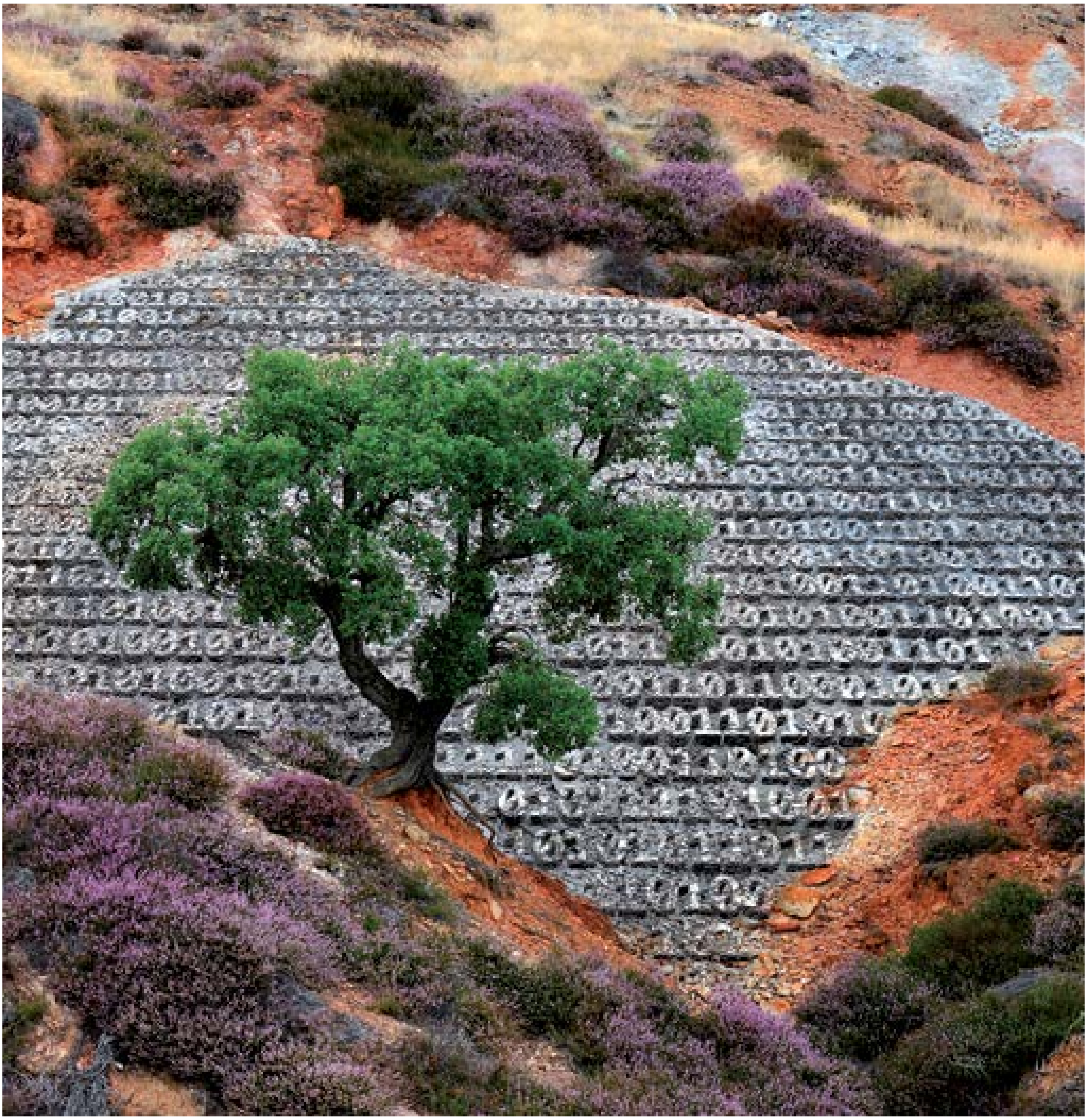
Environmental Report 2013



Environmental Report 2013

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CEO's message

In 2013, in spite of a still uncertain global economic scenario, the Enel Group continued to score a positive performance, recognized by the market, thanks to its technological and geographic diversification, managerial actions to curb costs and optimize investments, expansion in emerging markets and renewables (especially in Latin America).

Looking to the future, the growth of emerging markets, the dissemination of new technologies, the proximity to active and responsive customers, as well as the new energy and environmental policies will contribute to shaping the new dynamics of the sector in an increasingly decisive way. In this setting, Enel captured ongoing changes in a timely fashion, by leveraging its strengths: skills, know-how and expertise, managerial rigor, technological excellence, transparency in relations with all counterparts, listening to customers and caring for their needs.

In choosing our growth path, we decided to bet on innovation and a process of internationalization, whereby we are now present in 40 countries across 4 continents and among the key players in the economic and social development of all the communities where we operate. Innovative green technologies, smart-city and smart-grid projects, solutions for energy efficiency and value-added services are just a few examples of what we have exported to serve our customers, from Europe to Russia and to the American continent.

While consolidating our international presence, we are implementing a major project of integration of our different technological, operational, cultural and social skills and expertise. Enel is consolidating its own model, strong in its principles and flexible in its applications, suitable for serving the communities where we operate, ensuring everywhere respect for the applicable rules and for the environment and persons with which/whom we interact. We intend to become an example, recognized at international level, of good management in all of our operations and our environmental policy will be crucial to this intent.

We are pursuing the strategic target of extending the application of environmental management systems to all of our activities. In 2012, we gained the ISO 14001 certification for the overall Group. At present, ISO 14001-certified systems cover 94% of our net generating capacity, over 95% of grids and 100% of the activities of the Global Service Functions, of the Engineering and Research Division and of the market functions in Italy and Romania.

As a large international utility, we are spearheading the fight against climate change. The results that we have obtained so far in terms of greenhouse-gas emissions and the targets of our strategic development plan testify our constant efforts. Today, more than 46% of the electricity that we generate comes from zero-emission sources. In 2013, the Group further invested in the development of generating capacity from renewables, increasing it by about 940 MW. Our penetration into the renewable-energy sector has continued to grow thanks to Enel Green Power. This company, with about 9,000 MW of installed capacity in 16 countries of the world and with over 29 billion kWh generated, is one of the leading worldwide operators, relying on a well-diversified and geographically distributed technological mix.

The overall emissions that we displaced in 2013 thanks to zero-emission power generation amount to 104 million tonnes of CO_2 equivalent.

With respect to 1990, the base year of the Kyoto Protocol, the Group's specific emissions of CO_2 in 2013 were down by 37%. Additionally, in 2013, thanks to higher generation of electricity from renewables (+10% with respect to 2012), which was made possible by an increase in the related installed capacity and by a good level of hydraulicity, we curbed these emissions by 16% on 2007, a reduction already higher than our target by 2020.

In 2013, we continued to cut down polluting emissions. Specific emissions of SO_2 and NO_x were down by about 7% on 2012. Specific emissions of particulates, although diminishing in the countries where we are most active, such as Italy (-11%) and Spain (-14%), rose slightly at Group level owing to the progressive aging and consequent lower efficiency of electrostatic precipitators in the Reftinskaya thermal power plant (Russia). This is the reason why we started revamping this plant and we expect to reduce its emissions of particulates by about 50% by 2020.

As we are continuously listening to and dialoguing with our stakeholders, ethical investors and sustainability analysts, we are constantly stimulated towards improvement and an increasingly sustainable and transparent management of water resources. With a view to communicating these efforts, Enel was the first utility in the world to participate both in the CDP Water program (for the first time at Group level in 2013) and in a further assessment via Aqua Gauge, a tool developed by Ceres, a network of international investors. Recently, we have also joined the UN Global Compact's CEO Water Mandate, a unique public-private initiative designed to assist companies in developing, implementing and disclosing water sustainability policies and practices. Our overall consumption of water in 2013 was equal to 189.6 million m^3, i.e. less than in 2012 due, among others, to a decrease in thermal generation.

Among the other strategic targets of the Group's environmental policy, it is worth mentioning our commitment to optimal waste management. In 2013, the Enel Group recovered as much as 32% of its waste, i.e. 5 percentage points more than in 2012.

Likewise, as regards biodiversity conservation, the Group is promoting projects all over the world, both as an industrial operator and as an active player of the local social life. In 2013, after completing the mapping of Group-level activities, Enel put in place a Group-wide Plan for Biodiversity Conservation, consisting of 133 projects, with an investment of € 21 million since 2011.

In its new 2014-2018 Business Plan, Enel set its strategic priorities for the coming years, taking into account the expected structural changes in economic and sector-specific scenarios, and confirmed its low-carbon development path.

The Group will continue to invest in new renewable installed capacity for a total of about € 6 billion in the period of the plan. Furthermore, we will continue to undertake efforts for technological innovation, to make power generation more and more efficient and eco-friendly and to provide our customers with innovative solutions, from energy efficiency to e-mobility and smart grids.

We have big opportunities to seize in terms of both higher energy efficiency across the entire energy value chain, from generation to consumption, and environmental impact mitigation, by combining the supply and dissemination of electricity as an energy carrier with the process of decarbonization of our economies and societies. This is a target not to be missed and a commitment that we will firmly and strongly pursue in the coming years.

The Chief Executive Officer
and General Manager
Fulvio Conti

Parameters of the Environmental Report

Methodological note

Environmental reporting

Environmental reporting enables the Enel Group to check its environmental performance vs. targets, to process the related data and information and to report them in its publications. It is an integral part of Enel's environmental management system and its methodology, supported by adequately structured procedures and ICT tools, ensures that the collected data are homogeneous.
The formats used to collect both process and governance data are continuously updated to accommodate changes in Enel's organizational configuration, legislative, regulatory and technological developments, as well as experience feedbacks. The data are aggregated at different organizational levels (business unit, group of power plants, technology, company, country, division, Group, etc.).
Moreover, a broad range of reporting datasheets (status data, process data, resources, emissions, liquid releases, waste) and indicators (ratios between homogeneous or heterogeneous quantities) make it possible to compare the results of the various components and assets of the Group, track their performance over time (regardless of their volume of activities), identify deviations from average or target values and assess the reliability and consistency of the reported data.

Mission and structure of the Report

The report deals with the environmental implications of the activities that Enel carries out in the world through all the companies that are included in its scope of consolidation: electricity generation, distribution and sale; fuel storage & handling; mining; and real-estate & service management.
After an overview of the Enel Group, the report describes: i) the environmental policy and targets; ii) the environmental organization; iii) the environmental management systems; iv) the environmental reporting process; v) the relations with stakeholders; and vi) the environmental commitment (financial resources, climate strategy, renewables, energy efficiency, nuclear energy, fuel exploration and extraction, research & innovation, management of water resources, biodiversity conservation, environmental risk assessment and management, as well as awareness, training & education). Then, the report reviews performance and key energy & environmental data in the five-year period from 2009 to 2013 for the overall Group and for each country and technology.

Qualitative and quantitative environmental performance data are reported in accordance with the "Sustainability Reporting Guidelines & Electric Utilities Sector Supplement" (version G3.1), issued by the Global Reporting Initiative (GRI). Based on the following GRI Content Index, the reader may identify the individual GRI key performance indicators in the text. However, the report has a deeper level of detail than required by the GRI guidelines, since it is the result of a reporting process that Enel has carried out progressively in eighteen editions, including the present one.
Moreover, Enel voluntarily requested Reconta Ernst & Young SpA to conduct a "limited assurance review" of the report. The report presents the Enel Group's environmental performance results vs. targets. In particular, the preparation of the report involved the identification of the relevant stakeholders and of the significant aspects to be reported and relied on the use and update of suitable processes of internal management and control of the reported data and information.

Data consolidation

The data and information included in the Environmental Report 2013 refer to Enel SpA and to the companies included in its scope of consolidation in financial years 2009, 2010, 2011, 2012 and 2013 (for details about the companies, the reader is referred to the consolidated financial statements for the various years, available at http://www.enel.com/it-IT/investor/financial_reports/annual/ and http://www.enel.com/en-GB/investor/financial_reports/annual/).
In particular, the data presented in the report concern the fully consolidated companies as per the consolidated financial statements at December 31, 2013. Affiliates (assessed under the net-worth criterion in the consolidated financial statements) and other entities on which Enel exerts significant influence (including joint ventures) are included in the computation of the data (where available) proportionally to Enel's holdings therein. If the same affiliates or entities produce significant impacts, they are also included in the qualitative reporting sections. The status data (number of installations, net maximum capacity, length of grids, etc.) reflect the situation of the companies as of December 31 of 2013 or of each of the reported years. The flow data (resources, electricity and heat generation, emissions, liquid releases, waste, etc.) of the companies are only considered to the extent of their period of relevance to the Group, except for those about the companies that exited the Group during the year (as specified in the text from time to time).
Some deviations from the KPIs and the data of the Environmental Report 2012 are to be ascribed to variations in the scope of consolidation of the Group, to changes in the computation methodology used or to corrections made after the publication of the report.

