cd rom attached to 2004 Sustainability Report

Environmental Accounts
Company fact sheets: Italy – Abroad
Glossary

2004 Sustainibility Report

Corporate Identity
Vision and strategy
Group profile
Corporate governance and management systems
Stakeholders

Economic Section
Economic responsibility
Creation of Added Value
Distribution of Added Value
GRI economic performance indicators

Social Section
Social responsibility
Customers and the Community
Suppliers
Human resources
Shareholders and financial backers
Institutions and the Company
GRI social performance indicators

Environmental Section
Environmental responsibility
Community
Customers
Suppliers
Human resources
Institutions and the Company
GRI environmental performance indicators

on the attached cd:
Environmental Accounts
Company fact sheets: Italy – Abroad
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Environmental Accounts

The *Environmental Accounts*, which have been attached in cd rom format to the *Sustainability Report* this year, are an important internal management instrument, since they provide the corporate management divisions with general information for checking the interaction between the Company and the environment; they also represent one of the documents intended for the most complete external communication of the Group's environmental performances.

PRODUCT SYSTEMS

Energy Area

- Energy generation (thermoelectric + hydroelectric)
- Transmission and distribution of electricity
- Production and distribution of heat
- Public lighting
- Valleranello Laboratory[1]

Water-Environmental Area

- Drinking water supply
- Non-drinking water supply
- Water distribution
- Waste water transportation/treatment
- Analysis and research laboratory

The method adopted for the drawing up of the Accounts, consistent with that used in the last four years, facilitates the comparison of the data and aids the comprehension of the trends.

A Group vision of the environmental problems has been maintained, seeking to aggregate the relevant data in accordance with the approach known as *Life Cycle Assessment* (ISO 14040 standard), which proposes the presentation of the results by "product systems".

With regards to the quality of the data presented, particularly if gauged, estimated or calculated, additional information is provided in the *Explanatory Notes*, page 22, where the main items of the *Environmental Accounts* (indicated in the text by a number in brackets) are accompanied by a concise explanatory description.

The document contains the environmental inventory data regarding the activities of the spun-off companies, as defined in dossier I, *Corporate Identity*, page 5.

The figures, relating to the years 2002, 2003 and 2004, have been grouped together in three similar categories:

- the product supplied
- the resources used
- the waste produced

together with the performance indicators – the main indicators of environmental performance - which close the reporting sessions relating to each area.

As far as waste is concerned, divided up into the categories "hazardous" and "non-hazardous", the figures presented refer to the two areas, energy and water-environmental, with the waste produced by the Holding Company equally attributed to both.

[1] In October 2004, the responsibilities of the Valleranello Laboratory were merged within the company LaboratoRI SpA.

The products

Energy Area

ELECTRICITY	u.m.	2002	2003	2004	%2004-2003
Generation					
Total gross electricity produced (1) = (1 A + 1 B)	**GWh**	**1,318.97**	**1,159.21**	**1,184.75**	**2.2**
Total gross hydroelectric energy (1 A)	GWh	356.10	433.53	484.31	11.7
A. Volta Castel Madama	GWh	8.72	18.21	32.40	77.9
G. Ferraris Mandela	GWh	6.38	9.95	18.93	90.3
G. Marconi Orte	GWh	43.26	43.26	65.68	51.8
Sant'Angelo	GWh	117.72	179.68	192.37	7.1
Salisano	GWh	176.94	179.22	171.90	-4.1
Other minor plants	GWh	3.08	3.21	3.04	-5.3
Total gross thermoelectric energy (1 B)	GWh	962.87	725.68	700.44	-3.5
from gas oil					
Montemartini plant	GWh	57.14	43.79	34.73	-20.7
from natural gas	GWh	905.73	681.89	665.70	-2.4
Tor di Valle combined cycle plant	GWh	856.32	615.38	607.97	-1.2
Tor di Valle co-generation plant	GWh	49.41	66.51	57.73	-13.2
Energy consumed for production (2) = (2 A + 2 B + 2 C)	GWh	22.47	20.08	37.20	
		1.7% of (1)	1.7% of (1)	3.1% of (1)	85.2
Internal consumption (2 A + 2 B)	GWh	18.09	16.23	16.13	-0.6
Hydroelectric (2 A)	GWh	2.10	2.54	2.30	-9.5
Thermoelectric (2 B)	GWh	15.99	13.69	13.83	1.0
Initial transformation (2 C)	GWh	4.38	3.85	21.07	447.3
Total net electricity produced (3 A) = (1 - 2)	**GWh**	**1,296.53**	**1,139.13**	**1,147.55**	**0.7**
Transport and sale					
Supply from Acea Group (3) = (3 A - 3 B)	GWh		1,122.46	385.69	-65.6
Electricity sold by Acea Group to third parties (3 B)	GWh		16.67	761.86	4.470.2
Supply from other wholesalers (4) = (4 A + 4 B)	GWh	8,919.07	9,702.01	10,420.17	7.4
From Enel Distribuzione (Sole Purchaser) (4 A)	GWh		9,297.18	10,008.70	7.7
From imports (4 B)	GWh		404.83	411.47	1.6
Electricity requested on the network (5) = (3 + 4)	**GWh**	**10,215.6**	**10,824.47**	**10,805.86**	**-0.2**
Distribution and transport losses (6) = 5 - (7 + 8 + 9)	GWh	837.20	865.95	674.8	-22.1
		8.2% of (5)	8.0% of (5)	6.2% of (5)	
Net electricity sold to third parties (7)	GWh	0.67	1.80	2.04	13.3
Net electricity conveyed by Acea for eligible customers (8)	**GWh**	**1,292.22**	**1,951.28**	**2,397.54**	**22.9**
Net electricity sold to restricted customers (9)	**GWh**	**8,085.50**	**8,005.44**	**7,731.48**	**-3.4**

The products

Energy Area

THERMAL ENERGY	u.m.	2002	2003	2004	%2004-2003
Thermal energy produced by the Acea Group (10)	**GWh_t**	**51.72**	**60.40**	**65.22**	**8.0**
Production and distribution losses (11) = (10 - 12)	GWh_t	4.72 9.1% of (10)	9.12 15.1% of (10)	10.46 16.0% of (10)	14.7
Transport losses	GWh_t	n.a.	3.44	8.37	143.3
Production losses	GWh_t	n.a.	5.68	2.09	-63.2
Net thermal energy sold (12)	**GWh_t**	**47.0**	**51.28**	**54.76**	**6.8**

PUBLIC LIGHTING	u.m.	2002	2003	2004	%2004-2003
Lighting flux (13)	**Mlumen**	**2,012**	**2,076**	**2,172**	**4.6**
Lighting flux (13 A) (*)	**Mlumen**			**858**	**-**

MONITORING AND GAUGING	u.m.	2002	2003	2004	%2004-2003
Valleranello laboratory monitoring and gauging activities (14) (**)	**no.**	**208**	**679**	**873**	**28.6**
Gauging of electro-magnetic field	no.	39	25	6	-76
Noise monitoring	no.	33	20	12	-40
Chemical analysis of asbestos	no.	0	4	1	-75
Chemical analysis of PCB	no.	77	533	499	-6.4
Waste classification	no.	59	97	355	266

(*) Municipality of Naples: management activities were started on 1 January 2004.

(**) In October 2004, the responsibilities of the Valleranello Laboratory were partly merged within the company LaboratoRI SpA, and partly within Acea Distribuzione SpA.

The products

Water–Environmental Area

DRINKING WATER IN THE MUNICIPALITY OF ROME AND OTHER MUNICIPAL AREAS	u.m.	2002	2003	2004	%2004-2003
Drinking water withdrawn from the environment					
for the Rome aqueduct system (15)	**Mm³**	**562.6**	**563.7**	**568.9**	**0.9**
from lake Bracciano. treated	Mm³	20.3	7.9	0.5	-93.7
from wells	Mm³	22.8	22.1	14.7	-33.5
from springs	Mm³	519.5	533.7	553.7	3.7
Drinking water withdrawn from the environment					
forr other aqueduct system (15 A)	**Mm³**		**46.6**	**38.3**	**-17.8**
Drinking water sold to municipal retailers (16)	**Mm³**	**51.3**	**72.7**	**70.6**	**-2.9**
Drinking water introduced onto the non-drinking network (19)	**Mm³**	**19.3**	**19.8**	**20.0**	**1.0**
Water losses before distribution					
(17) = (15 + 15 A) - (16 + 18 + 19)	Mm³	9.3	37.8	39.1	3.4
Drinking water introduced onto the Rome network (18)	**Mm³**	**482.7**	**480.0**	**477.5**	**-0.5**
Drinking water supplied on the Rome network (20)	**Mm³**	**315.3**	**313.8**	**312.0**	**-0.6**
Technical and commercial losses (21) = (18 - 20)	Mm³	167.4	166.2	165.50	-0.4
Assessment of the losses in accordance with Italian Ministerial Decree No. 99/97					
(22 A) = Overall losses (*parameter* A 17 - MD 99/97)	Mm³	155.43	154.29	153.66	-0.4
(22 B) = Effective losses (*parameter* A 15 - MD 99/97)	Mm³	117.75	116.78	116.34	-0.4
Total drinking water supplied to Rome					
and in other municipalities (23) = (16 + 20)	**Mm³**	**366.6**	**386.5**	**382.6**	**-1.0**

The products

Water–Environmental Area

NON-DRINKING WATER	u.m.	2002	2003	2004	%2004-2003
Offtake non-drinking water (24)	**Mm³**	**7.8**	**4.9**	**4.8**	**-2.0**
Drinking water introduced into the non-drinking water network (25) = (19)	**Mm³**	**19.3**	**19.8**	**20.0**	**1.0**
Technical and commercial losses (26) = (24 + 25) - (27 + 28)	Mm³	14.59 54% of total	12.19 49% of total	12.25 49.5% of total	0.5
Non-drinking water supplied to the Municipality of Rome (27)	**Mm³**	**12.5**	**12.5**	**12.5**	**-**
Non-drinking water supplied to other municipalities (28)	**Mm³**	**0.01**	**0.01**	**0.01**	**-**

WASTE WATER TREATED	u.m.	2002	2003	2004	%2004-2003
Waste water treated in the purification plants (29)	**Mm³**	**447.1**	**454.8**	**459.1**	**0.9**
Rome South	Mm³	262.7	259.0	255.1	-1.5
Rome North	Mm³	82.3	84.2	86.0	2.1
Rome East	Mm³	78.6	87.3	91.6	4.9
Rome Ostia	Mm³	16.1	16.9	18.2	7.7
COBIS	Mm³	4.2	4.1	4.9	19.5
Fregene	Mm³	3.2	3.3	3.3	-
Other (29 A) (*)	Mm³		45.2	67.0	48.2

LABORATORI SPA ANALYTICAL CONTROLS CARRIED OUT FOR THE ACEA GROUP	u.m.	2002	2003	2004	%2004-2003
Analytical control activities (30)	**no.**	**265,813**	**251,213**	**265,813**	**5.8**
Drinking water controls (30 A)	no.	214,666	196,884	261,387	32.8
Waste water controls (30 B)	no.	25,732	28,287	28,158	-0.5
Surface water controls (30 C)	no.	25,415	26,042	31,871	22.4

(*) (29 A): Item not included in item (29), in order to permit a comparison with previous years.

The resources used

Energy Area

PRODUCTION, TRANSMISSION AND DISTRIBUTION OF ELECTRICITY	u.m.	2002	2003	2004	%2004-2003
Natural resources					
Natural gas for thermoelectric generation (31)	**Mlns of Nm³**	**193.497**	**150.525**	**145.548**	**-3.3**
Tor di Valle co-generation natural gas	Mlns of Nm³	19.772	25.373	21.593	-14.9
Tor di Valle combined cycle natural gas	Mlns of Nm³	173.725	125.151	123.955	-1.0
Gas oil for thermoelectric generation (32)	**Mlns of litres**	**20.826**	**16.258**	**13.114**	**-19.3**
Tor di Valle gas oil	Mlns of litres	0.000	0.000	0.000	0
Montemartini gas oil	Mlns of litres	20.826	16.258	13.114	-19.3
Offtake water for hydroelectric production (33)	**Mm³**	**2,391.00**	**2,829.00**	**3,849.00**	**36.1**
Offtake water for cooling the Tor di Valle combined cycle (34) = (75)	**Mm³**	**52.60**	**43.24**	**46.40**	**7.3**
Offtake aqueduct water for replenishing Tor di Valle combined cycle (35)	Mm³	0.0272	0.0227	0.0285	25.6
Water for civil/sanitary uses (36)	Mm³	n.a.	0.1418	0.1380	-2.7
Water consumed in the offices (50% of the drinking water consumed by the Parent Company (37)	Mm³	n.a.	0.4076	0.3470	-14.9
Total drinking water consumed (38) = (35 + 36 + 37)	**Mm³**	**n.a.**	**0.5721**	**0.5135**	**-10.2**
Sundry materials					
Dielectric and lubricant oil (39)	**t**	**110.80**	**168.73**	**33.00**	**-80.4**
SF_6 (40)	**t**	**0.60**	**0.30**	**0.32**	**6.7**
Electricity					
Electricity consumed for electricity distribution/transmission (41) = (6)	GWh	837.2	866.0	674.80	-22.1
Electricity consumed for electricity generation (42) = (2)	GWh	22.5	20.1	37.20	85.1
Electricity consumed for offices (50% of the electricity consumed by the Parent Company) (43)	GWh	5.2	6.6	6.60	0.0
Total electricity consumed (44) = (41 + 42 + 43)	**GWh**	**864.9**	**892.7**	**718.60**	**-19.5**

The resources used

Energy Area

PRODUCTION, TRANSMISSION AND DISTRIBUTION OF ELECTRICITY	u.m.	2002	2003	2004	%2004-2003
Production and distribution of thermal energy					
Natural gas for district heating (45) (*)	**Mlns of Nm^3**	**0.771**	**0.095**	**1.555**	**1,536.8**
Thermal energy (46)	**GWh_t**	**156.274**	**206.357**	**183.592**	**-11.0**
Aqueduct water for district heating replenishments (47)	**Mm^3**	**0.0325**	**0.0400**	**0.0483**	**20.8**
Sundry materials					
Acidity corrector	kg	0	15	0	-100
Deoxygenating substances	kg	2,681	790	1,100	39.2
Stabilizers and biodispersing agents	kg	15,580	12,400	15,000	21.0
Sodium chloride	kg	45,925	47,400	47,500	0.2
Caustic soda	kg	59,200	46,250	51,000	10.3
Sodium hypochlorite	kg	288,500	181,900	229,000	25.9
Hydrochloric acid	kg	63,300	48,800	70,850	45.2

PUBLIC LIGHTING	u.m.	2002	2003	2004	%2004-2003
Electricity					
Electricity consumed for public lighting (48)	**GWh**	**147.2**	**156.1**	**158.50**	**1.5**
Wattage installed (48 A)	MW	32.3	32.20	32.80	1.9

(*) Included in the value indicated for Item No. 31, representing just the consumption due to reserve boilers. These, up until 2003, were only started up in exceptional circumstances when use of the regeneration boiler (co-generation) was not possible. During 2004, such use was modified in order to optimize the handling of the district heating service with the requirements deriving from the electricity exchange market which led, during certain periods of the year, to the advantage of resorting to heat production using traditional systems rather than via co-generation.

