091	18,789	8,325
% Cumulated 24/23	2.1%	0.7%	3.3%	3.2%	2.8%	2.1%	1.4%	1.8%

In 2024, the Y-o-Y percentage change in demand is +3% in the Centre, +2.1% in the South, +1.8% in the North and +1.5% for the Islands

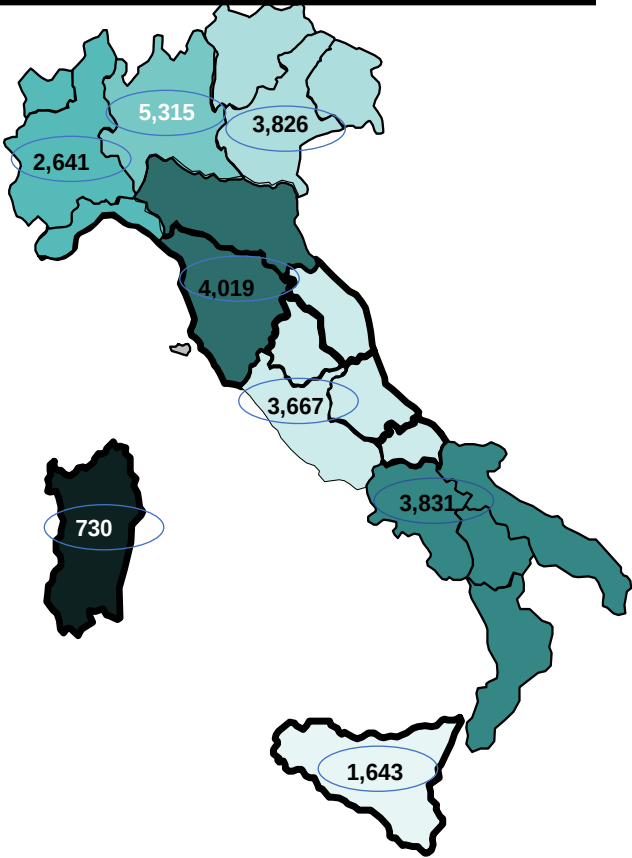
Source: Terna

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.

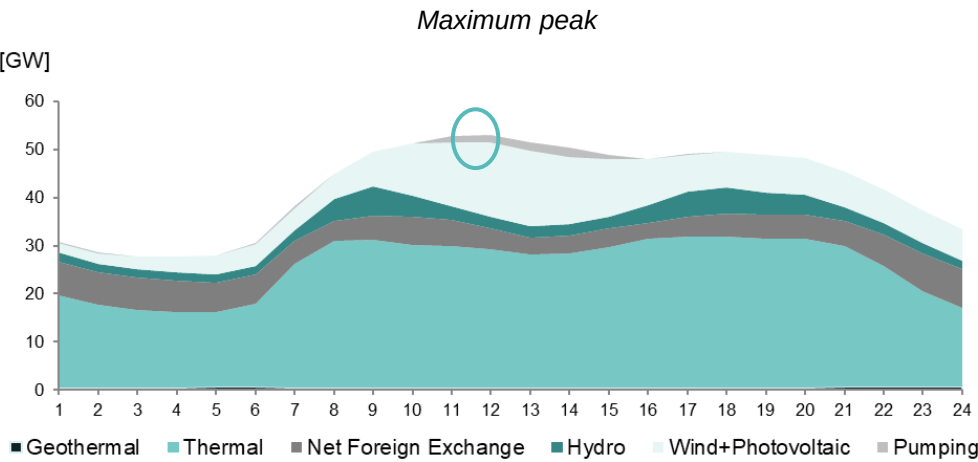
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Peak Demand

In December 2024, peak demand was recorded on **Thursday 5 December, 11:00-12:00**, at 51,572 MW (+0.9% Y-o-Y). The hourly demand diagram of the peak day is presented below.

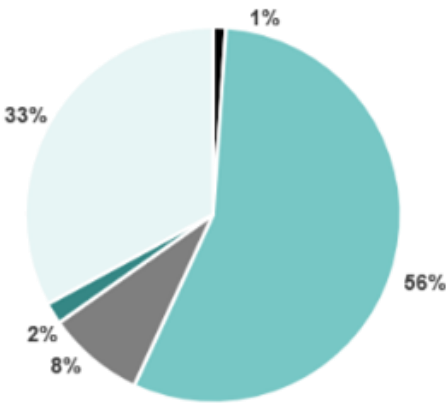
Peak Demand



At peak, the contribution from thermal production was 28,790 MW, down (-21.1%) compared to the contribution from thermal production at the November 2023 peak (36,505 MW).

Source: Terna

Coverage of demand - 05 December 2024 11:00-12:00



At its peak, production from wind and photovoltaic sources contributed to covering 33% of demand, with thermal production covering 56% and foreign exchange covering 8%.

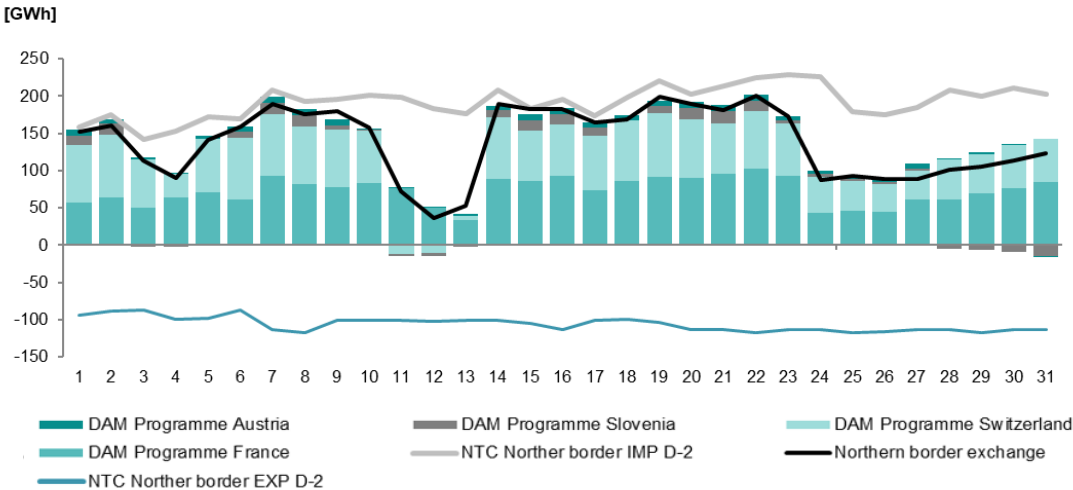
■ Geothermal ■ Thermal ■ Net Foreign Exchange ■ Hydro+Pumping ■ Wind+Photovoltaic

Source: Terna

Net Foreign Exchange – December 2024

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

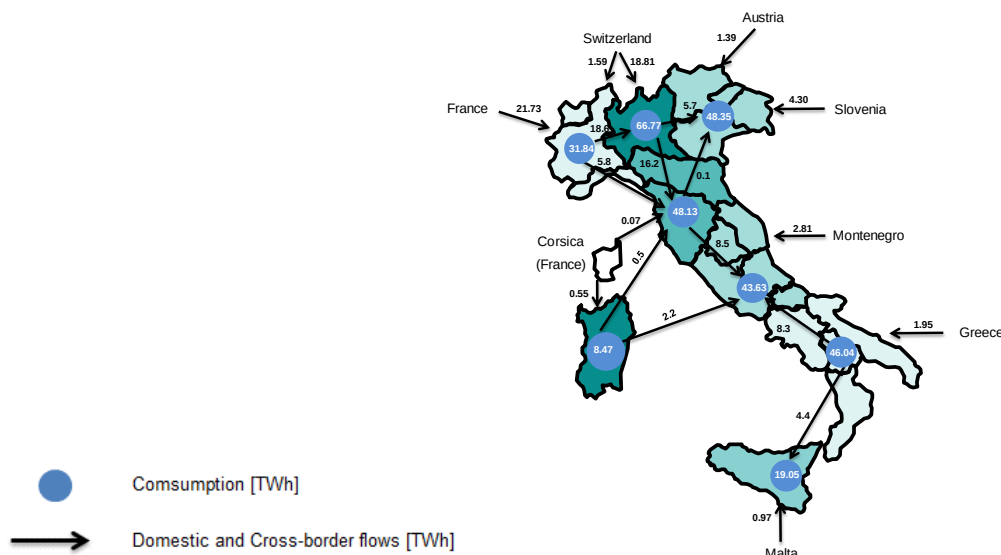
Net Foreign Exchange on the Northern border



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 2024, a net exchange was recorded from the Northern zone to Emilia Romagna and Tuscany of 22.1 TWh. The mainland recorded a net exchange towards Sicily of 4.4 TWh.

Source: Terna

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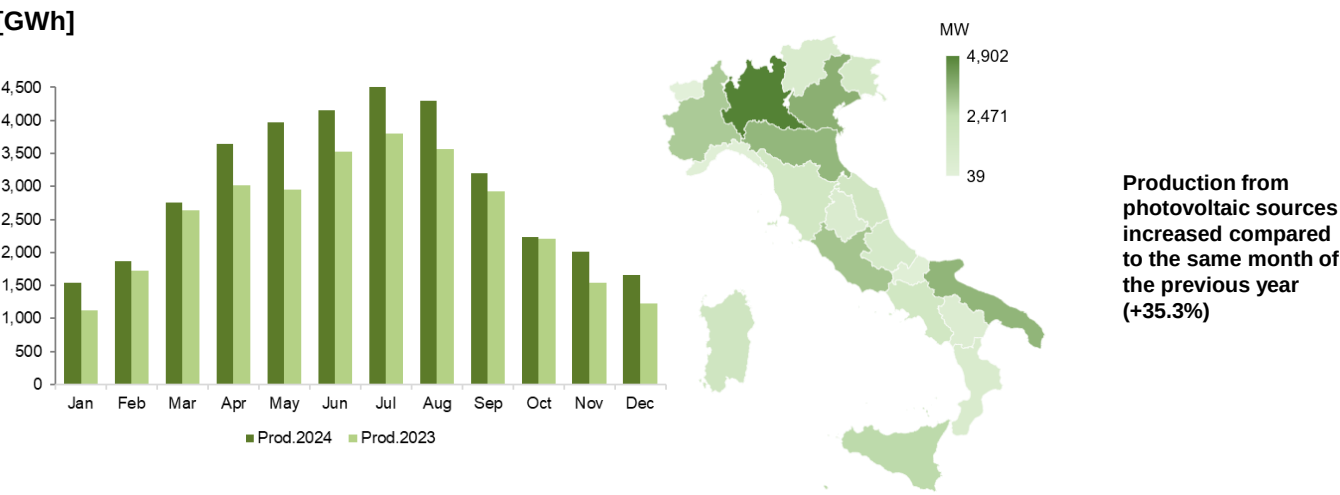
Electricity System



Production and Installed Capacity

Energy produced from photovoltaic sources in December 2024 reached 1,659 GWh, an increase compared to the same month of the previous year (+433 GWh).

