# ENVIRONMENTAL ACCOUNTS

# INDEX

## REFERENCE PERIMETER

The perimeter of the *Environmental Account* is consistent with the reporting perimeter of the *Sustainability Report* (pursuant to Italian Legislative Decree 254/2016), as defined in the *Methodological Note*.
The water companies in which Acea has an investment: Acque, Gori, Acquedotto del Fiora, Publiacqua and Umbra Acque - consolidated in the Financial Statements with the equity method - are marginally included in the *Environmental Accounts* and only relative to the aspects which are specifically signaled in the text. Please see the chapter *Water Company data sheets and overseas activities* (outside the perimeter of the *Non-Financial Statement*).

The *Environmental Accounts*, integral part of the *Sustainability Report*, combines and presents systematically the information and environmental performance data of the principal companies of the Group.
The data is divided into "product systems" pertaining to the energy, "environment" and water fields, according to the Life Cycle Assessment approach (standard ISO Series 14040), which assesses the entire life cycle of the systems.
The substances used by the Group - whether natural, like water, or not natural, like chemicals, the "products" and the emissions, the effluents and waste related to the activities managed, are reported for the three-year period, since they are significant in terms of **producing and distributing energy, collecting and distributing drinking water**, the **purification** processes and for all the processes connected to **waste management**, including **waste-to-energy**.

Every use is reduced to a minimum in terms of quantity and every substance is selected carefully in terms of quality, safety and environmental sustainability.

The resources, **both the renewable and non-renewable ones**, used are explained in the three areas. In particular, among the renewable resources listed we highlight the consumption of water and the biomasses used for the production of compost. The energy produced from renewable sources (photovoltaic and biogas) is used where possible in the closest factories or installations (see *Relations with the environment*).
In the *Explanatory Notes* we provide additional information regarding the **quality of the data presented**, in particular whether it was **measured, estimated** or **calculated**, and the principal items of the *Environmental Accounts*, indicated in the tables and in the text by a number in brackets, including a brief description.

# PRODUCT SYSTEMS

### ENERGY AREA

- ENERGY GENERATION (THERMOELECTRIC + HYDROELECTRIC + PHOTOVOLTAIC + ELECTRICITY FROM WASTE AND BIOGAS)
- DISTRIBUTION OF ELECTRICITY
- PRODUCTION AND DISTRIBUTION OF HEAT
- PUBLIC LIGHTING
- CONTROLS AND MEASUREMENTS

### ENVIRONMENT AREA

- SOLID URBAN WASTE DISPOSED
- PRODUCTION OF COMPOST
- ANALYSIS AND MEASUREMENTS

### WATER AREA

- DRINKING WATER SUPPLY
- NON-DRINKING WATER SUPPLY
- WATER DISTRIBUTION
- ADDUCTION/PURIFICATION WASTE WATER
- ANALYSIS AND MEASUREMENTS

The data is provided for the 2015-2017 three-year period and aggregated in three homogeneous categories:
- **The product supplied,**
- **the resources used,**
- **the waste produced.**

The service indicators and the principal environmental performance indicators are explained below for every area.

# THE PRODUCTS - ENERGY AREA

The financial statement data relative to the generation of electricity refer to Acea Produzione and Acea Ambiente - Waste-to-Energy.

| ELECTRICITY - GENERATION | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **Summary data** | | | | | |
| **Total gross electricity produced (1) = (3+11+16)** | **GWh** | **783.07** | **737.39** | **837.88** | **13.6** |
| **Total net electricity produced (2) = (10+15+18)** | **GWh** | **728.07** | **681.84** | **776.31** | **13.9** |
| *From fossil fuels (thermoelectric) (5 + 0.47x $15_{San\ Vittore}$ +0.58x $16_{Terni}$)* | *GWh* | *170.16 21.7% di (1)* | *166.29 22.6% di (1)* | *229.44 27.4% di (1)* | *38.0* |
| *From renewable sources (Hydroelectric, solar, biodegradable waste fraction) (4+0.53x$15_{San\ Vittore}$ +0.42 x $16_{Terni}$ +16 +19)* | *GWh* | *612.91 78.3% di (1)* | *571.11 77.5% di (1)* | *608.43 72.6% di (1)* | *6.5* |
| **Acea Produzione - Thermoelectric** | | | | | |
| **Total gross electricity produced (3) = (4+5)** | **GWh** | **462.26** | **399.73** | **420.18** | **5.1** |
| **Total gross hydroelectric energy (4)** | **GWh** | **449.19** | **389.68** | **380.48** | **-2.4** |
| *A. Volta Castel Madama* | *GWh* | *15.67* | *0.00* | *6.93* | *-* |
| *G. Ferraris Mandela* | *GWh* | *12.21* | *10.71* | *3.27* | *-69.5* |
| *G. Marconi Orte* | *GWh* | *62.53* | *62.69* | *56.31* | *-10.2* |
| *Sant'Angelo* | *GWh* | *177.19* | *132.62* | *128.42* | *-3.2* |
| *Salisano* | *GWh* | *179.21* | *181.26* | *182.82* | *0.9* |
| *Other minor* | *GWh* | *2.38* | *2.40* | *2.72* | *13.6* |
| **Total gross thermoelectric energy (5)** | **GWh** | **13.08** | **10.05** | **39.70** | **294.9** |
| From diesel *Montemartini power plant* (*) | GWh | 1.84 | 1.18 | 2.15 | 82.2 |
| From natural gas | GWh | 11.24 | 8.88 | 37.55 | 323.1 |
| *Tor di Valle cogeneration* | *GWh* | *11.24* | *8.88* | *8.22* | *-7.4* |
| *Tor di Valle CAR module* | *GWh* | *-* | *-* | *29.33* | *-* |
| **Total losses of electricity (6) = (7+8+9)** | **GWh** | **12.81** | **10.90** | **8.76** | **-19.6** |
| *Self consumption hydro plants (7)* | *GWh* | *2.29* | *2.09* | *2.0* | *-5.3* |
| *Self consumption thermo plants (Tor di Valle, Montemartini) (8)* | *GWh* | *4.18* | *4.17* | *2.27* | *-45.6* |
| *First processing losses* | *GWh* | *6.34* | *4.63* | *4.51* | *-2.6* |
| **Total net electricity produced by Acea Produzione (10) = (3-6)** | **GWh** | **449.46** | **388.84** | **411.42** | **5.8** |
| **Production Area - Photovoltaic** | | | | | |
| **Gross photovoltaic electrical energy (11) (**)** | **GWh** | **13.93** | **10.91** | **11.58** | **6.1** |
| Total losses of electricity (12) | GWh | 0.28 | 0.32 | 0.34 | 6.3 |
| **Net photovoltaic energy (13) = (11-12)** | **GWh** | **13.65** | **10.59** | **11.24** | **6.1** |
| **Acea Ambiente - Waste-to-energy** | | | | | |
| **Total gross electricity produced (14) = (15)+(16)** | **GWh** | **306.87** | **326.75** | **384.25** | **17.6** |
| *San Vittore del Lazio plant (15)* | *GWh* | *225.35* | *243.68* | *301.15* | *23.6* |
| *Terni plant (16)* | *GWh* | *81.52* | *83.07* | *83.10* | *0.0* |
| **Self consumption + losses from first processing (17)** | **GWh** | **41.91** | **44.34** | **51.30** | **15.7** |
| *San Vittore del Lazio plant* | *GWh* | *32.88* | *35.68* | *42.78* | *19.9* |
| *Terni plant* | *GWh* | *9.03* | *8.66* | *8.52* | *-1.6* |
| **Total net electricity produced (18) = (14-17)** | **GWh** | **264.96** | **282.41** | **332.95** | **17.9** |
| **Acea Ambiente - Biogas** | | | | | |
| **Total gross electricity produced from biogas (19)** | **GWh** | **-** | **17.69** | **21.87** | **23.6** |
| *Orvieto plant* | *GWh* | *-* | *17.69* | *21.87* | *23.6* |
| **Self consumption (20)** | **GWh** | **-** | **1.10** | **1.17** | **6.9** |
| **Total electricity transferred in network (21) = (19-20)** | **GWh** | **-** | **16.60** | **20.69** | **24.7** |

(*) The Montemartini power plant is maintained operational but in reserve mode.
(**) Compared to the data published, for the 2016-2017 two-year period the FV production of Parco della Mistica, directed to ALL srl from 29.12.2015, of about 5 GWh both in 2016 and in 2017.

| THERMAL ENERGY - GENERATION | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Acea Produzione | | | | | |
| **Total gross thermal energy produced Tor di Valle power plant (22)** | **$GWh_t$** | **80.20** | **90.03** | **96.19** | **6.8** |
| Total losses of of thermal energy (23) | $GWh_t$ | 7.98 | 23.95 | 20.14 | -15.9 |
| *Distribution losses* | *$GWh_t$* | *5.82* | *17.83* | *14.06* | *-21.1* |
| *Production losses* | *$GWh_t$* | *2.16* | *6.11* | *6.08* | *-0.6* |
| **Net thermal energy sold (24) =(22-23)** | **$GWh_t$** | **72.21** | **66.08** | **76.05** | **15.1** |

| ELECTRICITY - TRANSPORT AND SALE | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| In Rome and Formello - summary data | | | | | |
| Supply from Acea Group (25) | GWh | 2.35 | 3.00 | 3.21 | 7.0 |
| Electricity from the market (26) | GWh | 11,197.77 | 10,798.59 | 10,832.86 | 0.3 |
| *from Single Buyer* | *GWh* | *2,839.87* | *2,675.92* | *2,620.42* | *-2.1* |
| *From importation* | *GWh* | *389.12* | *390.20* | *389.13* | *-0.3* |
| *From wholesalers + other producers* | *GWh* | *7,968.78* | *7,732.47* | *7,823.31* | *1.2* |
| **electricity requested on the grid (27) =(25+26) = (28+29+30+31+32)** | **GWh** | **11,200.12** | **10,801.60** | **10,836.07** | **0.3** |
| *Distribution, transport and commercial losses (28)* | *GWh* | *690.62 6.17% of (27)* | *699.58 6.45% of (27)* | *747.40 6.90% of (27)* | *6.8* |
| *Uses for own transmission and distribution (29)* | *GWh* | *30.05* | *32.45* | *40.39* | *24.5* |
| *Net electricity transferred to third parties (30)* | *GWh* | *2.67* | *2.52* | *2.59* | *2.8* |
| **Net electricity conveyed from Acea to clients of the open market (31)** | **GWh** | **7,525.98** | **7,309.74** | **7,393.80** | **1.2** |
| *Net electricity sold by Acea Energia to clients of the open market on distribution company grid (Areti)* | *GWh* | *5,644.24* | *5,673.51* | *5,847.37* | *3.1* |
| *Net electricity sold by other sellers to clients of the open market on distribution company grid (Areti)* | *GWh* | *1,881.74* | *1,636.22* | *1,546.43* | *-5.5* |
| **Net electricity sold to managed clients (32)** | **GWh** | **2,950.80** | **2,757.30** | **2,651.9** | **-3.8** |
| Sale in Italy - summary data | | | | | |
| **Net electricity sold by Acea on the open market - including sale on Rome (33)** | **GWh** | **6,467.5** | **5,558.80** | **4,190.90** | **-24.6** |
| *Acea Energy* | *GWh* | *6,092.0* | *5,163.4* | *3,852.1* | *-25.4* |
| *other Associated companies* | *GWh* | *375.5* | *395.0* | *338.8* | *-14.3* |
| **Net electricity sold by Acea in Italy (open market + managed) (32+33)** | **GWh** | **9,418.3** | **8,316.1** | **6,842.8** | **-17.7** |

| PUBLIC LIGHTING | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **Luminous flux to Rome (34)** | **Mlumen** | **3,376** | **2,750** | **1,991** | **-27.6** |

| CONTROLS AND MEASUREMENTS | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **measurement and control activity (35)** | **no.** | **371** | **410** | **371** | **-9.5** |
| *Electro-magnetic field measurements* | *no.* | *22* | *23* | *25* | *8.7* |
| *Noise measurements* | *no.* | *14* | *18* | *27* | *50.0* |
| *PCB chemical analyses* | *no.* | *75* | *76* | *43* | *-43.4* |
| *Waste classification* | *no.* | *43* | *43* | *28* | *-34.9* |
| *Transformer diagnostics* | *no.* | *199* | *217* | *216* | *-0.5* |
| *other* | *no.* | *18* | *33* | *32* | *-3.0* |

# THE PRODUCTS - ENVIRONMENT AREA

The data refers to the three composting plants (the one located in Aprilia and the two located, respectively, in Monterotondo Marittimo and Sabaudia) and the waste management plant of Orvieto, all in Acea Ambiente and 100% Acea SpA. The Sabaudia plant, in order to permit the implementation of ordinary and extraordinary maintenance operations, suspended conferments in September 2016 and was inactive throughout 2017. The Aprilia plant, which obtained the release on 21.12.2015 (and resumed activity on 1.06.2016), starting on 14.12.2017 was once again seized by the Public Prosecutor's Office of Latina[1]. The percentage changes are not calculated for this plant since they are not very significant considering the various operating times.