The resources used

Water–Environmental Area

COLLECTION, TRANSPORTATION AND DISTRIBUTION OF DRINKING AND NON-DRINKING WATER	u.m.	2002	2003	2004	%2004-2003
Sundry materials and natural resources					
Reagents for purification and disinfection (49)	**t**	**920.30**	**1,053.80**	**912.15**	**-13.4**
Reagents for chemical analysis (50)	**t**	**1.00**	**1.50**	**1.10**	**-26.7**
Gas for chemical analysis (51)	**Mlns of Nm³**	**1.92**	**2.76**	**2.22**	**-19.6**
Electricity					
Electricity for non-drinking water pumping plants (52) (*)	GWh	0.26	0.26	0.26	--
Electricity for drinking water pumping plants (53) (*)	GWh	24.67	34.60	30.90	-10.7
Electricity for offices (50% of energy consumed by the Parent Company (54) = (43)	GWh	5.17	6.60	6.60	--
Electricity for chemical laboratory (55)	GWh	0.72	0.62	0.98	59.0
Total electricity consumed (56) = (52 + 53 + 54 + 55)	**GWh**	**30.82**	**42.08**	**38.74**	**-7.9**
Drinking water					
Water for civil/sanitary use (57)	Mm³	n.a.	1.03	1.05	1.9
Water consumed in the offices (50% of drinking water consumed by the Parent Company) (58) = (37)	Mm³	n.a.	0.41	0.35	-14.6
Total drinking water consumed (59) = (57 + 58)	**Mm³**	**n.a.**	**1.44**	**1.40**	**-2.8**

WASTE WATER TREATMENT	u.m.	2002	2003	2004	%2004-2003
Materials and natural resources					
Reagents for waste water treatment (60)	**t**	**7,076**	**6,000**	**6,070**	**1.2**
Polyelectrolytes for dehydration of sludge	t	877	789	836	6.0
Emulsion	t	766	660	709	7.4
Powder	t	111	129	127	-1.6
Sodium hypochlorite for final disinfection	t	2,664	3,446	3,520	2.1
Ferric chloride for dehydration of sludge	t	2,586	1,693	1,714	1.2
Lime	t	949	72	0	-100.0
Mineral oil and grease (61)	**t**	**36.8**	**56.23**	**73.70**	**31.1**
Electricity					
Electricity used in treatment plants (62)	**GWh**	**120.0**	**120.0**	**108.0**	**-10.0**

(*) Figures referring to Rome.

Fuels used by the Group for automotive and heating purposes

FUEL TYPE	u.m.	2002	2003	2004	%2004-2003
Automotive (*)					
Petrol (63)	Mlns of litres	0.0000	0.0000	0.0000	-
Unleaded petrol (64)	Mlns of litres	0.7078	1.6516	0.9193	-44.3
Gas oil (65)	Mlns of litres	0.7960	0.5690	0.6527	14.7
Heating					
Gas oil (diesel) (66)	Mlns of litres	0.0190	0.0298	0.0166	-44.3
Natural gas (67)	Mlns of Nm^3	0.8164	0.8712	0.7031	-19.3
LPG (68)	Mlns of litres	0.0692	0.0771	0.0629	-18.4

(*) For 2003, when calculating the quantities of fuel used by the Group companies, use was made of an approximation in order to estimate the consumption of around 500 vehicles used by Acea Distribuzione SpA, acquired as a result of the merger with the former division of Enel Distribuzione SpA.

Emissions, spills and waste

Energy Area

AIR EMISSIONS	u.m.	2002	2003	2004	%2004-2003
CO_2 (69)	Mlns of Nm^3	289.408	237.390	172.30	-27.4 (*)
	(t)	(568,484)	(466,295)	(338,438)	-27.4
NO_x (70)	t	624.0	586.8	550.8	-6.1
CO (71)	t	80.6	35.7	33.4	-6.4
SO_2 (72)	t	2.1	1.4	0.5	-64.3

OTHER SPILLS AND WASTE	u.m.	2002	2003	2004	%2004-2003
Treated waste water (73)	Mm^3	0.035	0.034	0.033	-3.0
Screened sludge and other (74)	t	181.5	206.0	388.0	88.3
Cooling water returned (75) = (34)	Mm^3	52.6	43.24	46.40	7.3
50 Hz electric field (76)	kV				Monitored
					Commitment to keep within the legal limits
50 Hz magnetic fields (77)	µT				Monitored
					Commitment to keep within the legal limits
Noise (78)	dB				Monitored
					Commitment to keep within the legal limits
Dispersed light flux (79)	Mlumen				Commitment to design the plants in order to limit to the maximum the percentage of emissions dispersed towards the sky

WASTE (AS PER ITALIAN LEG. DECREE NO. 22/97)	u.m.	2002	2003	2004	%2004-2003
Hazardous waste (80) = (80 A + 80 B)	t	494.3	848.7	582.8	-31.3
Own production energy sector (80 A)	t	491.1	844.2	578.6	-31.5
Portion for the activities carried out by the Parent Company (80 B) (**)	t	3.2	4.5	4.3	-4.4
Non-hazardous waste (81) = (81 A + 81 B)	t	2,094.5	882.3	808.3	-8.4
Own production energy sector (81 A)	t	2,009.5	803.3	688.4	-14.3
Portion for the activities carried out by the Parent Company (81 B) (**)	t	85.0	79.0	119.9	51.8

(*) The considerable reduction in the period 2003-2004 is the result of a different approach to the calculation of the emissions, introduced by the European Union by means of the Decision of the Commission dated 29 January 2004, which establishes the Guidelines for the monitoring and communication of the greenhouse effect gases, in accordance with Directive 2003/87/CE of the European Parliament and Council.

(**) 50% of the waste produced by the Parent Company.

Emissions, spills and waste

Water-Environmental Area

SPECIAL WASTE FROM WASTE WATER TREATMENT	u.m.	2002	2003	2004	%2004-2003
Sludge from treatment (82)	**t**	**125,180**	**114,028**	**132,106**	**15.9**
Sand and sediment from treatment (83)	**t**	**6,750**	**9,211**	**23,862**	**159.1**

OTHER SPILLS AND WASTE	u.m.	
Noise (84)	**dB**	**Monitored**
		Commitment to keep within the legal limits
Smells (85)		**Monitored**
		Commitment to keep within the limit of perception
		in areas adjacent to treatment plants

WASTE (AS PER ITALIAN LEG. DECREE NO. 22/97) (*)	u.m.	2002	2003	2004	%2004-2003
Hazardous waste (86) = (86 A + 86 B)	**t**	**14.6**	**41.8**	**66.2**	**58.4**
Production in water sector (86 A)	t	11.4	37.3	61.9	66.0
Portion for the activities carried out by the Parent Company (86 B) (*)	t	3.2	4.5	4.3	-4.4
Non-hazardous waste (87) = (87 A + 87 B + 87 C)	**t**	**449.2**	**360.3**	**5,406.9**	**not applicable**
Production in water sector (87 A)	t	364.2	281.4	120.0	-57.4
Portion for the activities carried out by the Parent Company (87 B) (*)	t	85.0	78.9	119.9	52.0
Inert material (87 C) (**)	t	n.a.	n.a.	5.167	-

(*) 50% of the waste produced by the Parent Company.

(**) Figure included for the first time for the *2004 Sustainability Report*.

Automotive and heating emissions

GROUP COMPANIES	u.m.	2002	2003	2004	%2004-2003
Automotive (*)					
CO_2 (88)	Mlns of Nm^3	4.908	2.764	2.137	-22.7
	(t)	(9,640)	(5,429)	(4,198)	
NO_x (89)	t	15.5	9.5	6.6	-30.5
CO (90)	t	325.8	134.5	93.6	-30.4
SO_2 (91)	t	n.a.	n.a.	n.a.	-

HEATING (**)	u.m.	2002	2003	2004	%2004-2003
CO_2 (88 A)	Mlns of Nm^3	1.117	1.197	0.961	-19.7
	(t)	(2,195)	(2,352)	(1,888)	

(*) 2004 figures: From the consumption of fuels expressed in tep, calculating the CO_2 corresponding to three times this consumption. For the other emissions: in 2004, since it was not possible to apply the COPERT, they have been estimated starting off from the consumption in tep and from the 2003 figures relating to NO_x and CO.

(**) From the consumption of fuels expressed in tep, calculating the CO_2 corresponding to three times this consumption.

The environmental sustainability performances

Key environmental performance indicators

INDICATOR	u.m.	2002	2003	2004
ENERGY				
Energy directly utilized in processes:				
A - Electricity distribution/transmission (datum 61)	TJoules	3,013.6	3,117.4	2,428.3
	(GWh)	(837.2)	(865.9)	(674.8)
B - Electricity production (datum 2)	TJoules	80.9	72.3	133.9
	(GWh)	(22.5)	(20.1)	(37.2)
C - Heat loss on district heating network (datum 11)	TJoules	17.0	32.8	37.8
	(GWh)	(4.7)	(9.1)	(10.5)
D - Public lighting (datum 48)	TJoules	529.9	561.8	570.6
	(GWh)	(147.2)	(156.1)	(158.5)
E - Water distribution (datum 56 - 54)	TJoules	110.9	127.8	115.7
	(GWh)	(30.8)	(35.5)	(32.1)
F - Water treatment (datum 62)	TJoules	432.0	432.0	388.8
	(GWh)	(120.0)	(120.0)	(108.1)
G - Services (datum 43 + 54 + 66 + 67 + 68) (*)	TJoules	68.4	80.3	74.7
	(GWh)	(19.0)	(22.3)	(20.7)
H - Motor vehicles (datum 63 + 64 + 65)	TJoules	88.0	73.2	52.5
	(GWh)	(24.4)	(20.3)	(14.6)
Total own consumption	**TJoules**	**4,340.7**	**4,521.3**	**3,803.2**
	(GWh)	**(1,205.6)**	**(1,255.9)**	**(1,056.4)**
I - Energy losses when converting	TJoules	3,989.0	3,312.0	3,116.0
from primary sources to electricity	(GWh)	(1,108.0)	(920.0)	(865.6)
Total direct energy uses (sum of A : I)	**TJoules**	**8,329.7**	**7,997.5**	**6,919.2**
	(GWh)	**(2,313.8)**	**(2,221.5)**	**(1,922.0)**

(*) The transformation from units of volume to units of energy was made using the formulas illustrated on page 20 for the calculations 1 and 2.

The environmental sustainability performances

Key environmental performance indicators

INDICATOR	u.m.	2002	2003	2004
EMISSIONS, EFFLUENT AND WASTE				
Greenhouse gas emissions				
CO_2 (datum 69 + 88 + 88 A)	**t**	**580,319**	**474,076**	**344,524**
Emissions of SO_2, NO_x and other significant gases by type				
NO_x (datum 70 + 89)	t	639.5	596.3	557.4
CO (datum 71+ 90)	t	406.4	170.2	127.01
SO_2 (datum 72 + 91)	t	2.1	1.4	0.54
NO_x/thermoelectric production (datum 70) / (datum 1 B)	g/kWh	0.65	0.81	0.79
CO/thermoelectric production (datum 71) / (datum1 B)	g/kWh	0.08	0.05	0.05
CO_2/thermoelectric production (datum 69) / (datum 1 B)	g/kWh	590	643	483
CO_2/total production (datum 69) / (datum 1 A + 1 B)	g/kWh	431	402	286
SO_2/thermoelectric production (datum 72) / (datum 1 B)	g/kWh	0.0022	0.0019	0.0008
Hazardous waste (datum 80 + 86)	**t**	**508.9**	**890.4**	**649.0**
Non-hazardous waste (datum 81 + 87)	**t**	**2,543.7**	**1,242.6**	**6,215.2 (*)**
Sludge from treatment (datum 82)	**t**	**125,180**	**114,028**	**132,106**
Sand and sediment from treatment (datum 83)	**t**	**6,750**	**9,211**	**23,862**

(*) In 2004, the figure includes inert material: 5,167 t of debris.

The environmental sustainability performances

Key environmental performance indicators

INDICATOR	u.m.	2002	2003	2004
PRODUCTS AND SERVICES: ELECTRICITY				
Efficiency of electricity generation process (*)				
Gross average efficiency of thermoelectric production (calculation 1)	%	**45.5**	**44.1**	**44.7**
Tor di Valle plant (combined cycle)	%	49.9	49.75	49.63
Tor di Valle plant (co-generation, electricity production efficiency only)	%	25.3	26.52	27.05
Tor di Valle plant (co-generation electricity + heat recovery efficiency)	%	51.7	50.6	57.6
Montemartini Plant	%	28.3	27.7	27.3
Gross average efficiency of thermoelectric production including recovered thermal energy (calculation 2)	%	**48.0**	**47.8**	**48.9**
Gross average efficiency of hydroelectric production (calculation 3)	%	**88.6**	**79.5**	**83.8**
Gross average efficiency of total production (calculation 4)	%	**57.2**	**57.3**	**60.7**
Gross average efficiency of total production including recovered thermal energy (calculation 5)	%	**59.0**	**59.0**	**61.9**
Specific production of waste (datum 80 + 81) / (datum 9)	g/kWh	**0.32**	**0.22**	**0.18**
Protection of the surrounding areas (total length of HV lines in cables/length of overhead HV lines) • 100	%	**24.1**	**24.3**	**25.2**
Public lighting flux efficiency (datum 13) / (datum 48)	Lumen/kWh	**13.8**	**13.3**	**13.7**
Average efficiency of installed lamps (datum 13) / (datum 48 A)	Lumen/W	**62.20**	**64.47**	**66.22**
Specific consumption per lighting unit (datum 48) / no. of lighting units	kWh/lighting units (lighting units)	**1,044 (140,952)**	**1,083 (144,110)**	**1,062 (149,309)**
No. of operating and laboratory checks/GWh net electricity sold (datum 14) / (datum 9)	no./GWh	**0.03**	**0.08**	**0.11**
Total electricity losses (6) - own consumption - initial transformation - transport - technical and commercial	% energy requested	**8.2**	**8.0**	**6.2**

(*) The calculations used to determine the electricity generation efficiency are described on page 20.