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

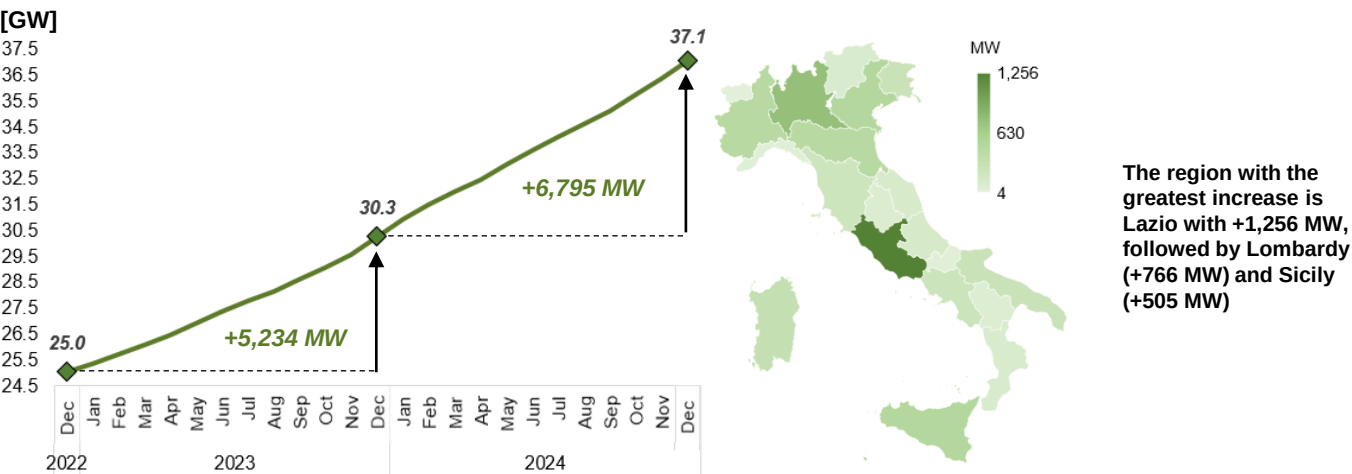


1. The operating capacity takes into account new activations, upgrades and decommissioning of plants

Source: Terna

In 2024, operating capacity increased by 6,795 MW. During the same period of 2023 the increase was 5,234 MW, recording an increase of 1,561 MW (+30%).

Cumulative operating capacity (left) and distribution of new activations 2024 (right)



Source: Terna

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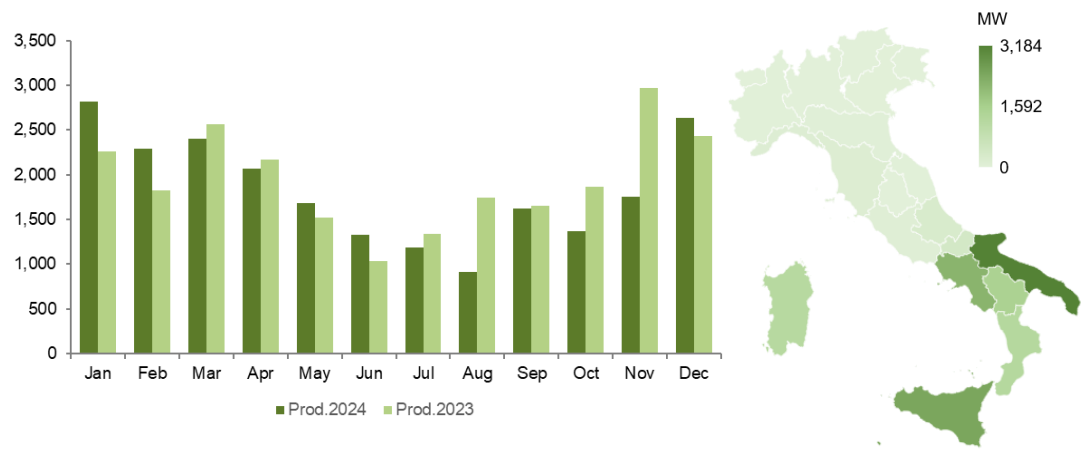
Electricity System



Energy produced from photovoltaic sources in December 2024 reached 2,632 GWh, an increase compared to the same month of the previous year (+199 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 (+8.2%)

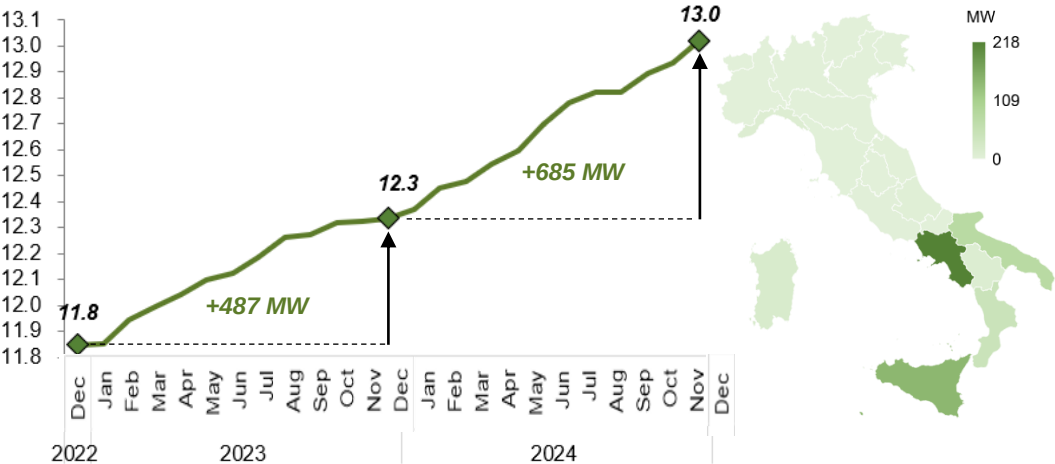
1. The operating capacity takes into account new activations, upgrades and decommissioning of plants

Source: Terna

In 2024, operating capacity increased by 685 MW. During the same period of 2023, the increase was 487 MW, which is an increase of 198 MW (+41%).

Cumulative operating capacity (left) and distribution of new activations 2024 (right)

[GW]



The region with the greatest increase is Campania with +218 MW, followed by Sicily (+166 MW) and Apulia (+131 MW)

Source: Terna

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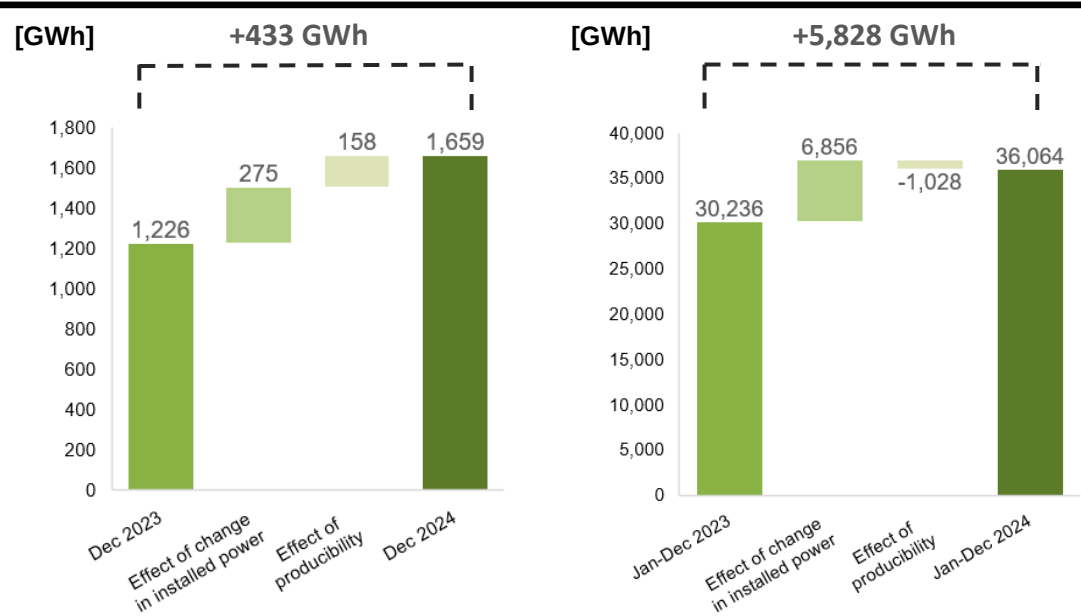
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In the month of December, the increase in photovoltaic production (+433 GWh) was due to the positive outcome of both an increased operating capacity (+275 GWh) and the greater producibility linked to solar irradiation (+158 GWh).
In 2024, increased production (+5828 GWh) is the result of the positive contribution of greater installed power (+6856 GWh), which amply makes up for the lower producibility linked to solar irradiation (-1028 GWh).

