

Natural capital

Environmental data, when referring to Terna, refers to 83% of workplace of all the Group's employees, whilst when referring to the Group, it regards 100% of employees. In terms of revenue, these percentages are 87% when referring to Terna and 100% when the data refers to the Group.

Direct CO₂ emissions (scope 1)

Total direct greenhouse gas emissions – Tonnes of CO₂ equivalent

	GROUP ⁽¹⁾			TERNA		
	2023 (**)	2022	2021	2023	2022	2021
Direct emissions	77,588.9	76,505.6	73,203.7	71,724.8	72,477.1	68,942.0

⁽¹⁾ The figures shown in the column "Group" regard the Terna Group in 2023; in 2022, they regarded Terna, Tamini Group and Brugg Group, whilst in 2021 Terna, Tamini Group and Brugg Switzerland.

^(**) With regard to Brugg's emissions, only a minimal part is due to leakages of natural gas following work on cables.

Total direct greenhouse gas emissions - Tonnes of CO₂ equivalent⁽¹⁾

	TERNA		
	2023	2022	2021
Direct emissions			
Leakages of SF ₆	63,956.2	64,732.5	61,204.6
Diesel for motor vehicles	4,039.6	6,198.7	6,453.4
Petrol for motor vehicles	1,615.2	103.2	95.7
Jet fuel for helicopters	1,192.8	595.9	452.0
Fuel oil for heating and generators	233.3	336.5	279.5
Natural gas for heating	200.7	291.1	196.5
Leakages of refrigerant gases (R407C, R410A, R32, R134A) ⁽¹⁾	487.0	219.2	260.3
Total direct emissions	71,724.8	72,477.1	68,942.0

⁽¹⁾ The conversion of direct energy consumption and leakages of SF₆ (sulphur hexafluoride) and refrigerant gases into equivalent CO₂ emissions has been carried out using the parameters indicated in the IPCC Fifth Assessment Report (AR5) and the Greenhouse Gas Protocol (GHG) Initiative.

⁽¹⁾ It should be noted that the figure for 2023 also includes for the first-time leakages of R32 and R134A gases. For a better understanding of these figures, in addition to those included in the table, in 2022, leakages of R32 and R134A gases were recorded, amounting to 117 tonnes of CO₂ equivalent.

Management of SF₆ gas and of other gasses

SF₆ amounts and emissions

	UNIT	TERNA		
		2023	2022	2021
Quantity of SF ₆	kg	683,045.0	664,192.2	650,239.8
- in operating equipment	kg	629,840.8	616,579.6	608,766.5
- in cylinders	kg	53,204.2	47,612.6	41,473.2
SF ₆ leakage rate	%	0.40	0.41	0.40
SF ₆ greenhouse gas emissions	kg	2,721.5	2,754.6	2,604.5

2023 KEY INDICATOR TABLES

305-4 > Refrigerant gases – amounts and leakages

	UNIT	2023	2022	2021
Quantity of R22	kg	21	17	18
Leakages of R22	kg	2.9	0	0
Quantity of R407C	kg	2,259.9	1,712.6	2,075.2
Leakages of R407C	kg	0	4	1.4
Quantity of R410A	kg	10,781.7	10,587.5	10,706.2
Leakages of R410A	kg	112.9	97.6	123.5
Quantity of other refrigerant gases ⁽¹⁾	kg	3,884.5	2,787.4	2,466.3

⁽¹⁾ Compared with the figure shown, 56% was identified as R32 and 36% as R134A. Leakage for these gases is 2.9 kg and 206 kg.

Indirect emissions of CO₂ (scope 2)

305-2 > Total indirect greenhouse gas emissions – Tonnes of CO₂ equivalent

	GROUP ⁽¹⁾			TERNA		
	2023	2022	2021	2023	2022	2021
Indirect emissions	1,534,836.9	1,662,890.5	1,450,131.4	1,530,657.7	1,735,046.6	1,658,342.6

⁽¹⁾ The figures shown in the column "Group" regard the Terna Group in 2023; in 2022, they regarded Terna, Tamini Group and Brugg Group, whilst in 2021 Terna, Tamini Group and Brugg Switzerland.