Criteria for the presentation of numerical values

For the numerical values shown in the tables – excluding those which can be expressed only as integers (e.g. number of installations, number of personnel members) – the following approximation criterion has been followed: no decimals for values greater than or equal to 100; one decimal for values lower than 100 and greater than or equal to 10; two decimals for values lower than 10 and greater than or equal to 1; and three decimals for values lower than 1. This criterion reflects the one adopted in data collection. However, if the last decimal digit is zero, it is omitted.

Technical definitions

As regards electricity, the technical definitions of an energy nature are based on the "Statistical Terminology Employed in the Electricity Supply Industry", published by UNIPEDE (International Union of Producers and Distributors of Electrical Energy), which merged with Eurelectric in June 2001.

Software application

The software application used for reporting both process and governance data is continuously updated, taking into account changes in Enel's organizational configuration, developments in legislation, regulations and technologies, as well as experience feedbacks.

GRI Content Index (1)

	EN1	EN2	EN3	EN4	EN5	EN6	EN7	EN8	EN9	EN10	EN11	EN12	EU13	EN13
OVERALL GROUP	**31, 93, 94, 95, 96, 97, 98, 100, 101, 102, 103**		**93, 94, 96, 97, 98, 102, 103, 105**	**92, 95, 98, 102, 104, 107, 109**	**42**	**29, 41, 42**	**29, 42**	**95, 99, 102, 104**		**95, 99, 102, 105**			**73, 79, 80**	**72, 73, 74, 75, 76, 77, 78, 79, 80**
EUROPE														
BELGIUM	10, 12		10, 12					10, 12						
BULGARIA	13, 16		13, 16	13				13, 16		13, 16				
FRANCE	18		18	18		20								
GREECE	21		21	21	**143**	**142**								
ITALY	**149**, 25, 26, 27, 32, 33		**151**, 25, 26, 32, 33	26, 27, 33	**149**	**149**, 34	**151**	**150**, 26, 33		**150**, 26, 33				
PORTUGAL	**156**, 36, 37, 41, 43		**156**, 36, 41	37				**156**, 37, 41		**156**, 49, 52				
ROMANIA	44		43	43, 44, 46	**159**	**159**, 46								
RUSSIA	**163**, 48, 49, 52		**163**, 48, 52	48	**163**	52		**163**, 48, 52		**163**				
SLOVAKIA	**171**, 54, 55, 59, 60	**173**	54, 55, 59, 60	55				**171**, 55, 59		55, 6				
SPAIN	**180**, 63, 64, 65, 71		**180**, 63, 64, 71	64, 66, 71	**180**	**180**		60, 64		64, 71				
NORTH AMERICA														
CANADA	76, 79		76, 79		**187**	**187**		71, 76						
UNITED STATES	80, 82		80, 82		**190**	**190**		79, 80, 82						
LATIN AMERICA														
ARGENTINA	**198**, 86, 87, 90		**198**, 86, 87, 90	87, 88, 90				**198**, 87, 90						
BRAZIL	**202**, 93, 94, 96, 97		**202**, 93, 96, 97	94, 96				**202**, 94, 96, 97						
CHILE	**210**, 98, 100, 102, 103		**209**, 98, 102, 103, 105	99, 100, 102	**209**			**209**, 99, 102, 103		99, 103				
COLOMBIA	**215**, 105, 106, 109		**215**, 109	106, 107, 109	**215**			**215**, 106, 109						
COSTA RICA	112		112	112										
GUATEMALA	115		115	115										
MEXICO	117		117	117										
PANAMA	120		120											
PERU	**228**, 122, 123, 125		**229**, 122, 123, 125	123, 125	**228**			**228**, 123, 125						
AFRICA														
MOROCCO	130, 131, 132		130, 131, 132					**233**, 130, 131						

Legend

Volume I
Volume II

MATERIALS
EN1 Materials used by weight or volume. This indicator includes the sector-specific commentary required by the EUSS (Electric Utilities Sector Supplement).
EN2 Percentage of materials used that are recycled input materials.

ENERGY
EN3 Direct energy consumption by primary energy source.
EN4 Indirect energy consumption by primary source.
EN5 Energy saved due to conservation and efficiency improvements.
EN6 Initiatives to provide energy-efficient or renewable-energy-based products and services, and reductions in energy requirements as a result of these initiatives.
EN7 Initiatives to reduce indirect energy consumption and reductions achieved.

WATER
EN8 Total water withdrawal by source. This indicator includes the sector-specific commentary required by the EUSS (Electric Utilities Sector Supplement).
EN9 Water sources significantly affected by withdrawal of water.
EN10 Percentage and total volume of water recycled and reused.

BIODIVERSITY
EN11 Location and size of land owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas.
EN12 Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas. This indicator includes the sector-specific commentary required by the EUSS (Electric Utilities Sector Supplement).
EU13 Biodiversity of offset habitats compared to the biodiversity of the affected areas.
EN13 Habitats protected or restored.
EN14 Strategies, current actions, and future plans for managing impacts on biodiversity. This indicator includes the sector-specific commentary required by the EUSS (Electric Utilities Sector Supplement).
EN15 Number of IUCN (International Union for Conservation of Nature and Natural Resources) Red List species and national conservation list species with habitats in areas affected by operations, by level of extinction risk.

EMISSIONS, EFFLUENTS, AND WASTE
EN16 Total direct and indirect greenhouse gas emissions by weight. This indicator includes the sector-specific commentary required by the EUSS (Electric Utilities Sector Supplement).
EN17 Other relevant indirect greenhouse gas emissions by weight.

EN14	EN15	EN16	EN17	EN18	EN19	EN20	EN21	EN22	EN23	EN24	EN25	EN26	EN27	EN28	EN29	EN30
73, 74, 75, 76, 77, 79	**80**	**92, 112, 113, 114, 115, 117, 120**	**92**	**113**		**112, 113, 114, 115, 117, 118, 120**	**95, 113, 118, 119, 120, 122, 123, 125**	**123, 124, 126, 129, 130, 131**		**131**		**70**		**34, 35**	**91**	**37, 38, 39**
		11, 12				11, 12	11	11, 12								
		14, 16		**139,** 15		14, 16	15	15, 16, 17							13	
		19		**141,** 19				20							18	
		22		**143,** 22				22, 23							21	
		150, 29, 34		**149, 150,** 29		**150,** 29, 34	26, 30	**150,** 30, 31, 32, 35	**151**			**150, 151**			24, 32	
		156, 39, 42		**156,** 39		**156,** 38, 41, 42	39	**156,** 40, 41,42				**156**			36	
		45, 47		**159,** 45				**159,** 45, 46, 47				**160**			43, 46	
		163, 50, 52, 53				**163,** 50, 52	49, 5	**163,** 51, 53	**164**			**164**			48	
		171, 57, 60		**171,** 57	**174**	**171,** 56, 57, 60	55, 57, 58, 61	**171,** 58, 59, 61				**172**			54	
		180, 66, 67, 72		**180,** 67	**180**	**180,** 66, 67, 72, 77	64, 67, 68, 72	**180,** 68, 69, 70, 72, 73	**181**						**182,** 63, 70	
		77		**187,** 77		**187,** 79	77	**187,** 78, 79, 81, 82								
		81, 82		**190,** 81				**190,** 89, 90							80	
		198, 88, 91		**198,** 88	**198**	**198,** 88, 91	87, 88, 89	89, 90, 91				**198**			90, 93, 94	
		202, 95, 97		**202,** 95	**202**	**202,** 95, 97	95, 99	95, 96, 97	**202**			**202**			96, 98	
		209, 100, 101, 103		**209,** 101	**209**	**209,** 100, 103	101	**209,** 101, 102, 104	**210**			**210**			102, 105	
		215, 107, 110		**215,** 107		**215,** 107, 110	106, 107	**209,** 108, 109, 110				**215**			109	
		113		**217,** 113				113, 114							112	
		116		**219,** 116	**219**			**219,** 116							115	
		118		**221,** 118				118, 119							117	
		121		**223,** 121				**223,** 121							120, 122	
		228, 124, 126		**228,** 124		**228,** 124, 126	124	124, 125, 126				**228**			125	
		131, 132				131, 132	130, 131	131, 132								

EN18 Initiatives to reduce greenhouse gas emissions and reductions achieved. This indicator includes the sector-specific commentary required by the EUSS (Electric Utilities Sector Supplement).
EN19 Emissions of ozone-depleting substances by weight.
EN20 NO_x, SO_x, and other significant air emissions by type and weight. This indicator includes the sector-specific commentary required by the EUSS (Electric Utilities Sector Supplement).
EN21 Total water discharge by quality and destination. This indicator includes the sector-specific commentary required by the EUSS (Electric Utilities Sector Supplement).
EN22 Total weight of waste by type and disposal method. This indicator includes the sector-specific commentary required by the EUSS (Electric Utilities Sector Supplement).
EN23 Total number and volume of significant spills.
EN24 Weight of transported, imported, exported, or treated waste deemed hazardous under the terms of the Basel Convention Annex I, II, III, and VIII, and percentage of transported waste shipped internationally.
EN25 Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the reporting organization's discharges of water and runoff.

PRODUCTS AND SERVICES
EN26 Initiatives to mitigate environmental impacts of products and services, and extent of impact mitigation.
EN27 Percentage of products sold and their packaging materials that are reclaimed by category.

COMPLIANCE
EN28 Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations.

TRANSPORT
EN29 Significant environmental impacts of transporting products and other goods and materials used for the organization's operations, and transporting members of the workforce.

OVERALL
EN30 Total environmental protection expenditures and investments by type.

(1) For each indicator, the table shows the commentary page numbers.

Independent auditors' report on the limited assurance engagement of the Environmental Report of Enel Group as of December 31, 2013

Building a better
working world

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Independent auditors' report on the limited assurance engagement of the Environmental Report of Enel Group as of December 31, 2013
(Translation from the original Italian text)

To the Board of Directors of
Enel S.p.A.

1. We have carried out the limited assurance engagement of the Environmental Report of Enel S.p.A. and its subsidiaries ("Enel Group") as of December 31, 2013 exclusively in relation to the indicators summarized in the *"GRI Content Index"* section of the Environmental Report. The directors of Enel S.p.A. are responsible for the preparation of the Environmental Report in accordance with the qualitative and quantitative environmental performance disclosures required by the *"Sustainability Reporting Guidelines"*, version 3.1, issued in 2011 by *Global Reporting Initiative* ("G.R.I.") and with the sector supplement *"Sustainability Reporting Guidelines & Electric Utilities Sector Supplement"* issued in 2009 by G.R.I., as stated in the section *"Methodological note"*, as well as for determining the Group's commitments regarding the environmental performance and the reporting of results achieved. The directors of Enel S.p.A. are also responsible for the identification of stakeholders and of significant matters to report, as well as implementing and maintaining appropriate processes to manage and control internally data and disclosures indicated in the Environmental Report. Our responsibility is to issue this report on the basis of the work performed.
2. Our work has been conducted in accordance with the principles and guidelines established, for a limited assurance engagement, by the *"International Standard on Assurance Engagements 3000 - Assurance Engagements other than Audits or Reviews of Historical Financial Information"* (*"ISAE 3000"*), issued by the *International Auditing and Assurance Standards Board*. This standard requires the compliance with applicable ethical principles (*"Code of Ethics for Professional Accountants"* issued by *the International Federation of Accountants - I.F.A.C.*), including professional independence, as well as planning and executing our work in order to obtain a limited assurance, rather than a reasonable assurance, that the Environmental Report is free from material misstatements. A limited assurance engagement of the Environmental Report consists in making inquiries, primarily with company's personnel responsible for the preparation of information included in the Environmental Report, in the analysis of the Environmental Report and in other procedures in order to obtain evidences considered appropriate. The procedures performed are summarized below:

   a. analysis of the processes that support the generation, recording and management of the quantitative data reported in the Environmental Report. In particular, we have carried out the following procedures:

      - interviews and discussions with Enel S.p.A.'s management and personnel from Enel Produzione S.p.A., Enel OGK-5 OJSC, Enel Ingegneria e Ricerca S.p.A. and Enel Green Power S.p.A., to obtain an understanding about the information, accounting and reporting system in use for the preparation of the Environmental Report as well as the internal control processes and procedures supporting the collection, aggregation, processing and transmission of data and information to the department responsible for the preparation of the Environmental Report;
      - on-site verifications at Reftinskaya GRES thermal power plant (Russia), Trezzo sull'Adda hydropower plant (Italy), Brindisi thermal power plant and research centre (Italy);

- analysis, on a sample basis, of the documentation supporting the preparation of the Environmental Report in order to confirm the processes in use, their adequacy and the operation of the internal control system for the correct reliability of data and information in relation to the objectives described in the Environmental Report.

b. compliance analysis of qualitative information included in the Environmental Report with the guidelines identified in paragraph 1 of the present report and of their internal consistency, with reference to the strategy and to the environmental policies.

c. obtaining the representation letter, signed by the legal representative of Enel S.p.A., relating to the compliance of the Environmental Report with the qualitative and quantitative environmental performance disclosures required by the guidelines indicated in paragraph 1, as well as to the reliability and completeness of information and data presented in the Environmental Report.