The environmental sustainability performances

Key environmental performance indicators

INDICATOR	u.m.	2002	2003	2004
PERFORMANCE INDICATORS FOR SUPPLY OF SERVICE: DRINKING WATER				
Drinking water abstraction efficiency				
{100 - [(datum 17 • 100) / (datum 15)]}	%	**98.35**	**93.29**	**93.13**
Drinking water distribution efficiency				
{100 - [(datum 21 • 100) / (datum 18)]}	%	**65.32**	**65.38**	**65.34**
Total efficiency				
total {100 - [(datum 17 + 21) • 100 / (datum 15)]}	%	**68.59**	**63.81**	**64.04**
Assessment parameters as per Ministerial Decree No. 99/97				
Primary efficiency (R1): (datum 23) / (datum 18)	%	**75.95**	**80.52**	**80.13**
Efficiency at consumption level (R2): [(datum 23 + A 11) / (datum 18)]				
A 11 = 1.5% of (datum 20)	%	**76.93**	**81.50**	**81.11**
Net efficiency (R3): [(datum 23 + A 11 + A 12) / (datum 18)]				
A 12 = 1.5% of (datum 18)	%	**78.43**	**83.00**	**82.61**
PERFORMANCE INDICATORS BY PRODUCT: DRINKING WATER				
Linear index of overall drinking water losses (as per MD No. 99/97) (*)	**m³/km**	**27,900**	**24,842**	**23,640**
(datum 22 A) / (km - network)		(5,471 km)	(6,211 km)	(6,500 km)
Linear index of total drinking water losses (*)	**m³/km**	**30,048**	**26,759**	**25,462**
(datum 21) / (km - network)		(5,471 km)	(6,211 km)	(6,500 km)
Drinking water additive process index (datum 49) / (datum 18)	**g/m³**	**1.91**	**2.20**	**1.91**
Specific electricity consumption for water network (datum 56) / (datum 18)	**kWh/m³**	**0.064**	**0.088**	**0.081**
No. of checks on drinking water distributed (datum 30 A) / (datum 18)	**no./Mm³**	**445**	**410**	**547**

(*) The index has been recalculated for the various years, updating the data relating to the length of the network.

The environmental sustainability performances

Key environmental performance indicators

INDICATOR	u.m.	2002	2003	2004
PERFORMANCE INDICATORS FOR SUPPLY OF SERVICE: WASTE WATER TREATMENT				
Total sludge disposed	t	125,180	114,028	132,106
Sand and sediment removed	t	6,750	9,211	23,862
COD removed	t	84,185	80,091	81,857
Total suspended solids (TSS) removed	t	53,075	51,917	56,443
Additive process index (datum 60) / (datum 29)	t/Mm³	15.83	13.19	13.22
Specific electricity consumption for treatment process (datum 62) / (datum 29)	kWh/m³	0.268	0.264	0.235
No. of checks on waste water (datum 30 B) / (datum 29)	no./Mm³	58.0	62.2	61.3
COMPLIANCE				
Penalty paid for non-compliance with environmental regulations/agreements	Euro	18.495 (*)	n.a.	0
GENERAL				
Environmental expenditure	Mlns of Euro	18.0	23.2	14.9

(*) Sanctions relating to 4 administrative offences committed at the treatment plants (1 in 1997 and 3 in 2002), paid in 2002.

Description of the calculations used to determine electricity generation efficiency

Calculation 1

$$efficiency\ (thermoelectric) = \frac{Energy_{thermoelectric}\ (kWh)}{Energy_{gas\ oil}\ (kWh) + Energy_{natural\ gas}\ (kWh)}$$

Where:

$Energy_{thermoelectric}$ = gross electricity produced using thermoelectric cycle (1 B)

$$Energy_{gasoil}\ (kWh) = \frac{gas\ oil\ (l) \cdot 0.835 \cdot PCI_g\ (kcal\ /\ kg)}{860\ (kcal/kWh)}$$ *Energy equivalent to gas oil consumed: (32)*

$$Energy_{natural\ gas}\ (kWh) = \frac{natural\ gas\ (Nm^3) \cdot PCI_m\ (kcal\ /\ Nm^3)}{860\ (kcal\ /\ kWh)}$$ *Energy equivalent to natural gas consumed: (31)*

PCI_g = 10,000 kcal / kg (net calorific value of gas oil)
PCI_m = 8,500 kcal / Nm^3 (net calorific value of natural gas)
860 = energy conversion factor from kcal to kWh
0.835 = specific weight of gas oil (kg/l)

Calculation 2

$$efficiency\ (thermoelectric) = \frac{Energy_{thermoelectric}\ (kWh) + Energy_{thermal}\ (kWh)}{Energy_{gas\ oil}\ (kWh) + Energy_{natural\ gas}\ (kWh)}$$

$Energy_{thermal}$ = (10)

$Energy_{thermoelectric}$ = (1 B)

$$Energy_{gas\ oil}\ (kWh) = \frac{gas\ oil\ (l) \cdot 0.835 \cdot PCI_g\ (kcal\ /\ kg)}{860\ (kcal/kWh)}$$ *Energy equivalent to gas oil consumed: (32)*

$$Energy_{natural\ gas}\ (kWh) = \frac{natural\ gas\ (Nm^3) \cdot PCI_m\ (kcal\ /\ Nm^3)}{860\ (kcal\ /\ kWh)}$$ *Energy equivalent to natural gas consumed: (31)*

PCI_g = 10,000 kcal / kg (net calorific value of gas oil)
PCI_m = 8,500 kcal / Nm^3 (net calorific value of natural gas)
860 = energy conversion factor from kcal to kWh
0.835 = specific weight of gas oil (kg/l)

Calculation 3

$$efficiency\ (hydroelectric) = \frac{Energy_{hydroelectric}\ (MWh) \cdot 3.6 \cdot 10^9}{[m(kg) \cdot 9.8(m/s^2) \cdot h(m)](Joule)}$$

$3.6 \cdot 10^9$	= water energy conversion factor from Joules to MWh
m	= offtake water for hydroelectric production
9.8	= gravitation acceleration at sea level
h	= height of water drop (free surface reservoir – turbine)
$Energy_{hydroelectric}$	= energy produced in the hydroelectric cycle: (1 A)

Calculation 4

$$\frac{(E_i)}{(E_i + E_t)} \cdot \varepsilon_i + \frac{(E_t)}{(E_i + E_t)} \cdot \varepsilon_t = \varepsilon_{average}$$

E_i	= total hydroelectricity produced (1 A)	
E_t	= total thermoelectricity produced (1 B)	
ε_i	= hydroelectric efficiency	(totalling 83.8% for 2004)
ε_t	= thermoelectric efficiency	(totalling 44.7% for 2004)
$\varepsilon_{average}$	= average production efficiency	

Calculation 5

$$\frac{(E_i)}{(E_i + E_\tau)} \cdot \varepsilon_i + \frac{(E_\tau)}{(E_i + E_\tau)} \cdot \varepsilon_\tau = \varepsilon_{average}$$

E_i	= total hydroelectricity produced (1 A)	
E_τ	= sum of total energy (thermoelectric and thermal) produced (10 + 1 B)	
ε_i	= hydroelectric efficiency	(totalling 83.8% for 2004)
ε_τ	= efficiency (thermoelectric + thermal)	(totalling 44.7% for 2004)
$\varepsilon_{average}$	= average production efficiency	

Explanatory notes to the Environmental Accounts

The figures presented in the *Environmental Accounts* have been produced and audited by the divisions directly responsible.

Since a standardized Environmental Management System, capable of encoding the procedures for obtaining a regular flow of numeric information, has not been implemented, to-date responsibility for the correct formation of the datum has been maintained within the individual production units.

Before final acceptance, however, the official datum is subject to a validation process which anticipated four control procedures:

1. comparison with the historical data in order to highlight and justify any significant discrepancies

2. repetition at least twice of the acquisition process

3. feed-back to the divisions responsible for the final go-ahead to use the datum

4. audit carried out by an external independent society.

The figures have been divided up into three categories:
› estimated
› calculated
› gauged.

In the event of estimated data, the greatest of attention was paid to checking the reasonableness of the underlying criteria used, with the aim of resorting as little as possible, in the future, to this form of gauging of the environmental figures.

When the datum is the result of calculation, the algorithm used has been concisely specified in order to permit the full comprehension of the mathematical result.

When, lastly, the data has been gauged, an estimate of the uncertainty to be associated with the number is provided.

ENERGY AREA PRODUCTS	
Datum no.	**Explanation - Comment**
1	Total electricity produced gross of losses. The datum is gauged with uncertainty of less than ± 0.5%.
2	Electricity losses attributable exclusively to the production phase. It includes: the auto-consumption (16.13 GWh) and the initial transformation losses (21.07 GWh). The datum is gauged with uncertainty of less than ± 0.5%.
3	Electricity supplied by Acea Electrabel Produzione SpA, to Acea Electrabel Elettricità SpA for consumption on the restricted market. The heavy decrease which took place in 2004 is due to the fact that as from April 2004 AE Produzione sold on the exchange or by means of bilateral agreements. The datum is gauged with uncertainty of less than ± 0.5%.
	3 A: Electricity produced net of losses due exclusively to the production phase. The datum is calculated.
	3 B: Electricity supplied by Acea Electrabel Produzione SpA to third parties: de-regulated market, GRTN (AEEG 62/02) and others. The datum is gauged with uncertainty of less than ± 0.5%.
4	Net electricity acquired from: . Enel Distribuzione in its capacity as Acquirente Unico (Sole Purchaser) for 10,008.7 GWh (4 A) . Imports for 411.47 GWh (4 B) The datum is gauged with uncertainty of ± 0.5%.
5	Energy requested on the network by all the connected customers (de-regulated + restricted). The datum is estimated.
6	Electricity losses which take place during the distribution and transmission phase. This is attributable to internal consumption, transformation and transport losses, fraud, erroneous measurements, dissipation due to the Joule effect. The datum is estimated.
7	Electricity transferred to third parties. This involves exchanges of energy between Distribution Companies. The datum is gauged with uncertainty of ± 0.5%.
8	Net electricity conveyed to eligible end customers. The datum is gauged with uncertainty of ± 1%. The considerable increase in the datum over the last three years is the direct consequence of the process for de-regulating the electricity market underway in Italy since 1999 (Italian Legislative Decree No. 79/99).
9	Net electricity sold to restricted end customers. The downwards trend since 2002 is the consequence of the progressive changeover of restricted customers to the de-regulated market, in other words it is the direct consequence of the process for de-regulating the electricity market underway in Italy since 1999 (Italian Legislative Decree No. 79/99). The datum is estimated on the basis of the readings of billed consumption.
10	Thermal energy produced at the Tor di Valle co-generation plant, gross of losses. The datum is gauged with uncertainty of ± 2% in correspondence with the delivery pipes of the boilers. The thermal energy is produced in a co-generation plant comprising a turbogas unit and a superheated water regeneration generator powered by the hot exhaust fumes of the turbogas unit. Three traditional boilers make up the reserve integration system.

ENERGY AREA PRODUCTS

Datum no.	Explanation - Comment
11	Thermal energy losses of the district heating system, due to: heat dispersion, losses on the network, technical emissions due to maintenance work, thermal recoveries of the heat accumulation systems. The datum is calculated as the difference between the thermal energy produced and that effectively supplied to the customers (billed).
12	Net thermal energy supplied to end customers. The datum, calculated, was obtained from the reading of the billed consumption.
13	Lighting flux supplied by the public lighting system. The data item, calculated, represents the product between the number of lamps installed and the related value of "rated" lighting flux. As a result of the overestimation introduced by: 1. abatement of efficiency due to the ageing of the lamps 2. shutdown due to faults 3. shutdown due to maintenance it is believed that a more realistic supplied lighting flux figure equates to the data item provided, decreased by 20%.
14	Total number of gaugings/checks carried out by the Valleranello Laboratory benefiting the energy area. The datum calculated is the sum of the individual calculations made in 2004. During October 2004, the Valleranello Laboratory's responsibilities were incorporated within Acea Distribuzione SpA and, in relation to the chemical checks, within the company LaboratoRI SpA.

WATER-ENVIRONMENTAL AREA PRODUCTS

Datum no.	Explanation - Comment
15	Total drinking water withdrawn from the sources except the high drains and introduced into the Rome aqueduct system. The datum is gauged with uncertainty of ± 3%. 15 A: Total drinking water withdrawn from the sources for other aqueduct systems except the high drains. The datum is gauged with uncertainty of ± 3%.
16	Total drinking water sold to municipalities located along the route of the aqueducts and in turn retailers of the resource. The datum is gauged and is affected by a systematic error estimated as around ± 5%.
17	Total drinking water lost along the route of the aqueducts until the distribution point in the city, due to operating drainage and outlets, for tank fillings and overflows. The datum is calculated as the difference of gauged values.
18	Total drinking water transported to the distribution network, net of the losses due to abstraction at the sources. The datum is gauged with uncertainty of ± 3%.
19	Drinking water introduced onto the non-drinking water network. These are events which occur in the case of maintenance work or extraordinary measures which render the dedicated non-drinking resource insufficient. The datum is estimated.

WATER-ENVIRONMENTAL AREA PRODUCTS

Datum no.	Explanation - Comment
20	Total drinking water supplied in the municipality of Rome and in neighbouring municipalities (Fiumicino and Guidonia). The datum, calculated, refers to billed consumption. Therefore it is affected by an uncertainty due to the calculation methods used for the billing.
21	Water losses at widespread distribution level within the city of Rome due to: authorized but not recorded consumption (drinking fountains), consumption for network maintenance and cleaning, unauthorized and unrecorded consumption (frauds), dispersions (effective losses), accidental inefficiency, erroneous gauging and erroneous readings. The datum is estimated as the sum total of: *Parameter A 11* of MD 99/97 – authorized and unrecorded uses, totalling 1.5% of total water supplied to end users – datum (20) • 1.5/100; *Parameter A 12* of MD 99/97 – maintenance and cleaning, totalling 1.5% of total introduced onto the network datum (18) • 1.5/100; *Parameter A 17* of MD 99/97 – overall distribution losses; *Parameter A 13* of MD 99/97 – inefficiencies, estimated at 3 million m^3 per year; *Parameter A 14* of MD 99/97 – frauds, totalling 1.0% of total water supplied to end users - datum (20) • 1.0/100; *Parameter A 16* of MD 99/97 – gauging errors, totalling 10% of total water supplied to end users - datum (20) • 10.0/100; *Parameter A 15*: Volume lost in distribution (effective losses).
22	22 A: Overall distribution losses. This is the *parameter A 17* of MD No. 99/97 defined as the quantity of water lost during distribution. 22 B: Effective distribution losses. This is the *parameter A 15* of MD No. 99/97 and represents the nearest value to the true estimate of the volume of water lost along the distribution network.
23	Total drinking water supplied to Rome and to the retailer municipalities. The datum is calculated.
24	Total non-drinking water taken from the source, gross of losses. The datum is estimated.
25	Coincides with datum No. 19.
26	Total non-drinking water lost due to technical (dispersion, maintenance, etc.) and commercial reasons (failure to bill, fraud, etc.). The datum is estimated.
27	Total non-drinking water supplied to Rome. The datum, calculated, corresponds with total water billed.
28	Total non-drinking water supplied to municipalities other than the municipality of Rome. This is a small estimated quantity.
29	Total waste water conveyed to treatment plants. The datum is calculated. The quantity of waste water conveyed to the treatment plants is greater than the total of drinking water supplied, in that the civic sewerage system is configured so as to collect part of the meteoric water and some surface water courses as well. 29A: The datum is not included in item 29; it relates to the municipalities acquired as of 31 December 2004 and to minor treatment plants in the municipality of Rome.