| NON-HAZARDOUS WASTE DISPOSED AND RECOVERED - ORVIETO PLANT | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **Total incoming waste (36) = (36A)+(37)** | **t** | **93,865** | **96,541** | **88,273** | **-8.6** |
| **Waste sent for treatment (36A)** | **t** | **31,484** | **55,328** | **58,297** | **5.4** |
| *Of which: waste sent to the anaerobic digester and aerobic treatment* | *t* | *6,926* | *29,846* | *42,506* | *42.4* |
| *Of which: sent for aerobic treatment or just shredding* | | *n.a.* | *n.a.* | *15,791* | - |
| **Waste sent directly to landfill (37)** | **t** | **62,523** | **40,894** | **29,976** | **-26.7** |
| **Waste sent to landfill after treatment (37A)** | **t** | **20,956** | **29,886** | **13,625** | **-54.4** |
| **Waste recovered (38)** | **t** | **7,031** | **3,887** | **336** | **-91.4** |
| **High quality compost (39)** | **t** | **0** | **1,339** | **4,578** | **241.9** |
| **Reduction through stabilisation (40) = (36) – (37+37A+38+39)** | **t** | **3,355** | **20,536** | **39,759** | **93.6** |

| PRODUCTION OF COMPOST | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **Total incoming organic waste (41) = (42+43+44)** | **t** | **19,509.9** | **45,051.07** | **56,474.33** | **25.4** |
| **Incoming sludge (42)** | **t** | **11,390.98** | **16,999.50** | **10,593.60** | **-37.7** |
| *Aprilia plant* | *t* | *0.00* | *6,393.94* | *5,464.54* | - |
| *Monterotondo Marittimo plant* | *t* | *4,986.98* | *4,867.80* | *5,129.06* | *5.4* |
| *Sabaudia plant* | *t* | *6,404.00* | *5,737.76* | *0.00* | - |
| **Incoming green (43)** | **t** | **8,118.94** | **12,596.45** | **11,220.33** | **-10.9** |
| *Aprilia plant* | *t* | *0.00* | *5,705.00* | *8,585.21* | - |
| *Monterotondo Marittimo plant* | *t* | *2,155.94* | *2,202.43* | *2,635.12* | *19.6* |
| *Sabaudia plant* | *t* | *5,963.00* | *4,689.02* | *0.00* | - |
| **Organic fraction from separate incoming collection and other agrifood waste (44)** | **t** | **0.00** | **15,467.18** | **34,660.40** | **124.1** |
| *Aprilia plant* | *t* | *0.00* | *15,439* | *33,141.62* | - |
| *Monterotondo Marittimo plant* | | - | *27.78* | *1,518.78* | - |
| **High quality compost produced (45)** | **t** | **7,203.0** | **12,654.00** | **13,150.00** | **3.9** |
| *Aprilia plant* | *t* | *0.0* | *5,000.0 (*)* | *10,850.0* | - |
| *Monterotondo Marittimo plant* | *t* | *3,167.0* | *2,100.0* | *2,300.0* | *9.5* |
| *Sabaudia plant* | *t* | *4,036.0* | *5,554.0* | *0.0* | - |
| **Non-compostable material for disposal (46)** | **t** | **118.03** | **3,364.08** | **9,163.36** | **172.4** |
| *Aprilia plant* | *t* | *118.03* | *3,364.08* | *9,163.36* | - |
| *Monterotondo Marittimo and Sabaudia plants* | *t* | *0.00* | *0.00* | *0.00* | - |
| **Reduction through stabilisation (47) = (42+43+44-45-46)** | **t** | **12,306.9** | **29,045.1** | **34,161.0** | **17.6** |

| LIQUIDS TO PURIFICATION | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **Liquids to purification (48)** | | | | | |
| *Liquids to purification - Sabaudia plant* | **t** | **14,648** | **10,489** | **0** | **-** |

[1] It is a precautionary seizure with reference to aspects correlated to the odour emissions relative to summer 2017.

| ANALYTICAL DETERMINATIONS ON WASTE AND ON QUALITY COMPOST | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **total analytical determinations (49)** | **no.** | **73** | **95** | **104** | **9.5** |
| *Analytical determinations on compost - Orvieto plant* | *no.* | *0* | *0* | *0* | *-* |
| *Analytical determinations on compost - Aprilia, Monterotondo Marittimo and Sabaudia plants* | *no.* | *17* | *35* | *30* | *-14.3* |
| *Analytical determinations on waste - Orvieto plant* | *no.* | *56* | *60* | *62* | *3.3* |

(*) Figure adjusted compared to that published in the 2016 Sustainability Report: it represents the total quantity produced in 2016.

# THE PRODUCTS - WATER AREA

The water data **summarised at the national level** include all the principal water companies of the Acea Group: Acea Ato 2, Acea Ato 5 (Lazio), Gesesa (Campania), Gori (Campania), Umbra Acque (Umbria), Acque, Publiacqua and Acquedotto del Fiora (Tuscany). The details of the water balances are only presented for the companies operating in the reporting perimeter of the *Sustainability Report* (pursuant to Italian Legislative Decree 254/2016): Acea Ato 2, Acea Ato 5 and Gesesa. Please see the chapter *Water Company data sheets and overseas activities* for the water balance sheets of the other companies of the Group.
The **water balance items have been recalculated** for the three-year period **following the criteria provided by the ARERA.**

| SUMMARISED WATER DATA OF THE GROUP IN ITALY(*) | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **Total drinking water collected from the environment or from other systems (50)** | **Mm³** | **1,423.8** | **1,445.8** | **1,406.3** | **-2.7** |
| **Total drinking water released into network (51)** | **Mm³** | **1,285.5** | **1,297.6** | **1,263.5** | **-2.6** |
| **Total drinking water supplied (52)** | **Mm³** | **667.0** | **668.0** | **658.0** | **-1.5** |

(*) The 2016 data has been adjusted after consolidation of certain items by the water companies of the Group. Some 2017 items were estimated and will be consolidated in the months following publication.

| SUMMARY WATER DATA OF THE OPERATING COMPANIES IN THE DNF PERIMETER: ACEA ATO 2, ACEA ATO 5 AND GESESA | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **Total drinking water collected from the environment or from other systems** | **Mm³** | **859.9** | **890.6** | **857.1** | **-3.8** |
| **Total drinking water released into network** | **Mm³** | **744.1** | **763.2** | **734.6** | **-3.8** |
| **Total drinking water supplied** | **Mm³** | **389.8** | **391.7** | **383.6** | **-2.1** |
| Acea Ato 2 for historic network of Rome (*) | | | | | |
| **Drinking water collected from the environment (53)** | **Mm³** | **619.4** | **635.9** | **612.0** | **-3.8** |
| *Purified from Lake Bracciano* | *Mm³* | *36.7* | *32.0* | *22.6* | *-29.4* |
| *From wells* | *Mm³* | *19.8* | *20.5* | *33.1* | *61.5* |
| *From springs* | *Mm³* | *562.9* | *583.5* | *556.1* | *-4.7* |
| Drinking water transferred to Municipalities located along the route of the aqueducts (54) | Mm³ | 66.7 | 69.1 | 70.5 | 2.0 |
| Drinking water released into non-potable network (55) | Mm³ | 11.4 | 11.2 | 8.8 | -21.4 |
| Drinking water returned to the environment / technical operating amounts (56) | Mm³ | 48.1 | 45.6 | 55.4 | 21.5 |
| **Drinking water released into the historic network of Rome (57) = (53)-(54+55+56)** | **Mm³** | **493.2** | **510.1** | **477.4** | **-6.4** |
| **Drinking water supplied through the historic network of Rome (58)** | **Mm³** | **274.3** | **271.1** | **270.2** | **-0.3** |
| **Assessment of the losses according to Ministerial Decree no. 99/97 and in conformity with the ARERA requirements** | | | | | |
| Overall losses (quantity A17 Ministerial Decree 99/97) (59) | Mm³ | 217.5 | 237.7 | 205.9 | -13.4 |
| Actual losses (quantities A13+A15 as per Ministerial Decree 97/99) (60) | Mm³ | 209.1<br>42.4% of (57) | 229.5<br>45.0% of (57) | 197.2<br>41.3% of (57) | -14.0 |
| **Water balance non-potable network of Rome** | | | | | |
| **Non-potable water collected from the environment (61)** | **Mm³** | **25.9** | **24.6** | **23.2** | **-5.4** |
| *From the Tiber River treated (Grottarossa Plant)* | *Mm³* | *4.7* | *9.2* | *10.7* | *15.9* |
| *From springs* | *Mm³* | *9.8* | *4.2* | *3.8* | *-9.5* |
| *Drinking water released into non-potable network* | *Mm³* | *11.4* | *11.2* | *8.8* | *-21.4* |
| **Non-potable water supplied to the Municipality of Rome (62)** | **Mm³** | **13.2** | **12.0** | **12.1** | **0.8** |
| **Non-potable water supplied to other municipalities (63)** | **Mm³** | **0.03** | **0.01** | **0.01** | **-** |

| Acea Ato 2 for Ato 2 – Central Lazio (Rome + municipalities acquired at 31.12.2017)(*) | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **drinking water collected from the environment and from other systems (64)** | **Mm³** | **735.6** | **761.7** | **735.9** | **-3.4** |
| *Purified from Lake Bracciano* | *Mm³* | *36.7* | *32.0* | *22.6* | *-29.4* |
| *From wells* | *Mm³* | *92.4* | *99.9* | *114.6* | *14.7* |
| *From springs* | *Mm³* | *601.0* | *624.6* | *592.9* | *-5.1* |
| *From other aqueduct systems* | *Mm³* | 5.5 | 5.2 | 5.8 | *11.5* |
| drinking water transferred to other aqueduct systems (65) | Mm³ | 35.7 | 36.8 | 29.5 | -19.8 |
| drinking water released into non-potable network (66) | Mm³ | 11.4 | 11.2 | 8.8 | -21.8 |
| drinking water returned to the environment / technical operating amounts (67) | Mm³ | 58.9 | 60.2 | 67.8 | 12.6 |
| **drinking water released into the Ato 2 network (68) = (64) - (65+66+67)** | **Mm³** | **629.6** | **653.5** | **629.8** | **-3.6** |
| **Total drinking water released into the Ato 2 network (69)** | **Mm³** | **362.8** | **364.7** | **360.5** | **-1.2** |
| **Assessment of the losses according to Ministerial Decree no. 99/97 and in conformity with the ARERA requirements** | | | | | |
| Overall losses (quantity A17 Ministerial Decree 99/97) (70) | Mm³ | 300.9 | 324.1 | 297.2 | -8.3 |
| Actual losses (quantities A13+A15) (71) | Mm³ | 290.8 (46.6% of 68) | 314.1 (48.1% of 68) | 286.7 (45.5% of 68) | -8.7 |
| Acea Ato 5 for Ato 5 – Southern Lazio - Frosinone (85 municipalities) | | | | | |
| **drinking water collected from the environment and from other systems (72)** | **Mm³** | **107.7** | **107.4** | **97.4** | **-9.3** |
| *From wells* | *Mm³* | *60.2* | *73.0* | *65.9* | *-9.7* |
| *From springs* | *Mm³* | *47.5* | *34.4* | *31.5* | *-8.4* |
| *From other aqueduct systems* | *Mm³* | *5.4* | *8.3* | *8.4* | *1.2* |
| **drinking water released into network (73)** | **Mm³** | **103.3** | **96.5** | **89.6** | **-7.2** |
| **drinking water supplied (74)** | **Mm³** | **27.0** | **27.0** | **23.1** | **-14.4** |
| **Assessment of the losses according to Ministerial Decree no. 99/97 and in conformity with the ARERA requirements** | | | | | |
| Overall losses (quantity A17 Ministerial Decree 99/97) (75) | Mm³ | 75.0 | 72.8 | 64.9 | -10.9 |
| Actual losses (quantity A13+A15 Ministerial Decree 99/97) (76) | Mm³ | 69.6 (67.4% of 73) | 64.4 (66.7% of 73) | 58.1 (64.8% of 73) | -9.8 |
| Gesesa – Ato - Calore Irpino - Benevento (21 municipalities) | | | | | |
| **drinking water collected from the environment (**)** | **Mm³** | **5.9** | **5.9** | **8.1** | **37.3** |
| *From wells* | *Mm³* | *5.2* | *4.9* | *6.6* | *34.7* |
| *From springs* | *Mm³* | *0.7* | *1.0* | *1.5* | *50.0* |
| **drinking water collected from other aqueduct systems** | **Mm³** | **5.3** | **7.3** | **7.4** | **1.4** |
| **drinking water released into network** | **Mm³** | **11.2** | **13.2** | **15.2** | **15.2** |
| **drinking water supplied** | **Mm³** | **11.0** | **12.6** | **14.1** | **11.9** |
| **Assessment of the losses according to Ministerial Decree no. 99/97 and in conformity with the ARERA requirements** | | | | | |
| Overall losses (quantity A17 Ministerial Decree 99/97) | Mm³ | 4.5 | 5.53 | 6.79 | 22.8 |
| Actual losses (quantity A13+A15 Ministerial Decree 99/97) | Mm³ | 4.2 (37.5% of the quantity released) | 5.50 (41.7% of the quantity released) | 6.75 (44.4% of the quantity released) | 22.7 |

(*) The 2016 data of the water balance for the Acea Ato 2 network have been adjusted to updated certain items. The 2017 amounts relative to the municipal balances and the minor sources are estimated and may be consolidated after publication.
(**) For the 2016 and 2017 years, the measurement of the amounts collected from the environment is partly estimated.

| TOTAL WASTE WATER TREATED BY THE COMPANIES OF THE GROUP IN ITALY - SUMMARY DATA | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **waste water treated in the principal treatment plants of the companies of the Group in Italy (77)** | **Mm³** | **895.9** | **872.7** | **815.4 (*)** | **-6.6** |

| TOTAL WASTE WATER TREATED BY THE COMPANIES OPERATING IN THE DNF PERIMETER (ACEA ATO 2, ACEA ATO 5 AND GESESA(**) - SUMMARY DATA) | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Waste water treated in the principal treatment plants of Acea Ato 2, Acea Ato 5 (79) + (80) | $Mm^3$ | 650.1 | 621.9 | 574.7 | -7.6 |

| WASTE WATER TREATED BY ACEA ATO 2 | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Waste water treated in the principal treatment plants (78) | $Mm^3$ | 528.1 | 514.3 | 467.1 | -9.2 |
| *Rome South* | *$Mm^3$* | *296.7* | *288.1* | *276.9* | *-3.9* |
| *Rome North* | *$Mm^3$* | *96.5* | *95.7* | *75.2* | *-21.4* |
| *Rome East* | *$Mm^3$* | *96.1* | *94.8* | *83.0* | *-12.4* |
| *Rome Ostia* | *$Mm^3$* | *26.6* | *24.9* | *20.9* | *-16.1* |
| *CoBIS* | *$Mm^3$* | *7.5* | *6.7* | *7.0* | *4.5* |
| *Fregene* | *$Mm^3$* | *4.7* | *4.1* | *4.1* | *-* |
| Other - Municipality of Rome | $Mm^3$ | 16.0 | 14.8 | 14.0 | -5.4 |
| Other - outside the Municipality of Rome | $Mm^3$ | 79.0 | 66.1 | 72.5 | 9.7 |
| Total waste water treated by Acea Ato 2 (79) | $Mm^3$ | 623.1 | 595.2 | 553.6 | -7.0 |

| WASTE WATER TREATED BY ACEA ATO 5 | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Waste water treated in the principal treatment plants (80) | $Mm^3$ | 27.0 | 26.7 | 21.1 | -21.0 |