A limited assurance engagement is substantially less in scope than a reasonable assurance engagement performed in accordance with *ISAE 3000* and, as a consequence, we may not have become aware of all the significant events and circumstances which could be identified by performing a reasonable assurance engagement.

With respect to the data and information relating to the prior year, presented for comparative purposes, reference should be made to our report issued on April 24, 2013.

3. Based on the procedures carried out, nothing has come to our attention that causes us to believe that the Environmental Report of Enel Group as of December 31, 2013, exclusively in relation to the indicators summarized in the *"GRI Content Index"* section of the Environmental Report, is not in compliance, in all material respects, with the qualitative and quantitative environmental performance disclosures required by the *"Sustainability Reporting Guidelines"*, version 3.1, issued in 2011 by G.R.I., and with the sector supplement *"Sustainability Reporting Guidelines & Electric Utilities Sector Supplement"* issued in 2009 by G.R.I., as stated in the section *"Methodological note"*.

Rome, May 15, 2014

Reconta Ernst & Young S.p.A.

Signed by: Massimo delli Paoli, Partner

This report has been translated into the English language solely for the convenience of international readers

Profile of the Enel Group

Enel is the largest power company in Italy, the second listed utility in Europe in terms of installed capacity and one of the leading integrated power and gas operators in Europe and Latin America. The Group, which is present in 40 countries across 4 continents, generates electricity from a net installed capacity of over 98 GW and distributes electricity and gas to about 61 million customers through a grid of roughly 1.9 million kilometers.

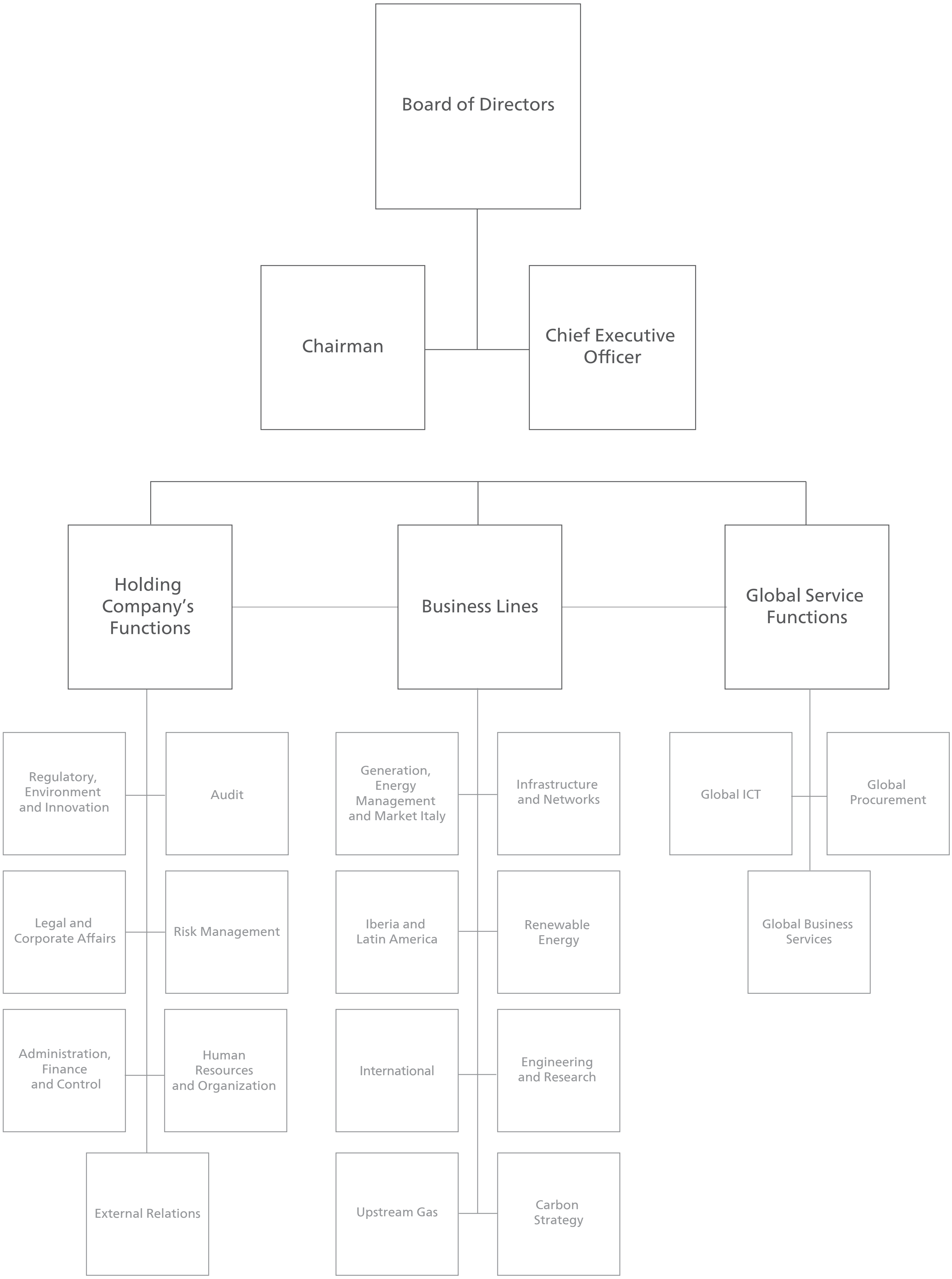
Business

In 2013, Enel posted revenues of around € 80.5 billion, a gross operating margin of roughly € 17 billion and a net ordinary income of about € 3.1 billion. The Group's workforce at December 31, 2013 was equal to more than 71,000. Enel's generating mix is extremely diversified: hydro, thermal, nuclear, geothermal, wind, solar photovoltaic and other renewable-energy installations. More than 42% of the electricity generated in 2013 was carbon-free.

Enel is strongly engaged in deployment of renewables, as well as in research and development of new eco-friendly technologies. Enel Green Power (EGP), listed on the stock exchange, is the company of the Group dedicated to developing and managing electricity generation from renewables. The company manages about 8.9 GW of installed capacity (hydro, wind, geothermal, photovoltaic, biomass-fired and CHP plants) in Europe and the Americas.

Enel was the first in the world to replace traditional electromechanical meters with smart meters, permitting real-time meter reading and remote customer relationship management. Today, about 32 million retail customers in Italy are equipped with smart meters installed by Enel. Enel is installing another 13 million smart meters at the premises of its customers in Spain. This innovative metering system is one the cornerstones of smart grids, smart cities and electric mobility.

Organizational chart



Shareholders

Enel, which has been listed on the Milan stock exchange since 1999, is the Italian company with the highest number of shareholders: about 1.2 million including retail and institutional ones. Enel's main shareholder is the Ministry of Economy and Finance (31.24% holding). Other 14 companies of the Group are listed on the stock exchanges of Italy, Spain, Russia, Argentina, Brazil, Chile and Peru. Thanks to Code of Ethics, Sustainability Report, environmental protection policy and adoption of international best practices of transparency and corporate governance, Enel's shareholders include major international investment funds, insurance companies, pension funds and ethical funds.

Global presence

After completing its international expansion stage, Enel is now engaged in consolidating its assets and further integrating its business.

In Italy, Enel is the largest electricity company. It is active in electricity generation by thermal and renewable power plants with about 40 GW of installed capacity. Of this figure, more than 3 GW of renewable plants are operated through Enel Green Power. Furthermore, Enel manages most of the Italian electricity distribution grid and offers integrated solutions of electricity and gas products and services to its 31 million customers.

In the Iberian peninsula, Enel owns 92.06% of the share capital of Endesa, the leading power company of Spain and Portugal with more than 24 GW of installed capacity and a strong presence in the electricity distribution business and in the sale of electricity and gas products to over 12 million customers. In the region, Enel Green Power operates approximately 1.9 GW of renewable plants.

In the rest of Europe, Enel is also present in Slovakia, where it owns 66% of Slovenské elektrárne, the largest electricity generator in the country and the second largest in Central-Eastern Europe with an installed capacity of 5.4 GW. In France, Enel is active in the sale of electricity and gas and in electricity generation from renewables. In Romania, the Group serves 2.7 million customers through its distribution grid. In Romania and Greece, Enel Green Power owns and operates renewable plants. In Russia, Enel is engaged in the electricity generation sector, where its subsidiary, Enel OGK-5, owns 9 GW of thermal plants. In the retail sector, Enel owns 49.5% of RusEnergoSbyt, one of the largest private electricity traders of the country.

In Latin America, through Endesa and its branches in 5 countries, the Enel Group is the largest private operator, with more than 17 GW of capacity installed in thermal, hydro and other renewable plants, serving 14.4 million customers. In the electricity generation sector, Endesa owns and operates 4.4 GW in Argentina, 1 GW in Brazil, 5.9 GW in Chile, 2.9 GW in Colombia and 1.8 GW in Peru. In the distribution business, the Group is present in the State of Ceará in Brazil and in five of the largest cities of South America: Rio de Janeiro, Bogotá, Buenos Aires, Santiago de Chile and Lima. In the transmission sector, Endesa operates one interconnected power line between Brazil and Argentina. In Chile, Brazil, Costa Rica, Guatemala, Panama and Mexico, Enel Green Power Latin America operates more than 1 GW of wind and hydro plants.

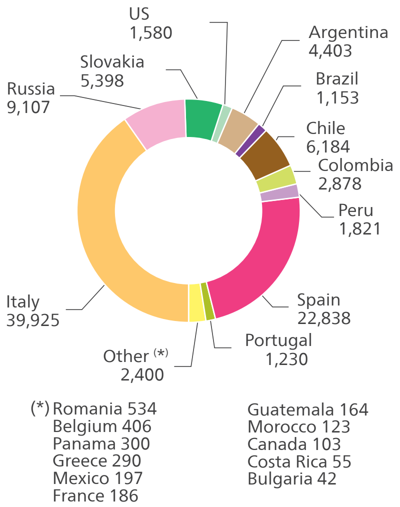
In North America, Enel Green Power North America owns and operates more than 1.6 GW of hydro, geothermal, wind, solar and biomass-fired plants.

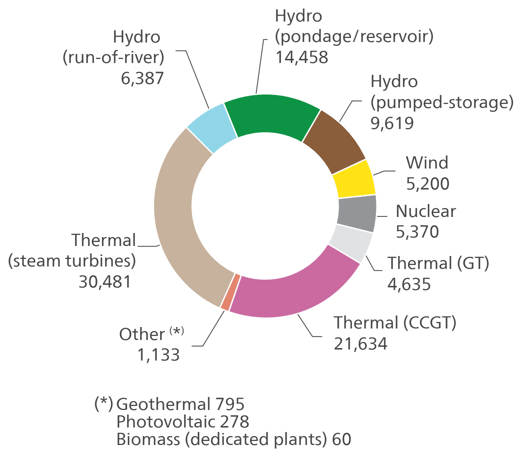
In Africa, Enel is present in the upstream gas sector by participating in the development of gas fields in Algeria and Egypt. Through Endesa, Enel also runs a thermal power plant in Morocco. In South Africa, Enel Green Power won contracts of supply of photovoltaic and wind power totaling 513 MW, as part of a public tender for renewable energy launched by the South-African government.

(Unless otherwise specified, the data of this profile refer to December 31, 2013).