Breakdown of effects of photovoltaic production - monthly (left) and annual cumulative (right)



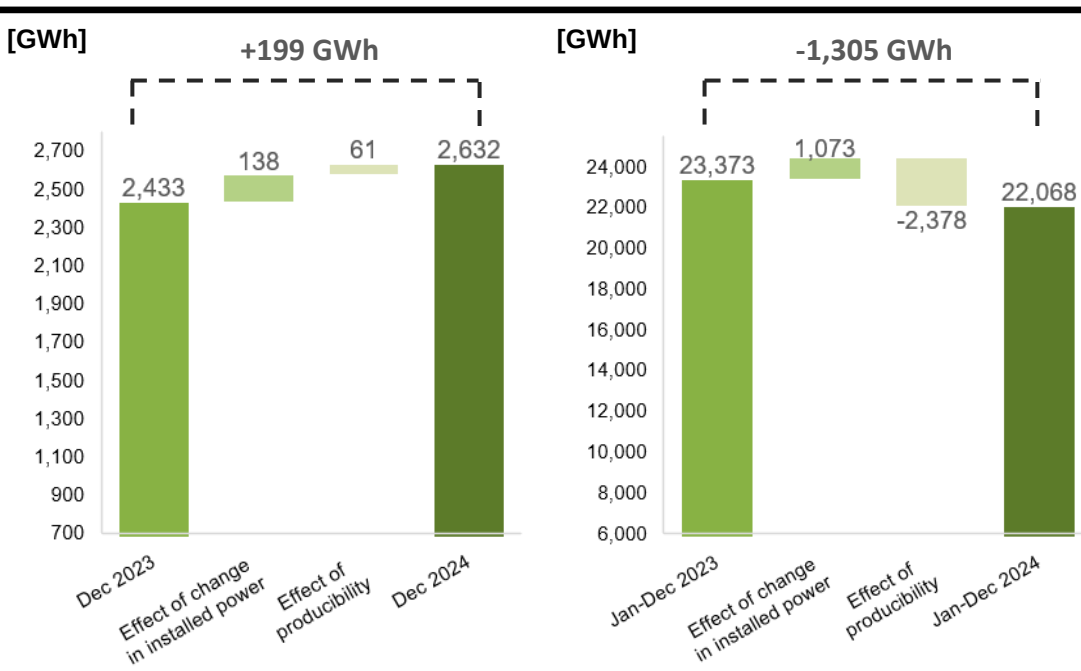
In December, photovoltaic production increased by +35.3% compared to December 2023.

In 2024, production increased +19.3% compared to the same period of 2023.

Source: Terna calculation

In December 2024, there was an increase in wind production (+199 GWh) due to the combined effect of greater operating wind capacity (+138 GWh) and more wind (+61 GWh).
In 2024, decreased production (-1,305 GWh) is the combined result of the increase in installed power (+1,073 GWh) and the lower producibility (-2,378 GWh).

Breakdown of effects of wind production - monthly (left) and annual cumulative (right)



In December, wind production increased by +8.2% compared to December 2023.

In 2024, production decreased by -5.6% compared to the previous year.

Source: Terna calculation

Note: for calculation of breakdown of the effect of power and producibility see legend

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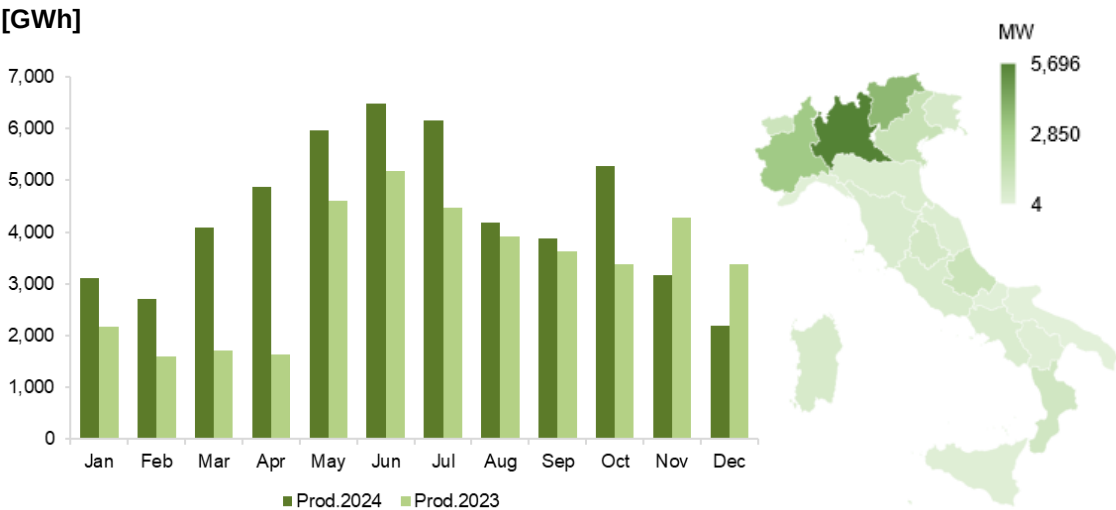
December 2024

Electricity System



Energy produced from renewable hydroelectric sources in December 2024 reached 2,186 GWh, a decrease compared to the same month of the previous year (-1,195 GWh).

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

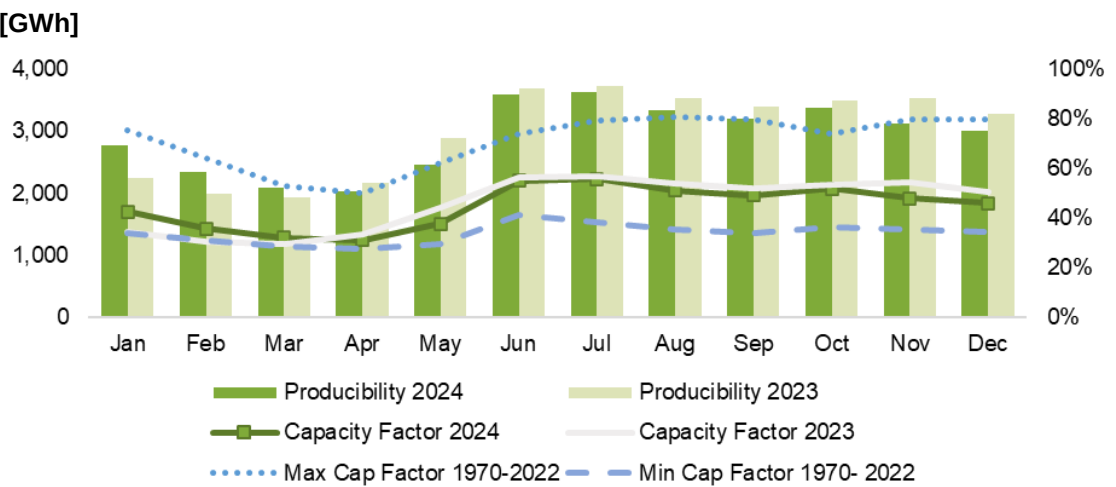


1. The operating capacity takes into account new activations, upgrades and decommissioning of plants.

Source: Terna

In December, hydroelectric producibility decreased (-8.6%) compared to the same month of the previous year.

Hydroelectric Producibility and Reservoir Percentage



Dec 23 Dec 24	Reservoir Capacity		NORTH	CENTRE	SOUTH	ISLANDS	TOTAL
	[GWh]		2,241	644	114		3,000
	% (capacity/max capacity)		51.8%	35.5%	30.0%		46.0%
	[GWh]		2,315	862	104		3,281
	% (capacity/max capacity)		53.5%	47.5%	27.4%		50.3%

Source: Terna

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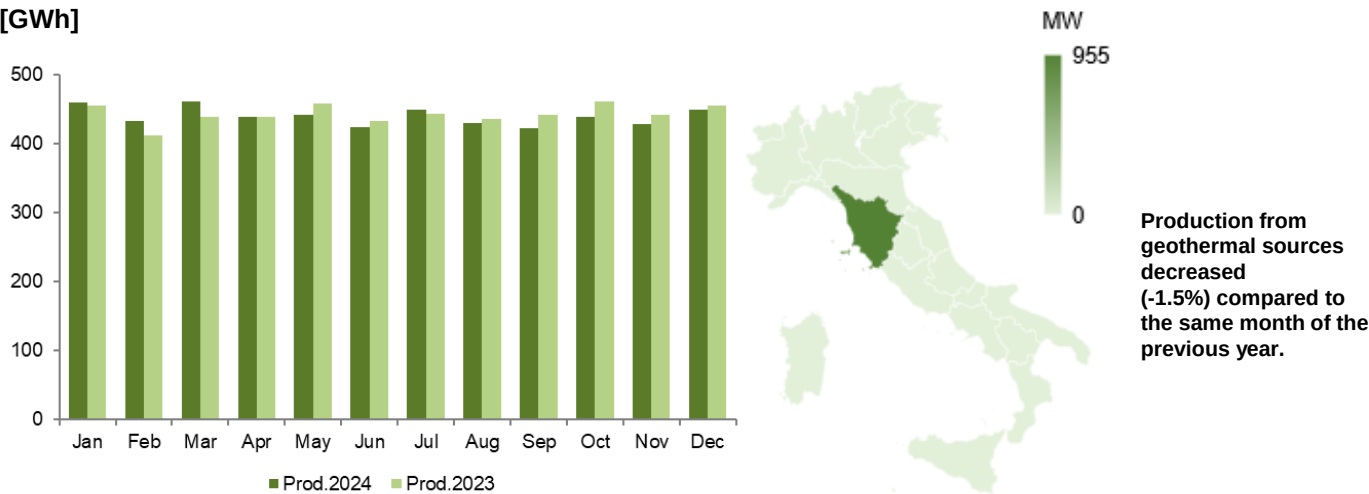
December 2024

Electricity System



Energy produced from geothermal sources in December 2024 reached 448 GWh, down compared to the same month of the previous year (-7 GWh).