Total indirect greenhouse gas emissions – Tonnes of CO₂ equivalent

	TERNA		
	2023	2022	2021
Electricity ⁽¹⁾	55,620.7	64,380.6	61,232.6
Grid losses	1,475,037	1,670,666	1,597,110

⁽¹⁾ The conversion of indirect electricity consumption is carried out taking into account the share of total Italian electricity production represented by thermoelectric production in 2023. Allocation for the purposes of the production mix was based on the December 2023 issue of the "Monthly Report on the Electricity System" available on the website at www.terna.it. It should also be noted that approximately 12% of Terna's electricity consumption is based on an estimate, above all for buildings at the construction site at Polo Galbani.

EU12 Grid losses

	2023		2022		2021	
	% COMPARED WITH ENERGY DEMAND	GWH	% COMPARED WITH ENERGY DEMAND	GWH	% COMPARED WITH ENERGY DEMAND	GWH
VHV and HV grid	1.66	5,096	1.60	5,068	1.62	5,143

Direct and indirect emissions: carbon intensity

Total direct and indirect greenhouse gas emissions - Tonnes of CO₂ equivalent

	GROUP ⁽¹⁾			TERNA		
	2023	2022	2021	2023	2022	2021
Direct emissions	77,588.9	76,505.6	73,203.7	71,724.8	72,477.1	68,942.0
Indirect emissions	1,534,836.9	1,739,906.5	1,662,890.5	1,530,657.7	1,735,046.6	1,658,342.6
Total emissions	1,612,425.8	1,816,412.1	1,736,094.2	1,602,382.5	1,807,523.7	1,727,284.6

⁽¹⁾ The figures shown in the column "Group" regard the Terna Group in 2023; in 2022, they regarded Terna, Tamini Group and Brugg Group, whilst in 2021 Terna, Tamini Group and Brugg Switzerland.

< 305-1

< 305-2

Carbon intensity – Tonnes of CO₂ equivalent / revenue (€m)

	TERNA		
	2023	2022	2021
Emissions (scope 1 and electricity)	127,345.5	136,857.7	130,174.6
Emissions (scope 1 and electricity) in relation to revenue	40.0	46.2	50.0

< 302-3

Other indirect emissions of CO₂ (scope 3)

Other indirect emissions (scope 3) – Tonnes of CO₂ equivalent

	GROUP ⁽¹⁾			TERNA		
	2023	2022	2021	2023	2022	2021
Purchases of goods and services	152,730.8	122,650.7	98,638.4	24,041.4	4,120.1	1,308.7
Capital assets	355,647.2	81,294.8	27,447.8	355,647.2	81,294.8	27,447.8
Energy and fuel related activities	470,898.1	468,983.8	475,907.6	468,777.2	466,686.0	473,450.6
Upstream transportation and distribution	6,833.7	1,142.9	395.0	6,833.7	1,142.9	395.0
Waste generated in operations	16,511.7	3,945.9	2,321.8	16,511.7	3,945.9	2,321.8
Business travel	1,137.6	985.8	918.0	885.5	712.0	918.0
Employee commuting	10,075.9	9,321.1	8,731.2	8,275.60	7,690.8	7,180.8
Downstream transportation and distribution	274.1	233.2	502.7	n.a.	n.a.	n.a.
Use of products sold	1,166,872.1	965,738.9	973,225.1	n.a.	n.a.	n.a.
End-of-life treatment of products sold	141.0	105.4	132.2	n.a.	n.a.	n.a.

⁽¹⁾ The figures shown in the column "Group" in this table regard Terna, the Tamini Group and Brugg.