Generating mix as of December 31, 2013

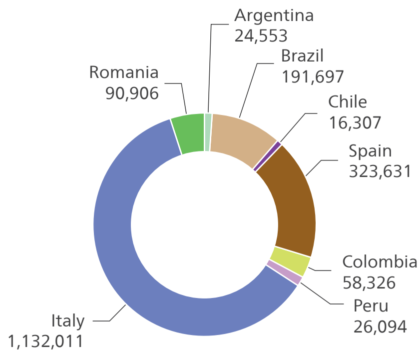
Total: 98,917 MW

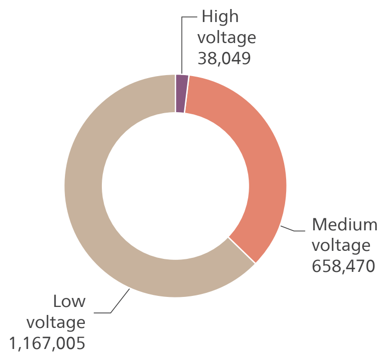


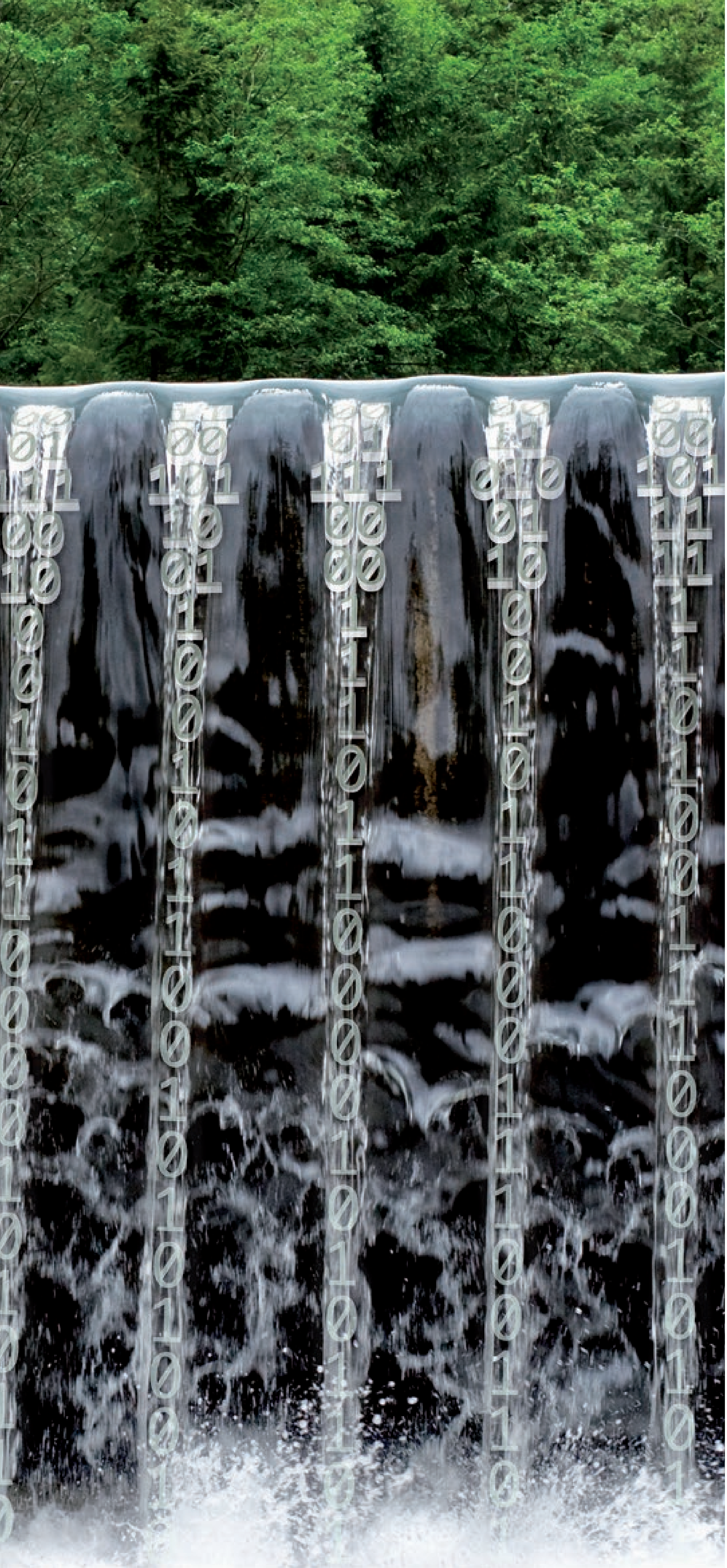


Electricity distribution grid as of December 31, 2013

Total: 1,863,524 km







Environmental governance

Environmental policy and targets

Enel regards the environment, the fight against climate change and sustainable development as strategic factors in carrying out and expanding its operations and as key drivers for consolidating its leadership in energy markets.
All the persons working within the Enel Group are involved in continuous environmental performance improvement, while abiding by codes of ethics and principles of social responsibility.
Enel considers compliance with legal obligations and other requirements as a pre-requisite for all of its activities. Therefore, its environmental policy is based on three fundamental principles and pursues ten strategic targets.

The Chief Executive Officer
and General Manager
Fulvio Conti

Principles

1. Safeguarding the environment
2. Improving and promoting the environmental features of products and services
3. Creating corporate value

Strategic targets

1. Application of internationally recognized environmental management systems to the entire organization
2. Optimized integration of installations and buildings into the landscape, while conserving biodiversity
3. Mitigation of environmental impacts by applying the best available technologies and the best practices in construction, operation and decommissioning of installations
4. Leadership in renewables and low-emission electricity generation
5. Efficient use of energy, water and raw materials
6. Optimized management of waste and liquid releases
7. Development of innovative technologies for the environment
8. Communication of Enel’s environmental management efforts and performance to citizens, institutions and other stakeholders
9. Environmental awareness, training & education of employees
10. Promotion of environmentally sustainable practices among suppliers, contractors and customers

	Description of targets	2013 Results
1	■ Extension of certification to sites that are not certified yet ■ Yearly maintenance of already acquired ISO 14001 certifications and EMAS registrations	■ 94% of net maximum capacity ■ 95% of ISO 140001-certified grids
2	■ Biodiversity conservation projects (conservation of protected species habitats, rehoming of particular species, research centers and sighting points, replanting of indigenous flora) ■ Biomonitoring (land-, sea- and river-based) ■ Use of overhead or underground cables (in lieu of bare conductors) in power distribution lines ■ Mitigation of the visual impact of production and distribution installations and of mines ■ Analysis of international biodiversity conservation scenarios ■ Definition of a Group-wide plan for biodiversity conservation	■ About € 21 million invested in biodiversity projects since 2011 ■ 63.9% of power lines with overhead or underground cables
3	■ Assessment of the environmental impact of construction or major retrofits of installations ■ Study and sustainable use of the Best Available Techniques (BATs) ■ Protection, monitoring and remediation of surface water, soil and subsoil in the areas surrounding installations ■ Development and application of the best practices	■ Particulates (g/kWh total net): -25.4% on 2010 ■ SO_2 (g/kWh total net): -4.3% on 2010 ■ NO_x (g/kWh total net): -8.5% on 2010
4	■ Progressive enlargement of the renewable-energy portfolio by building new plants, acquiring holdings and forging partnerships in view of long-term decarbonization ■ Development of new low-emission generating capacity and of the nuclear technology	■ Carbon-free generation: about 47% ■ New renewable installed capacity: about 940 MW

5	- Improvement of power plant efficiency (use of more efficient components and/or processes, reduction of consumption by auxiliaries) - Reduction of grid losses in electricity distribution (optimized grid design, use of conductors with larger cross-section and of electrical components with less losses) - Mapping and monitoring of all production sites to identify potential water stress and, where necessary, to make a more efficient use of the water resource - Internal recycling of water for industrial uses - Recovery of ash and gypsum from coal and brown coal for use as raw materials in external production processes - Promotion of end-use energy efficiency (distribution of more energy-efficient products for lighting and space heating, use of more energy-efficient lamps in public lighting) - Deployment of systems (e.g. smart meters) and rate plans raising awareness of and encouraging efficient electricity usage among customers - Analysis of international water resource use scenarios	- Water consumption covered by liquid releases: about 5% - Continuous improvement of Russian and Slovak installations since 2010
6	- Reduction of waste production - Decrease of the polluting load of liquid releases - Increased recovery of waste and liquid releases (also by better sorting) - Qualification of waste disposal operators - Use of information systems for waste traceability	- Recovery of waste produced: 32% (27% in 2012)

7	■ Research on and construction of pilot facilities for: › carbon capture & storage (CCS) › systems to increase efficiency and hold down emissions › smart grids › solar thermodynamic power generation › innovative renewable-energy installations (solar photovoltaic, geothermal, wind and sea energy) › multi-generation systems › electric mobility	■ € 76 million invested in research & development in 2013
8	■ Publication of the Environmental Report, of the Sustainability Report and of the sustainability section of the Annual Report ■ Preparation of Environmental Declarations for EMAS-registered sites ■ Communication with analysts and participation in various sustainability indices ■ Opening of installations to the public ■ Posting of environmental initiatives on the Internet site	■ 10th consecutive year of presence in the Dow Jones Sustainability Indices
9	■ Periodical sessions on environmental themes ■ Posting of thematic insights on the Intranet site	■ 79,830 man-hours of awareness, training and education
10	■ Use of suppliers' qualification criteria based on environmental performance ■ Monitoring of contractors' performance during and at the end of works or upon acceptance tests ■ Seminars of training on/awareness of significant environmental aspects upon commencement of works (communication of Enel's environmental policy, explanation of procedures to manage impacts due to activities, e.g. waste, emissions, liquid releases, etc.)	■ Green contracts/orders: about 31% of total contracts/orders

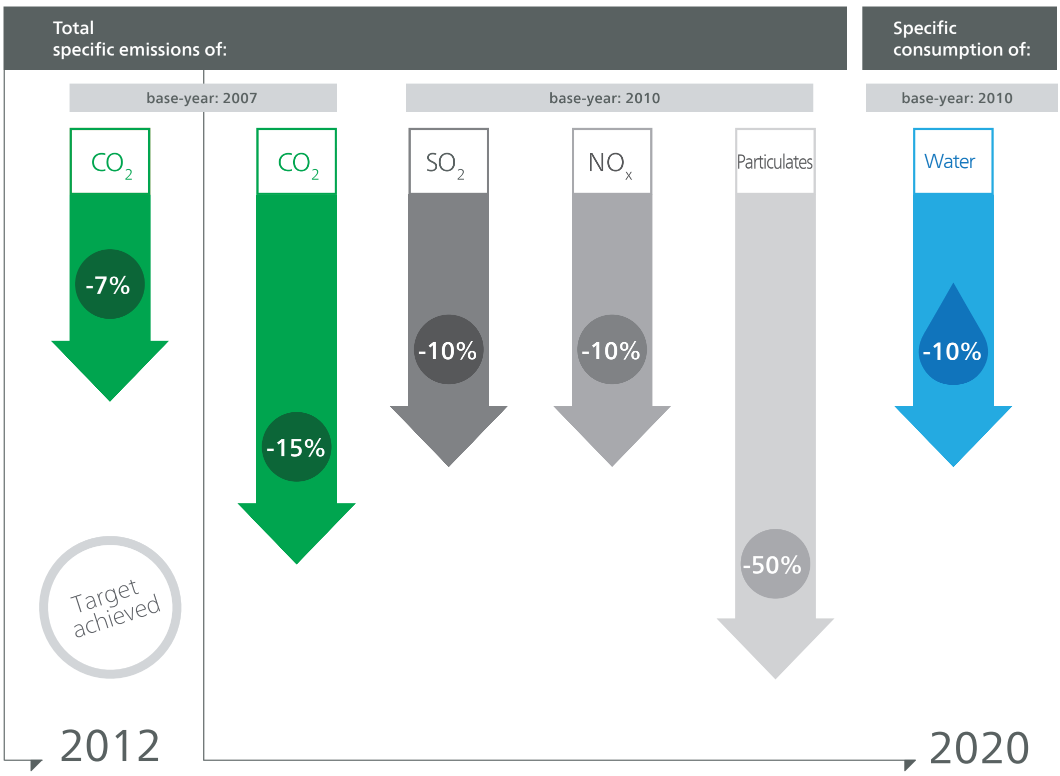
Environmental targets

With respect to the data reported in 2010, Enel set the following targets – to be reached by 2020 – for some of the most significant environmental aspects of its activities:

> total specific emissions of SO_2: down by 10%;
> total specific emissions of NO_x: down by 10%;
> total specific emissions of particulates: down by 50%;
> specific consumption of water [1]: down by 10%.

As regards specific emissions of CO_2, in 2013 Enel curbed them by 16% from their levels in 2007 (the year immediately before the first Kyoto Protocol commitment period), a reduction already higher than its target by 2020 with respect to 2007. In the light of this positive performance, Enel will explore the opportunity of rescheduling a medium-term target. These targets are in line with current initiatives and programs, which include installing emission abatement systems in thermal plants and developing new generating capacity from renewable and nuclear sources.