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

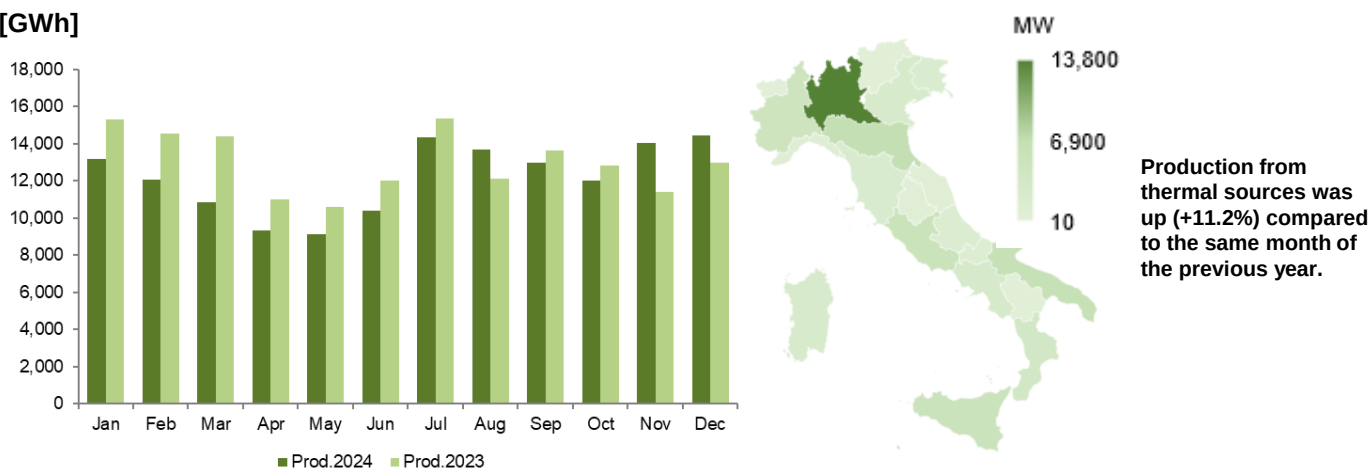


1. The operating capacity takes into account new activations, upgrades and decommissioning of plants

Source: Terna

Energy produced from thermal sources in December 2024 reached 14,441 GWh, up compared to the same month of the previous year (+1,451 GWh).

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



Source: Terna

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Electricity System



In 2024 the operating capacity of renewables increased by 7,480 MW. This value is 1,689 MW higher (+29%) compared to the same period of the previous year.

Variation in monthly operating capacity and number of plants per Source in Italy 2024¹

[MW]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Photovoltaic	656	562	503	446	601	573	512	497	512	619	626	686	6,795
Wind	32	85	25	67	53	101	80	41	2	68	45	85	685
Hydroelectric	-1	-1	3	1	3	3	2	1	-2	11	4	3	27
Geothermal & Biomass	0	-3	-17	-1	0	0	-2	3	2	3	-3	-8	-27
Total	687	643	514	513	658	676	591	543	515	702	672	766	7,480

Number of Plants	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Photovoltaic	31,380	32,737	29,257	25,241	27,857	22,531	22,538	16,983	19,109	21,223	16,539	18,519	283,914
Wind	12	8	5	4	6	7	6	0	6	-2	4	7	63
Hydroelectric	6	2	6	0	6	4	6	4	4	10	3	4	55
Geothermal & Biomass	-1	5	3	4	2	2	3	3	10	12	4	5	52
Total	31,397	32,752	29,271	25,249	27,871	22,544	22,553	16,990	19,129	21,243	16,550	18,535	284,084

Source: Terna

The evolution of operational capacity by source in 2023 is shown below.

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	492	724	5,234
Wind	4	93	48	50	53	25	63	80	11	45	6	11	487
Hydroelectric	1	2	7	1	2	3	-6	-1	6	7	6	4	33
Geothermal & Biomass	-4	0	1	-2	9	1	-5	39	0	1	0	0	42
Total	297	471	442	409	499	498	458	514	441	523	503	740	5,795

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	26,723	31,548	373,929
Wind	0	17	7	3	3	3	5	9	5	18	6	6	82
Hydroelectric	6	3	9	3	12	6	3	2	8	6	4	8	69
Geothermal & Biomass	2	7	3	6	9	6	0	8	7	5	1	2	56
Total	29,659	35,834	37,604	30,702	35,509	33,737	29,486	25,864	27,269	30,174	26,734	31,564	374,136

Source: Terna

1. The operating capacity and the number of plants take into account new activations, upgrades and decommissioning of plants

RES capacity targets for 2024

The following table shows the net change in installed capacity¹ between January 2021 and December 2024, broken down by region and the related progressive target in December 2024. This target is determined with reference to the regional distribution envisaged by the Eligible Areas Ministerial Decree.

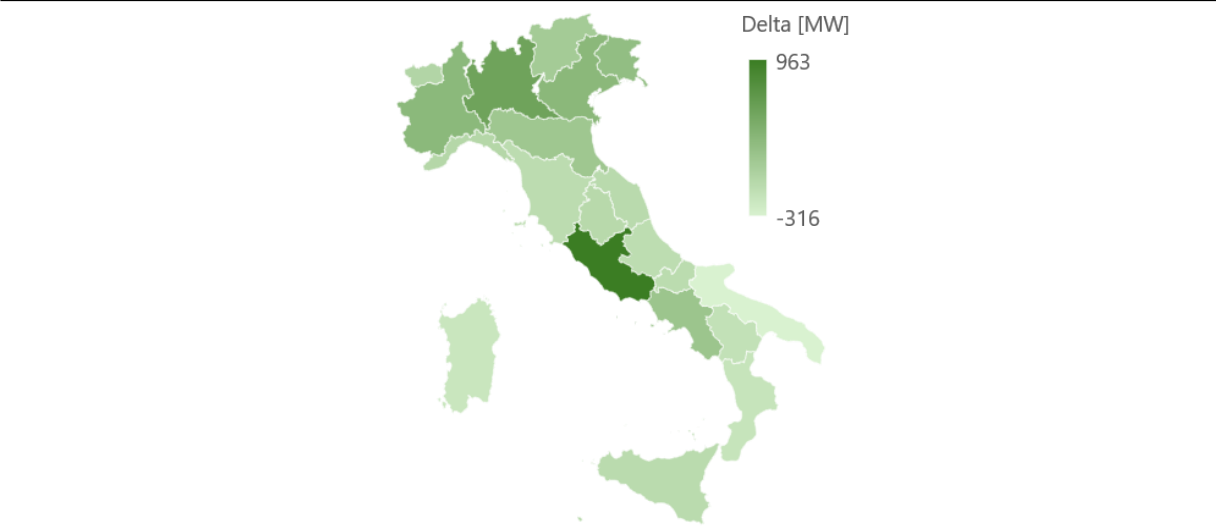
Change in installed capacity Jan 2021–Dec 2024 and deviation from the regional target

Region	Installed change ¹ Jan 21–Dec 24 [MW]	Eligible Areas Target Jan 21–Dec 24 [MW]	Delta Installed change vs Target [MW]
ABRUZZO	366	454	-88
BASILICATA	415	543	-128
CALABRIA	386	549	-163
CAMPANIA	1,087	909	178
EMILIA ROMAGNA	1,443	1,288	155
FRIULI VENEZIA GIULIA	659	404	255
LAZIO	1,896	933	963
LIGURIA	176	198	-22
LOMBARDY	2,509	1,963	546
MARCHE	400	457	-57
MOLISE	102	175	-73
PIEDMONT	1,409	1,098	311
APULIA	1,356	1,672	-316
SARDINIA	812	998	-186
SICILY	1,778	1,842	-64
TUSCANY	587	667	-80
TRENTINO ALTO ADIGE	389	279	110
UMBRIA	234	279	-45
VALLE D'AOSTA	24	27	-3
VENETO	1,689	1,373	316
TOTAL ITALY	17,717	16,108	1,609

Source: Terna

See below for the geographic representation of regional deviations from the December 2024 target.

Regional change from targets at 31 December 2024 in installed RES capacity



In December 2024, the first region where the net change in power was higher than the additional MW envisaged in 2024 was Lazio

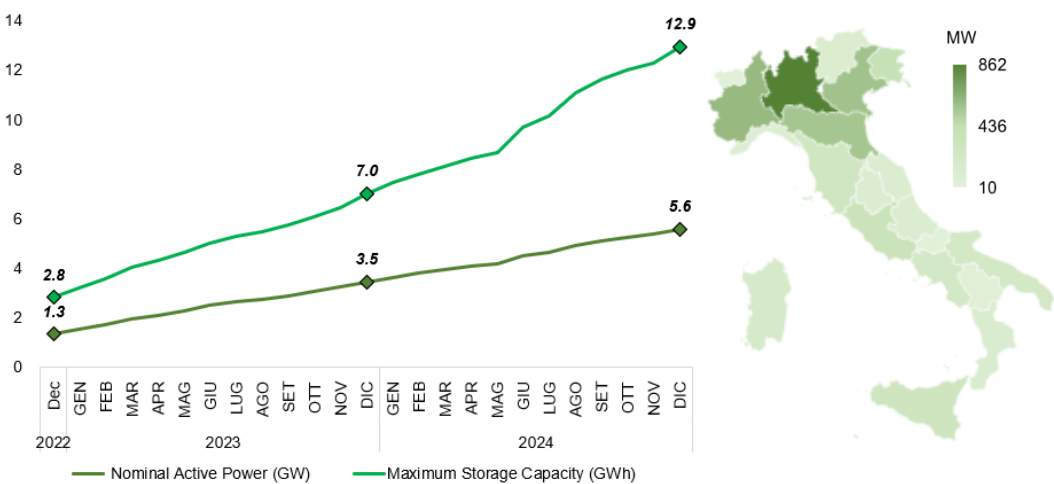
Source: Terna

1. The net change in power is calculated as follows: new installations + upgrades - decommissioning - downgrades
2. The 2024 target represents the objective value expressed as additional power in MW for each region between 31/12/2020 and 31/12/2024 as indicated in "Table A – Regional distribution of minimum power per year expressed in MW" annexed to the Eligible Areas Ministerial Decree of 21 June 2024.

Storage Systems¹ - Installed Capacity

In 2024, the nominal power² of storage in operation increased by 2,113 MW, against an increase of 2,111 MW in the same period of 2023, thus remaining essentially stable within 3 MW (+0.1%). The maximum usable capacity³ of storage in operation increased by 5,921 MWh, against an increase of 4,200 MWh in the same period of 2023, for a different of 1,721 MWh (+41.0%). Approximately 730,000 storage systems are in operation.