(*) The waste water treated of the Acquedotto del Fiora and Umbra Acque are estimated to be the same at the 2016 figure since the 2017 figure has not been received.
(**) The Gesesa company does not currently have flow meters at the entrance of the purification plants.

| ANALYTICAL DETERMINATIONS ON DRINKING WATER AND WASTE WATER IN THE GROUP IN ITALY - SUMMARY DATA (*) | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| analytical determinations on Group total drinking water (81) | no. | 1,147,716 | 1,188,656 | 1,144,365 | -3.7 |
| analytical determinations on Group total waste water (82) | no. | 486,425 | 448,123 | 470,239 | 4.9 |

| ANALYTICAL DETERMINATIONS ON DRINKING WATER AND ON WASTE WATER OF THE OPERATING COMPANIES IN THE DNF PERIMETER: ACEA ATO 2, ACEA ATO 5 AND GESESA - SUMMARY DATA | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Analytical determinations on drinking water of Acea Ato 2, Acea Ato 5 and Gesesa | no. | 447,613 | 462,320 | 409,375 | -11.5 |
| Analytical determinations on waste water of Acea Ato 2, Acea Ato 5 and Gesesa | no. | 217,149 | 186,754 | 211,890 | 13.5 |

| ANALYTICAL DETERMINATIONS ACEA ATO 2 | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| analytical determinations on Ato 2 drinking water | no. | 359,090 | 370,720 | 311,929 | -15.9 |
| analytical determinations on Ato 2 waste water | no. | 191,552 | 151,446 | 184,201 | 21.6 |

| ANALYTICAL DETERMINATIONS ACEA ATO 5 | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| analytical determinations on drinking water Ato 5 | no. | 83,910 | 85,500 | 91,157 | 6.6 |
| analytical determinations on waste water Ato 5 | no. | 21,681 | 31,258 | 21,421 | -31.5 |

| GESESA ANALYTICAL DETERMINATIONS | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| analytical determinations on Gesesa drinking water | no. | 4,613 | 6,100 | 6,289 | 3.1 |
| analytical determinations on Gesesa waste water | no. | 3,916 | 4,050 | 4,268 | 5.4 |

(*) The number includes both the determinations performed independently by each company, and those carried out by the in-house company, Acea Elabori. Some data of the preceding two-year period have been adjusted.

# THE RESOURCES USED - ENERGY AREA

The data on the resources used refer to Acea Produzione, Acea Ambiente - Waste-to-energy and Areti.

| GENERATION, TRANSPORT AND SALE OF ELECTRICITY AND HEAT, PUBLIC LIGHTING | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Natural gas | | | | | |
| **Electricity and heat generation (83) = (84+85)** | **$Nm^3$ x 1,000** | **14,853** | **14,849** | **18,351** | **23.6** |
| **Thermoelectric and AP heat production (84)** | **$Nm^3$ x 1,000** | **11,363** | **11,314** | **15,134** | **33.8** |
| *Tor di Valle auxiliary boilers - for district heating* | *$Nm^3$ x 1,000* | *7,247* | *7,958* | *4,334* | *-45.5* |
| *Tor di Valle cogeneration* | *$Nm^3$ x 1,000* | *4,116* | *3,357* | *2,942* | *-12.4* |
| *Tor di Valle CAR module* | *$Nm^3$ x 1,000* | - | - | *7,857* | - |
| **Waste-to-energy (85)** | **$Nm^3$ x 1,000** | **3,490** | **3,535** | **3,217** | **-9.0** |
| *San Vittore del Lazio waste-to-energy plant* | *$Nm^3$ x 1,000* | *2,109* | *2,816* | *2,719* | *-3.4* |
| *Terni waste-to-energy plant* | *$Nm^3$ x 1,000* | *1,381* | *719* | *498* | *-30.7* |
| Diesel for thermoelectric generation | | | | | |
| **thermoelectric production and Terni plant (86)** | **l x 1,000** | **757** | **564** | **924** | **63.8** |
| *Montemartini power plant* | *l x 1,000* | *748* | *492* | *865* | *-34.2* |
| *Terni plant* | *l x 1,000* | *9* | *72* | *60* | *-16.7* |
| CSS (Secondary Solid Fuel from waste) processed | | | | | |
| **San Vittore del Lazio waste-to-energy plant (87)** | **t x 1,000** | **239.871** | **281.917** | **345.639** | **22.6** |
| Waste-to-energy paper mill pulper | | | | | |
| **Terni waste-to-energy plant (88)** | **t x 1,000** | **99.892** | **99.768** | **99.970** | **0.2** |
| Biogas for the production of electricity | | | | | |
| **Orvieto plant (89)** | **$Nm^3$x 1,000** | | **10,459** | **12,695** | **21.4** |
| Water | | | | | |
| **Derivation from hydroelectric production (90)** | **$Mm^3$** | **3,514.77** | **3,176.99** | **2,899.00** | **-8.8** |
| **Process water (91)** | **$Mm^3$** | **0.1179** | **0.1395** | **0.1498** | **7.4** |
| **Water for civilian/sanitary uses (92)** | **$Mm^3$** | **0.2770** | **0.3078** | **0.3413** | **10.9** |
| Miscellaneous materials | | | | | |
| **Dielectric mineral oil in operation (93)** | **t** | **9,885** | **9,871** | **9,979** | **1.1** |
| Dielectric mineral oil - reintegrations | t | 3.21 | 2.74 | 1.58 | -57.2 |
| **$SF_6$ in operation (94)** | **t** | **29.64** | **29.75** | **29.80** | **0.1** |
| $SF_6$ - reintegrations | t | 0.6 | 0.7 | 0.6 | -14.3 |
| **Cooling fluids (HCFC type) in operation (95)** | **t** | **1.27** | **1.33** | **1.33** | **-** |
| Cooling fluids (HCFC type) - reintegrations | t | 0.008 | 0.000 | 0.000 | - |
| **Miscellaneous chemicals (96)** | **kg** | **7,993,950** | **8,351,458** | **9,694,690** | **16.1** |
| *acidity regulator* | *kg* | *60* | *120* | *0* | - |
| *Sodium chloride* | *kg* | *53,000* | *93,000* | *79,500* | *-14.5* |
| *Sodium hydroxide (caustic soda)* | *kg* | *105,410* | *106,938* | *190,330* | *78.0* |
| *Sodium bicarbonate* | *kg* | *6,731,810* | *7,007,300* | *8,035,000* | *14.7* |
| *Hydrochloric acid* | *kg* | *109,310* | *11,760* | *198,770* | *77.9* |
| *Ammonia solution* | *kg* | *655,440* | *725,340* | *793,090* | *9.3* |
| *Activated carbon* | *kg* | *338,500* | *307,000* | *398,000* | *29.6* |
| **Oils and fats / miscellaneous lubricants (97)** | **kg** | **6,332** | **1,098** | **3,776** | **243.9** |

| GENERATION, TRANSPORT AND SALE OF ELECTRICITY AND HEAT, PUBLIC LIGHTING (follows) | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **Electricity** | | | | | |
| *Consumption for distribution of electricity (98)= (28)* | *GWh* | *690.62* | *699.58* | *747.40* | *6.8* |
| *Consumption for production of electricity (99)= (1)-(2)* | *GWh* | *55.00* | *55.55* | *61.56* | *10.8* |
| *Consumption for offices (50% of the electricity consumed by the Parent Company) (100)* | *GWh* | *5.10* | *4.96* | *5.01* | *1.0* |
| *Other consumption (100 B)* | *GWh* | *-* | *-* | *1.16* | *-* |
| *Other personal uses (101)* | *GWh* | *30.05* | *32.45* | *41.49* | *24.5* |
| **total (102) = (98+99+100+100B+101)** | **GWh** | **780.77** | **792.55** | **855.53 (*)** | **-** |
| **Public lighting** | | | | | |
| **Consumption for public lighting (103)** | **GWh** | **167.34** | **167.85** | **115.64** | **-31.1** |

(*) The consumption cannot be compared with the previous year since the estimate of consumption not reported previously was included.

# THE RESOURCES USED - ENVIRONMENT AREA

The data on the resources refers to the three composting plants of Acea Ambiente (all 100% Acea SpA): the one located in Aprilia and the two located, respectively, in Monterotondo Marittimo and Sabaudia, and the waste waste management plant of Orvieto.

| WASTE DISPOSAL - ORVIETO PLANT | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Process water (104) | $m^3$ | 2,468 | 3,425 | 6,251 | 82.5 |
| Miscellaneous chemicals (105) | t | 1.7 | 7.3 | 251.9 | - |
| Electricity (106) | GWh | 0.600 | 3.557 | 3.959 | 11.3 |
| Diesel (107) | l | 262,618 | 249,422 | 257,953 | 3.4 |
| Water for civilian/sanitary uses (108) | $m^3$ | 1,353 | 4,227 | 1,330 | -68.5 |

| PRODUCTION OF COMPOST | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Process water (composting plants of Aprilia, Monterotondo Marittimo and Sabaudia) (109) | $m^3$ | 572 | 3,946 | 8,553 | 116.8 |
| miscellaneous chemicals (posting plants of Aprilia, Monterotondo Marittimo and Sabaudia) (110) | t | 53.20 | 70.83 | 101.5 | 43.3 |
| electricity (composting plants of Aprilia, Monterotondo Marittimo and Sabaudia) (111) | GWh | 1.551 | 1.924 | 3.691 | 91.8 |
| diesel (composting plants of Aprilia, Monterotondo Marittimo and Sabaudia) (112) | l x 1,000 | 91.60 | 127.50 | 138.02 | 8.3 |

# THE RESOURCES USED - WATER AREA

The data refers to the water companies of the Group included in the perimeter of the *Sustainability Report*: Acea Ato 2, Acea Ato 5 and Gesesa.

| COLLECTION, SUPPLY AND DISTRIBUTION DRINKING AND NON-POTABLE WATER | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Miscellaneous materials and natural resources | | | | | |
| **Reagents for purification and disinfection (113)** | **t** | **2,405.70** | **2,922.00** | **2,996.35** | **2.5** |
| **Reagents for chemical analyses (114)** | **t** | **1.50** | **1.40** | **1.50** | **3.4** |
| **gas for chemical analyses (115)** | **MNm³** | **5.24** | **5.26** | **5.52** | **4.9** |
| **Cooling fluids (HCFC type) in operation (116)** | **t** | **1.27** | **1.33** | **1.33** | **-** |
| Cooling fluids (HCFC type) - reintegrations | t | 0.008 | 0.000 | 0.000 | - |
| Electricity | | | | | |
| *Water pumping plants (117)* | *GWh* | *225.94* | *242.18* | *277.13* | *14.4* |
| *Offices/personal uses (50% energy consumed by the Parent Company) (118) = (100)* | *GWh* | *5.10* | *4.96* | *5.01* | *1.0* |
| *Chemical laboratory (119)* | *GWh* | *1.23* | *1.12* | *1.12* | *-* |
| **total electricity consumed (120) = (117+118+119)** | **GWh** | **232.27** | **248.27** | **283.26** | **14.1** |
| Drinking water | | | | | |
| *civilian/sanitary uses (121)* | *Mm³* | *1.63* | *1.63* | *1.00* | *-38.5* |
| *Process uses* | *Mm³* | *n.a.* | *n.a.* | *0.83* | *-* |
| *offices (50% of the drinking water consumed by the Parent Company) (122)* | *Mm³* | *0.13* | *0.19* | *0.16* | *-15.8* |
| **total drinking water consumed (123) = (121+122)** | **Mm³** | **1.76** | **1.81** | **1.99** | **9.9** |

| PURIFICATION WASTE WATER | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Miscellaneous materials and natural resources | | | | | |
| **Reagents for purification waste water (124)** | **t** | **6,770** | **6,495** | **7,333** | **12.9** |
| *Polyelectrolyte for sludge dehydration* | *t* | *1,257* | *1,680* | *1,883* | *4.6* |
| *Sodium hypochlorite for final disinfection* | *t* | *3,027* | *2,575* | *2,693* | *4.6* |
| *Ferric chloride for sludge dehydration* | *t* | *642* | *86* | *9* | *-89.7* |
| *peracetic acid* | *t* | *1,809* | *1,969* | *2,332* | *18.4* |
| *Other (anti-foaming, etc.)* | *t* | *35* | *186* | *417* | *124.6* |
| **Oil and fat (125)** | **t** | **4.9** | **5.4** | **5.7** | **5.6** |
| Electricity | | | | | |
| **Sewage and purification (126)** | **GWh** | **193.3** | **189.4** | **178.8** | **-5.6** |
| Fuels | | | | | |
| **Methane for dryers and power generators (127)** | **Nm³x 1,000** | **-** | **-** | **982.5** | **-** |
| **Biogas produced and consumed on site (128)** | **Nm³x 1,000** | **-** | **-** | **1,006.0** | **-** |

# FUELS USED BY THE COMPANIES OF THE GROUP FOR TRANSPORT AND HEATING

| TYPE OF FUEL | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Transport (Group car fleet) | | | | | |
| Petrol (129) | l x 1,000 | 290.4 | 157.1 | 95.4 | -39.3 |
| Diesel (130) | l x 1,000 | 1,189.8 | 1,711.4 | 2,702.0 | 57.9 |
| Heating | | | | | |
| Diesel (131) | l x 1,000 | 2.3 | 4.5 | 2.7 | -40 |
| Methane (132) | $Nm^3$ x 1,000 | 766.4 | 463.0 | 461.0 | -0.4 |
| LPG (133) | l x 1,000 | 34.3 | 32.8 | 32.2 | -1.7 |