(1) Including water consumption for closed-cycle cooling and other industrial uses and excluding the one for open-cycle cooling.



Environmental organization

Environmental governance is implemented by operational units and coordinated by a dedicated unit at headquarters level with the mission of:

environmental governance

1. Formulating environmental policies and strategic environmental targets for the Group.

2. Monitoring the environmental management process and the achievement of targets.

3. Issuing guidelines for environmental management systems, managing the Group's environmental reporting process and preparing the Environmental Report.

4. Contributing to the Group's strategic guidelines and planning process in the environmental domain.

5. Fostering the dissemination of the best practices and of the culture of environmental performance improvement.

Business Lines and Global Service Functions

Depending on the specific issues to be covered, individuals and teams in charge of conducting environmental activities are present within the Business Lines and Global Service Functions. In particular:

> staff functions coordinate the management of the respective environmental issues, providing the necessary specialist support in line with the Holding Company's directions;
> operational units deal with the specific aspects of industrial sites.

Human resources dedicated to the environment

Within the Group, the human resources dedicated to the environment amount to 454 full-time equivalents (FTEs). This figure includes support personnel, i.e. personnel members at divisional and regional levels who provide environmental services to multiple operational units.

Organizational structure (FTEs)

4	Global Service Functions
53	Renewable Energy Division
111	Generation, Energy Management and Market Italy Division
118	Iberia and Latin America Division
66	International Division
78	Infrastructure and Networks Division
13	Engineering and Research Division
1	Upstream Gas Division
10	Holding Company - Regulatory, Environment and Innovation function
454	Total

Environmental management systems

Targets

The progressive deployment of internationally recognized environmental management systems in all the activities of the Group (industrial, planning, coordination, services, etc.) represents a strategic target of Enel's environmental policy.

Organization of environmental management systems

In 2012, Enel gained the ISO 14001 certification at Group level. Instrumental in achieving this strategic environmental-policy target was the development of an environmental management system, which connects, coordinates and harmonizes all the environmental management systems adopted within Enel. The new system ensures the environmental governance of the overall Group, by setting out guidelines and minimum requirements for implementing the Group's environmental policy in effective and homogeneous ways.

2013 results

EN6 EN7 At present, ISO 14001-certified systems cover 94% of the net maximum capacity of power plants, more than 95% of the grid length and 100% of the activities of the Global Service Functions and of the Engineering and Research Division, as well as of the market activities conducted in Italy and Romania. The higher coverage with respect to 2012 reflects the new certifications gained by: the wind farms of Enel Green Power in Europe and Latin America; the combined-cycle thermal plants of Pego in Portugal and Marcinelle in Belgium; and the diesel thermal plant of Ibiza in Spain.

The details of the ISO 14001-certified and EMAS-registered activities are provided in the Appendix to the Environmental. Report 2013.

ISO 14001-certified and EMAS-registered activities

ISO 14001		EMAS
Electricity generation	Electricity distribution	Electricity generation
93,015 Net maximum capacity certified (MW)	1,777,480 Grid length certified (km)	31,245 Net maximum capacity registered (MW)
94.0% Coverage	95.4% Coverage	44.4% Coverage (EU)

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and

CISQ/RINA

hereby certify that the organisation

ENEL S.P.A.

VIALE REGINA MARGHERITA, N. 137 00198 ROMA (RM) ITALIA

has implemented and maintains a

Environmental Management System

which fulfills the requirements of the following standard

ISO 14001:2004

in the following operative units

VIALE REGINA MARGHERITA, N. 137 00198 ROMA (RM) ITALIA
(View Attachments/Vedi allegati)

for the following field of activities

FOR ENEL SPA GROUP: DISTRIBUTION AND USE OF ELECTRICITY, PRODUCTION OF ELECTRICITY FROM RENEWABLE AND NON-RENEWABLE SOURCES, SALE OF ELECTRICITY, GAS AND MANAGEMENT OF CUSTOMER, PURCHASING ACTIVITIES FOR SUPPLIES AND/OR PROPERTY AND WORKS, FACILITY MANAGEMENT SERVICES AND GENERAL SERVICES, OCCUPATIONAL TRAINING ACTIVITY, FACTORING AND INSURANCE SERVICES, MANAGEMENT OF DESIGN, PRODUCTION, MAINTENANCE AND ADMINISTRATION OF INFORMATION TECHNOLOGY SYSTEMS, ORIENTATION OF POLICY RESEARCH AND DEVELOPMENT, DEFINITION AND MONITORING OF INITIATIVES IN INNOVATION AND ENVIRONMENT, DEVELOPMENT, SCOUTING, TESTING TECHNOLOGIES AND PROCESSES FOR THE GENERATION AND DISTRIBUTION, ENGINEERING PROCESSES RELATED TO THE DEVELOPMENT, IMPLEMENTATION AND ADAPTATION OF PLANTS FOR THERMAL POWER GENERATION AND NUCLEAR, RADIATION PROTECTION AND NUCLEAR SAFETY ACTIVITIES OVERSIGHT, DESIGN, CONSTRUCTION, DEVELOPMENT, RUNNING AND MAINTENANCE OF ELECTRICITY NETWORKS AT, MT BT AND REMOTE CONTROL, COMMERCIAL SERVICES RELATING TO

Registration Number: **IT-82367**

First Issue : 2012-07-26 Current Issue : 2013-12-19 Expiry Date : 2015-07-25

The status of validity of the certificate can be verified at http://www.cisq.com or by e-mail to fedcisq@cisq.com

Michael Drechsel
President of IQNET

Ing. Claudio Provetti
President of CISQ

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Green procurement

The environmental management system of Enel Servizi encompasses, among others, green procurement, i.e. the procurement of products and services having a lower impact on the environment than other products and services that may be used for the same purpose. Enel has the goal of broadening the range of products and services classified as green, by investigating eco-friendly criteria applicable to different types of products and services and monitoring the progress of international green labels (Ecolabel, Nordic Swan, Blue Angel, etc.). Green requirements (consumption of energy, water, raw materials and hazardous substances; use/recovery of packaging materials; emissions of pollutants and noise; waste recycling/reuse) were thus incorporated into the technical specifications of tenders ("green tenders"). The following table shows the results achieved by class of green products and services.

Classes of green products and services	Contracts awarded/orders placed (million €)
Sealed lead accumulators	4.121
Oil-insulated MV/LV transformers and autotransformers	0.036
Resin-insulated MV/LV transformers and autotransformers	0.510
Ammonia	4.909
Data storage devices (magnetic disks and back-up libraries)	3.725
Personal computers (desktops, notebooks, PDAs)	7.248
Stationery, printed material, paper or paperboard, toner cartridges, IT materials and accessories	0.160
Office furnishings	1.368
Promotional items and gadgets	0.138
Demolition of non-industrial installations and buildings	1.863
Demolition of large installations	0.991
Construction and maintenance of canals and hydraulic structures	12.444
Application and removal of insulating materials	7.346
Industrial painting	1.810
Routine maintenance of non-industrial buildings	2.775
Operation and maintenance of wind farms, specialist work on wind turbines	1.965
Industrial cleaning	5.113
Non-industrial cleaning	0.955
Handling and transport of goods/materials and porterage	0.293
Handling, transport and disposal of non-hazardous special waste	5.521
Handling, transport and disposal of hazardous special waste	7.699
Total	**70.990**

Green contracts/orders may also be awarded to/placed with suppliers or contractors possessing certified products/environmental management systems or awaiting certification. The following table shows the total amount of green contracts awarded/orders placed, highlighting the increase in their share of total contracts/orders in 2013 with respect to the previous two years.

Contracts awarded/orders placed (million €)

Year	Total contracts/ orders	Total green contracts/ orders	% of green contracts/ total contracts
2011	2,774	623	22.5%
2012	2,723	816	30.0%
2013	**2,587**	**789**	**30.5%**

Green procurement also helps to progressively increase the percentage of use of recycled materials through their purchase in the market (see EN1 Expendables, pages 98-99).

Stakeholders

Relations with institutions

In managing its relations with institutions in 2013, Enel continued to take an approach based on information completeness and disclosure, providing them with technical knowledge in support of their decision-making process. Relations with institutional counterparts took place at different levels – local, national, European and international – in an integrated way.

At **local level**, Enel seeks a continuous and constructive dialogue with institutions, with a view to finding the right balance among industrial requirements, land and landscape protection, as well as respect for local communities. In particular, when natural disasters occurred, Enel demonstrated capability of prompt response to and synergy with the competent agencies, which recognized its unique and strategic role. Likewise, during critical stages, such as the granting or renewal of authorizations, Enel maintained a seamless interaction with institutions, finding always new forms of cooperation.

At **national level**, Enel strengthened the relations established in previous years with members of Parliament and Government, widening and diversifying its network of contacts. In particular, after renewal of the Parliament, Enel established relations of direct cooperation with new political counterparts, i.e. the key players of the parliamentary process and of the Government's legislative activity

2013 was a year of big change, with the transition from Monti's technocratic government to Letta's "grand coalition", after elections in February that failed to produce a stable political majority. This outcome heavily weighed, among others, on the election of the Head of the State: former President Giorgio Napolitano was re-elected for a second term, an unprecedented event in the history of the Italian Republic.
In the last months of 2013, a significant part of center-right parliamentarians left the government majority, further chang-

ing the political scenario. Moreover, the new political forces that had entered the Parliament presented energy and environmental programs also in discontinuity with the national energy strategy approved with the national energy strategy, approved by Monti's government and practically supported by Letta's one. Interaction with members of Parliament and Government enabled Enel not only to express its positions on various issues, but also to make available its wealth of knowledge on energy and environmental matters.

On the institutional communication front, Enel actively participated in working groups and events organized by EU-wide and national think tanks and, through its own lecturers, in educational events on energy themes that took place in leading universities. Furthermore, Enel organized conferences on corporate strategic themes. In particular, as regards energy efficiency, it presented a study on the status and prospects of energy efficiency in Italy, conducted jointly by the Enel Study Center Foundation and the Polytechnic University of Milan. Cooperation between the Polytechnic University of Milan/Department of Management, Economics and Industrial Engineering and the Enel Study Center Foundation leveraged the strong synergies existing among academic, research, industrial and business communities. The study analyzed energy efficiency as a strategic factor of the energy policy and as a driver for the economic recovery of our country.

At **European level**, Enel took an active part in EU debates over major environmental issues, such as the partial reform of the Emissions Trading Directive, the Energy Efficiency Directive, the Energy Roadmap 2050, the Roadmap for Moving to a Competitive Low-Carbon Economy in 2050, the Roadmap to a Resource Efficient Europe and the Internal Energy Market Communication.

At **international level**, Enel played an active role within the non-governmental organizations of which it is a member and multilateral development banks. It also participated in an active and structured way in the major associations of the sector and in global fora of consultation over energy and environmental issues.

Main legislative and regulatory developments in the environmental field

In 2013, as part of the implementation of the Industrial Emissions Directive (IED, 2010/75/EU), the European Commission issued the first draft of the revised Best Available Techniques Reference Document (BRef) on large combustion plants (LCP). The LCP BRef is a sector-specific guidance document specifying the reference performance data based on the best available and economically efficient techniques that the competent authorities must transpose into their requirements for authorizing plants in compliance with the IED. In the second half of 2013, the European Commission opened a process of consultation on the draft document. The review is expected to end by 2014.

In 2013, the proposed revision of Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (environmental impact assessment - EIA) was completed with the drafting of a final text.
In December 2013, Decision no. 1386/2013/EU of the European Parliament and the Council of November 20, 2013 on a General Union Environment Action Programme to 2020 was published in the Official Journal of the EU. The decision concerns the Seventh Environment Action Programme (7th EAP), which sets priority targets to be achieved by 2020 via specific actions (including a better implementation of the existing legislation) concerning, among others, natural resources, the low-carbon economy and risks to human health and well-being, to be followed by implementing proposals by the European Commission.

Always in December 2013, the European Commission issued a package of legislative proposals on air quality policies (Clean Air Policy Package). The package included: a communication from the Commission (Clean Air Programme for Europe) setting targets to improve air quality in Europe by 2030 through regulatory and non-regulatory measures; a proposed decision on acceptance of the revision of the Gothenburg Protocol to the Convention on Long-Range Transboundary Air Pollution; a proposed directive regarding the National Emission Ceilings for certain air pollutants and amending Directive 2003/35/EC (NEC Directive); and a draft directive on the limitation of emissions of certain pollutants into the air from medium combustion plants.

During 2013, the revision of Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases (started at the end of 2012 with the Commission proposal for revision) went on. In December 2013, the European Parliament and the Council agreed on a compromise text.

