

# Environment

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## Waste

### WASTE MANAGEMENT <sup>(1)</sup>

	Unit	2018	2017	2016	Change 18-17	% change 18-17
<b>WASTE PRODUCED</b>	<b>tonnes</b>	<b>6,774.2</b>	<b>4,801.5</b>	<b>4,941.6</b>	<b>1,972.8</b>	<b>41</b>
<b>WASTE RECOVERED</b>	<b>%</b>	<b>86</b>	<b>87</b>	<b>93</b>	<b>-2</b>	<b>-2</b>
<i>Non-hazardous special waste</i>						
<i>Machinery, equipment, pylons, conductors and cables</i>						
- quantity produced	tonnes	2,073.0	1,818.6	2,526.8	254.4	14
- quantity sent for recovery	tonnes	2,136.0	1,764.9	2,509.6	371.2	21
<i>Packaging</i>						
- quantity produced	tonnes	365.2	356.4	317.7	8.7	3
- quantity sent for recovery	tonnes	365.4	354.3	321.2	11.2	3
<i>Other</i>						
- quantity produced	tonnes	847.9	375.8	254.6	472.1	126
- quantity sent for recovery	tonnes	357.6	236.9	190.0	120.7	51
<b>TOTAL NON-HAZARDOUS SPECIAL WASTE</b>						
- quantity produced	<b>tonnes</b>	<b>3,290.0</b>	<b>2,550.8</b>	<b>3,099.1</b>	<b>739.2</b>	<b>29</b>
- quantity sent for recovery	<b>tonnes</b>	<b>2,863.1</b>	<b>2,356.0</b>	<b>3,020.8</b>	<b>507.0</b>	<b>22</b>
<i>Hazardous special waste</i>						
<i>Machinery, equipment, pylons, conductors and cables</i>						
- quantity produced	tonnes	2,014.9	1,608.6	1,044.4	406.4	25
- quantity sent for recovery	tonnes	2,024.1	1,351.2	1,028.4	672.9	50
<i>Oils</i>						
- quantity produced	tonnes	1,347.0	534.4	558.3	812.6	152.1
- quantity sent for recovery	tonnes	803.0	396.3	474.5	406.6	103
<i>Lead batteries</i>						
- quantity produced	tonnes	37.2	36.8	28.6	0.4	1
- quantity sent for recovery	tonnes	36.5	36.8	28.6	-0.3	-0.8
<i>Waste consisting of materials containing asbestos</i>						
- quantity produced	tonnes	0.0	0.0	0.0	0.0	-
<i>Other</i>						
- quantity produced	tonnes	85.1	70.9	211.2	14.2	20
- quantity sent for recovery	tonnes	72.5	47.8	29.1	24.7	52
<b>TOTAL HAZARDOUS SPECIAL WASTE</b>						
- quantity produced	<b>tonnes</b>	<b>3,484.2</b>	<b>2,250.6</b>	<b>1,842.5</b>	<b>1,233.6</b>	<b>55</b>
- quantity sent for recovery	<b>tonnes</b>	<b>2,936.1</b>	<b>1,832.1</b>	<b>1,560.7</b>	<b>1,104.0</b>	<b>60</b>

<sup>(1)</sup> Only special waste produced during production processes is included, not waste produced by services (urban waste). Effluents and waste from septic tanks, produced by substations not connected to the sewer network, are not included; the quantity for effluents and waste from septic tanks was 388 tonnes in 2018, 617 tonnes in 2017, 789 tonnes in 2016. Waste sent for disposal may differ from the mere disparity between waste generated and recovered due to temporary waste storage.

## Biodiversity

### BIRD DETERRENTS ON THE NTG

	Unit	2018	2017	2016	Change 18-17	% change 18-17
Lines involved	km	237.6	221.8 <sup>(1)</sup>	212	15.8	7
<b>Total deterrents installed</b>	<b>no.</b>	<b>15,503</b>	<b>14,728</b>	<b>14,472</b>	<b>775</b>	<b>5.3</b>

<sup>(1)</sup> The figure for the length of lines concerned in 2017 was recalculated after additional evidence emerged after publication.

### OVERHEAD POWER LINES IN PROTECTED AREAS <sup>(1)</sup>

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	Unit	2018	2017	2016	Change 18-17	% change 18-17
Lines impacting on protected areas	km	6,138	6,024	5,512	114	2
Lines with an impact as a percentage of total lines operated by Terna	%	10	10	10	-	-

<sup>(1)</sup> To calculate the percentage of lines impacting on protected areas, the Company has used "ATLARETE" data, which may contain differences compared with the data presented in the tables showing indicators of the number of lines.