RESOURCES USED IN THE ENERGY AREA

Datum no.	Explanation - Comment
30	Total number of gaugings/checks carried out by LaboratoRI SpA at the Grottarossa Laboratory benefiting the water-environmental area. The datum is calculated as the sum of the individual calculations made in 2004.
31	Total natural gas used for the generation of electricity at the production plants. The datum, expressed in normal cubic metres (at 0°C and 1 atm), is gauged with uncertainty of ± 0.5%.
32	Total gas oil used for the generation of electricity at the production plants. The datum is gauged with uncertainty of ± 2%. For the conversions of the mass units (kg) to volume units (litres), a density value of 0.835 kg/lt was used.
33	Total water taken from surface resources and from aqueducts (Capore/Salisano) for the production of hydroelectricity. The datum is calculated.
34	Total water taken from the effluent canal of the Rome South treatment plant – adjacent to the Tor di Valle thermoelectric plant – and used for the cooling of the plant's apparatus. The datum is estimated.
35	Total quantity of aqueduct water (demineralised) used for replenishing the water lost in thermal cycles at the Tor di Valle (combined cycle) plant. The datum is gauged with uncertainty of ± 2%.
36	Quantity of drinking water used by the companies included in the energy sector for civil/sanitary use. The datum, calculated, refers to billed consumption.
37	Quantity of water consumed for civil/sanitary use within the installations not directly linked with the production phases (offices). The datum is calculated to an extent equating to 50% of total water consumed by the Parent Company.
38	Total drinking water consumed by the companies included in the energy sector. The datum, calculated, refers to billed consumption.
39	Total quantity of new dielectric and lubricant mineral oil introduced into the production circuit (transformers, condensers, rotating machines, storage deposits, etc.). The datum is gauged with uncertainty of ± 0.5%.
40	Total quantity of new gaseous insulator added to the production circuit (armoured sub-stations). The datum is gauged with uncertainty of ± 0.5%.
41	Coincides with datum No. 6.
42	Coincides with datum No. 2.
43	Electricity consumed by the processes not directly linked with the production phases (offices). The datum is calculated to an extent equating to 50% of the overall electricity consumed by the Parent Company.
44	Total electricity consumed by the product systems included in the energy sector. The datum is calculated.

RESOURCES USED IN THE ENERGY AREA

Datum no.	Explanation - Comment
45	Natural gas consumed for the production of thermal energy (district heating) with the traditional integration and reserve boilers. The datum, already contained in datum No. 31, is gauged with uncertainty of ± 0.5%. Up until 2003, the reserve boilers were only started up under exceptional circumstances when it was not possible to use the recovery boiler (co-generation). In 2004, such use was modified in order to improve the handling of the district heating service in line with the needs deriving from the electricity exchange market which led, during certain periods of the year, to the expediency of resorting to heat production using traditional systems rather than via co-generation.
46	The main thermal energy resource for the purposes of district heating is represented by the heat from gas turbine exhaust gases. The datum has been calculated on the basis of the sensitive heat and the flow of the exhaust fumes, the thermal head in the boiler and the running hours of the gas turbine.
47	Total water returned to the circuit of the district heating network due to: thermal dispersion, losses on the network, technical emissions due to maintenance work and thermal replenishment of the accumulation systems. The datum is calculated.
48	Total electricity consumed for public lighting in the municipality of Rome. Not including the consumption for Public Lighting in the municipality of Fiumicino, included in the 2002 datum. The datum is calculated.
	48 A: Installed capacity for the product system - public lighting in the municipality of Rome (excluding Fiumicino, included in the 2002 datum). The datum is calculated as the sum of the power of the lamps installed.

RESOURCES UTILIZED IN THE WATER-ENVIRONMENTAL AREA

Datum no.	Explanation - Comment
49	The datum represents the sum of the consumption of sodium hypochlorite – used as a disinfectant upon the request of the Health Authorities - and ozone. The datum is calculated.
50	Total quantity of chemical reactants used in the product system: Laboratory analysis and research. The datum is calculated.
51	Total volume of pure gas for analyses, used in the product system: Laboratory analysis and research. The datum is calculated.
52	Electricity used for the non-drinking water pumping plants. The datum is estimated.
53	Electricity used for the drinking water pumping plants. The datum is estimated.
54	Electricity consumed by the processes not directly linked with the production phase (offices). The datum, equal to datum No. 43, is calculated to an extent equating to 50% of the total electricity consumed by the Parent Company.

RESOURCES UTILIZED IN THE WATER-ENVIRONMENTAL AREA

Datum no.	Explanation - Comment
55	Electricity used for the Grottarossa chemical laboratory in the product system: laboratory analysis and research. The considerable increase during 2004, when compared with the previous year, is attributable to the rise in staff and services as a result of the transfer of the BU Environmental Engineering Development to LaboratoRI. The datum is gauged with uncertainty ± 0.5%.
56	Total electricity consumed in the water sector. The datum is estimated.
57	Quantity of drinking water used by the companies included in the water sector, for civil/sanitary uses. The datum, calculated, refers to billed consumption.
58	Quantity consumed for civil/sanitary uses within the installations not directly linked with the production phases (offices). The datum is calculated to an extent equating to 50% of the total water consumed by the Parent Company.
59	Total water consumed by the companies included in the water sector, for civil/sanitary uses. The datum, calculated, refers to billed consumption.
60	Total quantity of chemicals used in the waste water treatment process. This is obtained from the sum of the consumption registered for the substances: polyelectrolytes, sodium hypochlorite, ferric chloride, lime. The datum is calculated.
61	Total quantity of lubricant oil, equating to 36.03 tons and of grease, equating to 20.2 tons, used for the apparatus of the environmental water sector (pumps, centrifuges, engines, etc). The datum is calculated.
62	Electricity used for the running of the waste water treatment plants. The data item was estimated up until 2003. The datum for 2004 is gauged.

FUELS USED BY THE ACEA GROUP

Datum no.	Explanation - Comment
63	As from 1 January 2002, leaded petrol is no longer sold.
64	Total quantity of unleaded petrol used for the Acea Group's vehicle pool. The calculation includes the contribution due to approximately 500 Acea Distribuzione SpA vehicles, which were leased and after July 2004 returned. Limited to the latter, the litres of fuel are calculated by multiplying the km per month by 7 (months of circulation) divided by the specific consumption. In particular, 9.5 km/l per cc<1,400; 7 km/l per 1,400<cc<2,000. An estimate of the fuel consumption has been obtained equating to around 175 thousand litres which, added to the consumption gauged for the rest of the vehicle pool, takes the overall estimated figure to around 919,000 l. For the conversions of the volume units (litres) to mass units (kg), a density value equating to 0.735 kg/l was used.
65	Total quantity of gas oil used for the Acea Group's vehicle pool. For the conversions of the volume units (litres) to mass units (kg), a density value equating to 0.835 kg/l was used. The datum is gauged with uncertainty of ± 0.5%.

FUELS USED BY THE ACEA GROUP

Datum no.	Explanation - Comment
66	Total quantity of gas oil utilized for heating the Acea Group's premises. For the conversions of the volume units (litres) to mass units (kg), a density value equating to 0.835 kg/l was used. The datum is gauged with uncertainty of ± 0.5%.
67	Total quantity of natural gas used for heating the Acea Group's premises. The datum is gauged with uncertainty of ± 0.5%.
68	Total quantity of LPG (liquid petroleum gas) used for heating the Acea Group's premises. For the conversions of the volume units (litres) to mass units (kg), a density value equating to 0.550 kg/l was used. The datum is gauged with uncertainty of ± 0.5%.

EMISSIONS, SPILLS AND WASTE – ENERGY AREA

Datum no.	Explanation - Comment
69	Total quantity of carbon dioxide emitted into the atmosphere as a consequence of the generation of thermoelectric energy from fossil fuels. This represents a "physiological" product of the combustion reaction. The datum up until 2003 was measured as the product between a gauged datum - the CO_2 concentration – and a project datum – the flow of the fumes in the chimney. As a result of the provisions of the European Union (Commission Decision dated 29 January 2004 which established the *Guidelines for the monitoring and the communication of greenhouse gases*, in pursuance of Directive 2003/87/CE of the European Parliament and Council), in 2004 a calculation method was adopted based on the assignment of a standard emission factor and an oxidation factor. In this manner, the calculation of the CO_2 quantity actually produced emerges as accurate since it is deduced directly from the effective quantity of fuel consumed.
70	Total quantity of nitric oxides ($NO + NO_2$) emitted into the atmosphere as a consequence of the generation of thermoelectric energy from fossil fuels. Their presence in trace form in the emissions is due to the secondary undesirable reactions which take place at a high temperature between the nitrogen and the oxygen in the air. The sharp upwards trend since 1999 is due to the corresponding increase in electricity produced and the greater importance that the Montemartini plant has on total production. The datum is calculated.
71	Total quantity of carbon monoxide (CO) emitted into the atmosphere as a consequence of the generation of thermoelectric energy from fossil fuels. The presence of the pollutant in the emissions is due to incomplete combustion reactions and represents a symptom of decline in the combustion reaction efficiency. The datum is calculated.
72	Total quantity of sulphur dioxide (SO_2) emitted into the atmosphere as a consequence of the generation of thermoelectric energy from fossil fuels. The use of natural gas and gas oil (diesel) with a low sulphur content has made it possible to more or less write-off this type of emission, standing for years at very low levels. The datum is calculated.

EMISSIONS, SPILLS AND WASTE – ENERGY AREA

Datum no.	Explanation - Comment
73	Total quantity of waste water treated, deriving from thermoelectric production activities. The datum is gauged with uncertainty of ± 2%.
74	Total quantity of solid material deriving from electricity production activities (thermo and hydro). The datum is estimated.
75	Coincides with the datum No. 34.
76	The electrical field is constantly monitored by means of gauging campaigns at the electricity distribution plants, near to built-up areas. The average datum detected is well below legal limits.
77	The magnetic field is constantly monitored by means of gauging campaigns at the electricity distribution plants, near to built-up areas. The average datum detected, expressed in units of magnetic induction, is well below legal limits.
78	The sound emissions produced by the electricity generation and distribution plants are subject to monitoring involving the commitment to maintain the values below legal limits.
79	Light dispersion towards the sky is kept to minimum levels thanks to the careful planning of the public lighting systems.
80	Total quantity of hazardous waste (pursuant to Italian Legislative Decree 22/97) disposed of. The datum includes a portion produced by the Parent Company ascribed in equal parts to the two areas of activities, energy and water. The datum is gauged with uncertainty of ± 2%.
81	Total quantity of non-hazardous waste (pursuant to Italian Legislative Decree 22/97) disposed of. The datum includes a portion produced by the Parent Company ascribed in equal parts to the two areas of activities, energy and water. The datum is gauged with uncertainty of ± 2%

EMISSIONS, SPILLS AND WASTE – WATER-ENVIRONMENTAL AREA

Datum no.	Explanation - Comment
82	Total quantity of treated sludge disposed of. The datum is gauged with uncertainty of ± 2%.
83	Total quantity of sand and sediment disposed of. The datum for 2004 underwent a considerable increase due to the cleaning work carried out in the sedimentation tanks of the Rome South treatment plant (19,024 tons of sand and sediment were disposed of exclusively from the afore-mentioned plant). The datum is gauged with uncertainty of ± 2%.

EMISSIONS, SPILLS AND WASTE – WATER-ENVIRONMENTAL AREA

Datum no.	Explanation - Comment
84	The sound emissions produced by the treatment and pumping plants are subject to monitoring, involving the commitment to maintain the values below legal limits.
85	Smells produced by the treatment plants are subject to monitoring, involving the commitment to maintain the values below the limits of olfactory perception.
86	Total quantity of hazardous waste (pursuant to Italian Legislative Decree 22/97) disposed of. The datum includes a portion produced by the Parent Company ascribed in equal parts to the two areas of activities, energy and water. The datum is gauged with uncertainty of ± 0,5%.
87	Total quantity of non-hazardous waste (pursuant to Italian Legislative Decree 22/97) disposed of. The datum includes a portion produced by the Parent Company ascribed in equal parts to the two areas of activities, energy and water. The datum also includes debris (87 C) in 2004. The datum is gauged with uncertainty of ± 2%.

EMISSIONS, SPILLS AND WASTE OF THE ACEA GROUP – AUTOMOTIVE EMISSIONS

Datum no.	Explanation - Comment
88	Total quantity of carbon dioxide emitted by the Acea Group vehicle pool in 2004. In 2003, the datum was calculated using the COPERT III programme (Computer Programme to calculate Emissions from Road Transport – November 2000 edition). In 2004, it was not possible to use the COPERT . The datum is calculated assuming that for every tep of fuel used, 3 t of CO_2 are produced.
	88 A: Total quantity of carbon dioxide emitted by the air-conditioning systems in the work environments. The datum is calculated assuming that for every tep of fuel used, 3 t of CO_2 are produced.
89	Total quantity of nitric oxides emitted by the Acea Group vehicle pool in 2004. Estimated value.
90	Total quantity of carbon monoxide emitted by the Acea Group vehicle pool in 2004. Estimated value. The emissions of sulphur dioxide were not calculated, in any event being extremely small quantities which derive from the combustion of the modest quantities of sulphur present in the latest generation fuels.

Company fact sheets - Italy

The fact sheets relating to the main companies and units which during 2004 managed the Group's business, are presented below.

The fact sheets provide a summary description of the activities and the corporate assets, and disclose the staff numbers and the main economic results for the year.

The figures shown refer to 31 December 2004.

Acea Distribuzione SpA

Acea Distribuzione was established in 1999 in response to the dictates of the Bersani Decree (Italian Legislative Decree No. 79/99) which obliged accounting and administrative separation for companies involved in the distribution of electricity.

During 2004, Acea Distribuzione launched a ten-year investment plan for the upgrading of the civic electricity network.

STAFF EMPLOYED	1,501 human resources
VALUE OF PRODUCTION	Euro 301.7 million
NET RESULT FOR THE PERIOD	Euro 43.1 million

PLANT COMPOSITION

Type	Unit of measurement	Composition as of 31 December 2004	2004 increases (in absolute values) on 2003
RECEIVER STATIONS	no.	3	0
HV/HV PRIMARY SUB-STATIONS	no.	67	3
HV/HV AND HV/MV TRANSFORMERS	no.	175	1
POWER TRANSFORMATION	MVA	7,249	74
HV NETWORK – OVERHEAD LINES	km	409	-2
HV NETWORK – CABLES	km	222	6
MV NETWORK – OVERHEAD LINES	km	724	-1
MV NETWORK – CABLES	km	8,567	237
LV NETWORK – OVERHEAD LINES	km	1,729	-1
LV NETWORK – CABLES	km	16,118	147
SECONDARY SUB-STATIONS RUNNING	no.	12,202	101
MV/LV TRANSFORMERS	no.	11,908	77
TRANSFORMATION CAPACITY	MVA	4,244	44

(*) The cable km of the HV network has increased with respect to last year; in fact, the cables in 2003 stretched 216 km and not 231 km, as erroneously published in the *2003 Sustainability Report*.