Cumulative operating capacity (left) and distribution (right)

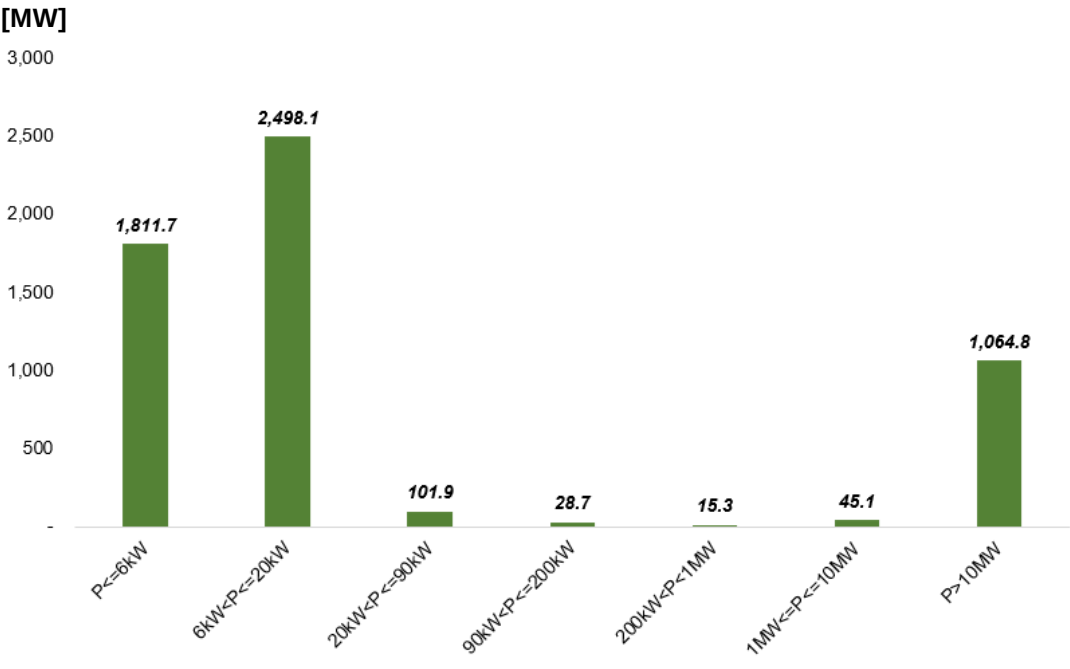


The regions that recorded the highest capacity in service were Lombardy (+862MW), Veneto (+613MW) and Piedmont (+600MW)

Source: Terna

The power class with the highest nominal active power was the one between 6kW<P<=20kW, which saw 2,498.1 MW installed

Nominal active power operating divided by plant size



Devices with capacity within a range of 6kW<P<=20kW accounted for 45% of the nominal active power of the storage systems

Source: Terna

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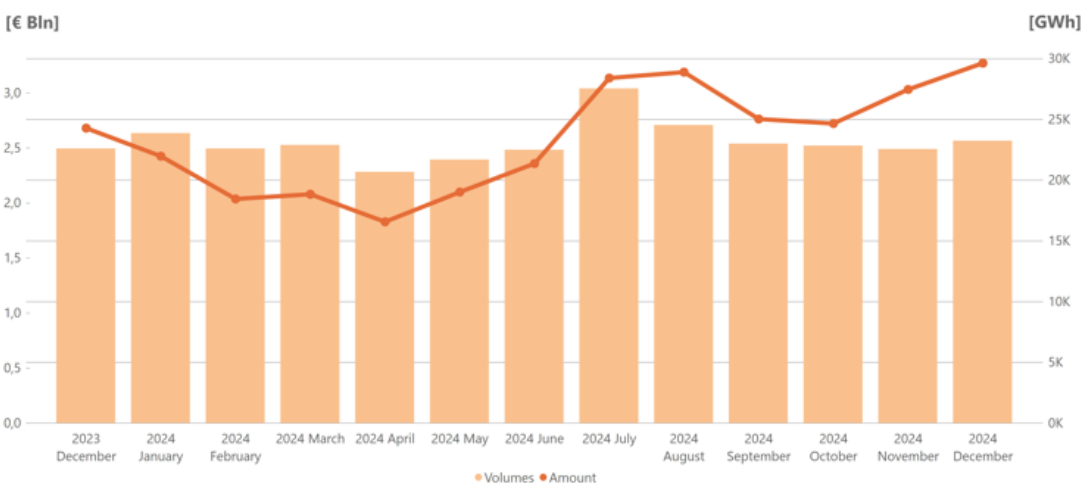
Electricity Market

3

Day-Ahead Market

The December total for withdrawal programmes on the DAM was approximately €3.3 Bn (+8% compared to the previous month and +22% compared to December 2023). The average PUN in December 2024 was approximately €135.1/MWh (+3% compared to the previous month and +17% compared to December 2023). There was also a change of +3% in demand compared to the previous month and of +3% compared to December 2023.

Day Ahead Market – amounts and volumes

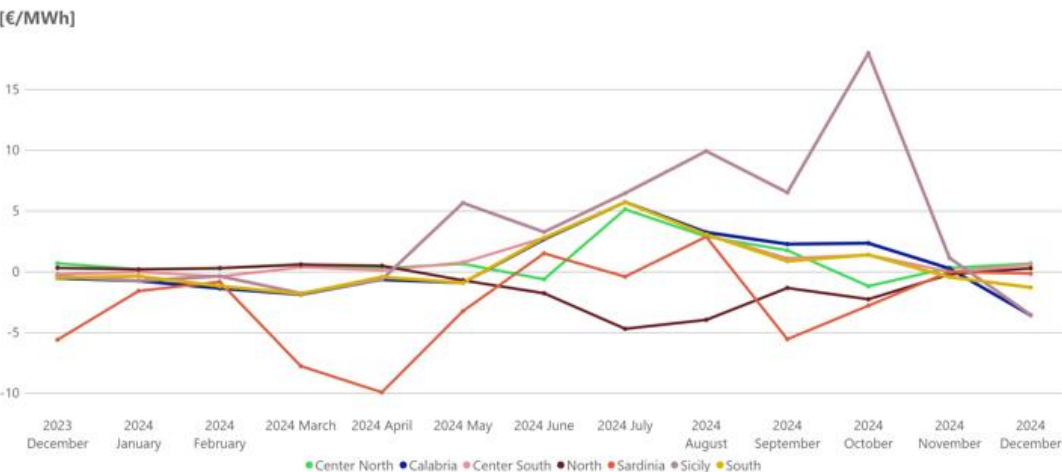


Total for December 2024: +22% compared to December 2023

Source: Terna calculation on GME data

In December, the zonal prices were essentially in line with the PUN. Sicily and Calabria were the exceptions, with both recording a spread of -€3.6/MWh.

Spread compared to the PUN



Spread in the Calabria and Sicily zones in December 2024: -€3.6/MWh compared to the PUN

Source: Terna calculation on GME data

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Electricity Market



The spread between the peak and off-peak prices in December 2024 was, on average, €25/MWh. The highest spread was recorded in the Centre-North zone, where it was €28/MWh.

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

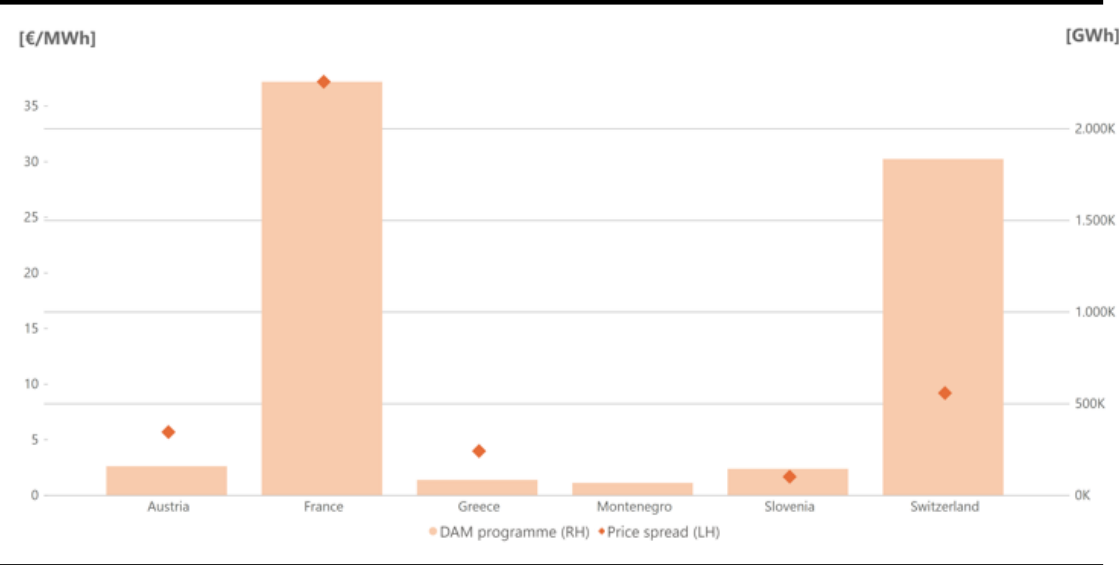
	PUN	Calabria	Centre-North	CSouth	North	Sardinia	Sicily	South
Average	135.1	131.5	135.7	135.6	135.3	134.9	131.5	133.8
Average Month Y-1	115.5	114.9	116.1	115.2	115.8	109.9	115.1	115.0
Δ vs PUN	-	-3.6	0.7	0.6	0.3	-0.2	-3.6	-1.3
Δ vs PUN Y-1	-	-0.5	0.7	-0.2	0.3	-5.6	-0.4	-0.5
Maximum	275.1	264.2	277.0	277.0	277.0	277.0	264.2	277.0
Minimum	6.0	6.0	6.0	6.0	6.0	0.0	6.0	6.0
Peak	148.3	141.4	149.5	149.4	148.9	147.9	141.4	145.7
Off Peak	121.8	121.5	121.9	121.9	121.7	121.9	121.6	121.9
Δ Peak vs Off Peak	26.5	19.9	27.6	27.4	27.2	26.0	19.9	23.8

Peak-off peak spread up compared to the previous month

Source: Terna calculation on GME data

The price spreads with France and Switzerland were €37.3/MWh and €9.3/MWh respectively (+21.1% and +52.5% compared to the previous month). Imports totalled 5.1 TWh, +10.9% compared to the previous month, with Switzerland and France accounting for 40% and 44% of the total respectively. Total exports were 0.6 TWh, with Switzerland accounting for 34% and Montenegro 23%.

