

The challenges of the environment

KPI	UM	2010	2009	2008	2010-2009	%	Boundary
ENVIRONMENTAL MANAGEMENT							
EN30							
Research and innovation							
Technological innovation ⁽¹⁾	(mil Euro)	68.01	73.8	38.9	-5.8	-7.8	Enel
Research personnel	(n.)	184	192	185	-8	-4.2	Enel
Environmental expense ⁽²⁾							
Environmental expense	(mil Euro)	773	589	564	184	31.2	Enel
Total current expense	(mil Euro)	420	395	413	25	6.2	Enel
Total environmental investment	(mil Euro)	353	194	151	159	82.2	Enel
Personnel dedicated to environmental issues	(n.)	550	433	391	117	26.9	Enel
EN28							
Environmental litigation							
Environmental proceedings as defendant	(n.)	1,295	287	213	1,008	351.2	Enel ⁽¹⁰⁾
Monetary value of environmental fines	(mil Euro)	0.058	0.06	-	-0.002	-3.3	Enel
Non-monetary environmental penalties	(n.)	52	44	47	8.0	18.2	Enel
EN14							
Environmental certification							
Extent of EMAS registration coverage	(%)	38.3	40.3	40.8	-2.0	-5.0	Enel
Extent of ISO 14001 coverage	(%)	82.7	81.4	77.6	1.3	1.6	Enel
Safety systems							
Inspections on oil tankers	(%)	100	100	100	-	-	Enel
Inspections on coal freighters	(%)	100	100	100	-	-	Enel
ENVIRONMENTAL PERFORMANCE							
EN3							
Total fuel consumption							
Total fossil-fuel consumption (excluding biomass, RDF, biodiesel, and biogas)	(Mtoe)	36.1	37.1	33.2	-1.0	-2.7	Enel
Coal	(Mtoe)	15.6	16.9	14.5	-1.3	-7.8	Enel
Lignite	(Mtoe)	2.1	2	2.1	0.1	6.0	Enel
Fuel oil	(Mtoe)	2.6	3.1	2.9	-0.5	-16.3	Enel
Natural gas	(Mtoe)	13.9	12.9	11.9	1	7.9	Enel
Gas oil	(Mtoe)	1.7	2	1.6	-0.3	-16.6	Enel
Biomass, refuse, and hydrogen for thermal production	(,000 toe)	213.4	198.9	142	14.6	7.3	Enel
Other (orimulsion + cokery gas + oil coke)	(Mtoe)	0.001	-	-	0.001	--	Enel
Breakdown of fossil-fuel consumption							
Coal	(%)	43.4	45.7	44	-2.4	-5.2	Enel
Lignite	(%)	5.9	5.5	6.4	0.5	9.0	Enel
Fuel oil	(%)	7.3	8.5	8.8	-1.2	-13.9	Enel
Natural gas	(%)	38.8	34.9	35.9	3.9	11.2	Enel
Gas oil	(%)	4.6	5.4	4.9	-0.8	0.5	Enel

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EN4							
Internal energy consumption							
Electricity consumption for civil uses	(MWh)	155,268	159,704	126,602	-4,436	-2.8	Enel
Other consumption of fuel (for vehicles + internal consumption)	(toe)	29,745	28,336	21,516	1,408	5.0	Enel
EN5							
Efficiency of thermal plants							
Incidence of CCGT power on total thermal	(%)	23	21	21	2	7.9	Enel
Efficiency lignite plants	(%)	31	33	30	-2	-4.9	Enel
Efficiency coal plants	(%)	36	35	35	0.4	1.1	Enel
Efficiency CCGT plants	(%)	48	50	52	-1	-2.7	Enel
Efficiency gas oil plants	(%)	35	34	33	1	2.9	Enel
Efficiency gas plants	(%)	47	31	48	16	51.8	Enel
Average efficiency thermal plants	(%)	39	39	39	0	0.8	Enel
EN16							
Greenhouse-gas emissions							
Total specific emissions of CO ₂ ⁽⁶⁾	(kg/MWh eq.)	389	413	437	-24	-5.7	Enel
Specific emissions of CO ₂ by simple thermal production ⁽⁴⁾	(kg/MWh eq.)	711	741	732	-30	-4.1	Enel
Specific emissions of CO ₂ by co-generation production ⁽⁴⁾	(kg/MWh eq.)	691	691	720	0	0	Enel
Specific emissions of CO ₂ by electricity production ⁽⁸⁾	(mil t)	116.2	122.2	110.6	-6.0	-4.9	Enel
- CO ₂ from vehicles	(.000 t)	73.2	70.1	56.8	3.1	4.4	Enel
- CO ₂ from internal services	(.000 t)	14.9	13.9	7.3	1.0	7.1	Enel
Other greenhouse gases expressed in CO ₂ equivalent (SF ₆ , CH ₄)	(mil t eq.)	0.182	0.177	0.553	0.005	2.7	Enel
Total greenhouse-gas emissions (scope 1)	(mil t eq.)	116.4	122.4	111.2	-6	-4.9	Enel
Emissions avoided ⁽⁹⁾	(mil t)	98.2	98.7	80.1	-0.5	-0.5	Enel
EN20							
Polluting emissions ⁽⁴⁾							
Net specific emissions of SO ₂	(kg/MWh)	1.74	1.71	1.76	0.03	1.8	Enel
Net specific emissions of NO _x	(kg/MWh)	1.52	1.56	1.34	-0.03	-2.0	Enel
Net specific emissions of H ₂ S	(kg/MWh)	1.97	1.98	2.51	-0.02	-0.8	Enel
Specific emissions of flue ash ⁽⁵⁾	(kg/MWh)	0.94	0.77	0.67	0.17	22.7	Enel
Polluting emissions ⁽⁶⁾							
Net specific emissions of SO ₂	(kg/MWh)	0.96	0.98	1.06	-0.02	-2.1	Enel
Net specific emissions of NO _x	(kg/MWh)	0.84	0.88	0.81	-0.04	-4.6	Enel
Specific emissions of flue ash ⁽⁵⁾	(kg/MWh)	0.52	0.44	0.4	0.08	19.3	Enel
Nuclear air emissions							
Noble gases	(GBq per Unit)	23.7	30.6	30.9	-6.9	-22.6	Enel
Iodine	(GBq per Unit)	0.09	0.26	0.16	-0.17	-65.4	Enel
Aerosol	(GBq per Unit)	6.6	18.4	20.1	-11.8	-64.3	Enel