Acea Trasmissione SpA

Acea Trasmissione was formed in 1999, in accordance with the matters laid down by Article 9 of the Bersani Decree, with the mission of guaranteeing the correct running of the transmission network in accordance with the indications provided by the Network Operator (GRTN).

During 2004, Acea Trasmissione ensured the control, maintenance and development of the overhead connections conferred, included within the portion of National Transmission Grid (RTN) which it avails of, while the same activities concerning the cable connections (of the same RTN) were carried out under service arrangements by Acea Distribuzione. The total length of network involved is 699.44 km. Acea Trasmissione also carried out activities under service arrangements for the control and maintenance of the HV overhead lines (60 and 150 kV) belonging to Acea Distribuzione.
In order to provide a complete picture of the Group's HV network composition, an analytical table is also presented, relating to the plants belonging to Acea Distribuzione.

The afore-mentioned electricity lines concern several regions (Lazio, Umbria and Abruzzo) and link the production plants of AceaElectrabel Produzione and Enel Produzione.

STAFF EMPLOYED	35 human resources
VALUE OF PRODUCTION	Euro 7.1 million
NET RESULT FOR THE PERIOD	Euro 0.2 million

HV NETWORK COMPOSITION

Type	RTN (km of line)	
	3 phase	Double 3 phase
220 kV OVERHEAD	8.5	-
150 kV OVERHEAD	330.04	325.33
60 kV OVERHEAD	-	-
TOTAL OVERHEAD	**338.54**	**325.33**
150 kV CABLE	35.57	
60 kV CABLE		
TOTAL CABLE	**35.57**	

TOTAL LENGTH OF RTN CONNECTIONS:
338.54 + 325.33 + 35.57 = 699.44 km

HV NETWORK COMPOSITION

Type	Acea Distribuzione (km of line)	
	3 phase	Double 3 phase
150 kV OVERHEAD	142.89	98.95
60 kV OVERHEAD	132.40	32.80
TOTAL OVERHEAD	**275.29**	**131.75**
150 kV CABLE	192.98	
60 kV CABLE	40.90	
TOTAL CABLE	**223.88**	

TOTAL LENGTH OF ACEA DISTRIBUZIONE CONNECTIONS:
275.29+ 131.75 + 233.88 = 640.92 km

AceaElectrabel
PRODUZIONE

AceaElectrabel Produzione SpA was formed following the agreement signed in 2002 between Acea SpA and the Belgian company Electrabel (Suez Group).

STAFF EMPLOYED	117 human resources
VALUE OF PRODUCTION	Euro 85.3 million
NET RESULT FOR THE PERIOD	Euro 13.8 million

Its main activities include:

› the production of electricity

› the production and distribution of heat

› the planning of the development and enhancement of the production activities

› the stipulation of contracts for the sale of energy and related services in order to maximize the valorization of the energy produced

› the development and management of the distribution systems for the heat produced also by means of co-generation

› the promotion and valorization of the use of renewable energy sources.

The overall installed power of the production plants comes to 362 MW:

› 223 MW of thermoelectric power capable of producing approximately 900 GWh of electricity per year (location of plants: Municipality of Rome)

› 139 MW of hydroelectric power capable of producing approximately 500 GWh of electricity per year (location of plants: provinces of Rome, Terni, Rieti and Chieti).

The Tor di Valle thermoelectric plant obtained its first environmental Certification under the ISO 14001 standard in 2000, renewed over the years up to the present day.

During May 2004, the Salisano hydroelectric plant obtained ISO 14001 Certification for its Environmental Management System. The Montemartini thermoelectric plant has completed the first stage of ISO 14001 certification and attainment of environmental Certification is also anticipated for the G. Marconi hydroelectric plant; the draft study on the initial environmental analysis has been started up for the latter.

The unit produced a total of around 700 GWh of gross thermoelectric energy and approximately 484 GWh of gross hydroelectric energy, for a total of 1,185 GWh, introducing onto the network around 1,148 GWh of net electricity.

It also guaranteed the production of 65 GWh of heat, distributed to around 25,000 inhabitants in the two Roman districts of Torrino and Mostacciano.

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A. VOLTA PLANT AT CASTEL MADAMA (ROME)	
PLANT TYPE	RUN-OF-RIVER WATER
TYPE OF USE OF ENERGY PRODUCED	COVERAGE OF BASIC NEEDS
RATED OUTPUT	9.4 MW
CAPACITY OF THE BASIN OR RESERVOIRS INTERLOCKED	100,000 m^3
AVAILABLE HEAD	41 m
MAXIMUM DERIVABLE DELIVERY	25 m^3/s
GROSS ELECTRICITY PRODUCED IN 2004	32.40 GWh

G. FERRARIS PLANT AT MANDELA (ROME)	
PLANT TYPE	RUN-OF-RIVER WATER
TYPE OF USE OF ENERGY PRODUCED	COVERAGE OF BASIC NEEDS
RATED OUTPUT	8.5 MW
AVAILABLE HEAD	27 m
MAXIMUM DERIVABLE DELIVERY	28 m^3/s
GROSS ELECTRICITY PRODUCED IN 2004	18.93 GWh

SALISANO PLANT (RIETI)	
PLANT TYPE	RUN-OF-RIVER WATER
TYPE OF USE OF ENERGY PRODUCED	COVERAGE OF BASIC NEEDS
RATED OUTPUT	42.2 MW (18 MW OF RESERVE)
AVAILABLE HEAD	83 m CAPORE 250 m PESCHIERA
MAXIMUM DERIVABLE DELIVERY	5.5 m^3/s CAPORE 9.5 m^3/s PESCHIERA
GROSS ELECTRICITY PRODUCED IN 2004	171.89 GWh

G. MARCONI PLANT AT ORTE (VITERBO)	
PLANT TYPE	RESERVOIR
TYPE OF USE OF ENERGY PRODUCED	COVERAGE OF PEAK NEEDS
RATED OUTPUT	20 MW
CAPACITY OF BASIN OR RESERVOIRS INTERLOCKED	1.2 Mm^3
AVAILABLE HEAD	11.5 m
MAXIMUM DERIVABLE DELIVERY	200 m^3/s
GROSS ELECTRICITY PRODUCED IN 2004	65.67 GWh

SANT'ANGELO PLANT (CHIETI)	
PLANT TYPE	RESERVOIR
TYPE OF USE OF ENERGY PRODUCED	COVERAGE OF PEAK NEEDS
RATED OUTPUT	58.4 MW
CAPACITY OF BASIN OR RESERVOIRS INTERLOCKED	84 Mm^3
AVAILABLE HEAD (AVERAGE)	152.3 m
MAXIMUM DERIVABLE DELIVERY	42 m^3/s
GROSS ELECTRICITY PRODUCED IN 2004	192.36 GWh

MINOR PLANTS

CECCHINA (ROME)	
PLANT TYPE	RUN-OF-RIVER WATER
TYPE OF USE OF ENERGY PRODUCED	COVERAGE OF BASIC NEEDS
RATED OUTPUT	0.4 MW
MAXIMUM DERIVABLE DELIVERY	0.95 m^3/s
GROSS ELECTRICITY PRODUCED IN 2004	1.45 GWh

MADONNA DEL ROSARIO (ROME)	
PLANT TYPE	RUN-OF-RIVER WATER
TYPE OF USE OF ENERGY PRODUCED	COVERAGE OF BASIC NEEDS
RATED OUTPUT	0.4 MW
MAXIMUM DERIVABLE DELIVERY	0.97 m^3/s
GROSS ELECTRICITY PRODUCED IN 2004	1.59 GWh

Thermoelectric production

TOR DI VALLE (COMBINED CYCLE) PLANT	
FUEL TYPE	NATURAL GAS
TYPE OF USE OF ENERGY PRODUCED	COVERAGE OF BASIC NEEDS
RATED OUTPUT OF A.C. GENERATORS	
	41.04 MW TURBOGAS No. 1
	41.04 MW TURBOGAS No. 2
	43.6 MW STEAM UNIT
PLANT SURFACE AREA	35,000 m^2
HEIGHT OF CHIMNEY STACKS	30 m
QUANTITY OF FUEL CONSUMED IN 2004	123.955 MNm^3
GROSS ELECTRICITY PRODUCED IN 2004	607.97 GWh
TOTAL GROSS EFFICIENCY OF COMBINED CYCLE	49.6 %

MONTEMARTINI PLANT	
FUEL TYPE	GAS OIL (DIESEL) WITH LOW SULPHUR CONTENT
TYPE OF USE OF ENERGY PRODUCED	COVERAGE OF PEAK NEEDS
RATED OUTPUT OF A.C. GENERATORS	26.1 MW TURBOGAS No. 1 26.1 MW TURBOGAS No. 2 26.1 MW TURBOGAS No. 3
HEIGHT OF CHIMNEY STACKS	13.35 m
QUANTITY OF FUEL CONSUMED IN 2004	10,950 t
GROSS ELECTRICITY PRODUCED IN 2004	34.73 GWh
TOTAL GROSS EFFICIENCY	27.3%

TOR DI VALLE (CO-GENERATION) PLANT	
FUEL TYPE	NATURAL GAS OR GAS OIL (DIESEL) WITH LOW SULPHUR CONTENT (FOR EMERGENCIES)
TYPE OF USE OF ENERGY PRODUCED	COVERAGE OF SEMI-PEAK AND DISTRICT HEATING REQUIREMENTS
RATED OUTPUT OF A.C. GENERATORS	19.32 MWe
HEIGHT OF CHIMNEY STACKS	20 m
QUANTITY OF FUEL CONSUMED IN 2004	21.593 MNm^3
GROSS ELECTRICITY PRODUCED IN 2004	57.73 GWh
TOTAL GROSS EFFICIENCY	27.05% ONLY ELECTRICITY 57.6% ONLY HEAT RECOVERY

UdB ILLUMINAZIONE PUBBLICA

Via its Public Lighting Business Unit, Acea SpA[1] manages the public lighting service for the whole area of the municipality of Rome, involving more than 150,000 lighting units and 171,000 lamps;
An installed capacity of 32.8 MW which provides a light flux of approximately 2,172 Mlumen. The service is also provided for street and residential consortiums who own private roads for public transit.

Acea SpA has acquired leading experience in the artistic and monumental lighting sector (approximately 10,500 dedicated lighting units) and as from the year 2000 obtained ISO 9001 certification for the majority of the activities carried out in the specific sector.

During 2004, it renewed the certification of the UNI EN ISO 9001:2000 quality system for the planning and construction activities concerning artistic, monumental and public lighting facilities.

LIGHTING FIGURES FOR 2004		
TOTAL CAPACITY OF LAMP SYSTEM	MW	32.8
LIGHTING FLUX	Mlumen	2,172
AVERAGE LUMINOUS EFFICIENCY	lumen/W	66.0

PLANT FIGURES *		
POWER SUPPLY STATIONS FOR PUBLIC LIGHTING CIRCUITS	no.	2,810
NETWORK	km	6,800
LAMP POSTS	no.	150,211
TOTAL LAMPS	no.	171,574

* Fiumicino excluded from 2003 onwards.

[1] During the first half of 2005, the business segment relating to public lighting was transferred from Acea SpA to Acea Distribuzione SpA.

lucenapoli

Gruppo Acea

In Naples, the public lighting services is managed by Luce Napoli Scarl, the consortium formed by Acea and Graded SpA, who were awarded the service under joint venture.

The main lighting and plant figures for the first year under Acea management are presented in the table[2].

LIGHTING FIGURES FOR 2004		
TOTAL CAPACITY OF LAMP SYSTEM	MW	12.04
LIGHTING FLUX	Mlumen	858.39
LIGHT EFFICIENCY	Mlumen/GWh	17.8
AVERAGE LUMINOUS EFFICIENCY	lumen/W	71.1

PLANT FIGURES		
POWER SUPPLY STATIONS OF PUBLIC LIGHTING CIRCUITS	no.	52 (sequence, with around 300 5,000V/20A transformers)
	no.	11 (branch)
NETWORK	km	3,294
LAMP POSTS	no.	50,275
TOTAL LAMPS	no.	56,779
MERCURY	no.	9,735
SODIUM	no.	37,248
IODIDE	no.	4,258
OTHER	no.	5,538

[2] It is not relevant to present the economic figures and the number of staff, since this is a consortium which operates by availing itself mainly of the human and financial resources of the consortia companies.

Acea Ato 2 SpA

Acea Ato 2 SpA represents one of the leading operators in Italy involved in services for the distribution of drinking and non-drinking water and the treatment of waste. Within the area of the municipality of Rome, and in neighbouring areas, it runs the drinking water supply and distribution service, the management of the entire municipal sewerage systems and the waste water purification service; it also handles the related water services, such as irrigation systems, ornamental fountains, drinking fountains, wells and fire hydrants.

In pursuance of the Galli Law, as from 1 January 2003 Acea Ato 2 SpA started up the management of the integrated water service for the Optimum Area of Operation (ATO) No. 2 – central Lazio, in 112 municipalities (Rome included) situated in the provinces of Rome, Viterbo and Frosinone. The complete undertaking of the management of the services is taking place gradually and should be completed by the end of 2005, when it will reach a consumer base of around 3,600,000 inhabitants. During 2004, in particular, the management of the municipalities of Castel Madama, Mentana, Fonte Nuova, Marcellina, Ciciliano and San Gregorio da Sassola were acquired, involving a total of around 51,000 inhabitants which join those already served.

STAFF EMPLOYED	1,338 human resources
VALUE OF PRODUCTION	Euro 357.8 million
NET RESULT FOR THE PERIOD	Euro 71.9 million

WATER SYSTEM MANAGED BY ACEA ATO 2 SPA IN FIGURES

	Drinking water system	Non-drinking water system
MAXIMUM DERIVABLE DELIVERY (m^3/s)	21	1.3
VOLUME OF WATER PROVIDED TO ROME AND FIUMICINO (Mm^3/year)	477.5	24.8
VOLUME OF WATER DELIVERED OUTSIDE MUNICIPALITY (Mm^3/year) INCLUDING THE VOLUME SOLD TO THE RETAILING MUNICIPALITIES OF THE SIMBRIVIO CONSORTIUM	70.6	0.03
AQUEDUCTS (km)*	208	102
TRANSPORTATION NETWORK (km)*	1,220.3	1.8
DISTRIBUTION NETWORK AND TRANSFER TO CUSTOMER BASE (km)*	6,500.7	294.8
PUMPING STATIONS (no.)*	76	31
PIEZOMETRES (no.)*	6	0
RESERVOIRS (no.)*	79	8
TREATMENT PLANTS (no.)*	1	1

* The figures include the consistent data of the Simbrivio Consortium and the municipalities with acquired integrated water services.