Price spread with foreign exchanges and day ahead programmes



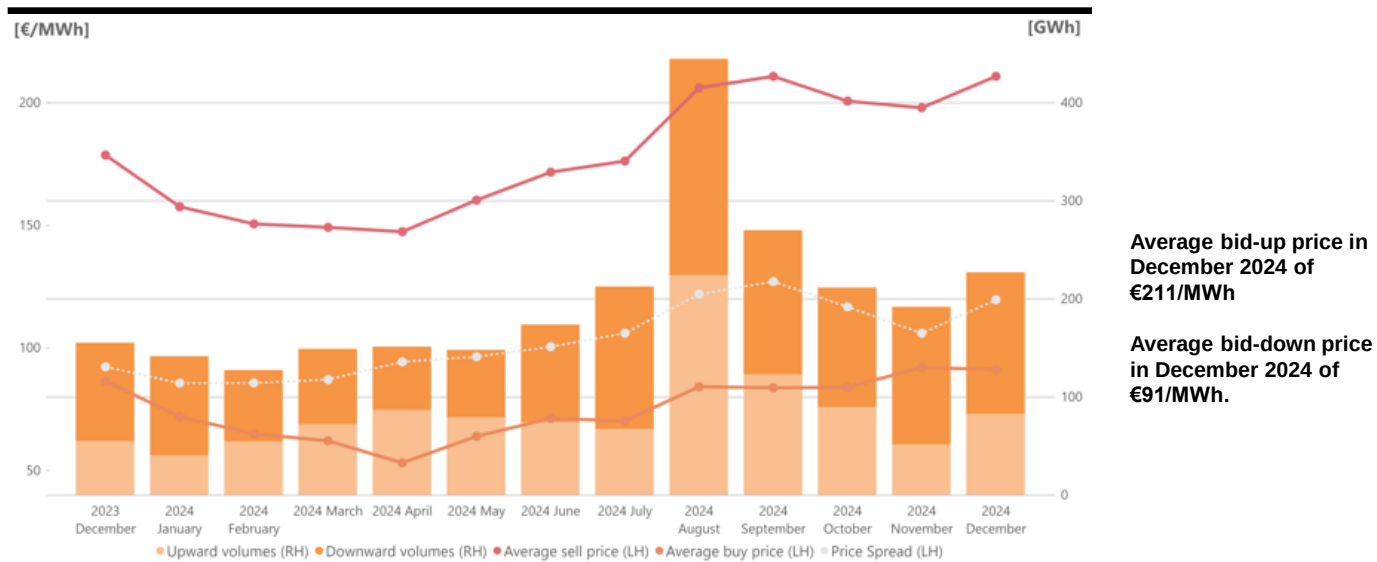
Net imports on the northern border of 4.4 TWh

Source: Terna calculation

Ex-ante Ancillary Services Market

In December 2024, the spread between bid-up and bid-down prices was €120/MWh (+13% compared to the previous month and +30% compared to December 2023). Total volumes increased compared to the previous month (+18%). Specifically, upward volumes increased by 60% while downward volumes increased by 3%. Upward volumes increased by 50%, while downward volumes increased by 44% compared to the same month of the previous year.

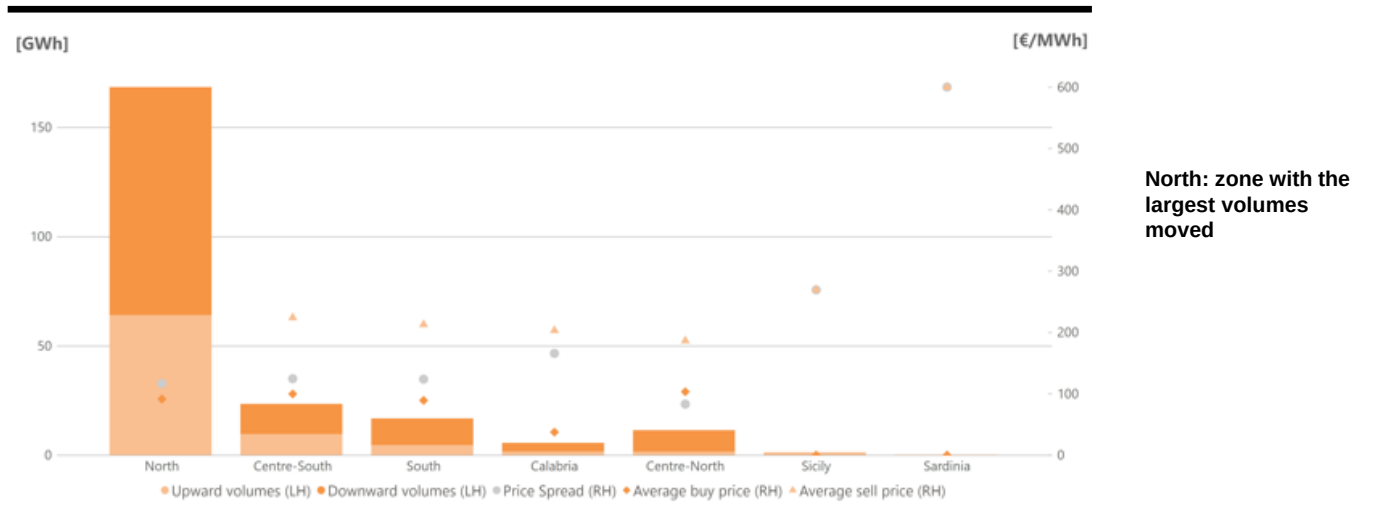
Ex-ante Ancillary Services - prices and volumes



Source: Terna

The average bid-up price went from €198/MWh in the month of November to €211/MWh in the month of December; the average bid-down price went from €92/MWh in the month of November to €91/MWh in the month of December.

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



Source: Terna

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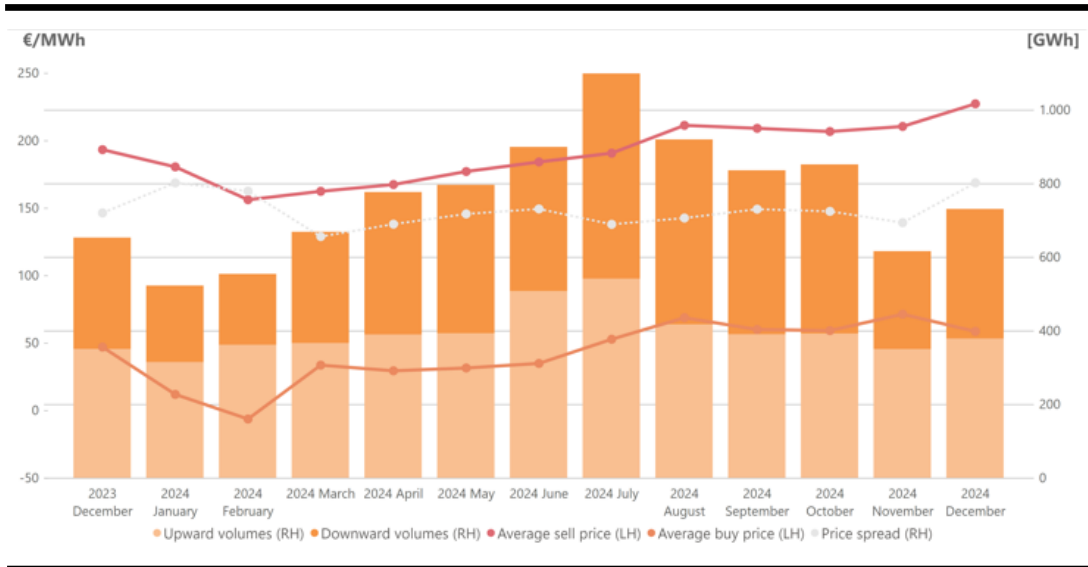
Electricity Market

3

Balancing Market

In December 2024, the spread between bid-up and bid-down prices was €168/MWh (+21% compared to the previous month and +15% compared to December 2023). Total volumes increased compared to the previous month (+19%). Specifically, upward volumes increased by 8% while downward volumes increased by 32%. Upward volumes increased by 8%, while downward volumes increased by 16% compared to the same month of the previous year.

Balancing market – prices and volumes



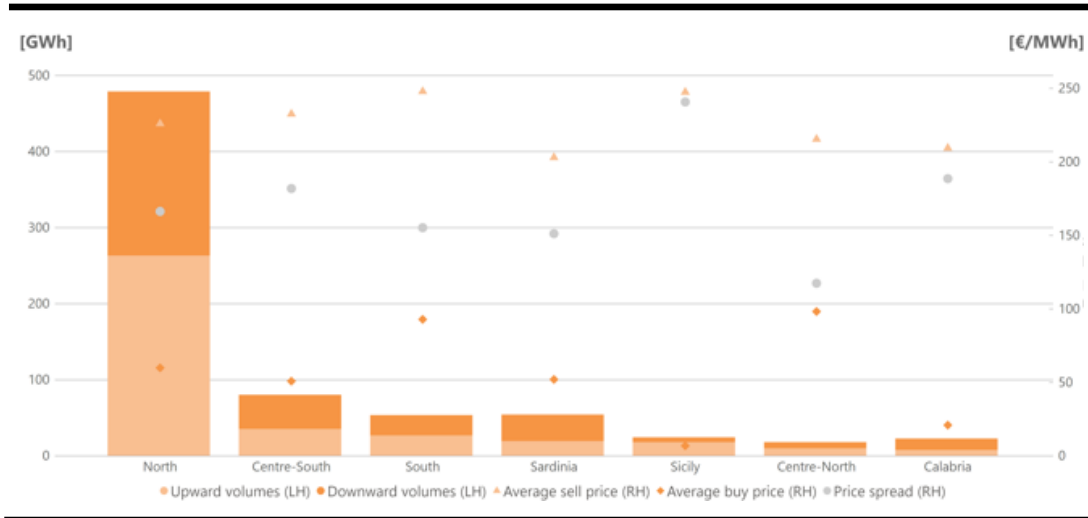
Average bid-up price in December 2024 of €227/MWh

Average bid-down price in December 2024 of €59/MWh.