# EMISSIONS AND WASTE - ENERGY AREA

The data on the emissions and waste refer to Acea Produzione, to the waste-to-energy plants of Acea Ambiente and Areti.

| EMISSIONS INTO THE ATMOSPHERE | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **$CO_2$ (134) = (135+136+137) (*)** | **t** | **260,670** | **272,295** | **369,546** | **35.7** |
| *Acea Produzione (135) (*)* | *t* | *25,440* | *24,610* | *33,507* | *36.2* |
| *Areti – from $SF_6$ (136)* | *t* | *12,540* | *14,820* | *14,100* | *-4.9* |
| *Waste-to-energy (137)* | *t* | *222,690* | *232,865* | *321,939* | *38.3* |
| **$NO_x$ (138) = (139+140)** | **t** | **190.86** | **171.13** | **198.20** | **15.8** |
| *Acea Produzione (139)* | *t* | *55.20* | *46.88* | *53.53* | *14.2* |
| *Waste-to-energy (140)* | *t* | *135.66* | *124.25* | *144.67* | *16.4* |
| **CO (141) = (142+143)** | **t** | **6.75** | **6.28** | **6.81** | **8.4** |
| *Acea Produzione (142)* | *t* | *3.61* | *3.56* | *2.18* | *-38.8* |
| *Waste-to-energy (143)* | *t* | *3.14* | *2.72* | *4.63* | *70.2* |
| **$SO_2$ (144) = (145+146)** | **t** | **0.22** | **0.28** | **0.42** | **50.0** |
| *Acea Produzione (145)* | *t* | *0.03* | *0.02* | *0.03* | *50.0* |
| *Waste-to-energy (146)* | *t* | *0.19* | *0.26* | *0.39* | *50.0* |
| **Powders (147) = (148+149)** | **t** | **0.32** | **0.55** | **0.55** | **-** |
| *Acea Produzione (148)* | *t* | *0.04* | *0.03* | *0.05* | *66.7* |
| *Waste-to-energy (149)* | *t* | *0.28* | *0.52* | *0.50* | *-4.5* |
| **HCl (150)** | **t** | **2.65** | **3.00** | **2.98** | **-0.7** |
| *Waste-to-energy* | *t* | *2.65* | *3.00* | *2.98* | *-0.7* |
| **HF (151)** | **t** | **0.20** | **0.09** | **0.12** | **33.3** |
| *Waste-to-energy* | *t* | *0.20* | *0.09* | *0.12* | *33.3* |
| **Organic Carbon (152)** | **t** | **1.79** | **1.40** | **1.88** | **34.6** |
| *Waste-to-energy* | *t* | *1.79* | *1.40* | *1.88* | *34.6* |

| OTHER EMISSIONS AND WASTE | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **waste water treated (153)** | **$Mm^3$** | **0.0006** | **0.0002** | **0** | **-** |
| **electrical fields at 50 Hz** | **kV** | **monitored**<br>Commitment to maintain the value below the legal limit | | | |
| **magnetic fields at 50 Hz** | **μT** | **monitored**<br>Commitment to maintain the value below the legal limit | | | |
| **noise** | **dB** | **monitored**<br>Commitment to maintain the value below the legal limit | | | |
| **Luminous flux dissipated** | **Mlumen** | Commitment to design the plants in order to limit to the utmost the emission value dissipated upwards | | | |

| WASTE (ITALIAN LEGISLATIVE DECREE No. 152/06) | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| **Hazardous waste - excluding waste-to-energy area (154)** | **t** | **1,254.34** | **324.17** | **409.26** | **26.2** |
| *Production energy own area (*)* | *t* | *1,252.80* | *323.58* | *406.42* | *25.6* |
| *Proportion for the activities performed by the parent company (**)* | *t* | *1.54* | *0.59* | *2.84* | *381.4* |
| **Hazardous waste from waste-to-energy (155)** | **t** | **54,405.71** | **73,035.04** | **80,031.71** | **9.6** |
| **Non-hazardous waste - excluding waste-to-energy area (156)** | **t** | **958.34** | **947.23** | **1,497.71** | **58.1** |
| *Production energy own area (*)* | *t* | *920.50* | *902.71* | *1,354.56* | *50.1* |
| *Proportion for the activities performed by the parent company (**)* | *t* | *37.84* | *44.52* | *143.15* | *221.5* |
| **Non-hazardous waste from waste-to-energy (157)** | **t** | **8,011.30** | **7,381.94** | **16,640.18** | **125.4** |

(*) The Acea Produzione data is estimated.
(**) 50% of the waste produced by the parent company.

# EMISSIONS AND WASTE - ENVIRONMENT AREA

The data refers to the three composting plants of Acea Ambiente: the one located in Aprilia and the two located, respectively, in Monterotondo Marittimo and Sabaudia, and the waste waste management plant of Orvieto.

| WASTE (ITALIAN LEGISLATIVE DECREE No. 152/06) | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| hazardous waste - composting plants of Aprilia, Monterotondo Marittimo and Sabaudia including leachate (158) | t | 847.66 | 562.12 | 33.95 | -94.0 |
| Non- hazardous waste - composting plants of Aprilia, Monterotondo Marittimo and Sabaudia including leachate (159) | t | 5,676.57 | 16,448.62 | 18,070.23 | 9.9 |
| Hazardous waste Orvieto Plant (160) | t | 1.0 | 9.7 | 14.9 | 53.5 |
| Non-hazardous waste Orvieto Plant including leachate (161) | t | 18,641.32 | 20,193.18 | 16,500.16 | -18.3 |

| EMISSIONS INTO THE ATMOSPHERE | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| $CO_2$ – Orvieto plant and composting plants (161 B) | t | - | - | 932 | - |
| Powders (162) | t | 2.58 | 0.68 | <0.012 | - |
| Total organic compounds (COT) (163) | t | ≤9.64 | 0.28 | <0.30 | - |
| Ammonia (164) | t | ≤0.58 | 0.80 | <0.10 | - |
| Volatile inorganic compounds (SIV) (165) | t | ≤4.05 | 2.42 | <1.64 | - |

# EMISSIONS AND WASTE - WATER AREA

The data refers to the Acea Ato 2, Acea Ato 5 and Gesesa water companies.

| WASTE PRODUCED | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Specific waste from purification of waste water | | | | | |
| **Total purification sludge (166)** | **t** | **151,654** | **137,175** | **118,915** | **-13.3** |
| *Acea Ato 2 purification sludge (167)* | *t* | *139,341* | *122,947* | *107,205* | *-12.8* |
| *Acea Ato 5 purification sludge (168)* | *t* | *11,856* | *13,098* | *10,580* | *-19.2* |
| *Gesesa purification sludge* | *t* | *300* | *457* | *1,130* | *147.3* |
| **total sand and slabs from purification (169)** | **t** | **28,921** | **10,955** | **16,826** | **53.6** |
| *Acea Ato sand and slabs (170)* | *t* | *28,733(*)* | *10,813* | *16,733* | *54.7* |
| *Acea Ato 5 sand and slabs (171)* | *t* | *184* | *120* | *81* | *-32.5* |
| *Gesesa sand and slabs* | *t* | *4* | *22* | *12* | *-45.5* |
| Waste (pursuant to Italian Legislative Decree no. 152/06) | | | | | |
| **Total hazardous waste (172) = (173+174+175)** | **t** | **81.1** | **114.0** | **86.5** | **-24.2** |
| *Acea Ato 2 and Acea Elabori production (173)* | *t* | *79.1* | *113.4* | *75.7* | *-33.3* |
| *Acea Ato 5 production (174)* | *t* | *0.5* | *0.02* | *8.0* | *-* |
| *Proportion for the activities performed by the parent company (175)(*)* | *t* | *1.5* | *0.6* | *2.8* | *366.7* |
| **Total non-hazardous waste (176) = (177+178+179+180)** | **t** | **7,185.6** | **19,101.5** | **8,239.1** | **-56.9** |
| *Acea Ato 2 and Acea Elabori production (177)* | *t* | *558.9* | *565.0* | *524.9* | *-7.1* |
| *Acea Ato 5 production (178)* | *t* | *6,570* | *18,492.0* | *7,571* | *-59.1* |
| *Gesesa Production* | | *18.9* | *28.7* | *34.6* | *20.4* |
| *Proportion for the activities performed by the parent company (179)(*)* | *t* | *37.8* | *44.5* | *143.2* | *221.8* |
| Other emissions and waste | | | | | |
| **$CO_2$ from methane for dryers (179B)** | **t** | **-** | **-** | **2,026** | **-** |
| **noise** | **dB** | **monitored** Commitment to maintain the value below the legal limit | | | |
| **odours** | | **monitored** Commitment to maintain the value below the limit of perception and in the areas adjacent to the treatment plants | | | |

(*) 50% of the waste produced by the parent company.

# THE EMISSIONS OF CARBON DIOXIDE FROM TRANSPORT AND PACKAGING

| COMPANIES OF THE GROUP | u. m. | 2015 | 2016 | 2017 | Δ% 2017/2016 |
|---|---|---|---|---|---|
| Transport | | | | | |
| **$CO_2$ (180)** | **t** | **3,815.7** | **4,890.6** | **7,370.7** | **50.7** |
| Heating | | | | | |
| **$CO_2$ (181)** | **t** | **1,644** | **1,018** | **1,008** | **-1.0** |

# KEY ENVIRONMENTAL PERFORMANCE INDICATORS (KPI) - ENERGY AREA

Environmental Key Performance Indicators

| INDICATOR | u. m. | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| Energy used for the processes | | | | |
| A Consumption in distribution of electricity | TJoules (GWh) | 1,341.8 (373.0) | 1,283.8 (356.6) | 1,244.9 (345.8) |
| B consumption in the production of electricity (figure 99) | | 197.1 (54.72) | 200.0 (55.55) | 221.6 (61.56) |
| C heat lost in the district heating network (Figure 23) | | 28.7 (7.98) | 86.2 (23.95) | 72.5 (20.14) |
| D Consumption for public lighting (Item 103) | | 602.42 (167.34) | 604.26 (167.85) | 416.30 (115.64) |
| E Environment Area consumption (106+111) | | 7.9 (2.2) | 19.8 (5.5) | 27.5 (7.7) |
| F water distribution (Item 120-118) | | 797.4 (221.5) | 846.0 (235.0) | 1,001.7 (278.3) |
| G water purification (Item 126) | | 695.5 (193.2) | 681.8 (189.4) | 643.7 (178.8) |
| H electricity for offices (Item 100+118) | | 36.7 (10.2) | 35.6 (9.9) | 36.1 (10.0) |
| Consumption for heating offices | | 29.2 (8.1) | 18.1 (5.0) | 17.9 (5.0) |
| Water area dryer consumption | | - | - | 36.4 (10.1) |
| L mobility (Item 129+130) | | 48.4 (13.4) | 66.5 (18.5) | 100.1 (27.8) |
| **Indirect consumption + consumption through mobility + heating** | | **3,785.1 (1,051.6)** | **3,842.1 (1,067.2)** | **3,818.7 (1,060.8)** |
| M loss of energy in the conversion from primary source to electricity | | 4,887.5 (1,408.3) | 5,394.4 (1,498.4) | 6,358.5 (1,766.3) |
| **Total energy consumption (sum A: M)** | | **8,672.6 (2,459.9)** | **9,236.5 (2,565.6)** | **10,177.2 (2,827.1)** |
| EMISSIONS, EFFLUENTS AND WASTE | | | | |
| **Greenhouse gas emissions ($CO_2$) (Item (134+161 B+179 B + 180 + 181)** | **t** | **266,129** | **278,204** | **380,883 (*)** |
| **Emissions of $SO_2$ , $NO_x$ and other significant gases by type** | | | | |
| **$NO_x$ (138)** | **t** | **190.86** | **171.13** | **198.20** |
| **CO (141)** | **t** | **6.75** | **6.28** | **6.81** |
| **$SO_2$ (144)** | **t** | **0.22** | **0.28** | **0.42** |
| Emission indicators/Acea Produzione (Acea Produzione and Acea Ambiente - Waste-to-energy) | | | | |
| **$NO_x$ /thermoelectric production** | **g/kWh** | **1.12** | **0.97** | **0.86** |
| **$CO_2$ /thermoelectric production** | **g/kWh** | **776** | **764** | **838** |
| **$CO_2$/gross total production** | **g/kWh** | **316.9** | **349.2** | **424.2** |
| **$SO_2$ /thermoelectric production** | **g/kWh** | **0.0** | **0.0** | **0.0** |

(*) For the first time, in 2017, the emission quantities of $CO_2$ of the composting and Orvieto plants and the water area dryers were included.