GENERAL COMPOSITION OF MUNICIPAL WATER NETWORKS MANAGED BY ACEA ATO 2 SPA – EXCLUDING ROME AND FIUMICINO

	Network	Maximum total delivery available (l/s)	Reservoirs (No./vol. total in m³)	Pumping plants (no.)	Piezometres (no.)	Resident population (inhabitants)
FONTE NUOVA	-	90	4/2,200	2	-	22,573
MARCELLINA	32.40	20	2/300	2	-	5,393
CICILIANO	11.6	10	2/380	2	-	1,147
SAN GREGORIO DA SASSOLA	15.9	7	3/305	1	-	1,529
GUIDONIA	151.3	225	4/1,560	3	-	65,775
MONTEROTONDO	164.1	130	4/4,660	2	1	32,831
TIVOLI	76.0	260	6/2,080	6	-	52,732
GROTTAFERRATA	34.1	99	4/6,190	3	-	17,641
CIAMPINO	118.1	115	5/1,857	7	-	36,464
CASTEL MADAMA	24.8	31	4/1,170	1	-	6,666
MENTANA	127.0	65	5/490	3	-	16,288

TREATMENT CAPACITY OF PURIFICATION PLANTS MANAGED BY ACEA ATO 2 SPA - MUNICIPALITY OF ROME

Treatment plant	Average treated capacity 2004 (m³/s)
ROME NORTH	2.72
ROME SOUTH	8.07
ROME EAST	2.84
OSTIA	0.58
MINOR PLANTS	1.20*
TOTALE	**15.41**
OTHER MUNICIPALITIES	0.95*

* Potential.

COMPOSITION OF TREATMENT AND SEWERAGE PLANTS MANAGED BY ACEA ATO 2 SPA

TREATMENT PLANTS (no.)	102
SEWAGE RAISERS (no.)	239
SEWERAGE NETWORK (km)	4,099

Acquedotto
De Ferrari Galliera SpA

Acquedotto De Ferrari Galliera SpA and Acquedotto Nicolay SpA, subsidiary companies of Acea via Acqua Italia SpA, provide water to around 60% of the population of Genoa and to other neighbouring municipalities, involving a total of around 450,000 inhabitants. They also produce electricity, mainly for internal consumption.

The tables below indicate the main plants of the two companies and the related technical characteristics.

	ADFG	NICOLAY
STAFF EMPLOYED (human resources)	173	58
VALUE OF PRODUCTION (in millions of Euro)	22.6	9.3
NET RESULT FOR THE PERIOD (in millions of Euro)	4.1	1.4

THE AQUEDUCTS IN FIGURES (2004)

	ADFG	NICOLAY
WATER PIPES (km)	489	287
ELECTRICITY PRODUCED (GWh)	22.00	6.67

MAIN PLANTS

Artificial lakes		Capacity (Mm^3)
GORZENTE LAKES (LUNGO, LAVEZZE AND BADANA)	ADFG	12.5
LAKE OF LAVAGNINA	ADFG	2.7
LAKE OF BUSALLETTA	NICOLAY	4.5

Wells		Production (Mm^3 / per year)
CAMPI AND TORBELLA	ADFG	4
PIETRA	ADFG	10.4
VOLTRI	NICOLAY	1.5
CASELLA	NICOLAY	0.8

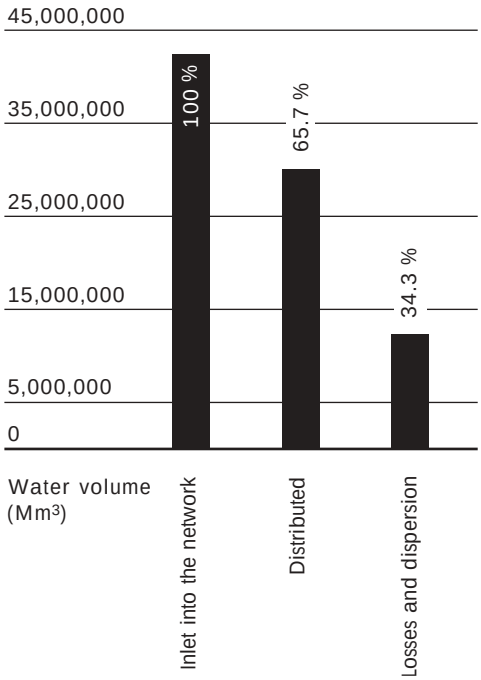
Catchment basins		Offtake water (Mm^3 / per year)
BUSALLA – SCRIVIA MOUNTAIN RIVER	NICOLAY	7.3
VOLTRI – LEIRA AND CERUSA MOUNTAIN RIVERS	ADFG	11.7

Drinking water plants		Capacity (litres / per second)
ISOVERDE	ADFG	900
VOLTRI	ADFG	700
MIGNANEGO	NICOLAY	900

2004 ENVIRONMENTAL ACCOUNTS - ACQUEDOTTO DE FERRARI GALLIERA

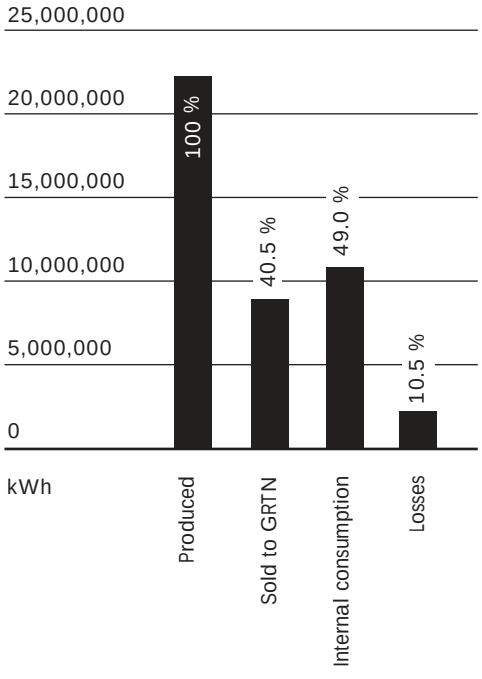
WATER BALANCE

Total inlet into the network: 42,766,097 m³



ELECTRICITY BALANCE

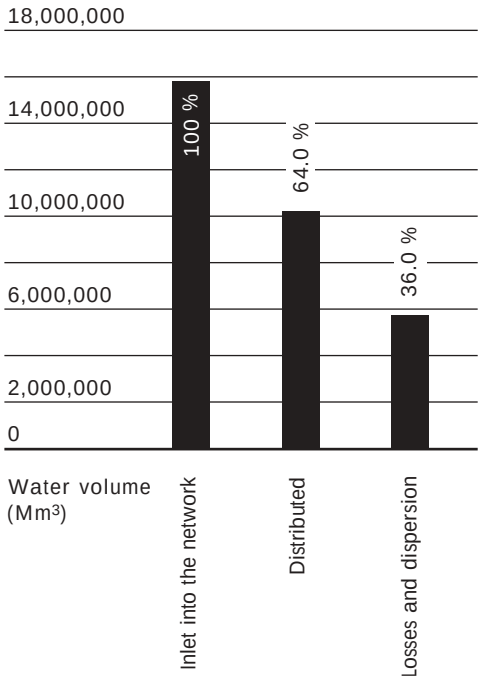
Total produced: 22,003,200 kWh



2004 ENVIRONMENTAL ACCOUNTS - ACQUEDOTTO NICOLAY

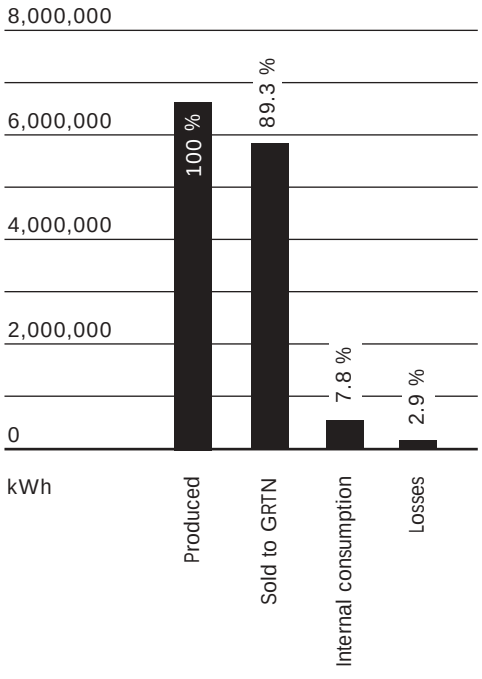
WATER BALANCE

Total inlet into the network: 15,960,000 m³



ELECTRICITY BALANCE

Total produced: 6,669,496 kWh



LaboratoRI
Lab services Research Innovation
Gruppo Acea

LaboratoRI SpA is an Acea Group company active in the sector of laboratory, research and consultancy services, associated with environmental matters and the entire water cycle: from protection of the water resources to optimization of their use. It performs its services both within the Group and on behalf of third parties.

As from October 2003, Acea SpA's business segment dedicated to the planning and supervision of works was merged with LaboratoRI; this business segment sees to the works necessary for the management of the integrated water cycle as well as providing specialist services in the geological-geo-technical field, and with regards to hydraulic and structural engineering.

The Analysis Laboratory Unit operates under the quality standard system by means of a system certified in accordance with the UNI EN 17025 standard.
The Planning Unit and the Construction Unit operate under quality standards certified in accordance with the UNI EN ISO 9000 international standards.
As from 1 October 2004, the transfer took place from Acea SpA to LaboratoRI of the business segment pertaining to the analytical and technical services of the commodity chemical laboratory provided by Acea SpA's services and technologies division.

STAFF EMPLOYED	114 human resources
VALUE OF PRODUCTION	Euro 12.9 million
NET RESULT FOR THE PERIOD	Euro 1.1 million

The laboratory can also claim the following acknowledgements:

› validation of the Experimental Institute for the Nutrition of Plants for the analysis carried out on terrain and foliage

› validation of the Experimental Institute for Vegetal Pathology for the analysis carried out on pesticide residues on fruit and vegetable matrixes.

The analytical laboratory activities concern in particular:

› assessments of the supply sources

› analysis of the water, drinking and waste, in the Rome water mains

› analytical assessments of a specialist nature on waste, terrain, contaminated sites, fruit and vegetable products and other matrixes of environmental interest.

During 2004, more than 331,000 analytical assessments were carried out, of which 89% benefiting Acea Ato 2 SpA.

Activities in the research and consultancy sector (in the water area) concerned the various aspects of the entire water cycle: protection of the water resources, optimization of the distribution networks, optimization of the urban waste water and drinking water treatment processes, assessment and reduction of the collateral impacts of the purification plants, sewerage networks (see *Environmental Section, Research*).

Business abroad

Acea has operated abroad in the integrated water service sector for some years now, serving a total of approximately 6.8 million inhabitants in Honduras, Peru, Columbia, the Dominican Republic, Albania and Armenia.

The activities, carried out by special companies created under partnership with local and international partners, have the purpose of improving the service, in situations where it is particularly lacking, with regards to its technical, operational, administrative and commercial aspects, by means of supporting the local water companies or by direct management.

Acea ensures the training of the human resources and the transfer of know-how to the local entrepreneurial class, in view of a progressive withdrawal of its presence.
A diagram is presented below which illustrates the main features of the companies and their mission in the countries they operate in; initiatives of social and environmental importance are also indicated, bearing witness to Acea's commitment towards sustainable growth, irrespective of the legislative and contractual regulations.

WATER SERVICES ABROAD

COUNTRY	ALBANIA	ARMENIA	PERU	HONDURAS	DOMINICAN REPUBLIC	COLUMBIA
COMPANY	Tirana Acque Scarl	Acea & Co. Armenian Utility Scarl	Consorcio Agua Azul SA	Aguas De San Pedro SA	Acea Dominicana SA – Consorcio Acea-Tradexo SA	Aguazul Bogotà SA ESP
PROJECT	Technical assistance provided to the Tirana water company	Management Contract for the supply of water and sewerage services	BOT (Build, Operate and Transfer) management of the drinking water supply using the River Chillón	Management of the integrated water service for the city of San Pedro de Sula	Commercial management of the water service	Commercial management of the water service, running and maintenance of the distribution network
AREA	Tirana and neighbouring areas	Yerevan	North of Lima (Cono Norte)	San Pedro Sula	Area north and east of Santo Domingo	Bogotà, Zones 2 and 5 d
INHABITANTS SERVED	650,000	900,000	750,000	500,000	1,500.000	2,500,000
CUSTOMER	Tirana Water Supply and Sewerage Enterprise (TWSE)	Yerevan Water and Sewerage Company (YWSC)	Sedapal (State-owned drinking water and sewerage service of Lima)	Municipal authority	Corporación de Acueducto y Alcantarillado de Santo Domingo (CAASD)	Empresa de Acueducto y Alcantarillado de Bogotà (EAAB)
SOURCE OF FUNDING	Foreign Office (Cooperazione italiana allo sviluppo)	World Bank (IDA)	Shareholders' equity and bonds issued on the Peruvian market	Shareholders' equity and loans from merchant banks	Shareholders' equity and loans from Acea SpA	Shareholders' equity and bank loan
PROJECT START– CONTRACT END DATE	10 Dec. 2001 10 Dec. 2005	1 May 2000 30 April 2005	7 April 2000 18 June 2027	1 February 2001 1 February 2031	1 October 2003 1 October 2010	2 January 2003 31 Dec. 2007
PARTNERS (AS OF 31 DEC. 2004)	Amga SpA 50% Acea SpA 40% Gorgovivo Multiservizi SpA 10%	Acea SpA 55% C. Lotti & Associati 25% WRC Plc 20%	Acea SpA 45% Impregilo International Infrastructure N.V. 45% Inversiones Liquidas SAC 10%	Acea SpA 31% Agac SpA 30% Astaldi SpA 15% Ghella SpA 15% Terra SA 5% C.Lotti & Associati 4%	Acea SpA 100%	Acea SpA 51% Gruppo Emdepa 29% Gruppo Hydros 20%
EMPLOYEES (AS OF 31 DEC. 2004)	8 The company assisted has around 1,100 employees)	38 consultants (the company managed has around 1,600 employees)	29	392	111	413
2004 TURNOVER (in thousands of Euro)	3,400	910	8,615	8,381	1,676	6,470