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EN8 - EN10							
Water consumption							
Water requirements for thermal production	(mil m ³)	154.4	171.4	171.3	-17.0	-9.9	Enel
Water requirements for nuclear production	(mil m ³)	215.9	211.2	144.3	4.7	2.2	Enel
Requirements for other industrial uses ⁽³⁾	(mil m ³)	0.1	0.26	0.02	-0.16	-61.5	Enel
Total water requirements for industrial use	(mil m³)	370.4	382.8	315.6	-12.4	-3.2	Enel
Specific requirements for thermal production	(l/kWh)	0.91	0.93	0.91	-0.02	-1.8	Enel
Specific requirements for nuclear production	(l/kWh)	6.33	7.55	6.04	-1.21	-16.1	Enel
Water requirements for industrial use	(mil m³)	370.4	382.8	315.6	-12.4	-3.2	Enel
from rivers	(mil m ³)	307.2	324.4	260.7	-17.3	-5.3	Enel
from wells	(mil m ³)	12.6	12.8	10.1	-0.2	-1.4	Enel
from aqueducts	(mil m ³)	9	10.8	8.9	-1.9	-17.3	Enel
Total withdrawal of internal water	(mil m³)	328.7	348	279.7	-19.3	-5.5	Enel
from the sea, used as is	(mil m ³)	8.3	8.6	13	-0.3	-3.4	Enel
from the sea, desalinated	(mil m ³)	9.7	9.3	7.6	0.4	4.5	Enel
from waste water (share used inside plants)	(mil m ³)	23.7	16.9	15.2	6.8	40.2	Enel
% of recycled and reused water	(%)	6.4	4.4	4.8	2.0	44.9	Enel
EN21							
Waste water							
Waste water (quantity discharged)	(mil m ³)	246.9	255.4	176.1	-8.5	-3.3	Enel
from thermal production	(mil m ³)	79.5	89.4	71.9	-9.9	-11.1	Enel
from nuclear production	(mil m ³)	167.4	165.9	104.2	1.4	0.9	Enel
for storage and handling of fuel oil	(mil m ³)	0.03	0.04	0.03	-0.01	-27.0	Enel
Emissions into water ⁽⁷⁾:							
COD (chemical oxygen demand)	(kg)	592,646	522,726	528,413	69,920	13.4	Enel
BOD (biochemical oxygen demand)	(kg)	155,592	108,787	104,787	46,804	43.0	Enel
Nitrogen	(kg)	375,188	338,421	157,852	36,767	10.9	Enel
Heavy metals	(kg)	128,750	119,452	97,025	9,298	7.8	Enel
Phosphorous	(kg)	26,900	18,958	11,294	7,942	41.9	Enel
Nuclear emissions into water							
Tritium	(GBq per Unit)	71	57.7	58.8	13.3	23.0	Enel
Fission and corrosion products	(GBq per Unit)	9.8	21.7	4.1	-11.9	-54.8	Enel
EN14 - EN29							
Impact on landscape/environment							
LV/MV cable	(%)	61.9	60.4	62.6	1.5	2.5	Enel
LV cable	(%)	78.7	76.2	78	2.5	3.3	Enel
MV cable	(%)	32.5	32.7	34.3	-0.2	-0.6	Enel
EN1							
Resources used in production							
Consumption of fuel for thermal production							
Coal	(mil t)	31.5	32.6	27.9	-1.1	-3.4	Enel
Lignite	(mil t)	11.3	10.2	10.7	1.1	10.7	Enel