< 305-3

Energy consumption and cuts in emissions: energy efficiency

Total energy consumption within the organisation - Gigajoules

	GROUP ⁽¹⁾			TERNA		
	2023	2022	2021	2023	2022	2021
Direct consumption in GJ	164,432.1	172,124.2	174,407.2	101,301.6	103,319.0	102,181.9
Indirect consumption in GJ	743,754.3	756,153.2	762,573.6	691,776.0	703,080.0	709,851.6
Total consumption in GJ	908,186.3	928,277.4	936,980.8	793,077.6	806,399.0	812,033.5

⁽¹⁾ The figures shown in the column "Group" regard the Terna Group in 2023; in 2022, they regarded Terna, Tamini Group and Brugg Group, whilst in 2021 Terna, Tamini Group and Brugg Switzerland.

< 302-1

Total energy consumption within the organisation by primary source - Gigajoules ⁽¹⁾

	TERNA		
	2023	2022	2021
<i>Direct consumption in GJ</i>			
Diesel for motor vehicles ⁽¹⁾	54,582.0	83,755.1	87,196.7
Petrol for motor vehicles ⁽¹⁾	23,307.6	1,491.0	1,382.5
Jet fuel for helicopters	16,682.1	8,333.7	6,321.7
Fuel oil for generators and heating	3,152.3	4,547.2	3,776.1
Natural gas for heating	3,577.7	5,192.0	3,505.0
Total direct consumption	101,301.6	103,319.0	102,181.9
<i>Indirect consumption in GJ</i>			
Electricity to power substations and offices ⁽²⁾	691,776.0	703,080.0	709,851.6

⁽¹⁾ Direct consumption data in tonnes and thousands of m³ is shown in detail in the "Key indicator tables" (published in the Sustainability section of the website at www.terna.it). To convert the volumes of the primary resources into gigajoules, the parameters set out in the Global Reporting Initiative (GRI) protocols were used.

⁽¹⁾ Only the consumption of operating vehicles is taken into account and not the vehicles used by management.

⁽²⁾ The conversion of indirect electricity consumption is carried out taking into account the share of total Italian electricity production represented by thermoelectric production in 2023, given that, for technical reasons, it is not possible for Terna to select a specific supplier. Allocation for the purposes of the production mix was based on the December 2023 issue of the "Monthly Report on the Electricity System" available on the website at www.terna.it. Given the above, in line with GHG Protocol methodology, emissions linked to electricity consumption are only classifiable as location-based and not as market-based. In line with this approach, the share of electricity from renewable sources is the following for the three-year period: 262,875 GJ in 2023, 208,129 GJ in 2022 and 244,776 GJ in 2021.

Total energy consumption within the organisation by primary source

	UNIT	TERNA		
		2023	2022	2021
<i>Direct consumption</i>				
Petrol for motor vehicles ⁽¹⁾	tonnes	520.3	33.3	30.9
Diesel for motor vehicles ⁽¹⁾	tonnes	1,259.7	1,933	2,012
Jet fuel for helicopters	tonnes	374.1	186.9	141.8
Natural gas for heating	000's of m ³	89.4	129.8	87.6
Fuel oil for generators and heating	tonnes	72.8	104.9	87.2
<i>Indirect consumption</i>				
Electricity to power substations and offices ⁽²⁾	GWh	192.2	195.3	197.2

⁽¹⁾ Only the consumption of operating vehicles is taken into account and not the vehicles used by management.

⁽²⁾ The conversion of indirect electricity consumption is carried out taking into account the share of total Italian electricity production represented by thermoelectric production, given Terna's inability to select a specific supplier, due to technical reasons. Allocation for the purposes of the production mix was based on the December 2023 issue of the "Monthly Report on the Electricity System" available on the website at www.terna.it. Moreover, approximately 12% of Terna's electricity consumption is based on an estimate. Given the above, in line with GHG Protocol methodology, emissions linked to electricity consumption are only classifiable as location-based and not as market-based. In line with this approach, the share of electricity from renewable sources is the following for the three-year period: 73 GWh in 2023, 57.8 GWh in 2022 and 68 GWh in 2021.