EN28 Environmental criticalities

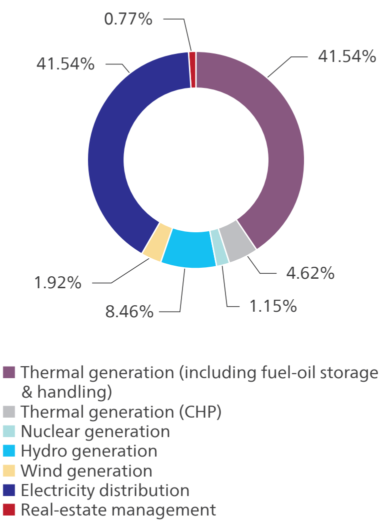
Environmental criticality means the rejection of, opposition to or complaint about the impact due to the operation of installations (power plants, grids, substations, buildings, etc.). This position is expressed – for obvious reasons – by a third party feeling disturbed, damaged or threatened by present or future installations. Environmental opposition translates into public or private initiatives, which may involve significant costs owing to denied authorizations, suspensions of works, modifications of installations, etc. Examples are administrative measures, letters before action, written protests (direct or through the press), actions by mass media, as well as verbal complaints (when local complaint desks or offices are available). Each protest concerning the same installation corresponds to a different criticality. The criticality ceases with the end of the circumstances generating it. In any case, environmental litigations are excluded from environmental criticalities.

The use of the most rigorous and advanced organization and management measures cannot avoid the occurrence of environmental criticalities, which originate from various factors, including the excessive emphasis that the media place on some issues, thus inducing particular expectations among communities.

In 2013, the number of environmental criticalities was equal to 260. The decrease is mainly due to improvements in reporting systems, which led to reclassify some pending criticalities. The following is a description of the main criticalities, grouped by type, and of the measures taken.

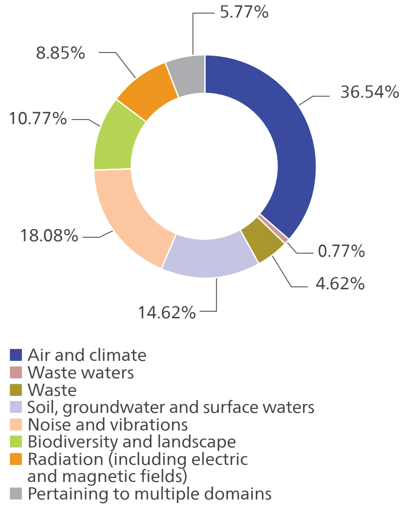
Environmental criticalities as of Dec. 31, 2013 (by business activity)

Total: 260



Environmental criticalities as of Dec. 31, 2013 (by environmental domain)

Total: 260



Public opposition to construction of some hydro power plants in Chile (Hidroaysén hydroelectric project) and Colombia (Quimbo dam project) and of the coal-fired thermal power plant of Punta Alcalde in Chile.
Local indigenous communities' opposition to planned offsets (Ralco hydro power plant) and to the flooding of sacred sites (Neltume hydroelectric project) in Chile.
Relations with stakeholders

Press campaigns and articles against the presence and operation of some thermal power plants in Italy (Brindisi and Piombino) and in Spain (Mahon diesel-fired plant and Litoral de Almeria thermal plant), against the operation of hydro power plants in Spain (Marmolejo dam) and public opposition to the conversion of the Porto Tolle power plant to coal firing (Italy).
Relations with stakeholders and power-plant open-house initiatives

Impact of the power grid on biodiversity and landscape in Spain and Brazil.
Applications for authorizations, payment of charges and reduction of tree logging

Impact of the presence of wind farms in Portugal (Alvaiazere) and of the operation of hydro power plants in Brazil (Casca II and III, Torixoréo, Culuene, Corujão) on land and local fauna.
Monitoring activity, plant retrofits, biodiversity conservation

Concerns and notices about electric & magnetic fields from power grids, especially in Colombia, Spain and Italy.
Verification of compliance with applicable limits via monitoring surveys

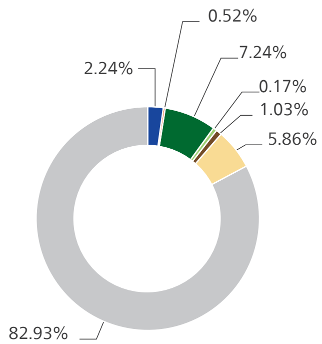
Noise produced by power grid transformers in Italy, Colombia and Spain (substations in Andalusia and Catalonia), Romania (substations of Bucuresti nord and Toporasi) and by wind farms in France (Coulonges and Pannecé) and Greece (Korinthos).
Noise monitoring plans, abatement measures and replacement/retrofit of components

Notices or administrative measures issued by the competent bodies concerning the operation of: thermal power plants in Italy (Porto Corsini, Priolo Gargallo), Russia (Reftinskaya, Sredneuralskaya, Konakovskaya), Spain (Energía de la Loma), Argentina (Costanera) and Chile (Bocamina); nuclear power plants in Spain (Ascó I and II); hydro power plants in Italy (Scalere, Regalbuto, Paternò and Casuzze dams); and the electricity distribution grid in Spain and Peru.
Provision of documents giving the necessary clarifications and specific actions

EN28 Environmental litigations

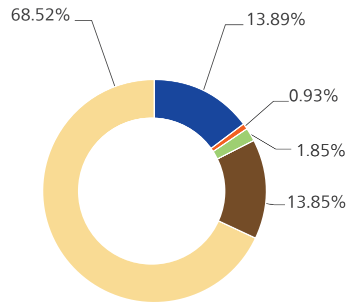
The civil and criminal proceedings described below are only those in which Enel was sued or prosecuted and those that arose from third parties' appeals seeking the quashing of administrative judgments in favor of Enel ("passive litigations"). As of December 31, 2013, Enel had 689 (2) pending judicial proceedings (about 80% related to its electricity distribution grid), of which 581 pending from previous years. In 2013, 119 proceedings were closed. The following table summarizes the most significant litigations.

Environmental litigations pending as of Dec. 31, 2013 (by business activity)
Total: 581



- Thermal generation (incluting fuel-oil storage & handling)
- Thermal generation (CHP)
- Nuclear generation
- Nuclear generation (CHP)
- Hydro generation
- Wind generation
- Electricity distribution

Environmental litigations initiated in 2013 (by business activity)
Total: 108

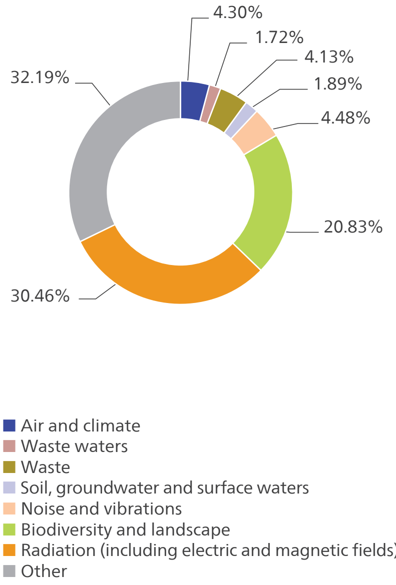


- Thermal generation (including fuel-oil storage & handling)
- Thermal generation (CHP)
- Nuclear generation
- Hydro generation
- Electricity distribution

(2) Until 2013, the number of litigations involving Endesa also included other environmental proceedings, such as administrative proceedings and penalties not purely judicial in nature.

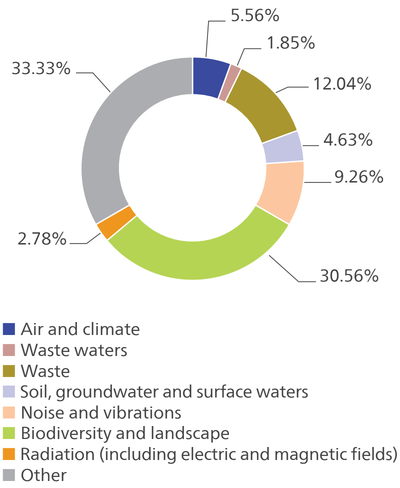
Environmental litigations pending as of Dec. 31, 2013
(by environmental domain)

Total: 581



Environmental litigations initiated in 2013
(by environmental domain)

Total: 108



Authorizations
Alleged lack of some authorizations for thermal generation in Italy (Bari, Mercure - province of Cosenza) and Chile (Bocamina); irregular authorization processes in Italy (Porto Tolle - Rovigo) and in Chile (Punta Alcalde project), violation of authorization prescriptions in Italy (Torrevaldaliga Nord - Rome); irregularities in hydro generation in Brazil (Cachoeira Dourada) and in the construction of the El Quimbo dam in Colombia and for some wind farms of Enel Green Power in Spain.

Depositions
Alleged damage to the environment or to property caused by pollutant depositions from thermal power plants in Italy (Brindisi, Livorno, Panarea - Messina, Porto Tolle - Rovigo, Torrevaldaliga Nord - Rome) and in Slovakia.

Waste
Alleged irregular waste management in thermal generation in Italy (Brindisi, Augusta - Syracuse, Mercure - Cosenza, Bari, Piombino Business Unit).

Releases into water bodies
Alleged irregularities or violations concerning releases from thermal generation in Italy (Porto Tolle - Rovigo, Porto Marghera - Venice, Torrevaldaliga Nord – Rome, Brindisi).

Water use
Alleged damage to groundwater caused by the operation of thermal and hydro power plants in Italy (Brindisi and Hydro Veneto Business Unit).

Noise
Noise and vibrations due to thermal and hydro generation in Italy (Montalto di Castro - Viterbo, Presenzano - Caserta) and thermal generation in Chile.

Electric and magnetic fields
Electric and magnetic fields associated with electricity distribution in Italy, Spain and Latin America. Enel Distribuzione and Endesa are defendants in various proceedings requiring the relocation of portions of the power grid or the change of its mode of operation on grounds of alleged damage induced by the installations.

Radiation
Appeal against the penalty inflicted for exceedance of limits of radioactive releases from the Ascó plant in Spain.

Damage from fires
Damage from fires caused by electricity distribution in Spain (Catalonia and Canary islands).

Damage to the environment
Alleged damage from pollution in hydro generation in Colombia (Muña basin) and fuel spills/ soil pollution associated with thermal generation (Brindisi, Sulcis).

Damage to flora and fish fauna
Alleged damage to flora and fish fauna associated with the management of minimum in-stream flows, sediment flushing-out and removal in hydro generation in Italy (Hydro Veneto Business Unit) and Brazil (Cachoeira Dourada and Braço Norte).

Damage to vegetation
Damage due to cutting of vegetation in electricity distribution in Brazil.

Possible adverse outcomes and negative effects of pending litigations are unpredictable. Therefore, they have not been included in the "Provision for litigations, risks and charges" of Enel's consolidated financial statements 2013. The consequences of these litigations might range from compensation for damages to costs to be incurred for modifying installations or due to their temporary unavailability.

In 2013, the monetary value of environmental penalties was equal to approximately € 131,000; this figure is mainly due to compensation to third parties for impacts on vegetation and farming in Slovakia.

Environmental commitment

EN30 Financial resources

Enel records its environmental expenditure (investments and current expenditure) according to a classification system based on the criteria adopted by Eurostat/Istat, under which "environmental protection expenditure" is defined as the costs incurred for preventing and mitigating environmental pollution and degradation and for restoring the quality of the environment, whatever the origin of such costs (legislation, regulations, agreements with local governments, corporate decisions, etc.). Costs incurred to purchase emission certificates are separately recorded, taking into account GRI EN30 (3) criteria.

The environmental expenditure excludes the costs incurred for minimizing the use of natural resources, as well as for activities that, albeit environmentally beneficial, primarily satisfy other requirements, such as health & safety in workplaces. The term "expenditure" always has an algebraic meaning, as it may also refer to revenues, such as those that may accrue from waste delivery to recovery operators.

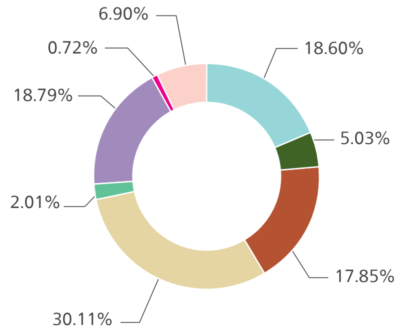
(3) The values of "current expenditure for waste disposal, emission abatement and environmental restoration" in the three-year period, published in the Sustainability Report, do not consider environmental liability insurance policies and depreciation charges for environmental protection investments for the following reasons: i) under the current method of accounting, insurance premiums cannot be associated with specific environmental cost items in a reliable way; and ii) investments are reported as such, as their depreciation charges have not yet been defined in a uniform way.