WATER SERVICES ABROAD

COMPANY	PROJECT, STAGE OF COMPLETION OF WORK AND OPERATIONS IN 2004	EVENTS OF SOCIAL-ENVIRONMENTAL IMPORTANCE
TIRANA ACQUE SCARL	Tirana Acque provides technical assistance to the water company serving Tirana and neighbouring municipalities, with the aim of reorganizing the company itself and transferring the know-how which will permit it to provide services according to rising standards as well as acquire financial independence. Specifically, the following are anticipated: support for the restructuring of the commercial and administrative areas, technical activities aimed at improving the functioning of the plants and networks, restoration of the buildings, warehouses and company workshops. During 2004, a computerized information system in Albanian started to operate for sales management; the renovation of the company's head offices was completed and projects were drawn up for measures to renovate and upgrade water plants and sewerage networks, which will be achieved thanks to the funds of Cooperazione Italiana.	An improvement has been recorded in the sales activities and dealings with the users, thanks to the greater accuracy of the invoice calculation and print-out activities. A survey and an objective assessment is anticipated of the results achieved after the completion of a number of invoicing cycles. Priority measures have been planned aimed at ensuring the safety of the staff; improving the quality of the water distributed (reducing the health risks for the population); increasing the efficiency of the networks and plants (limiting the wastage of water and energy resources and the related costs).
ACEA & CO. ARMENIAN UTILITY SCARL	Acea & Co. Armenian Utility is responsible for the management of the Yerevan water company, for whom it carries out general management duties, seeing to the administration of the company and its staff, the handling of the customers and the water and sewerage plants, as well as the restoration of the same by means of the management of a Work Bank loan totalling US$ 25 million. In April 2004, an Addendum to the contract was entered into, extending it for another year (until April 2005).	The objective of a considerable decrease in the water produced was achieved by means of the use of pumping plants, dropping from 261 million m^3 in the year preceding the start of the project (1999) to 194 million m^3 in the fourth year of activities (2003-2004), thanks to the loss reduction process and the changeover to the gravity transmission system for a considerable part of the water produced. This made it possible to contain the energy consumption by 30% when compared with the start-up year. The supply of the services, on a continual basis, reached 50% of the city, with clear benefits for the population, which at the start of the contract had access to water only during certain hours of the day. Further improvements are expected thanks to the activities for the breakdown into districts of the distribution system which are currently underway.
CONSORCIO AGUA AZUL SA	In accordance with BOT (Built, Operate and Transfer) project procedures, Consorcio Agua Azul has carried out the works necessary for the drinking water supply in the northern area of Lima, by means of the exploitation of the surface and subterranean waters of the River Chillón, and is also responsible for the management of these infrastructures until 2007, when they will be transferred to the Government. Therefore, during 2004 management continued of the plants under full steam. Several measures were also taken to improve the system, involving the installation of seismic alarms in the wells and the implementation of the laboratory for carrying out microbiological analysis.	ISO 9001 standard quality certification was maintained for the production process and an Environmental Management System was created in accordance with ISO 14001 standards, subject to auditing and certification. Both the systems are important instruments for checking the company processes and confirm the commitments towards environmental protection, formulated in the Quality and environmental protection policy.
AGUAS DE SAN PEDRO SA	Aguas de San Pedro (ASP) is the holder of the thirty-year concession for the management of the integrated water system for the city of San Pedro de Sula. The company has launched an important work programme for enhancing and improving the service which foresees the achievement of total coverage of the city, with a	After lengthy negotiation with the trade union, drafting of the new work contract was achieved, involving anticipated wage increases and particular concessions within the sphere of health care, offering the workers better conditions with respect to the average provided by other companies in Honduras.

WATER SERVICES ABROAD

COMPANY	PROJECT, STAGE OF COMPLETION OF WORK AND OPERATIONS IN 2004	EVENTS OF SOCIAL-ENVIRONMENTAL IMPORTANCE
	continual water service, and the accomplishment of works for catchment and for the purification of the sewer drains. During 2004, work continued for optimizing the networks, the area of Los Andes was pressurized and 3 districts identified for detecting losses. In relation to the control of the volumes, the installation of meters with the consumers continued. Work also continued for the construction of networks and plants for supplying outlying areas (particularly the Cofradia district), as well as the enhancement of the capacity of the production and treatment plants (Zapotal plant and drilling of new wells). Finally, the Plan for the collection and treatment of drain water was completed.	All the work carried out in the water sector– from the sewerage systems to the drinking water facilities – had an important and positive impact on health and environmental conditions, as well as on improving the living conditions of the citizens. So as to raise awareness of its activities and improve the relationship with the people of the city, Aguas de San Pedro has put together a information campaign targeted at the citizens, which will be disclosed via the main media. As far as significant environmental events were concerned, it should be pointed out that in 2004 energy consumption fell (23 GWh), involving a significant reduction in specific consumption from 0.33 kWh/m^3 in 2003 to 0.29 kWh/m^3 in 2004. In conclusion, an important project was developed and approved for the forestation of an area of the water reserve; this project will be launched in 2005. (EN27)
ACEA DOMINICANA SA	Acea Dominicana handles the commercial management of the water service users in the northern and eastern areas of Santo Domingo on behalf of CAASD, the water company for the Dominican capital. The activities include the management of the billing cycle, customer relations, and the installation of meters. The project represents one of the first experiments for private participation in the water services of the Republic. Overall, the operating results for 2004 were positive (the efficiency ratio for commercial operations – amounts collected/billed net of default positions- rose from 51.24% to 58.07%), taking into consideration the current situation of the water services, objectively wanting, and the initial more or less total lack of meters in the area managed. In June 2004, an addendum to the contract was signed, extending the duration from 4 to 7 years.	Scant quality of the water service is present in the country as a consequence of both technical-economic and social-cultural problems; specifically, the population still fails to perceive the importance of paying for the service offered, this being an instrument necessary for improving the quality of the same. Acea Domenicana, therefore, is seeking to raise awareness of the importance of a rational use of the resources and of the payment of the service, by means of information campaigns: during 2004, activities were carried out at primary schools targeted at education on the rational use of the water resource by means of theory lessons and interactive games, which have met with significant interest shown by parents and teachers.
AGUAZUL BOGOTÁ SA ESP	Aguazul Bogotá carries out activities for customer handling and management of the distribution networks in two areas of Bogotà on behalf of the EAAB, the Colombian capital's water company. The activities cover the management of the entire billing cycle, customer care activities including the call centre, the running and maintenance of the water mains, emergency service, loss detection, quality control and technical consultancy. The contract with EAAB anticipates the achievement of service standards, assessed by means of operating ratios which involve bonuses or penalties in addition to the basic fee.	"Community management" activities, or rather customer care activities oriented towards the needs of the poorer classes of the population served, assume increasingly greater importance. Other initiatives also fall under such care, organized jointly by the Municipal Authority and Aguazul in various districts of the city, in order to respond to the problems of the users and raise the awareness of the population in relation to matters of an environmental and health-sanitary nature (correct maintenance of the domestic tanks, functioning of the sewerage system). Encounters have been held with the citizens partly for the purpose of presenting EAAB's tariff policy, illustrating the new bill for the water service, which has undergone a number of improvements, and rendering the information more transparent. Attention was paid to raising the awareness of the younger citizens, by means of the organization of encounters within schools on the importance of the water resource and on the illustration of the water cycle. The company has implemented the Quality System, thereby achieving, in November 2004, ISO 9001:2000 quality certification.

Glossary

Aluminium polychloride Aln(OH)m Cl_3n-m
Chemical substance used in the flocculation process for the purposes of rendering water drinkable.

Aluminium sulphate $Al_2(SO_4)_3$
Chemical substance used in the flocculation process for the purification of water.

Ash particles
Solid residue of combustion mainly made up of unburnt hydrocarbons and inert materials (metals and other non-combustible products).

Bathometric
Term which refers to the depth of a body of water (sea or lake).

BOD (Biological Oxygen Demand)
This indicates the biodegradable organic substance content present in the water sluices. Expressed in terms of quantity of oxygen necessary for the decay by micro-organisms in a test lasting five days (BOD_5). The parameter represents an indicator of the possible reduction of the concentration of oxygen dissolved in the catchment water bodies of the sluices having consequent negative effects on the environment.

BTZ
Fuel oil with low sulphur content (< 0.05%).

Calorific heat
Heat produced by a unit of fuel.

Carbon
Chemical element, whose symbol is C, fundamental constituent of vegetable and animal organisms. It is at the basis of organic chemistry, also known as "carbon chemistry". It is widespread throughout nature, but not abundant. In element form, it is found as graphite and diamond. In the atmosphere it is present as carbon dioxide, deriving from combustion processes, as well as from volcanism phenomenon. A carbon isotope exists, C14, which is radioactive and is used, due to its specific characteristics, for analytical (dating) and scientific purposes as a "tracer" for the study of complex chemical processes.

Carbon dioxide
See CO_2.

Catalytic muffler
Complex device for treating the exhaust fumes of an engine, comprising an initial phase for the catalytic oxidation of carbon monoxide and unburnt hydrocarbons, which are converted into carbon dioxide and water vapour, followed by a phase for the catalytic fission of the nitric oxides into oxygen and nitrogen. This device permits an average reduction in the pollutant emissions of around 65-80%. Its adoption has led to significant improvements in the air quality in urban environments.

Catchment body
Reservoir, basin or surface/subterranean water course into which the waste water is made to flow.

Centrifuge
Apparatus for the separation of the dry fraction in purification sludge from the liquid portion.

Chemicals
Chemical products.

Chemical Oxygen Demand (COD)
The COD measures the quantity of oxygen utilized for the oxidation (oxidation reduction) of organic and inorganic substances contained in a sample of water following treatment with compounds with a strong oxidating power. This parameter, like BOD, is mainly used for estimating the organic content and therefore the potential level of pollution of the natural and sluice waters. A high COD value of sluice water involves a reduction of the oxygen dissolved in the catchment body of water and therefore a reduction in the self-purification capacity and the ability to sustain life forms.

CO
Carbon monoxide, gas produced from an imperfect oxidation of a fuel containing carbon. It counteracts the oxygen at lung level, taking up the haemoglobin contained in the red corpuscles and therefore

preventing the correct oxygenation of the tissue.

CO_2
Carbon dioxide, gas produced by all the processes for the combustion of derived fuels and fossil fuels as well as by natural processes. It contributes towards the formation of the greenhouse effect.

COD
See Chemical Oxygen Demand.

Co-generation
Associated production of electricity and heat within a thermoelectric power station, where the steam exiting the turbine is sent to various consumers, civil or industrial, both as it is and as hot water, after condensation. This technique is characterized by elevated thermodynamic efficiency and its utilization is being developed both in the industrial and civil sectors.

Combined cycle
Technology for the production of electricity from fossil fuels by means of thermal cycle plants. It makes it possible to obtain a considerable energy saving and at the same time an improvement in the atmospheric emissions. In general, the combined cycle plant for the production of electricity comprises the coupling of one or more gas powered turbines with a steam turbine.

Combustion
Reaction of organic substances with oxygen. It mainly produces carbon oxides (CO and CO_2), water vapour and thermal energy.

Corporate governance
A series of regulations on the basis of which companies are managed and supervised.

Data Warehouse
Collection of data directed at the management of a process, integrated, non-volatile and non-dependent on time.

Disinfection
The series of physical, chemical or mechanical operations, aimed at destroying pathogenic organisms.

Distribution network
Series of cables, pipelines, plants for the supply of electricity, heat and water to customers.

District heating
Heating of a vast urban area by means of the distribution of hot water or steam within a network of pipes belonging to a single natural or artificial heat source.

DLN (Dry Low NO_x)
Dry process system for reducing nitric oxides (NO_x). Its role is based on the premixing of the fuel with comburant air before entering the combustion chamber, thereby producing a reduction in the average flame temperature and as a consequence the reduction of the formation of nitric oxides.

Drying (System)
Equipment utilized in order to reduce the humidity of the purification sludge to values of around 5% in weight. The purpose of the treatment is to reduce the final volume of the sludge to be disposed of, thermally stabilizing it, partly due to the more or less complete absence of water, so as to render it utilizable for farming or as fuel in special plants equipped for the production of thermal energy or electricity.

Dust separator
System for eliminating the dust/powder present in combustion fumes.

Electric and magnetic fields
Effects produced on the surrounding environment by electricity lines and equipment where a voltage is applied (electric field) or through which a current passes (magnetic field).

Electric line
Element comprising the electricity network. It is made up of the conductors for the transport of the electricity from one point to another together with the related supports

(trestlework, pylons or other, depending on the case). They can be overhead (with conductors which are normally bare, sometimes insulated) or buried (cable). It comprises one or more circuits of conductors.

Electric station
Part of the plant of the primary electricity distribution network assigned to transform the voltage from HV to MV. It is also know as the "primary sub-station".

Electrical precipitator
Dust separator functioning in accordance with the principle of the electrostatic attraction of the dust/powders on special electrically charged plates.

Electricity distribution
Final stage of the activities of an electricity system. It uses high voltage electric lines (primary distribution) and medium and low voltage electric lines (secondary distribution). The latter involves the delivery to the consumer base.

EMAS
On 19 March 2001, the European Community issued Regulation No. 761/2001 EMAS concerning the voluntary participation of industrial companies in an eco-management and audit system. The Regulation anticipates that the companies participating adopt, at their production sites, environmental management systems based on policies, programs, procedures and objectives for improving the environment and that they publish an environmental statement (a genuine site-related environmental report). For the purposes of the registration of the site in the specific register held by the European Commission, the EMAS Regulation anticipates that the environmental statement be validated by an auditor, accredited by a competent national Body; in Italy, this body is the Committee for the Ecolabel (Ecolabelling) and the Ecoaudit which avails itself of the support of the ANPA. This environmental certification stands alongside other international standards on the subject such as the norms of the ISO 14000 and BS 7750 series and, especially in Germany, it has met with considerable success as far as company participation and the number of auditors accredited is concerned.

Emission
Discharge of substances (solid, liquid or gaseous) into the environment produced by human activities. In the case of the thermoelectric power stations, these are combustion products. The emissions relating to each kWh produced are called specific.

Environmental costs
Reduction in the level of collective well-being due to the impact on the environment of a project. The term is also commonly used simply in order to indicate a deterioration relating to one or more environmental components.

Environmental Management System
The part of the general management system which comprises the organizational structure, the planning activities, the responsibilities, the general rules, the procedures, the processes, the resources for drawing up, setting in motion, achieving, re-examining and keeping the environmental policy active (ISO 14001).

Environmental Policy
The lines of policy (usually written and published) which an organized community adopts, in order to positively and coherently deal with their environmental impact problems. Many companies, such as Acea, make the Environmental Policy adopted known by means of publication in a social-environmental report.

Ferric chloride ($FeCl_3$)
Chemical substance used in the flocculation process for the purification of water.

Flocculation
Coagulation phase, during which the individual colloidal particles dispersed in the sewage, destabilized by means of the

addition of appropriate substances, thicken and form larger flakes which sediment more quickly.

Fossil fuels
The result of the transformation of organic materials found in the subsoil. Fossil fuels include carbon, petroleum and its derivatives (fuel oil, diesel, etc.), and natural gas.

Fuel oil
Heavy products from the distillation of petroleum, used as fuel in the thermoelectric plants.

Global Reporting Initiative
The *Global Reporting Initiative* was set up in England in 1997 by the Coalition for Environmentally Responsible Economies (CERES). It became an independent, official centre in 2002 so as to provide support to the United Nations Environmental Program (UNEP) and now collaborates on the project entitled Global Compact organized by the United Nation's Secretary General, Kofi Annan. The *GRI Guidelines* are illustrated on the website www.globalreporting.org.

Greenhouse effect
Overheating of the atmosphere due to the presence of particular gases which, transparent to the incident solar radiation, do not permit the dispersion of the radiation originating from the earth. The main greenhouse gas is water vapour, which alone heats the terrestrial atmosphere up to nearly 30 °C, followed in order of importance by carbon dioxide, methane, certain nitric oxides, ozone and other trace compounds.

Greenhouse gas
A gas which contributes towards the greenhouse effect; in addition to the greenhouse gases of natural origin, the main human-produced greenhouse gases are carbon dioxide (CO_2), methane (CH_4), sulphuric hexafluoride (SF_6), the chlorofluorocarbons (CFCs) and nitrous oxide (N_2O).