Total energy consumption within the organisation by primary source

	UNIT	TERNA		
		2023	2022	2021
<i>Direct consumption</i>				
Petrol for motor vehicles ⁽¹⁾	MWh	6,474.3	414.2	384.0
Diesel for motor vehicles ⁽¹⁾	MWh	15,161.7	23,265.3	24,221.3
Jet fuel for helicopters	MWh	4,633.9	2,314.9	1,756.0
Natural gas for heating	MWh	993.8	1,442.2	973.6
Fuel oil for generators and heating	MWh	875.6	1,263.1	1,048.9
Total direct consumption	MWh	28,139.30	28,699.7	28,383.9
<i>Indirect consumption</i>				
Electricity to power substations and offices ⁽²⁾	MWh	192,160.0	195,300.0	197,181.0

⁽¹⁾ Only the consumption of operating vehicles is taken into account and not the vehicles used by management.

⁽²⁾ The conversion of indirect electricity consumption is carried out taking into account the share of total Italian electricity production represented by thermoelectric production in 2022, given Terna's inability to select a specific supplier, due to technical reasons. Allocation for the purposes of the production mix was based on the December 2023 issue of the "Monthly Report on the Electricity System" available on the website at www.terna.it. Moreover, approximately 12% of Terna's electricity consumption is based on an estimate. Given the above, in line with GHG Protocol methodology, emissions linked to electricity consumption are only classifiable as location-based and not as market-based. In line with this approach, the share of electricity from renewable sources is the following for the three-year period: 73,021 MWh in 2023, 57,813 MWh in 2022 and 68,027 MWh in 2021.

Vehicle fleet

Quantity and emissions for motor vehicles ⁽¹⁾

	UNIT	TERNA		
		2023	2022	2021
Total motor vehicles	no.	1,665	1,469	1,488
NOx emissions ⁽¹⁾	kg	5,316	7,526	7,238

⁽¹⁾ The table shows the vehicles in Terna's fleet that were refuelled at least once in the period in question. Figures for consumption by automobiles are provided below.

⁽¹⁾ The figure is calculated on the basis of the data provided by vehicle manufacturers in vehicle logbooks and of the estimated mileage of the vehicles concerned. The figure shown in the table for 2023 accounts for 72% of operating vehicles (in 2022 the figures referred to 87% of the fleet; in 2021 it was 84%).

Use of resources and waste management

Main materials provided by suppliers – Tonnes ⁽¹⁾

	UNIT	TERNA		
		2023	2022	2021
Steel	tonnes	15,134	32,527	20,793
Copper ⁽¹⁾	tonnes	8,010	10,226	9,475
Aluminium	tonnes	4,264	8,695	8,988
Glass	tonnes	1,693	3,805	4,324
Dielectric oil	tonnes	1,253	1,096	1,656
of which vegetable oil	tonnes	376	304	491
Porcelain	tonnes	533	466	518
Polymers	tonnes	471	293	508

⁽¹⁾ Most of the materials supplied to Terna are not renewable or cannot be regenerated quickly. For this reason, Terna is committed to ensuring that its supply chain is as far as possible based on a circular approach.

⁽¹⁾ The figures regarding copper in 2022 have been recalculated and therefore differ from those published in the previous Integrated Report.

Water consumption

	UNIT	GROUP			TERNA		
		2023	2022	2021	2023	2022	2021
Water withdrawn by source ⁽¹⁾	m ³	232,087	221,395	210,269	201,892	190,950	183,807

⁽¹⁾ With regard to water consumption, environmental and materiality analyses indicate that the subject is not material. This is because water does not usually form part of the production cycle for electricity transmission and dispatching. Water is primarily used for washing, office cleaning and cooling systems and derives from connection to water systems for civil use.