## Quantities and emissions

### TOTAL DIRECT AND INDIRECT GREENHOUSE GAS EMISSIONS <sup>(1)</sup>

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	Unit	2018	2017	2016	Change 18-17	% change 18-17
Leakages of SF <sub>6</sub>	CO <sub>2</sub> in tonnes	54,846.1	67,371.4	54,101.9	-12,525.3	-18.6
Leakages of refrigerant gases (R22, R407C, R410A)	CO <sub>2</sub> in tonnes	427.9	489.4	478.5	-61.5	-12.6
Petrol for motor vehicles	CO <sub>2</sub> in tonnes	36.8	39.9	37.7	-3.1	-7.8
Diesel for motor vehicles	CO <sub>2</sub> in tonnes	6,295.0	6,269.0	5,730.6	26.0	0.4
Jet fuel for helicopters	CO <sub>2</sub> in tonnes	605.6	582.2	499.5	23.4	4.0
Natural gas for heating	CO <sub>2</sub> in tonnes	316.0	419.9	458.8	-103.9	-24.7
Fuel oil for heating and generators	CO <sub>2</sub> in tonnes	471.8	621.3	684.6	-149.5	-24.1
<b>TOTAL DIRECT EMISSIONS</b>	<b>CO<sub>2</sub> in tonnes</b>	<b>62,999.2</b>	<b>75,792.9</b>	<b>61,991.7</b>	<b>-12,793.7</b>	<b>-16.9</b>
<i>Indirect CO<sub>2</sub> emissions in tonnes</i>						
Electricity	CO <sub>2</sub> in tonnes	64,050.5	72,489.3	74,715.5	-8,438.8	-11.6

<sup>(1)</sup> The conversion of direct energy consumption and leakages of SF<sub>6</sub> (sulphur hexafluoride) and refrigerant gases into CO<sub>2</sub> equivalent emissions has been carried out using the parameters indicated in the IPCC Fifth Assessment Report (AR5) and the Greenhouse Gas Protocol (GHG) Initiative. The conversion of indirect electricity consumption is carried out taking into account the share of total Italian electricity production represented by thermoelectric production in 2018. Allocation for the purposes of the production mix was based on the December 2018 issue of the "Monthly Report on the Electricity System", available on the website at [www.terna.it](http://www.terna.it).

### QUANTITIES AND EMISSIONS OF SF<sub>6</sub>

	Unit	2018	2017	2016	Change 18-17	% change 18-17
Quantity of SF <sub>6</sub>	kg	619,167.2	610,939.6	588,113.3	8,227.6	1
- in operating equipment	kg	575,912.7	565,664.1	543,780.8	10,248.6	2
- in cylinders	kg	43,254.5	45,275.5	44,332.5	-2,021.0	-5
SF <sub>6</sub> leakage rate	%	0.38	0.47	0.39	-0.09	-20
SF <sub>6</sub> greenhouse gas emissions	kg	2,333.9	2,866.9	2,302.2	-533.0	-19

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**CARBON INTENSITY - TONNES OF EQUIVALENT CO<sub>2</sub> / REVENUE (€M)**

	Unit	2018	2017	2016	Change 18-17	% change 18-17
Ratio of total emissions (direct and indirect) to revenue	CO <sub>2</sub> in tonnes / (€m)	57.8	66.0	65.0	-	-

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**REFRIGERANT GASES - QUANTITIES AND EMISSIONS**

	Unit	2018	2017	2016	Change 18-17	% change 18-17
Quantity of R22	kg	39	59	73	-20	-34
Leakages of R22	kg	0	0	0	0	-
Quantity of R407C	kg	2,821.9	2,770.3	2,846.4	52	2
Leakages of R407C	kg	173	174	205	-1	-1
Quantity of R410A	kg	9,526.6	8,612.8	7,869.7	914	11
Leakages of R410A	kg	76	107	76	-31	-29
Quantity of other refrigerant gases	kg	1,354.6	1,715.1	1,687.7	-360	-21

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**INDIRECT CO<sub>2</sub> EMISSIONS FOR AIR TRAVEL BY EMPLOYEES <sup>(1)</sup>**

	Unit	2018	2017	2016	Change 18-17	% change 18-17
Total emissions	CO <sub>2</sub> in tonnes	1,560	2,699	1,379	-1,139	-42

<sup>(1)</sup> The conversion factors indicated in the Greenhouse Gas Protocol Initiative were used to quantify the CO<sub>2</sub> resulting from air travel by employees. The reduction in 2018 is partly linked to implementation of the Group's policies encouraging use of the train for business trips.