Green Pricing
Tariff option offered to end consumers willing to pay a small additional cost for green power consumed, with the aim of encouraging the development of new renewable sources generation plants.

Gross electricity produced
Electricity gauged at the terminals of the electricity generators of the production plant.

GRTN
The Operator of the National Transmission Grid (GRTN) is a joint-stock company, established under Italian Legislation Decree No. 79 dated 16 March 1999 and operative since 1 April 2000 (Ministerial Decree dated 21 January 2000), having arisen within the sphere of the re-organization of the electricity system. The activities of the GRTN concern the transmission of electricity on the high and extremely high voltage networks, whose management is entrusted to the company operating under concession (Ministerial Decree dated 17 July 2000), as well as the dispatch, an activity which co-ordinates the running of the production plants, the national transmission grid (and the associated networks) and the ancillary services of the electricity system.

Hardness (of water)
This is the sum of the salt content of Ca and Mg, expressed as $CaCO_3$, stoichiometrically equivalent. A French degree (°F) corresponds to 10 mg of $CaCO_3$.

Hazardous waste
Pursuant to Italian Legislative Decree No. 22 dated 5 February 1997 (Ronchi Decree) hazardous waste comprises the material identified in a specific list attached to said decree. Therefore the classification of toxic or harmful waste anticipated by the previous legislation (Italian Presidential Decree No. 915/88) is outdated, having been based on the content matter of the waste to be determined as harmful substances, individuated by technical provisions. By means of the new criteria, complaint with

EC norms, the types of waste included on the afore-mentioned list are qualified as hazardous irrespective of the effective features of respective riskiness.

Hertz (Hz)
Unit for measuring frequency.

HV
High voltage

Hydroelectric basin
Weekly or daily modulation basin, with a filling (or flooding) duration of less than 400 and greater than 2 hours. In practice, the terms "basin", "tank" and "reservoir" are used without distinction (also see run-of-river water).

Hydroelectric power station
Plant which converts the kinetic energy of water into electricity.

Indicators
Qualitative and quantitative values which make it possible to correlate the most significant effects on the environment and the activities carried out by the company, making it possible to obtain the trend in the values monitored.

ISO 14000 (International Standardization Organization)
In September 1996, the ISO published a series of norms on environmental management and others, relating to the procedures for evaluating the life cycle, are undergoing preparation. These standards now represent the most advanced international benchmark for companies who wish to endow themselves with Environmental Management Systems for their production activities. Today, many companies request certification of their industrial sites in accordance with the ISO 14000 standards.

Joules
Unit for measuring energy.
109 Joules (1 GJoule) correspond to around 277.7 kWh.

Kilowatt-hour (kWh)
Unit of measurement for electricity produced or consumed equating to the energy produced or consumed in 1 hour at the capacity of 1 kW. 1 kWh corresponds to around 3.6 106 Joules (3.6 MJoules).

kW
Kilowatt: unit for measuring power:
1 kW = 1,000 W. = 1,000 Joule/s

kWh
See Kilowatt-hour.

Life Cycle Assessment (LCA)
This is the method which makes it possible to assess the overall environmental impact of a product, taking into consideration the entire life cycle, starting off from the activities relating to the extraction and the treatment of the raw materials, to the manufacturing processes, transport, distribution, use, recycling and re-utilization and the end disposal.

Light flux
Quantity of light energy emitted into space by a source during a unit of time; its unit of measurement is the lumen.

Lighting efficiency
Ratio between the flux emitted by the light source and the energy used for obtaining said flux (lumen/kWh). It expresses the energy saving with regards to the various types of lamps.

Logistics
The series of structures and the organization which ensure the handling and the distribution of the products.

Long-distance power line
Series of conductors and supports (trestlework, pylons) for the transport of electricity. They can be overhead or underground.

Lumen
Unit for measuring the light flux: energy radiated each second by a light source, with reference to the spectral sensitivity

relating to the human eye. The light flux emitted by a source can be measured under laboratory conditions by means of an instrument known as an “integrating photometer” or an “Ulbricht sphere”.

LV
Low voltage.

Market Operator
The joint-stock company formed by the Network Operator (GRTN) which is entrusted with the economic management of the energy market, a market established in 2004 in order to regulate the purchase and sale of energy on the de-regulated market.

Monitoring
A series of activities carried out over time, for the purpose of quantifying the parameters which indicate the environmental quality (of the air, the bodies of water, the subsoil, for example).

MV
Medium voltage.

MVA
Megavolt-ampere. Unit for measuring the apparent electrical output.

MW
Megawatt: 1 MW = 1,000 kW.

MWh
Megawatt-hour: 1 MWh = 1,000 kWh.

Natural gas
From a geological point of view, it represents the gaseous stage of petroleum; it is mainly made up of methane (from 88% to 98%) while the remainder comprises hydrocarbons such as ethane, propane, butane, etc.

Net electricity produced
Electricity gauged in correspondence with the introduction onto the network, less in other words the energy absorbed by the auxiliary machines necessary for the running of the plant itself and that lost in the transformers necessary for raising the voltage to the network value.

Network losses
Electrical: consequence of the resistance opposing the flow of the electrical current of the network. As a result of the losses, the electricity to be made available to the network (electricity demand) is greater than the consumption of the end users. The losses are commonly expressed in absolute terms or as a percentage of the electricity demand.
Water: physical leakages which take place in the man-made structures and in the tunnels, or at the time of pipe bursts.

Nitric oxides
See NO_x.

Nm_3
1 Normal m^3 is 1 m^3 measured at 0° C at atmospheric pressure (1 atm).

NO_x (Nitric oxides)
The nitric oxides are oxygenated compounds of nitrogen in gas form. The oxide NO is formed by means of a secondary reaction in combustion at high temperatures: it is subsequently transformed into NO_2 (the most aggressive oxide) by means of photochemical oxidation and into N_2O_5 which, absorbed by the atmospheric humidity, becomes nitric acid. The nitric oxides can affect the respiratory tracts in synergy with other gases and participate as "precursors" for the formation of photochemical oxidants (ozone, organic peroxides). After sulphur dioxide, they are the most widespread and aggressive atmospheric pollutants and as such give rise to so-called "acid rain".

Noise
Energy in the form of sound waves, capable of determining a physical disturbance in the propagation medium perceivable by man and animals.

Non-hazardous waste
Pursuant to Italian Legislative Decree No.

22 dated 5 February 1997, non-hazardous waste comprises that which is not included on the special list attached to said Decree.

Offtake works
Hydraulic works carried out on water courses which permit the withdrawal of water flows for industrial, irrigation or drinking purposes.

Oxidation-reduction
In chemistry, this is the definition of the reaction (known as redox) during which, by means of the transfer of electrons from one atom to another, that which receives them (oxidant agents) acquires negative charges and is reduced, while that which losses them (reducing agents) acquires positive charges and is oxidized. In biochemistry, the theory of oxidation-reduction explains the internal respiration process, or rather the intracellular oxidation mechanism for the fission products of foods, as sources of energy for living organisms.

Oxygen (O_2)
An extremely widespread element on land surface areas (40%, between minerals and water) and in the atmosphere (approximately 20%) where it is present as a biatomic gaseous molecule (O_2). It is a colourless and odourless gas, a little heavier than air. It is extremely reactive and responsible for the extremely slow oxidation processes of the most common metals, the relatively slow combustion in biological processes (respiration) and the rapid oxidation of hydrocarbons (combustion), also with an explosive course (detonation). All the organic, solid or liquid compounds undergo a global ageing process at room temperature, with a decline of the properties, of which oxidation is a crucial initial stage. The complete oxidation (or combustion) of a hydrocarbon produces carbon dioxide and water; if the process is partial, carbon monoxide is formed which is an extremely toxic gas.

Ozone (O_3)
Molecule produced in the lower layers of the atmosphere by the photochemical reactions (with sunlight) of NOx with unburnt hydrocarbons; it may damage the cellular membrane. A natural component of the upper strata of the atmosphere, by contrast ,ozone protects the earth from solar UV (ultraviolet) radiation. The reduction of this layer may cause damage to the environment and to health.

Particulate
Divided up into:
- extremely small solid particles present in the fumes from combustion plants powered by carbon or fuel oil;
- carbonious particles present in the exhaust fumes of internal combustion engines, especially diesel, due to the incomplete combustion of the fuel.

PCB (Polychlorobifenile)
Insulating liquid used in electrical equipment (transformers) progressively being eliminated from the production cycle since it is dangerous to health and the environment.

pH
Unit for measuring the acidity of a substance. (E. g: for liquids, neutral solutions have a pH of 7. Acidity is maximum with a pH = 0. Alkalinity is maximum with a pH = 14).

Photochemical oxidants
Chemical compounds which, as a result of light action, are able to encourage an oxidation reaction.

Pollutant
A substance which, once emitted into the environment, may change the related chemical, physical and biological features, involving a potential risk for human health and the environment itself.

Polyelectrolytes
Polymers which in water act as thickening agents vis-à-vis the colloidal dispersions, due to their chemical nature characterized by a succession of electrically active sites within the basis molecule.

Power
Work carried out within the unit of time.

ppm
Part per million, unit for measuring concentration.

Precautionary principle
Article 3 of the *UN Framework Convention on Climate Change*: «The Parties will have to adopt the precautionary measures for anticipating, preventing or minimizing the causes of the climatic change and mitigate the negative effects. In the presence of the danger of serious and irreversible damages, the lack of full scientific certainty should not be utilized as a reason for deferring said measures, considering that the polices and the measures relating to the climatic change will have to be cost-effective in order to ensure global benefits at the lowest possible cost».

Prevention
The array of provisions and measures – anticipated and adopted in all the phases of the production activities – targeted at avoiding or reducing the risks for the environment and for the health of the workers and the population.

Production (of electricity)
Initial phase of the activities of an electricity system. Comprising the transformation of the primary energy sources into electricity within the electricity power stations. Depending on the primary energy source, production adopts the appellation of thermoelectric (utilizing fossil fuels), hydroelectric (using water heads obtained by means of offtaking of the water courses), or photovoltaic (using the energy of the sun converted into electricity thanks to the photovoltaic effect).

Purification
A series of artificial treatments which makes it possible to fully or partially eliminate pollutants from the water. Numerous purification treatments exist and their use depends on the characteristics of the water to be purified and the degree of purification wished to be achieved. The purification plants can differ, in accordance with the running processes on which they are based, between physical, chemical-physical and biological.

Purification for drinking purposes
This comprises all the treatments (clarification, filtration, disinfection and correction) aimed at making the water drinkable, in other words making it utilizable for alimentary purposes, thereby avoiding any danger to health.

Reactant
Substance which enters into a chemical reaction.

Receiver
High voltage electricity sorting plant.

Reservoir
Volume of water equating to the available capacity of a basin or hydroelectric tank. By abstraction, the same basin or tank.

Run-of-river water (powering hydroelectric plants)
Hydroelectric plant with basin or without basin which has a filling (or flooding) duration less than or equal to two hours.

Sedimentation
A process involving the depositing of solid material transported in suspended form by water or wind. Sedimentary rocks derive from this process. When water is being purified, sedimentation is an operation by means of which the solid substances suspended in a liquid are deposited on the bottom of a suitable recipient, thanks to the force of gravity.

Self-purifying ability
Ability of a body of water or land to purify itself of pollutant substances in a natural way (for example petroleum, chemical products, etc.) by means of biological processes such as bacterial metabolism, aerobic or anaerobic in type.

Sodium hypochlorite (NaClO)
Chemical substance utilized in the disinfection process for the purification and/or treatment of the water for drinking purposes.

Soundproofing
Operation by means of which steps are taken to acoustically insulate a location.

Specific consumption
Ratio between the energy of the primary sources utilized in an electricity power station and the corresponding electricity produced. It is the opposite of the output.

Sulphur dioxide
SO_2, gas from the oxidation of sulphur, also produced by burning fossil fuels containing sulphur.

Sulphuric hexafluoride
Non-flammable and chemically stable gas (SF_6) used both as insulating material and for the extinction of electric arcs in high and medium voltage electrical equipment.

Sulphuric oxides (SO_x)
The emissions of sulphuric oxides, mainly comprising sulphur dioxide (SO_2), are mainly the result of the use of solid and liquid fuels and are correlated to the sulphur content of the latter. The sulphuric oxides are typical pollutants of urban and industrial areas, where the elevated intensity of the installations favours their accumulation, especially under unfavourable weather conditions. The most serious situations are present in winter periods when household heating joins the other sources of emissions. They give rise to so-called "acid rain".

Tep
Equivalent tons of petroleum: conventional energy unit equivalent to 10 million kcals, used for expressing any source of heat on the basis of the calorific value.

Tesla
Unit for measuring the intensity of a magnetic component of the field. 1 T (tesla) = 10,000 G (gauss).

Thermoelectric power station
Installation which converts energy from the combustion of fossil, solid, liquid and gaseous fuels into electricity.

TJoules
Unit for measuring energy, corresponding to 1012 Joule.

Total Suspended Solids (TSS)
Material, of any kind, in suspended form. The presence of suspended solids beyond certain limits alters the normal transparency of the water.

Transformer
Static electricity machine which raises or lowers the electricity voltage.

Transmission
Intermediate phase of the activities of an electricity system. It involves the transport of the electricity over large distances (from the production plants to the points of consumption) utilizing lines with the highest levels of voltage (essentially 380 and 220 kV).

Turbine
Motive machine capable of transforming energy of another type into mechanical energy made available on a rotating axis; depending on the fluid, the categories can be:
- gas turbines when the fluid is a gas or a gas mixture (for example: combustion fumes)
- steam turbines when the fluid is steam (typically water vapour)
- hydraulic turbines when the fluid is water.

Turbogas
Term used to indicate a gas turbine.

Turnover
The term indicates the speed at which the company's staff is turned over.

TWh
Terawatt-hour: 1 TWh = 1,000 GWh = 1,000,000 MWh = 1,000,000,000 kWh.

Urban waste water
Domestic waste water or mixture of civil waste water, industrial waste water or meteoric washout water.

Voltage (electricity)
Electric potential difference measured in volts between two conducting bodies or two points of a conductor.

Waste
Italian Legislative Decree No. 22 dated 5 February 1997 defines waste as «substances and objects falling within certain categories which the holder gets rid of or has decided to or is obliged to get rid of». Said Legislative Decree classifies waste, according to its origin, as urban or special and, according to the features of riskiness, as hazardous or non-hazardous.

Water purification sludge
This is the main product emerging from the purification of water, originated by the physical, chemical-physical and biological type treatments. When they derive from the purification treatment of household and/or urban waste water they are characterized by a considerable tendency towards anaerobic fermentation, giving rise to the emission of smelly substances.

Wave length
Distance travelled by an electromagnetic wave in a given period.

Acea
2004 Sustainability Report

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October 2005

Italian edition printed in September 2005
on 100% recycled ecological
Cyclus offset paper

cd rom attached to 2004 Sustainability Report

Environmental Accounts
Company fact sheets: Italy – Abroad
Glossary

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