| INDICATOR | u. m. | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| **PRODUCTS AND SERVICES: ELECTRICITY** | | | | |
| **Performance of the electrical production process of Acea Produzione** | | | | |
| **Gross average performance thermoelectric production (calculation 1)** | % | **25.8** | **25.0** | **37.3** |
| Tor di Valle power plant (electrical performance cogeneration only) | | 26.0 | 25.2 | 24.0 |
| Tor di Valle power plant - CAR module | | - | - | 46.0 |
| Montemartini power plant | | 24.9 | 24.2 | 25.7 |
| **Gross average thermoelectric production out included thermal energy recovered (calculation 2)** | | **66.8** | **73.3** | **86.6** |
| **Gross average performance hydroelectric production (calculation 3)** | | **80.5** | **81.9** | **82.4** |
| **Gross average performance overall production (calculation 4)** | | **78.2** | **80.4** | **78.1** |
| **Gross average total production performance including thermal energy recovered (calculation 5)** | | **79.8** | **81.1** | **83.2** |

| Performance of the electrical production process - waste-to-energy plants | | | | |
|---|---|---|---|---|
| **San Vittore del Lazio** | | | | |
| **CSS produced/gross energy produced - San Vittore** | **kt/GWh** | **1.064** | **1.157** | **1.148** |
| **Gross performance CSS conversion into electricity (calculation 6)** | **kWh /kg CSS** | **0.94** | **0.86** | **0.87** |
| **Electrical performance (calculation 7)** | **%** | **19.5** | **19.6** | **19.4** |
| **total waste produced/hours worked** | **t/h** | **2.74** | **3.55** | **3.31** |
| **Terni** | | | | |
| **Gross performance Pulper conversion into electricity (calculation 8)** | **kWh /kg pulper** | **0.82** | **0.83** | **0.83** |
| **Electrical output (calculation 9)** | **%** | **18.1** | **16.5** | **17.1** |
| **total waste produced/hours worked** | **t/h** | **2.0** | **2.0** | **2.0** |

| Performance of the electrical production process - photovoltaic | | | | |
|---|---|---|---|---|
| **Average efficiency photovoltaic modules** | **%** | **14.0** | **14.0** | **14.0** |
| **Other indicators (territory, public lighting, controls, losses)** | | | | |
| **Protection of the territory** (Total length HV lines in cable / length HV overhead + cable lines) x 100 | **%** | **42.53** | **43.09** | **44.0** |
| **Public lighting illumination efficiency** (Item 34 / Item 103) | **Lumen/ kWh** | **20.2** | **16.4** | **17.2** |
| **Average performance lamps installed** (Item 34 / electrical power) | **Lumen/W** | **84.9** (39,759 kW) | **84.3** (32,641 kW) | **101.8** (32,641 kW) |
| **Specific consumption per lamp** (Item 2013 / no. lamps) | **kWh/ No. lamps** | **760.03** (220,175) | **761.31** (220,474) | **515.15** (224,480) |
| **Percentage of roads illuminated** (*) | **% (km of roads illuminated/total km of roads)** | **86.6** (6,156/7,110) | **86.7** (6,165/7,110) | **88.3** (6,281/7,110) |
| **No. operating and laboratory checks /GWh net electricity sold** (Item 35) / (Item 32) | **n./GWh** | **0.13** | **0.15** | **0.14** |
| **Reintegrations of $SF_6$/km electricity distribution network** | **kg/km** | **0.0197** | **0.0211** | **0.0194** |
| **Total losses of electricity** (Item 28) / (Item 27) (**) | **% energy requested** | **6.2** | **6.5** | **6.9** |

(*) It is an estimate.
(**) The total losses of electricity include: transformation losses, transport losses and commercial losses, these last due to fraud and incorrect readings.

# KEY ENVIRONMENTAL PERFORMANCE INDICATORS (KPI) - WATER AREA

Environmental Key Performance Indicators

| INDICATOR | u. m. | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| Carbon footprint | | | | |
| WATER SERVICE | | | | |
| total $CO_2/m^3$ of water supplied (integrated water service) (*) | $kgCO_2/m^3$ | 0.39 | 0.39 | 0.43 |
| $CO_2/m^3$ of water supplied (water distribution process) | $kgCO_2/m^3$ | 0.21 | 0.22 | 0.26 |
| $CO_2/m^3$ of water treated (purification process) | $kgCO_2/m^3$ | 0.11 | 0.11 | 0.11 |
| SERVICE: DRINKING WATER | | | | |
| Assessment parameters according to Ministerial Decree no. 99/97 and in conformity with the ARERA requirements | | | | |
| Acea Ato 2 network | | | | |
| **Primary performance (R1):** (Item 69) / (Item 68) | % | 57.6 | 55.8 | 57.2 |
| **performance at consumption (R2):** (Item 69 + A 11) / (Item 68) A 11 =1.38 $Mm^3$ for 2017 | % | 59.6 | 58.1 | 57.5 |
| **net performance (R3):** (Item 69 + A 11 + A 12) / (Item 68) A 12 =1.65 $Mm^3$ for 2017 | % | 59.8 | 58.3 | 57.7 |
| PRODUCT: DRINKING WATER | | | | |
| Acea Ato 2 network | | | | |
| **Linear index of the total losses during distribution (according to Ministerial Decree no. 99/97: A 17 / km network)** (Item 70) / (network km including Rome and Fiumicino user branches) | $Mm^3$x1,000/km | 26.0 (11,346.3 km) | 28.5 (11,117 km) | 26.2 (11,339 km) |
| **Linear index of the actual losses during distribution (according to Ministerial Decree no. 99/97 and ARERA provisions): (A15+A13) / km network)** (Item 71) / (network km including Rome and Fiumicino user branches) | $Mm^3$x1,000/km | 25.6 (11,346.3 km) | 27.6 (11,117 km) | 25.3 (11,339 km) |
| **Specific consumption of electricity per water network** (Acea Ato 2 network energy consumption) / (Item 68) | kWh/$m^3$ | 0.252 | 0.264 | 0.318 |
| **Intensity of the checks on drinking water distributed** (Item 81 - Acea Ato 2 drinking water) / (Item 68) | n./$Mm^3$ | 570 | 567 | 495 |
| **Index of drinking water additive** (Item 113 - Acea Ato 2 network) / (Item 68) | g/$m^3$ | 3.3 | 4.0 | 4.3 |
| Acea Ato 5 network | | | | |
| **Linear index of the total losses during distribution** (according to Ministerial Decree no. 99/97: A 17 / km network) | $Mm^3$x1,000/km | - | - | 15.0 (4,330 km) |
| **Linear index of the actual losses during distribution** (according to Ministerial Decree no. 99/97 and ARERA provisions: (A15+A13) / km network) | $Mm^3$x1,000/km | - | - | 14.5 (4,330 km) |
| **Specific consumption of electricity per water network** (Acea Ato 5 network energy consumption) / (Item 73) | kWh/$m^3$ | 0.594 | 0.630 | 0.750 |
| **Intensity of the checks on drinking water distributed** (Item 81 - Acea Ato 5 drinking water ) / (Item 73) | no./$Mm^3$ | 812 | 886 | 1,017 |
| **Index of drinking water additive** (Item 113 - Acea Ato 5 network) / (Item 73) | g/$m^3$ | 2.9 | 2.7 | 2.9 |
| Gesesa network | | | | |
| **Linear index of the total losses during distribution (according to Ministerial Decree no. 99/97: A 17 / km network)** | $Mm^3$x1,000/km | 9.9 (457 km) | 4.5 (1,220 km) | 5.3 (1,270 km) |
| **Linear index of the actual losses during distribution (according to Ministerial Decree no. 99/97 and ARERA provisions: (A15+A13) / km network)** | $Mm^3$x1,000/km | 9.1 (457 km) | 4.5 (1,220 km) | 5.3 (1,270 km) |
| **Specific consumption of electricity per water network** (energy consumption / input) | kWh/$m^3$ | 0.499 | 0.623 | 0.625 |

| INDICATOR (follows) | u. m. | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| Intensity of checks on drinking water distributed | n./Mm³ | 413 | 462 | 415 |
| Index of drinking water additive | g/m³ | 3.41 | 3.41 | 3.96 |
| **SERVICE: PURIFICATION WASTE WATER** | | | | |
| Acea Ato 2 | | | | |
| Sludge disposed (Item 168) | t | 139,341 | 122,947 | 107,205 |
| sand and slabs removed (Item 171) | t | 28,733 | 10,813 | 16,733 |
| COD input | t | 163,451 | 198,946 | 203,889 |
| COD removed | t | 143,709 | 180,755 | 181,639 |
| Efficiency of COD removal | % | 88 | 91 | 89 |
| SST input | t | 113,971 | 121,876 | 137,117 |
| SST removed | t | 103,959 | 113,284 | 127,695 |
| Efficiency of SST removal | % | 91 | 93 | 93 |
| Efficiency of BOD removal | % | 90 | 90 | 89 |
| total N input (such as $NH_4$+$NO_2$+$NO_3$+ organic) | t | 14,375 | 22,870 | 18,871 |
| Total N removed | t | 8,157 | 17,365 | 13,076 |
| Efficiency of N removal (**) | % | 67 | 72 | 70 |
| Acea Ato 2 additivation index | g/m³ | 9.7 | 9.8 | 12.2 |
| Acea Ato 2 specific consumption of electricity by purification process | kWh/m³ | 0.282 | 0.288 | 0.290 |
| Acea Ato 5 | | | | |
| Sludge disposed (item 167) | t | 11,856 | 13,098 | 10,580 |
| sand and slabs removed (Item 171) | t | 184 | 120 | 81 |
| COD input | t | 7,020 | 9,012 | 9,772 |
| COD removed | t | 5,805 | 7,000 | 7,842 |
| Efficiency of COD removal | t | 81 | 78 | 84 |
| Total N input | t | - | 1,172 | 1,167 |
| Total N removed | t | - | 1,013 | 1,003 |
| Efficiency of removal N ($NH_4^+$) | % | 85 | 89 | 91 |
| SST input | t | - | - | 7,876 |
| SST removed | t | - | - | 7,096 |
| Efficiency of SST removal | % | 80 | 82 | 95 |
| Acea Ato 5 additivation index | g/m³ | 27.5 | 24.3 | 27.9 |
| Acea Ato 5 specific consumption of electricity by purification process | kWh/m³ | 0.619 | 0.620 | 0.787 |
| Gesesa (***) | | | | |
| Sludge disposed | t | 300 | 457 | 1,130 |
| sand and slabs removed | t | 4 | 22 | 12 |
| **CONFORMITY** | | | | |
| Penalties paid for non-conformities relative to rules/agreements of an environmental nature (****) | euro | 75,469 | 414,491 | 319,666 |

(*) Emissions defined "Scope 2", in other words resulting from the consumption of electricity by the water companies in question.
(**) Value calculated as sum ($NH_4$+$NO_2$+$NO_3$+N organic). The 2015 and 2016 data does not coincide with the data published due to an updated of the database used for the calculation. The 2017 nitrogen removal data does not include the contribution of the Rome East treatment plant because it was undergoing significant maintenance operations during the period.
(***) Gesesa has an investment plan scheduled that includes the installation of input flow meters at the purification plants during the coming two-year period.
(****) Penalties paid in 2017 by Acea Ato 2, Acea Ato 5, Gesesa and the Terni waste-to-energy plant.

# KEY ENVIRONMENTAL PERFORMANCE INDICATORS (KPI) - ENVIRONMENT AREA

Environmental Key Performance Indicators

| INDICATOR | u. m. | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| **Non-hazardous waste disposed in landfill/total incoming waste** (Item 37)/(Item 36) | t/t | 0.89 | 0.73 | 0.49 |
| **Waste disposed in landfill/energy consumer net of photovoltaic energy** (Item 37+37A) / (Item 106) | t/kWh | 0.14 | 0.02 | 0.01 |
| **Compost produced/incoming waste** (Item 39 + 45)/(Item 36 + Item 41) | t/t | 0.06 | 0.10 | 0.12 |
| **Compost produced/electricity consumed** (Item 39 +45)/(Item 106 + 111) | kg/kWh | 3.35 | 2.55 | 2.32 |

## DESCRIPTION OF THE CALCULATIONS USED TO DETERMINE THE ELECTRICAL GENERATION EFFICIENCY

**Calculation 1**

$$\text{Efficiency}_{(thermoelectric)} = \frac{\text{Energy}_{thermoelectric}\ (kWh)}{\text{Energy}_{diesel}\ (kWh) + \text{Energy}_{methane}\ (kWh)}$$

**Where:**

**$\text{Energy}_{thermoelectric}$ = gross electricity produced with the thermoelectric cycle**

$$\text{Energy}_{diesel}\ (kWh) = \frac{\text{(diesel (l) x 0.835 x PCI}_g\ (kcal/kg)}{860\ (kcal/kWh)}$$

Energy equivalent to the diesel consumed (86)

$$\text{Energy}_{methane}\ (kWh) = \frac{\text{methane (Nm}^3\text{) x PCI}_m\ (kcal/Nm^3)}{860\ (kcal/kWh)}$$

Energy equivalent to the methane consumed (84)

$PCI_g$ = 10,000 kcal/kg (calorific value lower than diesel)

$PCI_m$ = 8,500 kcal/$Nm^3$ (calorific value lower than methane)

860 = conversion coefficient of the energy from kcal to kWh

0.835 = diesel specific weight (kg/l)

**NB** *the calorific values used for Acea Produzione are those actually derived from the measurements of the gas and diesel suppliers*

Calculation 2

$$\text{Efficiency}_{(thermoelectric)} = \frac{\text{Energy}_{thermoelectric}\,(kWh) + \text{Energy}_{thermal}\,(kWh)}{\text{Energy}_{diesel}\,(kWh) + \text{Energy}_{methane}\,(kWh)}$$

$\text{Energy}_{thermal}$ = Gross thermal energy produced

$\text{Energy}_{thermoelectric}$ = Gross thermoelectric energy produced

$$\text{Energy}_{diesel}\,(kWh) = \frac{\text{(diesel (l) x 0.835 x PCI}_g\,(kcal/kg)}{860\,(kcal/kWh)}$$

Energy equivalent to the diesel consumed: (86)

$$\text{Energy}_{methane}\,(kWh) = \frac{\text{methane (Nm}^3\text{) x PCI}_m\,(kcal/Nm^3)}{860\,(kcal/kWh)}$$

Energy equivalent to the methane consumed (84)

$PCI_g$ = 10,000 kcal/kg (calorific value lower than diesel)

$PCI_m$ = 8,500 kcal/$Nm^3$ (calorific value lower than methane)

860 = conversion coefficient of the energy from kcal to kWh

0.835 = diesel specific weight (kg/l)

**NB** *the calorific values used for Acea Produzione are those actually derived from the measurements of the gas and diesel suppliers*

Calculation 3

$$\text{Efficiency (hydroelectric)} = \frac{\text{Hydroelectric energy (MWh) x } 3.6 \times 10^9}{[m(kg) \times 9.8\,(m/s^2)\,xh(m)]\,(Joule)}$$

Where:

$3.6 \times 10^9$ = conversion factor of the water energy from joule to MWh

m = secondary water for hydroelectric production

9.8 = acceleration of gravity at sea level

h = falling height of the water (hydro system - turbine)

$\text{Energy}_{hydroelectric}$ = energy produced during the hydroelectric cycle

Calculation 4

$$\text{Efficiency (average)} = \frac{E_i}{(E_i + E_t)} \times \eta_i + \frac{E_t}{(E_i + E_t)} \times \eta_t$$

Where:

$E_i$ = total hydroelectric energy produced

$E_t$ = total thermoelectric energy produced

$\eta_i$= Hydroelectric efficiency

$\eta_t$ = thermoelectric efficiency

Efficiency (average) = average efficiency of production

Calculation 5

$$\text{Efficiency (average)} = \frac{E_i}{(E_i + E_T)} \times \eta_i + \frac{E_T}{(E_i + E_T)} \times \eta_T$$

Where:

$E_i$ = total hydroelectric energy produced

$E_T$ = sum of the total energy (thermoelectric and thermal) produced

$\eta_i$ = Hydroelectric efficiency

$\eta_T$ = Efficiency (thermoelectric + thermal)

Efficiency (average) = average efficiency of production

Calculation 6

$$\text{Recovery efficiency (kWh/kg)} = \frac{\text{Gross electricity produced (kWh)}}{\text{RDF (kg)}}$$

$\text{Energy}_{\text{gross energy produced}}$ (kWh) = gross electricity produced at San Vittore = (Item 12)

Calculation 7

$$\text{Electric efficiency} = \frac{\text{Electricity produced (kWh)}}{\text{Internal energy CSS (kWh)+Methane internal energy (kWh)}}$$

Where:

Electricity produced = electricity produced at San Vittore = (Item 12)

$$\text{Methane internal energy} = \frac{Sm^3\ CH_4 \times PCI_m\ (kcal/\ Sm^3)}{860\ (kcal/kWh)}$$

$PCI_m$ = PCI methane = approx. 8,500 kcal/$Sm^3$

860 = conversion coefficient of the energy from kcal to kWh.

$$\text{Internal energy CSS (kWh)} = \frac{\text{CSS (kg)} \times PCI_{css}\ (kcal/kg)}{860\ (kcal/kWh)}$$

$PCI_{css}$ = 3,583 kcal/kg (15,000 kJ/kg) - calorific value lower on average than the CSS

860 = conversion coefficient of the energy from kcal to kWh

Calculation 8

$$\text{Recovery efficiency (kWh/kg)} = \frac{\text{Gross electricity produced (kWh)}}{\text{pulper (kg)}}$$

Gross electricity produced (kWh) = electricity produced at Terni= (Item 13)

Calculation 9

$$\text{Efficiency} = \frac{\text{Electricity produced (kWh)}}{\text{Pulper internal energy (kWh)+methane internal energy (kWh)}}$$

Where:

Electricity produced = Electricity produced at Terni = (Item 13)

$$\text{Methane internal energy (kWh)} = \frac{Sm^3\ CH_4 \times PCI_m\ (kcal/\ Sm^3)}{860\ (kcal/kWh)}$$

$PCI_m$ = PCI methane = approx. 8,500 kcal/$Sm^3$

860 = conversion coefficient of the energy from kcal to kWh.

$$\text{Pulper internal energy (kWh)} = \frac{\text{pulper (kg)} \times PCI_p\ (kcal/kg)}{860\ (kcal/kWh)}$$

$PCI_p$ = PCI pulper = 3,635 kcal/kg (15,216 kJ/kg) - calorific value lower on average than the pulper

860 = conversion coefficient of the energy from kcal to kWh.

# EXPLANATORY NOTES TO THE ENVIRONMENTAL ACCOUNTS

The numerical data presented in the *Environmental Accounts* is produced and certified by the competent Departments.
The responsibility for the correct preparation of the data pertains to the individual production units, pending the implementation of a standardised Environmental Management System, capable of coding the procedures in order to obtain a regular flow of numerical information.
Before their final acceptance, however, the official data underwent a validation process that anticipated four control steps:

1. Comparison with historical data to highlight and justify possible large deviations;
2. At least two repetitions of the acquisition process;
3. Feed-back to the Departments responsible for the final validation of the data;
4. Random check carried out by auditing firm.

The numerical data have been divided into the three categories:

- estimated;
- calculated;
- measured.

In the event of data resulting from estimates, the utmost attention was paid to the verification of the reasonableness of the basic criteria used, with the objective of resorting as little as possible, in the future, to this type of measurement of the sizes of environmental significance.
When data was achieved through calculation, the algorithm used was briefly explained to permit full understanding of the mathematical result.
Lastly, when the data was measured, an uncertainty estimate to be associated with the number was provided.

# ADDITIONAL INFORMATION ON THE NUMERICAL DATA PROVIDED IN THE ENVIRONMENTAL ACCOUNTS

## PRODUCTS - ENERGY AREA

| Figure no. | Explanation - comment |
|---|---|
| 1 | Gross total energy produced by Acea Ambiente and Acea Produzione. The figure is calculated. |
| 2 | Electricity produced net of the losses due to just the production phase. The figure is calculated. |
| 3=4+5 | Total electricity produced, inclusive of the losses, by the Acea Produzione power plants. Includes thermoelectric and hydroelectric energy. The figure is measured with an uncertainty of less than ± 0.5% |
| 6=7+8+9 | Losses of electricity attributable to just the production phase of the Acea Produzione power plants. Includes: the self-consumption (thermal and hydro) and the losses of initial transformation. The figure is measured with an uncertainty of less than ± 0.5% |
| 10 | Electricity produced by the Acea Produzione power plants net of the losses. The figure is calculated. |
| 11 | Gross energy produced by photovoltaic installations. From 29.12.2015, the FV branch of Arse was merged into Acea Produzione, except for the installations called Parco della Mistica, transferred to ALL srl. For the 2016-2017 two-year period, the FV of Parco della Mistica is not reported because it is outside the perimeter. The figure is measured with an uncertainty of less than ± 0.5% |
| 12 | Total losses during photovoltaic generating phase, due in particular to joule effect (dissipation during heating) in the equipment. Estimated figure. |
| 13 | Net photovoltaic electricity made available by the generating installations. The figure is calculated. |
| 14=15+16 | Electricity produced by the Waste-to-Energy installations: waste-to-energy of San Vittore del Lazio and waste-to-energy of Terni of Acea Ambiente. We wish to specify that the fuel used in the two installations (CSS - secondary solid fuel - for San Vittore del Lazio and paper mill pulp for the Terni plant) is composed of both biodegradable organic material, therefore neutral on the balance of the $CO_2$, and by non-biodegradable organic substance (plastic, resins, etc.). In 2017, the renewable quota for San Vittore was equal to around 53%, the Terni quota was approx. 42%. |
| 17 | Self-consumption of the two waste-to-energy plants of San Vittore del Lazio and Terni + initial transformation losses at San Vittore. The figure is measured with an uncertainty of less than ± 0.5% |
| 18 | Electricity produced by the two waste-to-energy plants of San Vittore del Lazio and Terni, net of the self-consumption and initial transformation losses at San Vittore. The data for the three-year period cannot be compared because Line 1 of San Vittore only worked 12 months in 2017 (after revamping). The figure is calculated. |
| 19 | Electricity produced from biogas by the waste management plant of Orvieto (Acea Ambiente). The figure is calculated. |
| 20 | Self-consumption, including small dissipations. The figure is measured with an uncertainty of less than ± 5% |
| 21 | Net electricity produced from biogas and transferred to network. The figure is measured with an uncertainty of less than ± 5% |
| 22 | Thermal energy produced in the cogeneration plant of Tor di Valle including losses. The figure is measured with an uncertainty of ± 2% near the delivery piping of the generators. The thermal energy is produced by Galleri boilers and the cogeneration plant, composed of a gas turbine and a regenerative heated water generator supplied by hot discharge fumes of the gas turbine. |
| 23 | Losses of thermal energy of the district heating systems, due to: thermal dissipation, losses on the network, technical releases for maintenance operations, thermal reintegrations of the heat accumulation systems. The figure is calculated as the difference between the thermal energy produced and that actually supplied to the clients (invoiced). |
| 24 | Net thermal energy supplied to the final clients. The figure, calculated, is obtained from the consumption invoiced. |
| 25 | Electricity supplied to Acea Produzione to Acea Energy with inter-Group exchange. The figure is marginal as a result of the choice made by the Acea Group to sell the electricity produced by the generating companies on Borsa (Stock Exchange) or through bilateral agreements. |
| 26 | Net electricity acquired on the market by:<br>• Single Buyer of 2,620.4 GWh<br>• Import of 389.1 GWh<br>• Market of 7,823.3 GWh<br>The figure is measured with an uncertainty of ± 0.5% |
| 27 | Energy requested on the electrical distribution network of Rome and Formello by all the client connected (open market + managed). The figure is estimated. |
| 28 | Losses of electricity that occur during the distribution and transmission phase. They are attributable to: losses of transformation and transport, fraud and incorrect measurements. The figure is estimated. |
| 29 | Personal use of electricity for the implementation of the distribution activities. The figure is estimated. |
| 30 | Electricity transferred to third parties. These are exchanges of energy between distribution companies. The figure is measured with an uncertainty of ± 0.5% |

## PRODUCTS - ENERGY AREA

| Figure no. | Explanation - comment |
|---|---|
| 31 | Total net electricity conveyed to final clients of the open market connected to the electrical distribution network of Rome and Formello. Includes both the quota of electricity sold by Acea Energy, and that sold by other operators active on the open market. The figure is measured with an uncertainty of ± 5% according to Standard CEI 13-4. |
| 32 | Net electricity transferred to managed final clients.<br>The decrease is the result of the progressive passage of managed clients to the open market. In other words, it is a direct consequence of the deregulation process of the electricity market in effect in Italy since 1999 (Italian Legislative Decree no. 79/99). The figure is estimated based on the consumption invoiced. |
| 33 | Net electricity sold by Acea on the open market nationally in Italy. Includes the electricity sold in Rome and Formello (figure 28). The total sale on the open market and managed market is obtained by adding the figures (29) and (30). The figure is estimated. |
| 34 | Luminous flux supplied by the public lighting system in Rome. The figure, calculated, is the product of the number of lamps installed and the relative value of "rated" luminous flux. |
| 35 | Total number of measurements/controls performed in favour of the energy area.<br>The figure is calculated as the sum of the individual determinations carried out by the competent laboratories. |

## PRODUCTS - ENVIRONMENT AREA

| Figure no. | Explanation - comment |
|---|---|
| 36 | Total incoming waste. They are the quantities arriving at the Orvieto plant which include: unsorted urban solid waste, organic fraction, green, non-hazardous industrial waste. The figure is calculated. |
| 36 A | Waste partly sent for shredding only, partly just for aerobic treatment, partly both to the anaerobic digester and the aerobic treatment. The figure is calculated. |
| 37 | Waste disposed directly in landfill. The figure is measured with an uncertainty of ± 1 % |
| 38 | Waste recovered and not sent to landfill. It is glass, paper and cardboard, iron and plastic. In 2017, only iron was recovered. The figure is calculated. |
| 39 | Compost produced at the Orvieto plant. Passing only through the aerobic process to the combination, in 2016, of the anaerobic process with the aerobic one, an optimization of the product was achieved, now High Quality Compost. The figure is measured with an uncertainty of ± 1 % |
| 40 | Reduction due to stabilization. This represents the loss of mass due to the natural transformations of the material and the loss of water through evaporation. The figure is calculated. |
| 41 | Total incoming organic waste. They are the amounts arriving at the plants of Aprilia, Monterotondo Marittimo and Sabaudia, which include: sludge, green and organic fraction. The figure is calculated. |
| 42 | Incoming sludge. It is the quantity of sludge entering the composting plants of Aprilia (LT), Monterotondo Marittimo (GR) and Sabaudia (LT). The figure is measured with an uncertainty of ± 1 % |
| 43 | Incoming green. It is the quantity of green matter coming from the parks, woods or other areas arriving at the plants of Aprilia, Monterotondo Marittimo and Sabaudia. The figure is measured with an uncertainty of ± 1 % |
| 44 | Organic fraction of sorted collection (FORSU) entering the composting plant of Aprilia and FORSU and other agrifood waste arriving at the Monterotondo Marittimo plant. Starting in 2017, the types accepted at the Monterotondo plant increased. The figure is calculated. |
| 45 | High Quality Compost. It is the quantity of high quality compost produced at the Aprilia, Monterotondo Marittimo and Sabaudia plants. The data represents the quantities produced during the three-year period (not the amount sold). The production of compost is estimated based on the quantities transported daily to maturation. During that phase, process losses occur so that at the time of the sale the compost will be approx. 20-25% less. The figure is measured with an uncertainty of ± 1 % |
| 46 | Non-compostable material for disposal. It is the non-biodegradable material (for example plastics) which is separated from the compostable material sent for disposal. The figure is measured with an uncertainty of ± 1 % |
| 47 | Reduction due to stabilization. This represents the loss of mass due to the natural transformations of the material and the loss of water through evaporation. The figure is calculated. |
| 48 | Liquids entering the Sabaudia plant and sent to purification. The figure is calculated. |
| 49 | Total analytical determinations. They are the total of the analytical determinations performed at the following plants: Orvieto, Aprilia, Monterotondo Marittimo and Sabaudia. The figure is calculated. |