Group's financial allocations for environmental protection in 2013

Business/line of activity (million €)	Investments	Current expenditure	Total
Thermal generation	125	204	329
Nuclear generation	16	132	148
Electricity generation from renewables	14	45	59
Electricity distribution	68	43	111
Other activities (including mining and environmental support activities (4))	95	65	160
Total	318	489	807
Emission certificates	-	*335*	*335*
Total	**318**	**824**	**1,142**

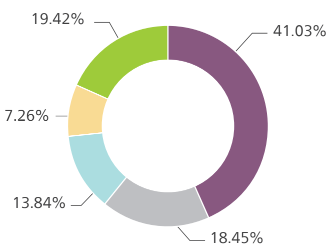
(4) "Environmental support activities" mean the activities of advice and guidance not pertaining directly to a specific business or line of activity.

Overall environmental investments in 2013
(by environmental protection activity)
Total: € 318 million



- Air and climate protection
- Waste water management
- Waste management
- Soil, groundwater and surface water conservation and remediation
- Noise and vibration abatement
- Biodiversity and landscape conservation
- Research & development for environmental protection
- Other environmental protection activities

Financial resources allocated to environmental protection as of Dec. 31, 2013
(by business or line of activity)
Total: € 807 million



- Thermal generation
- Nuclear generation
- Electricity generation from renewables
- Electricity distribution
- Other activities

EN30 Investments

The most significant investments on **thermal plants** were as follows:

- improvements to SO_2, NO_x and particulate emission abatement systems (plant system upgrades to comply with emission limits and modernization of desulfurizers, denitrification and particulate abatement systems, the latter especially in coal-fired plants);
- installation of new low-NO_x burners;
- revamping and remediation of some tanks for fuel-oil storage & handling and upgrades of passive protection systems (containment basins in fuel storage areas and fire prevention systems);
- handling, transport and storage of gypsum and ash;
- renovation and modernization of systems for treating liquid releases (desulfurizer drainage, waste and sewage waters);
- new systems for monitoring and analyzing flue gases;
- characterization of contaminated sites, planning/design and implementation of rehabilitation projects;
- morphological, hydrographic and landscape restoration in mining areas;
- removal of asbestos-containing materials;
- decontamination of PCB-contaminated oils and machinery;
- noise mitigation.

Investments on electricity generation from **renewables** were as follows:

- upgrades of transformer-oil collection tanks;
- retrofitting of outlets;
- desilting of basins;
- consolidation of some channels/canals and of landslide-prone slopes;
- improved methods to collect materials removed from the trashracks of intake structures (automatic collection machines were installed in some plants in Slovakia);
- noise abatement in installations and replacement of noisy generators;
- construction of infrastructures to safeguard faunal communities near installations;
- better integration of installations into the environment;
- retrofitting of intake structures to release the minimum in-stream flow into water bodies;
- construction of fish ladders;
- testing of a new system for microorganism-based clean-up of channels/canals;
- reforestation and offsets;

€ 125 million
Thermal generation

€ 16 million
Nuclear generation

€ 14 million
Electricity generation from renewables

€ 68 million
Electricity distribution

- replacement of asbestos- or PCB-contaminated equipment;
- replacement of oil-insulated transformers with new resin-insulated ones.

The main investments on **nuclear plants** were as follows:

- management of hazardous and radioactive waste;
- management of waste waters.

Investments on **electricity distribution** were as follows:

- disposal of PCB-contaminated equipment;
- retrofit or replacement of transformers;
- use of overhead or underground cables in power lines to conserve biodiversity and landscape; the following extra cost items are recorded as environmental investments: overhead and underground cables in place of bare conductors in medium-voltage lines in areas of low population density; underground cables in place of overhead cables in low-voltage lines in the above areas; underground cables in place of bare conductors in high-voltage lines, whatever their location.

EN30 Current expenditure

The current environmental expenditure of 2013 is almost entirely attributable to electricity generation (82%).

The main items of expenditure, divided by business or line of activity, are as follows.

Thermal generation

> industrial clean-ups connected with plant operation (handling and removal of liquid releases and by-products);
> delivery of coal ash and gypsum from desulfurization to waste operators;
> purchase of reagents for pollutant abatement;
> analysis and characterization of waste and liquid releases;
> maintenance of flue-gas desulfurization and environmental monitoring systems;
> maintenance of crystallizers and waste water treatment systems;
> construction of first-flush diverters;
> environmental restoration;
> noise monitoring surveys;
> awareness, training & education;
> maintenance of environmental certification.

Nuclear generation

> protection from radiation;
> radioactive waste management;
> industrial clean-ups connected with plant operation (handling and removal of liquid releases and by-products);
> analysis and characterization of waste and liquid releases;
> maintenance of waste water treatment systems;
> groundwater quality monitoring;
> noise monitoring surveys;
> awareness, training & education;

Electricity distribution

> water- and leak-proofing and clean-up of oil spills;
> analysis of liquid releases;
> waste management;
> noise monitoring surveys;
> improvement of overhead lines to mitigate their impact on biodiversity;
> awareness, training & education.

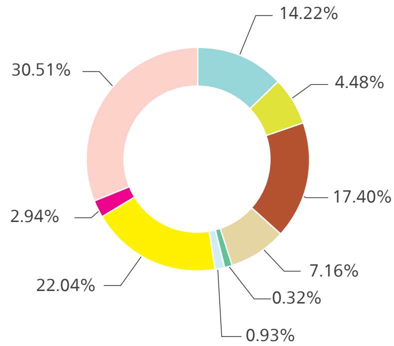
Electricity generation from renewables

> monitoring of groundwater;
> waste management;
> maintenance of septic tanks;
> reforestation;
> programs of prevention of pollution from chemical substances (geothermal activities);
> qualitative analysis of waters used;
> removal of sediment from trashracks;
> fish restocking;
> maintenance of hydraulic structures to keep them efficient and without risks to the environment;
> maintenance of environmental certification;
> awareness, training & education.

The above expenditure includes (in part as investments and in part as current expenditure) the research items shown (in million €) below.

Research and innovation expenditure by business or line of activity	Unit of measurement	2013	%
Conventional generation	(million €)	20.5	26.9
Electricity generation from renewables	(million €)	33.7	44.1
Grid	(million €)	16.3	21.4
End uses	(million €)	5.8	7.6
Total	**(million €)**	**76.3**	**100.0**

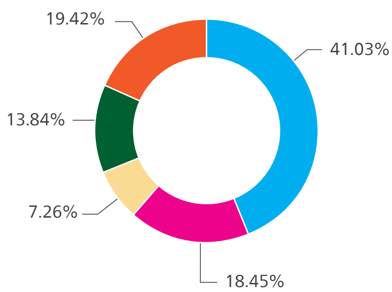
Current environmental expenditure in 2013, excluding extra fuel costs [1] (by environmental protection activity)
Total: € 489 million



(1) "Extra fuel costs" are the extra costs incurred to purchase fuels with a lower environmental impact.

- Air and climate protection
- Waste water management
- Waste management
- Soil, groundwater and surface water conservation and remediation
- Noise and vibration abatement
- Biodiversity and landscape conservation
- Protection from radiation
- Research & development for environmental protection
- Other environmental protection activities

Current environmental expenditure in 2013, excluding extra fuel costs (by business or line of activity)
Total: € 489 million



- Thermal generation
- Nuclear generation
- Electricity generation from renewables
- Electricity distribution
- Other activities

Other items of expenditure accrued in financial year 2013 (not explicitly allocated to environmental protection and thus separately recorded) include the purchase of green certificates (€ 270 million) to comply with the green quota obligation.

Climate Strategy - Clean Development Mechanism, Joint Implementation and voluntary initiatives

Enel recognizes the centrality of the fight against climate change among its responsibilities as a large global energy operator and has long initiated actions to cut down greenhouse-gas emissions in all the countries where it operates, both by complying with its obligations under the EU's Emissions Trading Directive and by implementing a long-term strategy.

In fact, Enel's Chief Executive Officer joined Eurelectric's initiative, under which 60 companies are committed to achieving a carbon-neutral European electricity industry by 2050.

Today, about 47% of Enel's electricity is generated from zero-emission sources. In 2013, Enel installed about 941 MW of new capacity from renewables, confirming its commitment to carbon-free generation, which will continue in the coming years.

With respect to 1990, the base year of the Kyoto Protocol, the Group's specific CO_2 emissions in 2013 were down by 37%. Additionally, in 2013, Enel curbed them by 16% from their levels in 2007, a reduction already higher than its target by 2020 with respect to 2007, the year immediately before the first Kyoto Protocol commitment period. In light of this positive performance, Enel will assess the need for redefining a medium-term target considering that its performance in 2013 was affected not only by the continuing and structural growth of electricity generation from renewables but also by contingent circumstances, such as high hydraulicity combined with market dynamics.

With respect to the data reported for 2010, Enel set the following additional targets, concerning some of the most significant environmental aspects of its activities, to be reached by 2020: -10% of total specific emissions of sulfur dioxide (SO_2), -10% of total specific emissions of nitrogen oxides (NO_x), -50% of total specific emissions of particulates and -10% of total specific consumption of water, from their levels in 2010.

The long-term strategy of the Enel Group is hinged on: developing zero-emission sources; using the best available technologies; promoting energy efficiency; deploying smart grids; pursuing research and innovation; and curbing emissions through projects in developing countries and economies in transition by relying, among others, on the Kyoto Protocol flexible mechanisms (Clean Development Mechanism – CDM – and Joint Implementation – JI), in which Enel acquired excellent skills and expertise over the past decade. In particular, the use of flexible mechanisms enables Enel not only to reduce emissions at the least cost (environmental benefits remaining equal), but also to foster technological transfers to and sustainable development in less advanced economies. Thanks to flexible mechanisms, Enel displaced nearly 20 million tonnes of CO_2-equivalent emissions in 2013.

Enel's CDM and JI projects (about 80) are located in Asia, Africa and Latin America and span a wide array of technologies: renewables (hydro, wind and geothermal), biomass, methane destruction, energy efficiency, water and waste treatment. The details of the CDM projects in which the Enel Group acts as project participant are available on the UNFFC website (starting from page http://cdm.unfccc.int/Projects/projsearch.html).

Enel is now supporting the first CDM project (registered in November 2013) ever implemented in Haiti. The project is aimed at manufacturing and distributing efficient cook stoves. Thanks to Enel's participation in these activities, previously of a small-business nature, thousands of Haitian families will benefit from a more efficient and cleaner household appliance technology at an affordable cost.

For some years, Enel has also been active in the voluntary emission reduction market, by encouraging various parties (companies, institutions, final customers, etc.) to monitor or neutralize their carbon footprint, i.e. the impact of their activities (events, publications, products and services) in terms of emissions. All the initiatives are associated with the "CO_2 NEUTRAL" trademark that Enel registered in 2011.

Moreover, in the past three years, Enel has been reporting its climate strategies within the framework of the Carbon Disclosure Project (CDP), thus ranking among the best sustainable companies in the world.

In parallel with mitigation policies, the Enel Group is also working on adaptation to climate change. Extreme weather events may have significant impacts on the level and quality of electricity generation, distribution and supply in the short and medium term. This is the reason why the Enel Group started to investigate the theme of adaptation to climate change through a pilot project in the Iberian peninsula and Latin America. In 2014, this investigation will be extended with the goal of clarifying, first of all, the uncertainties associated with short- and medium-term impacts and of contributing in a much more effective way to the public debate with institutional stakeholders and civil society.

At present, the main risks induced by climate change to the Group are of a regulatory nature and concern the possibility that its generating mix does not comply with the rules on emissions of greenhouse gases (GHGs) into the atmosphere. The European legislation on the system for trading GHG emission allowances (Emissions Trading Scheme, EU-ETS) imposes burdens on the electricity sector that may become increasingly significant in the future. In this scenario, the instability of the allowance market heightens the difficulties of managing and monitoring them. With a view to reducing risk factors associated with compliance with CO_2 legislation, the Group tracks the development and implementation of national and EU legislation and develops strategies to purchase allowances at a more competitive cost.

Furthermore, the Group is constantly committed to satisfying all legislative/regulatory obligations concerning its activities in the various countries. For instance, in Italy, Enel fulfills its obligations as a distributor in terms of end-use efficiency (white certificates scheme) and as a producer in terms of the share of electricity from renewables to be injected every year into the grid (green certificates scheme).

Legislative/regulatory and technological changes related to climate change represent competitive advantages for Enel because they favor investments, including those on energy efficiency, by Enel's customers. They also enhance the technological leadership of the Group in smart grids, renewables and high efficiency in conventional plants.