Paper consumption

	UNIT	2023	2022	2021
Certified paper (100% recycled)	tonnes	23	33	67

Concentration of PCBs

	UNIT	2023	2022	2021
PCB > 500 ppm	tonnes	0	0	0
50 ppm < PCB < 500 ppm	tonnes	0.00	0.00	0.00

< 301-1

< 303-1

< 306-2

2023 KEY INDICATOR TABLES

Waste type and management - Tonnes

	UNIT	GROUP ⁽¹⁾			TERNA		
		2023	2022	2021	2023	2022	2021
Waste produced (1)	tonnes	12,368.9	12,356.8	11,768.8	7,671.6	9,078.7	8,524.7
Waste sent for recovery		9,977.2	10,948.3	9,927.8	6,685.1	8,281.3	7,302.4
Waste recovered	%	81	89	84	87	91	86
Waste sent for disposal (2)		2,468.6	1,338.6	1,828.8	1,063.4	823.0	1,210.1
<i>of which hazardous</i>		1,827.6	583.1	980.3	769.9	517.9	910.6
<i>of which non-hazardous</i>		641.0	755.5	848.4	293.5	305.1	299.5
Non-hazardous special waste							
<i>Machinery, equipment, pylons, conductors and cables</i>							
- quantity produced	tonnes	3,615.2	3,826.6	3,725.2	1,627.1	2,020.8	1,901.5
- quantity sent for recovery	tonnes	3,609.9	3,776.3	3,722.8	1,677.9	1,970.5	1,899.1
<i>Packaging</i>							
- quantity produced	tonnes	1,082.1	1,319.5	1,360.7	520.4	537.9	521.0
- quantity sent for recovery	tonnes	1,012.8	950.2	1,047.7	520.4	518.5	527.1
<i>Other</i>							
- quantity produced	tonnes	1,864.3	1,093.3	833.7	823.6	633.7	603.7
- quantity sent for recovery	tonnes	1,349.3	632.7	294.2	530.6	369.0	293.3
Total non-hazardous special waste							
- quantity produced	tonnes	6,561.6	6,239.5	5,967.4	2,971.0	3,192.5	3,073.3
- quantity sent for recovery (3)	tonnes	5,971.9	5,359.2	5,112.5	2,728.9	2,858.0	2,767.3
Hazardous special waste							
<i>Machinery, equipment, pylons, conductors and cables</i>							
- quantity produced	tonnes	2,873.8	4,133.0	3,404.7	2,850.0	4,104.3	3,292.8
- quantity sent for recovery	tonnes	2,877.4	3,998.6	3,505.9	2,870.3	3,970.1	3,393.9
<i>Oils</i>							
- quantity produced	tonnes	1,821.4	1,740.7	2,100.6	1,315.9	1,589.9	1,922.9
- quantity sent for recovery	tonnes	1,051.2	1,521.7	1,196.8	1,011.9	1,401.2	1,040.2
<i>Lead batteries</i>							
- quantity produced	tonnes	31.1	16.0	56.1	31.1	15.4	56.1
- quantity sent for recovery	tonnes	31.1	16.4	55.6	31.1	15.8	55.6
<i>Waste consisting of materials containing asbestos</i>							
- quantity produced	tonnes	00.0	00.0	00.0	00.0	00.0	00.0
<i>Other</i>							
- quantity produced	tonnes	1,081.1	227.6	240.0	503.6	176.6	179.6
- quantity sent for recovery	tonnes	45.7	52.5	57.0	42.9	36.2	45.3
Total hazardous special waste							
- quantity produced	tonnes	5,807.3	6,117.3	5,801.3	4,700.6	5,886.2	5,451.4
- quantity sent for recovery	tonnes	4,005.3	5,589.2	4,815.3	3,956.3	5,423.3	4,535.1

⁽¹⁾ The figures shown in the column "Group" regard the Terna Group in 2023; in 2022, they regarded Terna, Tamini Group and Brugg Group, whilst in 2021 Terna, Tamini Group and Brugg Switzerland.

⁽²⁾ Only special waste produced during production processes is included, not waste produced by services (urban waste). Excavated earth and rocks, effluents and waste from septic tanks, produced by substations not connected to the sewer network, are not included; the quantity for this waste was **235 tonnes in 2023**, 184 tonnes in 2022 and 618 tonnes in 2021.