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Fuel oil	(mil t)	2.7	3.2	2.9	-0.5	-15.8	Enel
Gas	(mil m ³)	16,405.3	15,265.0	13,893.3	1,140.3	7.5	Enel
Gas oil	(.000 t)	1,617.1	1,956.3	1,658.8	-339.3	-17.3	Enel
Biomass and waste for thermal production	(.000 t)	409.9	370.8	239	39.1	10.5	Enel
Geothermal fluid (total extracted)	(.000 t)	93,280	76,375	59,371	16,905	22.1	Enel
Geothermal fluid (net of reinjected fluid)	(.000 t)	27,486	28,462	29,855	-976	-3.4	Enel
Geothermal steam used in electricity production	(.000 t)	87,968	70,982	53,130	16,986	23.9	Enel
Consumables	(.000 t)	1,176.7	1,246.8	1,271.3	-70.1	-5.7	Enel
Limestone	(.000 t)	1,028.0	1,097.2	1,137.0	-69.2	-6.3	Enel
Ammonia	(.000 t)	15.7	20.6	20.1	-4.9	-23.8	Enel
Caustic soda	(.000 t)	30.6	32.1	21.2	-1.5	-4.7	Enel
Spent lime	(.000 t)	25.3	33.4	36.4	-8.0	-24.1	Enel
Sulfuric/hydrochloric acid	(.000 t)	13.6	15.1	12.4	-1.6	-10.3	Enel
Other	(.000 t)	63	48.4	44.2	14.6	30.2	Enel
Equipment with PCB	(%)	1.9	3.8	5	-1.9	-50.1	Enel
Quantity of PCB contained in equipment with >500 ppm PCB	(t)	6	34	70	-28	-82.7	Enel
Quantity of PCB contained in equipment with 50 to 500 ppm PCB	(t)	6,238	n.a.	n.a.	-	-	Enel
EN22							
Waste management							
Total waste produced	(.000 t)	11,482	11,322	10,180	160	1.4	Enel
Including hazardous waste	(.000 t)	75	72	67	3	3.7	Enel
Reclaimed waste	(%)	23.4	24.8	32	-1.5	-5.9	Enel
Low -/medium-activity radioactive liquid waste	(m ³)	80.2	93.6	118.8	-13.4	-14.3	Enel
Low -/medium-activity radioactive solid waste	(t)	29.3	31.7	39.4	-2.4	-7.5	Enel
High-activity radioactive liquid waste	(m ³)	4	0	0	4.0	-	Enel
High-activity radioactive solid waste	(t)	2.1	1	4.9	1.1	110.0	Enel
Disposed Asbestos	(t)	17,968	11,329	5,532	6,639.7	58.6	Enel

- (1) This amount regarding operating and investment costs includes both the expenses directly incurred by the Research technical area and the expenses incurred for technological innovation by other areas of the Group. In 2008 the figure regards only the Research technical area.
- (2) Calculated using the Eurostat/U.N. criterion. If the figure were calculated according to the table required by the GRI-EN 30, the value would amount to 917 million euro for 2010 and 639 million euro for 2009.
- (3) In 2009 the values were affected by the 100% consolidation of Endesa (67.05% consolidated in 2008).
- (4) Specific emissions are calculated considering the total emissions from simple thermoelectric production and the combined production of electricity and heat with respect to the total simple thermoelectric production and the combined production of electricity and heat (including the contribution of heat in MWh equivalent) with the exception of the H₂S, which is referred only to the geothermal production of electricity.
- (5) Flue-ash emission increased considerably in 2010 over 2009 because of the increased production of the Reftinskaya plant in Russia in less efficient units and the higher content of unburned material in the coal used.
- (6) Specific emissions are calculated considering the total emissions from simple thermoelectric production and the combined production of electricity and heat with respect to the total renewable, simple thermal, and nuclear production and the combined production of electricity and heat (including the contribution of the heat in MWh equivalent).
- (7) The analyses are performed from year to year on groups of different plants according to the specific checking requirements and therefore regard the power of plants that are not homogeneous.
- (8) The figure also includes the emissions of uncertified plants or not subject to the emission-trading directive.
- (9) Calculated considering the sum of the emissions avoided in each country or the Σ for each country of the quantity of carbon-free electricity produced (renewable + nuclear production + the contribution of the heat from nuclear co-generation), multiplied by the net specific emissions from thermal production.
- (10) 2010 regards the world boundary, while 2009 and 2008 regard only Italy.