## PRODUCTS - WATER AREA

| Figure no. | Explanation - comment |
|---|---|
| 50 | Total drinking water collected from the environment or from other systems It is the sum of the water collected by the companies of the Group. Acea Ato 2 (Rome), Acea Ato 5 (Frosinone); Gori (Sarnese Vesuviano); Acque (Pisa); Publiacqua (Firenze); Acquedotto del Fiora (Grosseto); Umbra Acque (Umbria). The figure is calculated. |
| 51 | Total drinking water transported to the distribution networks of the companies listed at number 44, without the losses due to the supply phase at the sources. The figure is estimated. |
| 52 | Total drinking water supplied to the respective clients by the companies listed in number 44. The figure is estimated. |
| 53 | Total drinking water collected at the sources, without the high discharges, by the Acea Ato 2 company and released into the aqueduct system of the "historic" network of Rome and Fiumicino. It includes the water collected from Lake Bracciano, purified. The figure is measured with an uncertainty of ± 3%, except for the smaller sources - 2017, for which it is estimated. |
| 54 | Total drinking water transferred to Municipalities located along the route of the aqueducts. The 2017 figure is estimated and may undergo consolidation after publication. |
| 55 | Drinking water released into non-potable network. These are events that occur at the time of extraordinary maintenance or interventions which make the dedicated non-potable resource insufficient. The figure is estimated. |
| 56 | Drinking water returned to the environment / technical operating amounts with reference to the "historic" distribution network of Rome and Fiumicino. The figure is calculated. |
| 57 | Drinking water released (Quantity A09 of Ministerial Decree 99/07). This is the total drinking water transported to the "historic" distribution network of Rome and Fiumicino less the losses due to the supply phase at the sources. The figure is estimated. |
| 58 | Total drinking water supplied in the "historic" network of Rome and Fiumicino. The figure includes consumption due to the Acea Ato 2 users, the water fountains, the water houses, etc. |
| 59 | Total distribution losses - "historic" network of Rome and Fiumicino. It is the A17 size of Ministerial Decree no. 99/97 defined as the quantity of water lost during distribution:<br>A17 = A9-(A10+A11+A12), overall distribution losses where, for the data starting in 2016, the following applies:<br>• Quantity A9 of Ministerial Decree 99/97 - total volume of water released into network.<br>• Quantity A10 of Ministerial Decree 99/97 - measured amount of water delivered to the user.<br>• Quantity A12 of Ministerial Decree 99/97 - amount of water consumer, invoiced, but not measured;<br>• Quantity A12 of Ministerial Decree 99/97 - As per provisions of ARERA (formerly AEEGSI), the Item is identified with the "amount of the water consumed (authorised) not measured and not invoiced", estimated as 0.005*A10;<br>• Quantity A14 of Ministerial Decree 99/97 - amount of water apparently lost due to unauthorised consumption and therefore not invoiced (fraud), estimated by the ARERA as 0.002*A10;<br>• Quantity A16 of Ministerial Decree 99/97 - amount of water apparently lost due to measurement errors attributable to the meters installed on the utilities, estimated by the ARERA as 0.02*A10 (Resolution 1/2016) and since 2015 as 0.03*A10 (Resolution 5/2016).<br>The figure is estimated. |
| 60 | Actual distribution losses - amount defined by the ARERA as A09-A10-A11-A12-A14-A16. The figure is estimated. |
| 61 | Total non-potable water derived from the environment including losses. The figure is estimated. |
| 62 | Total non-potable water supplied to Rome and Fiumicino. The figure, calculated, corresponds to the total amount of water invoiced. |
| 63 | Total non-potable water supplied to Municipalities other than Rome and Fiumicino. It is a small estimated quantity. |
| 64 | Total drinking water collected at the sources, without the high discharges, by the Acea Ato 2 company and released into the aqueduct system of the Ambito Territoriale Ottimale 2 of Central Lazio ("historic" network of Rome and Fiumicino + Municipalities acquired). The figure is measured with an uncertainty of ± 3%, except for the smaller sources in 2017, for which it is estimated. |
| 65 | Total drinking water transferred to other aqueduct systems. The 2017 figure is estimated and may undergo consolidation after publication. |
| 66 | Drinking water released into non-potable network. These are events that occur at the time of extraordinary maintenance or interventions which make the dedicated non-potable resource insufficient. The figure is estimated. |
| 67 | Drinking water returned to the environment / technical operating amounts with reference to the Acea Ato 2 distribution network (Rome and Fiumicino + municipalities acquired at 31.12.17). The figure is calculated. |
| 68 | Total of the drinking water transported to the Acea Ato 2 distribution network (Rome and Fiumicino + municipalities acquired at 31.12.17). The figure is calculated. |
| 69 | Total drinking water supplied (in other words measured at the meters, where present) to the clients connects to the Acea Ato 2 network (Rome and Fiumicino + municipalities acquired at 31.12.17). The figure represents the estimated consumption due to the entire territory served. Since 2014, the amount supplied includes the "other aqueduct systems", as per provisions of the ARERA. |

## PRODUCTS - WATER AREA

| Figure no. | Explanation - comment |
|---|---|
| 70 | Total distribution losses - Acea Ato 2 (Rome and Fiumicino + municipalities acquired at 31.12.17) network. It is the A17 quantity of Ministerial Decree no. 99/97 defined as the quantity of water lost during distribution: See Item 53 for details. |
| 71 | Actual distribution losses - Acea Ato 2 (Rome and Fiumicino + municipalities acquired at 31.12.17) network. It is the sum of the quantities (A15+A13) of Ministerial Decree no. 99/97. See Item 54. |
| 72, 73, 74 | Respectively: quantity of water collected from the environment, released into the distribution network and supplied to their clients by Acea Ato 5 (Frosinone). |
| 75 | Overall distribution losses of Acea Ato 5 (Frosinone). It is the A17 quantity of Ministerial Decree no. 99/97 defined as the quantity of water lost during distribution: See Item 53 for details. |
| 76 | Actual distribution losses of Acea Ato 5 (Frosinone). It is the sum of the quantities (A15+A13) of Ministerial Decree no. 99/97. See Item 54 for details. |
| 77 | Total waste water treated in the principal treatment plants of the Group's water companies: Acea Ato 2, Acea Ato 5, Gori, Umbra Acque, Publiacqua, Acque, Acquedotto del Fiora. The figure is calculated. |
| 78 | Total waste water sent to the principal treatment plants of Acea Ato 2 and treated. The total figure is calculated. |
| 79 | Total waste water send to the treatment plants and treated by Acea Ato 2, including the quantities treated in the small plants of the municipalities of Rome and in those outside the municipalities of Rome. The total figure is calculated. |
| 80 | Total waste water sent to the treatment plants and treated by Acea Ato 5. The figure is calculated. |
| 81 | Number of analytical determinations conducted overall on the drinking water by the Acea Group. The figure includes the analyses performed by Acea Elabori and the analyses performed independently by the companies. The figure is calculated. |
| 82 | Number of analytical determinations conducted overall on the waste water by the Acea Group. The figure includes the analyses performed by Acea Elabori and the analyses performed independently by the companies. The figure is calculated. |

## RESOURCES USED - ENERGY AREA

| Item no. | Explanation - comment |
|---|---|
| 83 = 84 + 85 | Total quantity of natural gas used to generate the electricity and heat at the Acea Produzione plants and at the waste-to-energy plants of Acea Ambiente. The figures expressed in normal cubic metres (volume at 0°C and 1 Atm), is measured with an uncertainty of ± 0.5%. Estimated figure. |
| 86 | Total quantity of diesel used to generate electricity at the Montemartini power plant (turbogas) of Acea Produzione and for operations at the waste-to-energy plant of Terni. The consumption of the Montemartini power plant is significant during those years when the power plant produces more electricity in order to fulfil the normal scheduled periodic tests, and to conduct the inspection activities. The consumption pertaining to the waste-to-energy plant increased during 2016 due to the internalisation of the transport service of a sector of the plant. The figure is measured with an uncertainty of ± 2%. |
| 87 | Quantity of CSS (Secondary Solid Fuel from waste) sent to waste-to-energy in the San Vittore del Lazio plant. The figure is measured with an uncertainty of ± 1%. |
| 88 | Quantity of pulp send to waste-to-energy in the Terni plant. The figure is measured with an uncertainty of ± 1%. |
| 89 | Quantity of biogas used to produce electricity. The figure is measured with an uncertainty of ± 1%. |
| 90 | Total water derived from surface resources and aqueducts (as in the case of the hydroelectric power plant of Salisano) for the production of hydroelectric energy. The figure is calculated. |
| 91 | Total quantity of water used in the industrial processes. The various contributions are due to:<br>- reintegration of losses in the district heating network. It is aqueduct water;<br>- various uses in the waste-to-energy plants of San Vittore del Lazio and Terni.<br>It is aqueduct and well water.<br>The figure is calculated. |
| 92 | Quantity of aqueduct water used by the companies included in the energy area, for civilian/sanitary uses. It is consumption of the Acea Produzione and Areti companies of the waste-to-energy plants and 50% of the consumption of the Holding Company. The figure, calculated, refers to the consumption invoiced. |
| 93 | It represents the total quantity of dielectric mineral oil present in the primary and secondary cabins. Since 2014, the quantity of oil present in the Petersen coils installed in certain primary cabins is also included: approx. 225 tons in 256 Petersen systems. The data relative to the reintegratons is estimated. The total quantity of new dielectric mineral oil released into the production circuit (transformers, capacitors, storage deposits etc.) includes both the Areti and the Acea Produzione figure. The figure is estimated. |
| 94 | It represents the total quantity of gaseous insulation ($SF_6$) in the Areti plants. The figure is estimated. The figure referred to the reintegrations represents the total quantity of $SF_6$ released ex-novo into the production circuit during the year. The figure is estimated. |
| 95 | It represents the total quantity of cooling fluids in operation. The reintegrations represent the quantity of cooling fluids used for the maintenance of the air-conditioning equipment, during which the gas in operation is recovered and replaced with the new one. In 2017 the reintegrations were zero since certain sites were decommissioned. Both figures are calculated by attributing all the gas supplied overall by the parent company in equal parts (50%) to the energy area and the water area. The figure matches Item 116. |
| 96 | Total chemical substances used in the electrical and thermal generating process in the Acea Produzione power plants and the waste-to-energy plants of Acea Ambiente. Since 2014, the activated carbon consumed in the waste-to-energy plants has also been included. The figure is calculated. |
| 97 | Quantity of lubricating oils and fats used by Acea Produzione. The figure is measured with an uncertainty of ± 0.5%. |
| 98 | The figure matches Item 28. |
| 99 | Matches the difference between Items 1 and 2. |
| 100 | Electricity consumed by the processes not directly connected to the production phase (offices). The figure is calculated at 50% of the electricity consumed overall by the parent company. The remaining 50% is attributed as consumption to the water area. |
| 100B | Consumption of electricity at other sites and plants, including the consumption of the waste-to-energy plants (Terni and San Vittore). The figure is estimated. |
| 101 | Other uses of the electricity in the energy area. The figure is calculated. |
| 102 | Total electricity consumer by the product systems included in the energy area. The figure is calculated. |
| 103 | Total electricity consumed for public lighting in the municipality of Rome. The significant reduction in 2017 is the result of the replacement of tens of thousands of lamps with LED technology, starting at the end of 2016.<br>The figure is calculated based on the consistencies of the installations in operation during the year. |

## RESOURCES USED - ENVIRONMENT AREA

| Item no. | Explanation - comment |
|---|---|
| **ORVIETO PLANT** | |
| 104 | Quantity of water consumed at the Orvieto plant. It is specified that this resource comes partly from roofs (rainwater) and partly from the riverbed (river water). The figure is estimated. |
| 105 | Total chemical substances used at the Orvieto plant. The 2015 figure is discontinuous (decreasing) because of the revamping of the site which ended in November of that year. The figure is calculated. |
| 106 | Electricity consumed in the Orvieto plant. The figure is measured with an uncertainty of ± 1% |
| 107 | Total quantity of diesel consumed at the Orvieto plant. The figure is measured with an uncertainty of ± 2%. |
| 108 | Quantity of water used for civilian purposes in the plant region of Orvieto. It is supplied by tanker trucks since the plant is not connected to the aqueduct. The figure is estimated. |
| **PRODUCTION OF COMPOST** | |
| 109 | Quantity of water consumed at the Aprilia, Monterotondo Marittimo and Sabaudia plants. The figure is close to zero since almost all the water used at the Aprilia plant comes from recirculation, following purification with reverse osmosis technology. In 2017, consumption was not significant and approx. 455 cubic metres was used at the Sabaudia plant, while at the Monterotondo Marittimo plant approx. 2,500 cubic metres was consumed. The total water consumption not from recirculation was therefore negligible. |
| 110 | Total chemical substances used at the Aprilia, Monterotondo Marittimo and Sabaudia plants. The figure is calculated. |
| 111 | Electricity consumed at the Aprilia, Monterotondo Marittimo and Sabaudia plants. The lower 2015 figure is due to the shut-down of the Aprilia plant that year. The figure is measured with an uncertainty of ± 1% |
| 112 | Total quantity of fuel consumed at the Aprilia, Monterotondo Marittimo and Sabaudia plants. The figure is measured with an uncertainty of ± 2%. |

## RESOURCES USED - WATER AREA

| Item no. | Explanation - comment |
|---|---|
| 113 | The figure represents the sum of the consumption of reagents for the purification and disinfection of the water in the water companies: Acea Ato 2 and Acea Ato 5. In particular they are sodium hypochlorite - used as disinfectant at the request of the Health Authorities, aluminium polychloride, caustic soda and ozone. The figure is calculated. |
| 114 | Total quantity of chemical reagents used by the Acea Elabori company to carry out the official duties, namely the analytical checks for the companies of the Acea Group. The figure is measured. |
| 115 | Total volume of pure gases for analysis, used by the Acea Elabori company. The figure is measured. |
| 116 | It represents the total quantity of cooling fluids in operation. The reintegrations represent the quantity of cooling fluids used for the maintenance of the air-conditioning equipment, during which the gas in operation is recovered and replaced with the new one. Both figures are calculated by attributing all the gas supplied overall by the parent company in equal parts (50%) to the energy area and the water area. Item 116 matches Item 95. |
| 117 | Electricity used for the drinking water and non-potable water pumping stations. The increase in the figure since 2015 is due mainly to the increasingly dry climate conditions that have entailed in certain cases the recourse to back-up pumping stations. The figure is measured with an uncertainty of ± 1% |
| 118 | Electricity consumed by the processes not directly connected to the production phase (offices). The figure, the same as Item 100, is calculated at 50% of the electricity consumed overall by the parent company. |
| 119 | Electricity used by the Acea Elabori company. It includes all the energy relative to the various fields of activity Acea Elabori, not only the analytical laboratory activities. The figure is estimated. |
| 120 | Total energy consumed in the water area. The figure of the preceding year was modified for adjustments in measurements of the partial data. The figure is calculated. |
| 121 | Quantity of drinking water used by the companies: Acea Ato 2 and Acea Ato 5, for civilian/sanitary uses. The figure, calculated, refers to the consumption invoiced. |
| 122 | Quantity of water consumed for civilian/sanitary uses within facilities not directly tied to production phases (offices). The figure is calculated at 50% of the water consumed overall by the parent company. The estimating methodology changed in 2016. |
| 123 | It is the sum of the figures 114 and 115. The figure is calculated. |
| 124 | Total quantity of chemicals used in the purification process of the waste water. It is obtained from the sum of the consumption registered for the following substances: polyelectrolytes, hypochlorite of sodium, iron chloride, lime. The figure is calculated. |
| 125 | Total quantity of lubricating oil and fat used for the equipment of the water area (pumps, centrifuges, motors, etc.). The figure is calculated. |