⁽³⁾ Waste sent for disposal may differ from the mere disparity between waste generated and recovered due to temporary waste storage. With regard to Terna, in response to requests from certain categories of stakeholder, it was deemed appropriate to estimate the main methods of disposal starting from the latest publicly available data in the 2023 edition of the "Special waste report", published by the Italian Institute for Environmental Protection and Research (ISPRA): it terms of hazardous waste, 52% is sent to landfill (397 tonnes in 2023), 5% is incinerated to produce energy (39 tonnes in 2023), 19% is incinerated without producing energy (147 tonnes in 2023), 24% is disposed of in other ways – such as through biological and chemical-physical treatment, and through reconditioning/grouping before being disposed of in other ways - (187 tonnes in 2023). With regard to non-hazardous waste, 30% is sent to landfill (89 tonnes in 2023), 6% is incinerated to produce energy (17 tonnes in 2023), 2% is incinerated without producing energy (7 tonnes in 2023), 62% is disposed of in other ways – such as through biological and chemical-physical treatment, and through reconditioning/grouping before being disposed of in other ways - (181 tonnes in 2023).

⁽⁴⁾ This comprises uncontaminated metal waste deriving from the decommissioning of transformers, electrical equipment and machinery (e.g. generators) with an average recovery rate of 100%.

Electricity power lines, biodiversity and birdlife

Bird deterrents on the ntg

	UNIT	TERNA		
		2023	2022	2021
Lines involved	no.	92	88	81
Total deterrents installed	no.	17,638	17,445	16,977

Power lines in protected areas ^(*) ^(**)

	UNIT	TERNA		
		2023	2022	2021
Lines impacting on protected areas	km	7,253	6,830	7,110
Lines with an impact as a percentage of total lines operated by Terna	%	10.6	9.3	10.5

^(*) The figures for 2023 were obtained by merging the figures for the assets extracted from the SinNet system with the official 2023 EUAP Areas. Until the 2021 reporting period, the ATLARETE database was used, which could have differed from data on the number of lines provided in the "Key indicator tables" (published in the Sustainability section of the website at www.terna.it in the Sustainability section). The figures by geographical area are as follows: North-east 904 km, North-west 1,160 km, Centre 1,543 km, South 2,205 km and, lastly, the Islands 885 km. The total number of km of lines impacting on protected areas shown in the table also includes the kms of marine cables.

^(**) For the sake of completeness, it should be noted that out of the 910 substations managed by the Terna Group, only 35 are located in protected areas. Nel 2022 the figure was 37, and in 2021 39.

Georeferenced nests at 31 December 2023

LOCATION	NESTS		SPECIES CONCERNED ^(*)
	NO. OF NESTS	OF WHICH IN PROTECTED AREAS	
Abruzzo	30	1	Kestrel
Calabria	30	23	Kestrel
Campania	31	0	
Emilia-Romagna	95	33	Kestrel; scops owl, cuckoo, common roller
Tuscany	8	0	
Friuli-Venezia Giulia	25	0	
Lazio	42	11	Kestrel, scops owl, common roller
Lombardy	20	0	
Piedmont	59	29	Common roller
Puglia	73	0	
Sicily	30	10	
Trentino-Alto Adige	8	0	
Veneto	14	1	
Total	465	108	

^(*) The species concerned were identified by the type of nest installed and subsequent monitoring. In any event, it cannot be excluded that the nests may be used by other unreported species.

Environmental complaints

Environmental complaints

	UNIT	2023		2022		2021	
		RICEVUTI	EVASI	RICEVUTI	EVASI	RICEVUTI	EVASI
Total complaints received	no.	33	30	30	26	35	29
<i>Environmental aspect of complaints received</i>							
- Waste	no.	1	1	0	0	0	0
- Noise	no.	10	10	11	8	11	11
- Biodiversity	no.	2	2	0	0	0	0
- Landscape	no.	2	2	2	2	2	1
- Electrical and magnetic fields	no.	1	1	1	1	3	3
- Lighting	no.	1	0	0	0	0	0
- Vegetation management	no.	8	7	5	4	9	6
- Other	no.	8	7	11	11	10	8