Source: Terna

The market zone characterised by the highest spread (€241/MWh) is Sicily. This spread recorded a difference of 3% compared to the previous month. The average bid-up price went from €211/MWh in the month of November to €227/MWh in the month of December; the average bid-down price went from €71/MWh in the month of November to €59/MWh in the month of December.

Balancing market – prices and volumes by market zone



Sicily: zone with the highest price spread

North: zone with the largest volumes moved

Source: Terna

Commodities – Spot Market

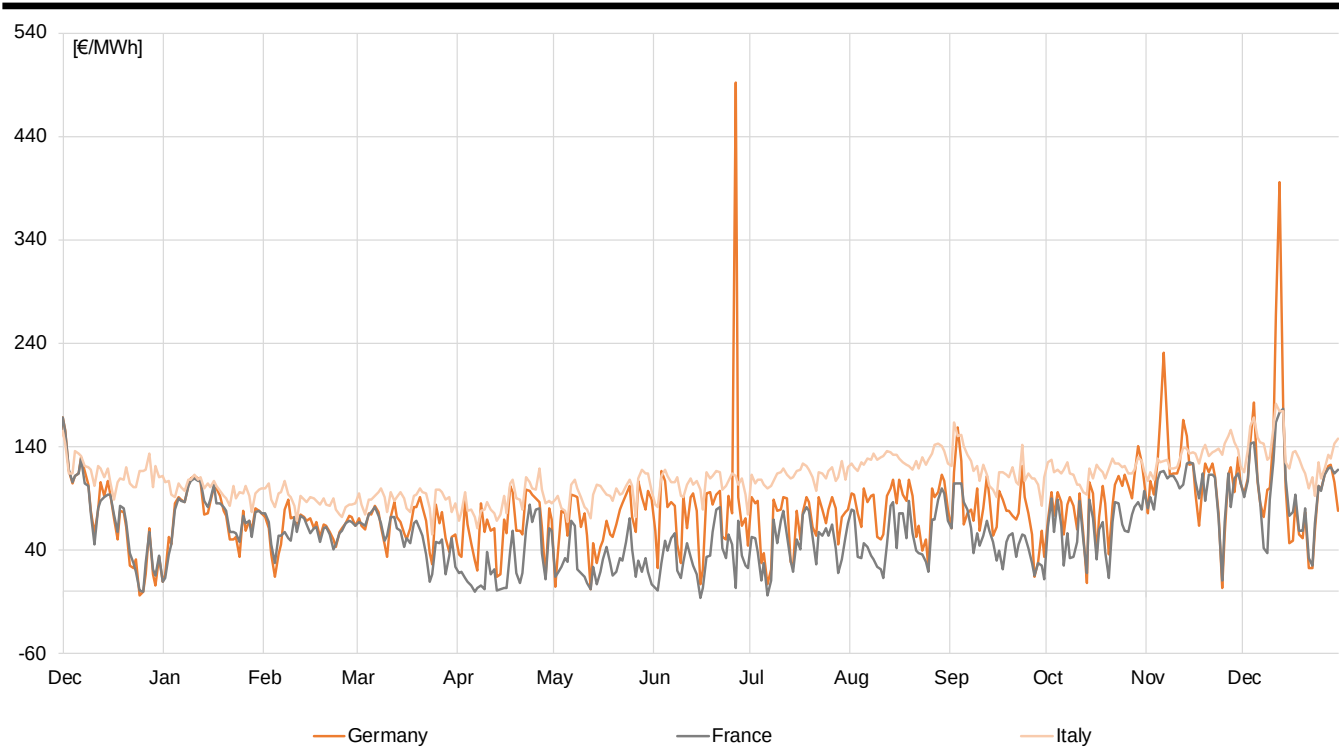
In December, Brent prices recorded an average value of \$73.8/bbl, down compared to November (-0.8%).

The average coal prices (API2) were down compared to November, settling at around \$113.6/t (-6.0%).

European gas prices (TTF) in December fell compared to November, with a monthly average of €45.0/MWh (+2.0% compared to the previous month); the PSV recorded an increase, settling at €48.1/MWh (+5.6%).

Electricity prices in Italy rose in December compared to the previous month, with a monthly average of €135.1/MWh (+3.2%). The French power exchange was down, with the price of electricity at €98.2/MWh (-2.3%), as did the German exchange, priced at €108.3/MWh (-4.9%).

Spot electricity prices



Source: Terna calculation on GME and EPEX data

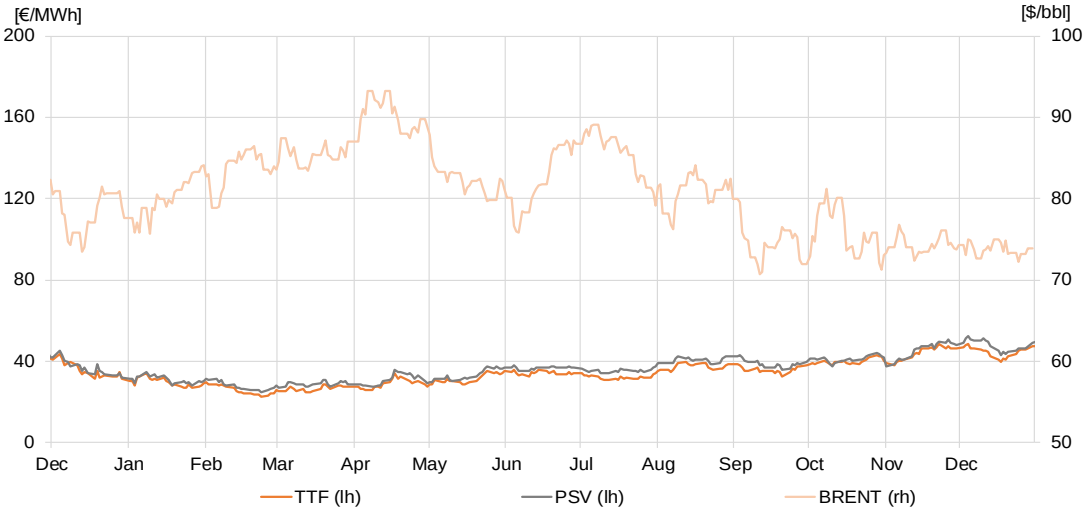
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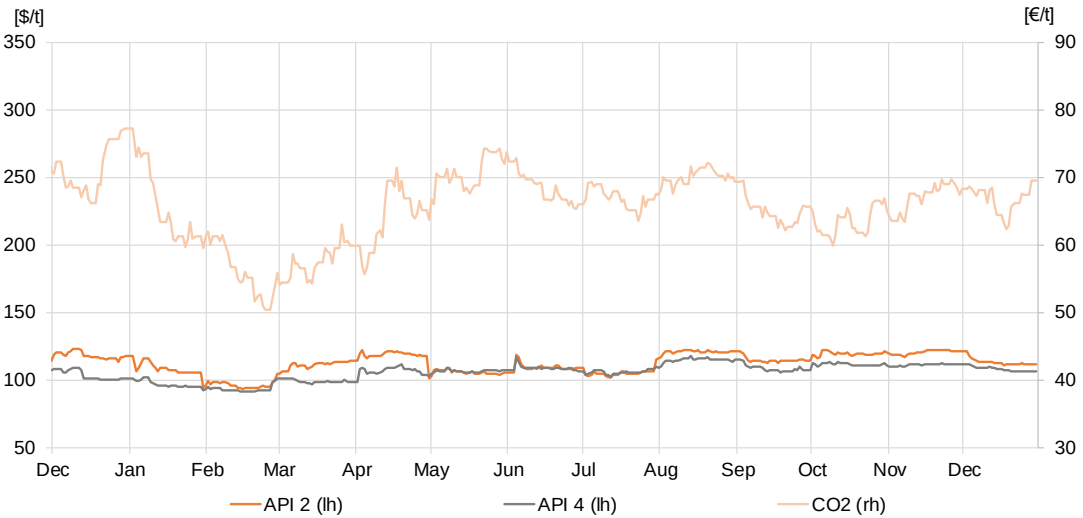
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Gas & Oil spot prices



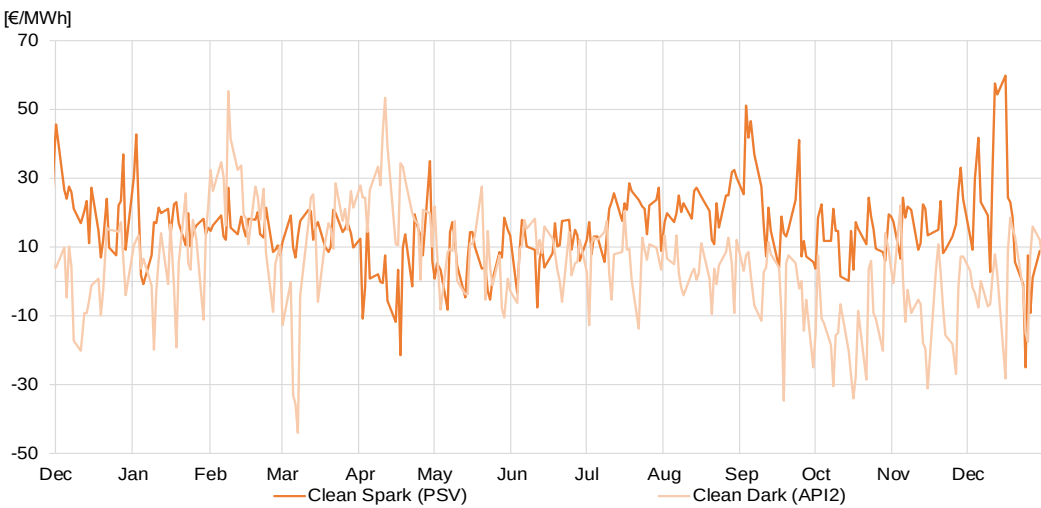
Source: Terna calculation on Bloomberg data

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 December, Brent forward prices recorded an average value of \$79.2/bbl, down compared to November (-1.3%).