**QUANTITIES AND EMISSIONS FOR MOTOR VEHICLES <sup>(1)</sup>**

	Unit	2018	2017	2016	Change 18-17	% change 18-17
Total motor vehicles	no.	1,436	1,344	1,323	92	6.85
Nitrogen oxide (NOx) emissions <sup>(2)</sup>	kg	7,594	7,631	8,260	-37	-0.49

<sup>(1)</sup> The table shows the vehicles in Terna's fleet that, in the period in question, were refuelled on at least one occasion, based on claims for fuel expenses. Consumption data for fleet vehicles is shown in the following tables.

<sup>(2)</sup> The figure is calculated on the basis of the data provided by motor manufacturers and included in registration certificates, as well as on estimates of the mileage covered by the vehicles. The figure shown in the table for 2018 refers to **83.0% of the Company's operating vehicles** (85.3% in 2017 and 85.4% in 2016).

**Consumption**

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**DIRECT AND INDIRECT ENERGY CONSUMPTION BY PRIMARY SOURCE**

	Unit	2018	2017	2016	Change 18-17	% change 18-17
Petrol for motor vehicles <sup>(1)</sup>	tonnes	11.9	12.9	12.2	-1.0	-8
Diesel for motor vehicles <sup>(1)</sup>	tonnes	1,963.0	1,954.9	1,787.0	8.1	0.4
Jet fuel for helicopters	tonnes	190.0	183.8	157.7	6.2	3
Natural gas for heating	000's of m <sup>3</sup>	144.5	187.3	204.6	-42.7	-23
Fuel oil for generators and heating	tonnes	147.1	193.7	213.5	-46.6	-24
Electricity	GWh	190.2	195.5	195.1	-5.3	-3

<sup>(1)</sup> Only the consumption of operating vehicles is taken into account.

## DIRECT AND INDIRECT ENERGY CONSUMPTION BY PRIMARY SOURCE - GIGAJOULES

	Unit	2018	2017	2016	Change 18-17	% change 18-17
Petrol for motor vehicles <sup>(1)</sup>	GJ	532	577	545	-45	-8
Diesel for motor vehicles <sup>(1)</sup>	GJ	85,057	84,705	77,431	352	0
Jet fuel for helicopters	GJ	8,470	8,194	7,031	277	3
Natural gas for heating	GJ	5,636	7,490	8,184	-1,854	-25
Fuel oil for generators and heating	GJ	6,375	8,394	9,250	-2,019	-24
<b>TOTAL DIRECT CONSUMPTION</b>	<b>GJ</b>	<b>106,070</b>	<b>109,359</b>	<b>102,440</b>	<b>-3,289</b>	<b>-3</b>
Electricity to substations and offices <sup>(2)</sup>	GJ	684,672	703,738	702,287	-19,065	-3

<sup>(1)</sup> Only the consumption of operating vehicles is taken into account.

<sup>(2)</sup> Allocation for the purposes of the production mix was based on the December 2018 issue of the "Monthly Report on the Electricity System", available on the website at [www.terna.it](http://www.terna.it).

## WATER CONSUMPTION

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	Unit	2018	2017	2016	Change 18-17	% change 18-17
Water withdrawn by source	m <sup>3</sup>	179,722	171,074	162,272	8,647	5

## PAPER CONSUMPTION

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	Unit	2018	2017	2016	Change 18-17	% change 18-17
Certified paper (100% recycled)	tonnes	61	50	60	10	21

## CONCENTRATION OF PCBs

	Unit	2018	2017	2016	Change 18-17	% change 18-17
PCB > 500 ppm	tonnes	0	0	0	-	-
50 ppm < PCB < 500 ppm	tonnes	0.05	0.05	0.18	-	-

## Environmental costs

### ENVIRONMENTAL COSTS - CAPITAL INVESTMENT AND OPERATING COSTS <sup>(1)</sup>

	Unit	2018	2017	2016	Change 18-17	% change 18-17
<b>CAPITAL EXPENDITURE</b>						
Environmental offsets	€m	7.1	7.9	14.7	-0.8	-10
Environmental impact studies	€m	3.5	4.2	2.4	-0.7	-17
Environmental activities - new plant	€m	3.9	4.8	4.3	-0.9	-19
Environmental activities - existing plant	€m	2.9	3.6	7.5	-0.7	-19
Demolitions	€m	2.2	0.8	0.9	1.4	175
<b>Total capital expenditure</b>	<b>€m</b>	<b>19.6</b>	<b>21.2</b>	<b>29.8</b>	<b>-1.6</b>	<b>-8</b>
<b>COSTS</b>						
Cost of environmental activities	€m	23.8	24.1	19.1	-0.3	-1
<b>Total operating costs</b>	<b>€m</b>	<b>23.8</b>	<b>24.1</b>	<b>19.1</b>	<b>-0.3</b>	<b>-1</b>

<sup>(1)</sup> Details of the accounting method used are provided on page 190.