## RESOURCES USED - WATER AREA

| Item no. | Explanation - comment |
|---|---|
| 126 | Electricity used to run the waste water purification plants and to operate the sewer network. The figure is measured with an uncertainty of ± 1% |
| 127 | Quantity of methane used in the dryers and generators. The figure is measured. |
| 128 | Quantity of biogas produced and consumed on site. The figure is measured. |

## FUELS USED BY THE GROUP (TRANSPORT AND HEATING)

| Item no. | Explanation - comment |
|---|---|
| 129 | Total quantity of petrol used for the vehicle fleet of the Acea Group. For the conversions from the unit of volume (litres) to that of mass (kg) a density value of 0.73 kg/l was used (source: Defra, conversion factors 2016). Starting in 2015, the older petrol vehicles have been decommissioned. |
| 130 | Total quantity of diesel used for the vehicle fleet of the Acea Group. For the conversions from the unit of volume (litres) to that of mass (kg) a density value of 0.84 kg/l was used (source: Defra, conversion factors 2016). In 2017, the figure includes the fuel consumed by the vehicles of the company included for the first time in this year's perimeter (Acea Ambiente and Aquader). The 2017 increase is also due to the increase in mixed-use vehicles assigned to Executives and Managers and the increase in the trips after the WFM went into operation. |
| 131 | Total quantity of diesel used for heating work areas and for the supply of the generators. Only the consumption of Acea Ato 2 and Acea Ato 5 is included for the 2015-2016 two-year period. The figure is measured with an uncertainty of ± 0.5%. |
| 132 | Total quantity of natural gas used for heating the work spaces. The perimeter includes: Acea, Areti; Acea Produzione (offices of Via Aeronautica), Acea Ato 2, Acea Ato 5, ARIA, Acea Elabori, Acea Energia. The figure is measured with an uncertainty of ± 0.5%. |
| 133 | Total quantity of LPG (Liquefied Petroleum Gas) used to heat the work spaces. For the conversions from the unit of volume (litres) to that of mass (kg) a density value of 0.550 kg/l was used. The figure is measured with an uncertainty of ± 0.5%. |

## EMISSIONS AND WASTE - ENERGY AREA

| Item no. | Explanation - comment |
|---|---|
| 134 | Total quantity of carbon dioxide released into the atmosphere as a result of generating thermoelectric energy from fossil fuels and from the waste-to-energy process of CSS and pulper. Includes the equivalent $CO_2$ estimated on the basis of the reintegrations of $SF_6$. The figure is calculated as the sum of Items 135, 136 and 137. The 2017 increase is due mainly to Line 1 going into operation (starting September 2016). Estimated figure. |
| 135 | Quantity of carbon dioxide released into the atmosphere by the Acea Produzione power plants. The figure is calculated in accordance with current legislation. |
| 136 | Quantity of equivalent $CO_2$ estimated based on the reintegrations of $SF_6$, considering that the 1 t of this gas has a heating power 22,800 times the $CO_2$. |
| 137 | Quantity of carbon dioxide released into the atmosphere by the Acea Ambiente waste-to-energy plants. Since 30.09.2016 Line 1 of San Vittore also went into operation, causing the increase in the emissions, in particular in 2017. The figure is calculated in accordance with current legislation. |
| 138 | Total quantity of nitrogen oxides ($NO + NO_2$) released into the atmosphere as a result of generating thermoelectric energy from fossil fuels and from the CSS and pulper waste-to-energy processes. Their presence in traces of the emissions is due to undesired secondary reactions which occur at high temperature between the nitrogen and the oxygen of the air. The figure is calculated. |
| 139 | Total quantity of nitrogen oxides ($NO + NO_2$) released into the atmosphere as a result of generating thermoelectric energy from fossil fuels in the Acea Produzione power plants. The figure is calculated. |
| 140 | Quantity of nitrogen oxides ($NO + NO_2$) released into the atmosphere by the Acea Ambiente waste-to-energy plants. The figure is calculated. |
| 141 | Total quantity of carbon oxide (CO) released into the atmosphere as a result of generating thermoelectric energy from fossil fuels and the waste-to-energy process. The existence of the pollutant in the emissions is due to incomplete fuel reaction and represents a symptom of deterioration in the performance of the combustion reaction. The figure is calculated. |
| 142 | Total quantity of carbon oxide (CO) released into the atmosphere as a result of generating thermoelectric energy from fossil fuels in the Acea Produzione power plants. The figure is calculated. |

## FUELS USED BY THE GROUP (TRANSPORT AND HEATING)

| Item no. | Explanation - comment |
|---|---|
| 143 | Quantity of carbon oxide (CO) released into the atmosphere by the Acea Ambiente waste-to-energy plants. The figure is calculated. |
| 144 | Total quantity of sulphur dioxide ($SO_2$) released into the atmosphere as a result of generating thermoelectric energy from fossil fuels and from the CSS and pulper waste-to-energy processes. The use of methane and diesel with low sulphur content in the power plants enables this type of emission to be contained. The figure is calculated. |
| 145 | Quantity of sulphur oxide ($SO_2$) released into the atmosphere as a result of generating thermoelectric energy from fossil fuels in the Acea Produzione power plants. The figure is calculated. |
| 146 | Quantity of sulphur dioxide ($SO_2$) released into the atmosphere by the Acea Ambiente waste-to-energy plants. The figure is calculated. |
| 147 | Total quantity of powders (microscopic particles with average aerodynamic diameter equal or less than 10 thousand of a millimetre) released into the atmosphere as a result of generating thermoelectric energy from fossil fuels and from the CSS and pulper waste-to-energy processes. Basically, it is amorphous unburned carbon, with traces of other compounds of various composition, obtained as sub-product of the combustion when it achieved completely. The figure is calculated. |
| 148 | Quantity of powders released into the atmosphere as a result of generating thermoelectric energy from fossil fuels in the Acea Produzione power plants. The figure is calculated. |
| 149 | Quantity of powders released into the atmosphere by the Acea Ambiente waste-to-energy plants. The figure is calculated. |
| 150 | Quantity of hydrochloric acid (HCl) released into the atmosphere by the Acea Ambiente waste-to-energy plants. The figure is calculated. |
| 151 | Quantity of hydrofluoric acid (HF) released into the atmosphere by the Acea Ambiente waste-to-energy plants. The figure is calculated. |
| 152 | Quantity of organic carbon (CO) released into the atmosphere by the Acea Ambiente waste-to-energy plants. The figure is calculated. |
| 153 | Total quantity of waste water, treated, resulting from the thermoelectric energy production activities. The figure is measured with an uncertainty of ± 2%. |
| 154 | Total quantity of hazardous waste (pursuant to Italian Legislative Decree no. 152/06) disposed by the companies of the Acea Group excluding the waste-to-energy area. The figure is measured with an uncertainty of ± 2% |
| 155 | Hazardous waste (Italian Legislative Decree no. 152/06) disposed by the waste-to-energy area. It is essentially light ashes and slag resulting from the incineration processes. The figure is measured with an uncertainty of ± 2% |
| 156 | Total quantity of non-hazardous waste (Italian Legislative Decree no. 152/06) disposed by the companies of the Acea Group excluding the waste-to-energy area.<br>The figure is measured with an uncertainty of ± 2% |
| 157 | Non-hazardous waste (Italian Legislative Decree no. 152/06) disposed by the waste-to-energy area. It is essentially heavy ashes and slag resulting from the incineration processes. The increase in the 2017 figure is attributable to the different classification of the water disposed (as non-hazardous waste in 2017 and as hazardous waste in 2016) at San Vittore del Lazio. The figure is measured with an uncertainty of ± 2% |

## EMISSIONS AND WASTE - ENVIRONMENT AREA

| Item no. | Explanation - comment |
|---|---|
| 158 | Hazardous waste (Italian Legislative Decree no. 152/06) disposed by the Aprilia, Monterotondo Marittimo and Sabaudia plants. The figure is calculated. |
| 159 | Non-hazardous waste (Italian Legislative Decree no. 152/06) disposed by the Aprilia, Monterotondo Marittimo and Sabaudia plants. The figure is calculated. |
| 160 | Hazardous waste (Italian Legislative Decree no. 152/06) disposed by the Orvieto plant. The figure is measured with an uncertainty of ± 2% |
| 161 | Non-hazardous waste (Italian Legislative Decree no. 152/06) disposed by the Orvieto plant. The figure is measured with an uncertainty of ± 2% |
| 161 B | Emissions of $CO_2$ of the Orvieto plant resulting from combustion on site and by the fuels for OTMs not included in the motor pool data. Estimated figure. |
| 162, 163, 164, 165 | They are powders, Total Organic Compounds (COT), ammonia and volatile inorganic substances (SIV) issued at the Aprilia plant. The presence of the "≤" symbol identifies values of concentration equal or lower than the limits detectable by the instruments used in the laboratory, therefore it indicates only an upper limit. The 2017 value of the ammonia refers to the October audit. The data is calculated starting from the measurement of the concentrations. |

## EMISSIONS AND WASTE - WATER AREA

| Item no. | Explanation - comment |
|---|---|
| 166 | Total quantity of purification sludge disposed by the Acea Ato 2 and Acea Ato 5 companies. They are non-hazardous waste. The figure is measured with an uncertainty of ± 2% |
| 167 | Total quantity of purification sludge disposed by the Acea Ato 2 company. The figure that dropped sharply in 2017 results mainly from the Rome East treatment plants where an anaerobic digester and a dryer are in operation. The figure is measured with an uncertainty of ± 2% |
| 168 | Total quantity of purification sludge disposed by the Acea Ato 5 company. The figure is measured with an uncertainty of ± 2% |
| 169 | Total quantity of sand and slabs disposed by the Acea Ato 2 and Acea Ato 5 companies. The figure is measured with an uncertainty of ± 2% |
| 170 | Total quantity of sand and slabs disposed by the Acea Ato 2 company. The 2015 figure includes 16,932 tons of sand and slabs removed in the Rome South plant, as a result of extraordinary cleaning of the oxidation compartment. The 2017 figure increased compared to 2016 for maintenance activity on the treatment plant of Rome East. The figure is measured with an uncertainty of ± 2% |
| 171 | Total quantity of sand and slabs disposed by the Acea Ato 5 company. The figure is measured with an uncertainty of ± 2% |
| 172 | Total quantity of hazardous waste (Italian Legislative Decree no. 152/06) disposed by Acea Ato 2, Acea Elabori and Acea Ato 5, to which was added an amount produced by the Parent Company and attributed in equal parts to the two Areas: Energy and Water. The figure is calculated. |
| 173 | Total quantity of hazardous waste (pursuant to Italian Legislative Decree no. 152/06) disposed by Acea Ato 2 and Acea Elabori. The figure is measured with an uncertainty of ± 2% |
| 174 | Total quantity of hazardous waste (pursuant to Italian Legislative Decree no. 152/06) disposed by Acea Ato 5. The figure is measured with an uncertainty of ± 2% |
| 175 | Proportion of hazardous waste (pursuant to Italian Legislative Decree no. 152/06) disposed by the parent company and attributed to the Water Area. The same proportion was attributed to the Energy Area. The much larger quantity produced in 2017 depends on the closing during that year of the Valleranello site, one of the Acea historical logistical sites, with the resulting disposal of many different materials, some hazardous. |
| 176 | Total quantity of non-hazardous waste (Italian Legislative Decree no. 152/06) disposed by Acea Ato 2, Acea Elabori and Acea Ato 5, to which was added an amount produced by the Parent Company and attributed in equal parts to the two main areas of business: energy and water. The figure is calculated. |
| 177 | Total quantity of non-hazardous waste (pursuant to Italian Legislative Decree no. 152/06) disposed by Acea Ato 2 and Acea Elabori. The figure is calculated. |
| 178 | Total quantity of non-hazardous waste (pursuant to Italian Legislative Decree no. 152/06) disposed by Acea Ato 5. The figure is estimated. |
| 179 | Proportion of non-hazardous waste (pursuant to Italian Legislative Decree no. 152/06) disposed by the Parent Company and attributed to the Water Area. The same proportion was attributed to the Energy Area. The much larger quantity produced in 2017 depends on the closing during that year of the Valleranello site, one of the Acea historical logistical sites, with the resulting disposal of many different materials, also non-hazardous. |

## $CO_2$ EMISSION FROM TRANSPORT AND HEATING

| Item no. | Explanation - comment |
|---|---|
| 180 | Total quantity of carbon dioxide issued by the motor pool of the Acea Group. For the entire three-year period, it was calculated using the consumption of fuel and the emission coefficients (ISPRA 2015). The increase in 2017 depends first of all on both the WFM model which is now operational and determined an increase in the operating capacity against a larger number of vehicles on the road at the same time, and on the new companies included in this year's parameter (Acea Ambient and Aquaser). |
| 181 | Total quantity of carbon dioxide emitted by the systems used to air-condition the work spaces. The 2015 figure is calculated using the consumption of fuel and the emission coefficients (ISPRA 2015). |