The average coal prices (API2) were down compared to November, settling at around \$116.5/t (-8.5%).

Forward prices of gas in Europe (TTF) were up compared to the previous month (+2.5%), settling at around €43.5/MWh. Forward prices in Italy (PSV) were also in line, showing an average value of €45.5/MWh (+2.5%).

The average forward prices of electricity in Italy stood at around €121.9/MWh, up compared to the previous month (+9.7%). The French power exchange was down, with the price standing at around €73.2/MWh (-3.4%), whilst the German power exchange increased, with a price of €92.6/MWh (+0.3%).

Forward Electricity Prices – Year+1



Source: Terna calculation on Bloomberg data

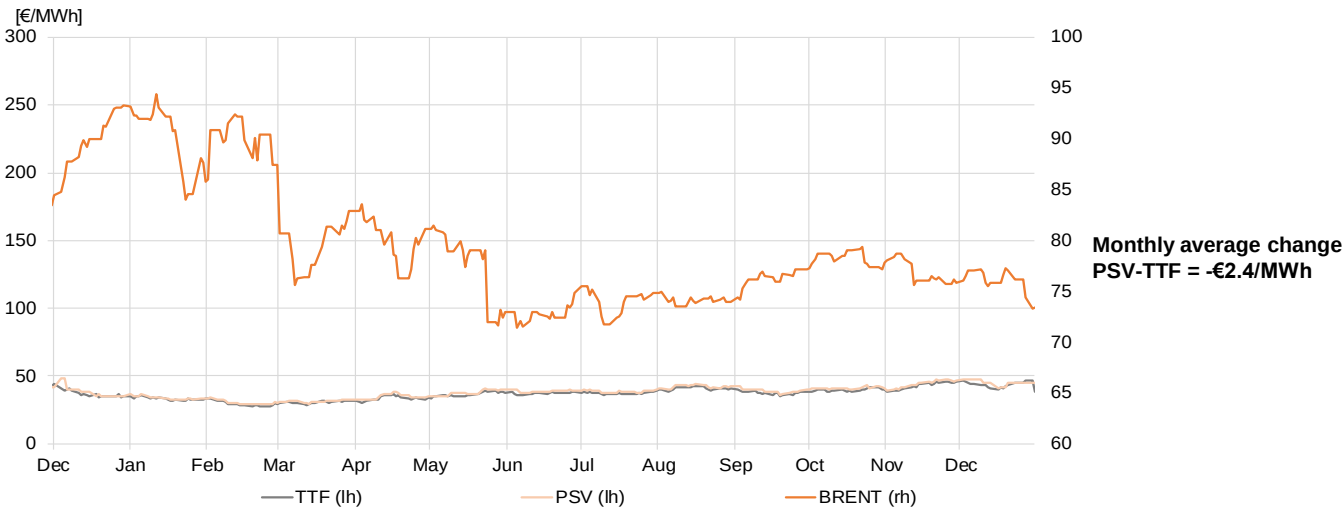
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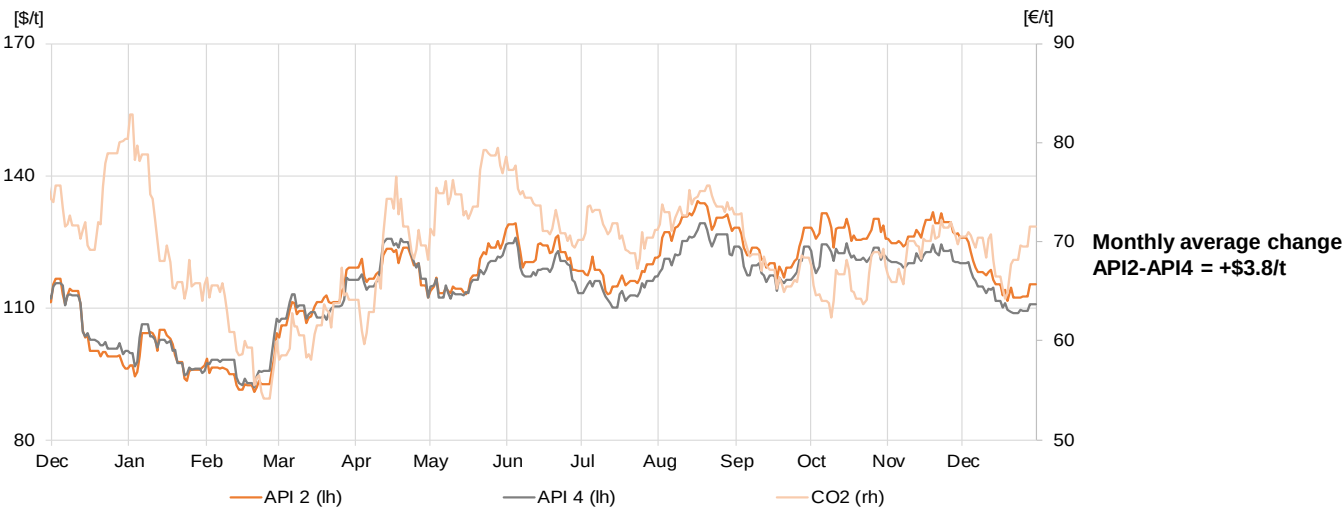
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Year+1 Forward Gas & Oil Prices



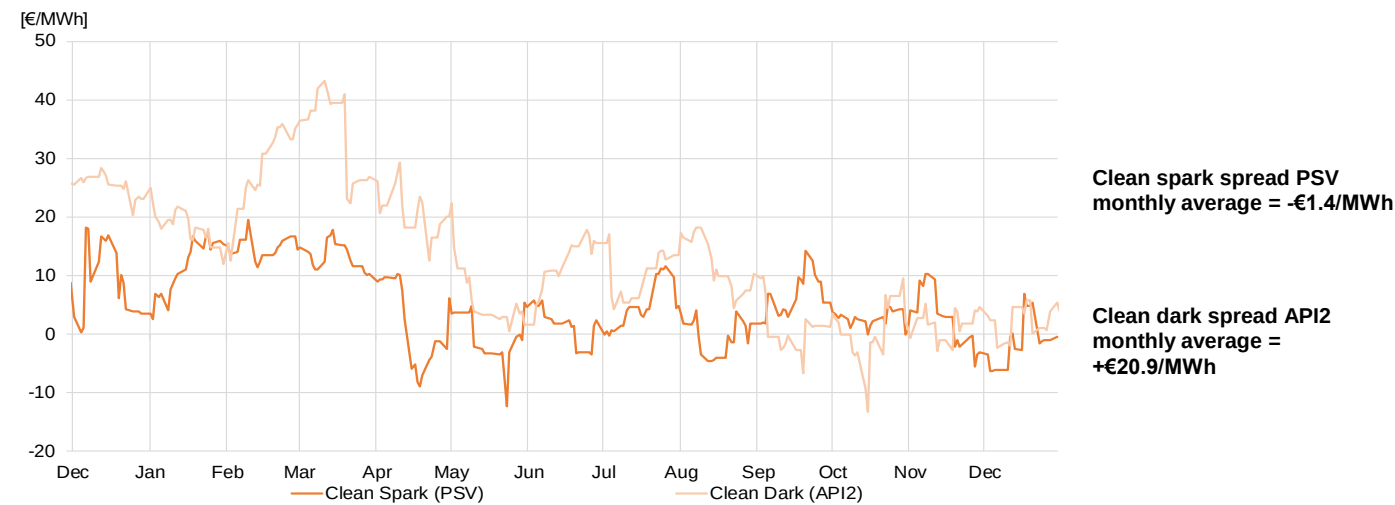
Source: Terna calculation on Bloomberg data

Year+1 Forward Coal & Carbon Prices



Source: Terna calculation on Bloomberg data

Clean Year+1 Forward Dark & Spark spreads Italy



Source: Terna calculation on Bloomberg data

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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.

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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), 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.

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 - Monthly Industrial Electrical Consumption Index: the monthly IMCEI was constructed based on the size of the monthly withdrawals of the approximately 1,000 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.

IMSER - Monthly index of electricity consumption for the services sector. The IMSER index (Monthly Services Index) is produced according to the supply of electricity consumption in the Services sector for five Distributors - E-Distribuzione, UNARETI, A-Reti, Edyna and Deval. These consumption data are given according to the Ateco2007 codes and are aggregated by commodity class. The index has a fixed basis (2019=100) and represents around 80% of the electricity consumption in the Services sector with a time lag of two months.

Effect of change in installed power and effect of producibility on solar and wind production: The change in photovoltaic or wind production in a given period can be attributed to two factors: a change in capacity ("Effect of change in installed power") and a change in producibility hours ("Effect of producibility") linked to solar irradiation or amount of wind. To determine these two components of production in a given period of the year Y compared to the same period of the year Y-1, equivalent hours of use are considered (HU). The HU figure is calculated as the ratio between energy produced and installed capacity operational as resulting in the period Y-1. To calculate the effect of the change in installed power (in energy) the HU figure for the period Y-1 is multiplied by the change in capacity between the same periods of year Y and year Y-1. The producibility effect is calculated as the difference between the change in total energy and the effect of the change in installed power.

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Disclaimer

1. The monthly electricity balances for 2023 are definitive, while those for 2024 are provisional.
2. More specifically, the monthly electricity reports for 2024 – prepared at the end of each month – are subject to further, more accurate 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.