EN6 Renewables

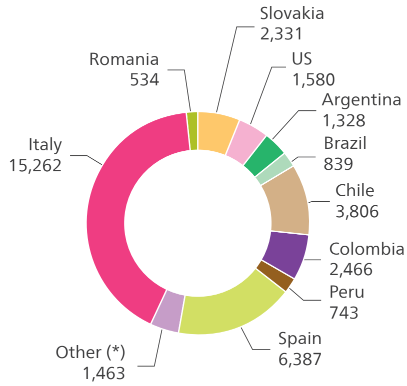
Renewable energy sources (RES) are one of the main strategic levers that the energy industry may use to curb CO_2 emissions into the atmosphere and, at the same time, to cover energy demand. Their potential is growing both quantitatively and technologically. Indeed, green energy is a key driver of the competitiveness of the production system: distributed generation of electricity from water, sun, wind and the Earth's heat contributes to raising energy independence and supports environmental protection, by holding down GHG emissions and countering climate change. These are the energy sources on which Enel decided to invest, becoming one of the leaders of the sector.

To boost its activities of development and operation of new RES-E plants, Enel set up a dedicated company: Enel Green Power. With about 9,000 MW of installed capacity in 16 countries and over 29 billion of kWh generated in 2013, Enel Green Power is one of the leaders in the world, with a portfolio of technologies which is well diversified and which spans the international arena. In 2013, the company's net maximum renewable capacity was up by over 900 MW thanks to the commissioning of wind farms in Spain, France, Chile, Brazil and the United States, of photovoltaic plants in Italy, Greece, Romania and the United States and of hydro plants in the United States .

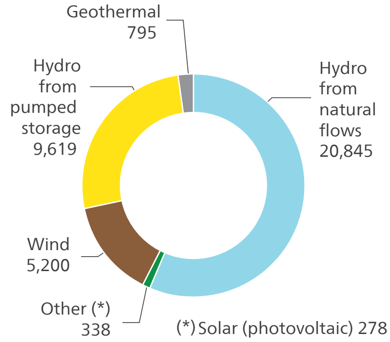
Medium- and large-sized hydro plants are managed by the companies of the Group, such as Enel Produzione in Italy, Endesa in Europe and Latin America and Slovenské elektrárne in Slovakia.

Renewable-energy generating mix as of Dec. 31, 2013

Total: 36,739 MW



(*) Panama 300
Greece 290
Mexico 197
France 186
Guatemala 164
Portugal 126
Canada 103
Costa Rica 55
Bulgaria 42



(*) Solar (photovoltaic) 278
Biomass 60

Today, the net maximum capacity of Enel's RES-E plants all over the world is equal to about 36,700 MW, accounting for about 42% of the overall capacity of Enel's generating mix. With this mix, Enel generated a total of over 89 billion kWh from RES in 2013, displacing over 100 million tonnes of CO_2 emissions into the atmosphere.

The strategy that the Group pursues in the sector of renewables places particular emphasis on:

> technological diversification – although the Group excels in historical technologies, e.g. hydro and geothermal, it is investing on the most recent technologies, harnessing wind, solar and biomass resources in the various countries where it is present;

> integration into the market – the Group firmly believes in full integration of renewables into the market and thus in maintaining existing incentives for renewables only for the strictly necessary period. The level of remuneration of incentives should be consistent with technological advances, while the ease of access and connection to the grid should not give rise to market distortions; in this regard, it is worth pointing out that the Group's RES-E plants have a low dependence on governmental incentives;

> Research & Development – the Group promotes innovation by making huge investments in innovative technologies, monitoring emerging ones and developing pilot projects for those that are close to the commercial stage, with a view to identifying new high-potential technologies on which to invest.

EN5 EN6 EN7 Energy efficiency

The following table shows the most important energy efficiency projects, divided by type and country. Additional data can be found further on in this chapter, under the "Research & innovation" heading, and in the previous "Environmental management systems" section.

Country	Type of project	Description
		EUROPE
Italy	Power distribution grid	Installation of new low-loss transformers, new substations and renovation/upgrade of LV/MV lines. Estimated savings: 350,235 GJ.
	Services	Optimized operation (set points, operating time) of power installations. Savings: about 26,100 GJ.
Romania	Power distribution grid	Modernization of grids and optimization of operation. Total savings: 23,010 GJ.
	Promotional campaign	Enel replaced over 3,000 incandescent lamps with low-consumption ones in the village of Tortoman (Constanța county). Savings: 222 GJ. More than 550 household customers will save a total of about € 12,000 on their electricity bills.
Russia	Thermal power generation	Konakovskaya: replacement, insulation and lining of boilers and turbines (estimated savings: 10,168 GJ). Nevinnomysskaya: replacement of unit 8 transformer (estimated savings: 4,252 GJ). Reftinskaya: revamping of unit 6 coal feeders with installation of a regulated frequency drive (estimated savings: 191 GJ).
Slovakia	Photovoltaic power generation	Reduction of electricity consumption by the Mohovce and Vojany plants and by the Terry chalet (savings: 24,934 GJ) thanks to generation by locallly installed PV facilities.
	Thermal power generation	By using biomass (60,794 t with a calorific value of 11.48 MJ/kg) instead of fossil fuel, the Vojany plant saved 698,069 GJ. By using biomass (11,561 t with a calorific value of 10.26 MJ/kg) instead of fossil fuel, the Nováky plant saved 118,574 GJ.
	Travel management	The personnel function worked out a specific procedure to promote the replacement of travel for duty with audio-videoconferencing systems.
Spain	Thermal power generation	Total: 6,741 GJ. TERUEL thermal plant: replacement of three coal mills (two in unit 1 and one in unit 3) with more efficient ones, with reduction of the electricity consumed by the plant auxiliaries; and installation of a magnetic separator on the coal conveyor belt. LAS SALINAS diesel plant: use of waste energy from exhaust gases of unit 6 to cover consumption by auxiliaries; this measure reduces the consumption of gas oil by the unit. CRISTÓBAL COLÓN combined-cycle plant: installation of a variable frequency drive on the booster pump; installation of a motion detector to switch on/off lighting in buildings.

Country	Type of project	Description
		LATIN AMERICA
Brazil	Environmental awareness & training	Energy-saving campaign in the offices of all the units of Enel Green Power in Brazil.
Peru	Reduction of energy consumption	Energy savings from the following initiatives were quantified: reduction of water and paper consumption - 8,151 GJ; reduction of travel for duty - 1,654 GJ; daily commuting - 2,250 GJ; vehicle fleet improvements - 4,659 GJ.

In 2013, by increasing the utilization of its most efficient thermal power plants, the Group slightly improved the overall heat rate of its thermal generation.

Nuclear energy

The role of nuclear energy in Enel's environmental policy

Enel regards nuclear power generation as a necessary – but not sufficient – ingredient to effectively pursue its energy and environmental strategy. Therefore, it regularly monitors its nuclear plants in order to guarantee their maximum operational safety.

At present, the Group has a net maximum nuclear capacity of about 5,370 MW (5.4% of its overall electrical capacity).

In 2013, Enel generated about 41 TWh in nuclear plants (14.2% of its total generation), displacing over 35 million tonnes of CO_2 emissions into the atmosphere.

The rationale behind Enel's interest in nuclear generation is based on:

> fighting pollution and climate change;

> strategic considerations of energy independence;

> economic considerations concerning the volatility of the prices of fossil fuels, which are strongly dependent on those of oil;

> political considerations concerning the instability of the main countries that supply oil and natural gas.

Nuclear fuel (uranium) accounts for a small share of the overall generation cost; it is a resource which is geographically diversified and which generally comes from politically stable countries. In the past few years, Enel has recovered nuclear expertise, by relying on new resources and making targeted investments abroad.

Enel's activities in this sector are concentrated in Slovakia (Slovenské elektrárne, with 4 reactors in operation - 2 in Bohunice and 2 in Mochovce - and 2 reactors under construction in Mochovce) and in Spain (Endesa, participation in 7 reactors, one of which under conditions of suspended operation since December 2012).

At the end of 2013, Enel initiated the process for selling its stake in the consortium for the project of completion of the Cernavodă plant in Romania. In Russia, after the end of its cooperation relationship under the Kaliningrad plant financing agreement, Enel maintained the target of its Memorandum of Understanding with Rosatom for future cooperation.

After the incident of Fukushima (Japan) in March 2011 and the decision of the EU to conduct stress tests on all of its nuclear power plants, Enel carried out the required tests on its plants and identified measures to improve their safety.

Nuclear Safety Oversight and radioprotection

The commitment of Enel to managing its nuclear assets under safety/security conditions is clearly expressed in its Nuclear Policy, approved by its Board of Directors. The Nuclear Safety Oversight (NSO) unit ensures the governance of this policy, as it is in charge of continuously monitoring and maximizing the safety/security performance of the Group's nuclear plants in an independent way, in line with international best practices. The NSO also represents Enel's interface with national and international nuclear safety bodies as regards the management of in-service nuclear plants under safety/security conditions.

Radioprotection (health protection against ionizing radiation) has the purpose of preserving the health and well-being of workers and the general population, reducing the health risks arising from exposure to ionizing radiation. In line with its purpose, it also deals with environmental protection (radioecology).

The Nuclear Area/Radioprotection, Nuclear Operation & Maintenance and Best Practice Sharing unit carries out structured actions of monitoring, control, analysis and coordination of radioprotection in the Group's nuclear plants via a Radioprotection Survey Network. It also supports the Nuclear Engineering unit in defining radioprotection and environmental requirements for all the stages of the plant, from design to operation, coordinating environmental impact analyses and studies and supporting authorization processes.

Proper management of nuclear plants

The operation of Enel's nuclear plants in Spain and Slovakia is in line with the international best practices of the sector. The processes defined in the guidelines of the Institute of Nuclear Power Operations (INPO), the World Association of Nuclear Operators (WANO), the Electric Power Research Institute (EPRI) and the International Atomic Energy Agency (IAEA) are a common denominator for the companies of the Group that are engaged in nuclear generation.
Based on the best practices accepted by the nuclear industry in the world, the soundest and most effective method to guarantee high and sustainable levels of safety/security and environmental protection (also upon unplanned outages) is the adoption of a model of plant operation, based on specific processes (described in detail in appropriate procedures).
Among the most important processes of the model:

> work management;
> equipment reliability;
> human performance (error prevention);
> corrective action program;
> operating experience.

Furthermore, Enel takes a continuous improvement approach, as described in the procedures of safety, environment and quality management systems.
All the tools used in the processes (procedures, training programs, etc.), including technical ones (software programs, simulators, etc.), are continuously updated in view of achieving operating excellence.

Stress tests on Enel's nuclear plants

As indicated by the European Commission, stress tests are aimed at determining the safety/security margins of in-service nuclear power plants upon extreme natural events (earthquakes, floods) or incidents (loss of grid power supply, unavailability of water for cooling) and, thus, at investigating their response to beyond-design-basis events.
Thanks to new rules and better coordination, Member States defined common criteria for the design and operation of nuclear plants, with a view to harmonizing the proposed preventive and mitigative measures and further enhancing the level of safety/security of European nuclear plants. These measures include: installation of new security/safety systems, availability of mobile equipment and portable diesel generating sets, technologies ensuring the continuity and availability of power supply in case of black-out.

In December 2011, the nuclear safety authorities of Member States published their final reports, setting out common criteria and providing details about all the plants analyzed in the reports of the individual utilities.

In 2012, the European Nuclear Safety Regulators Group (ENSREG), supported by the national nuclear safety authorities, developed a peer review process, which resulted into the publication of the respective national reports in April. After the assessment of the stress tests and the peer review process, the nuclear safety authorities of each Member State issued national action plans.

In April 2013, ENSREG organized a workshop to discuss national action plans, taking into account the comments received from stakeholders during a public consultation held in March 2013. The workshop highlighted good practices and future challenges and confirmed the commitment of Member States to implementing national action plans containing improvement measures and to continuing disclosure to the public. ENSREG will organize a new peer review stage in 2015.

Enel conducted a thorough analysis of the Fukushima incident, investigating the various stages of the seismic event (and of the subsequent tsunami), as well as the deficiencies in terms of regulation, plant design & operation and emergency response, so as to derive lessons learned for stress tests on its nuclear plants. The two Site and Plant Safety Analysis (ASI) and Nuclear Engineering (INN) units (belonging to the Nuclear Technical Area/Engineering and Research Division) supported the companies of the Group in the preparation of the reports, ensuring international coordination and harmonization of the proposed mitigative measures, and in the implementation of the planned improvement measures.

Management of radioactive waste

In both Slovakia and Spain, radioactive waste is managed by publicly-owned companies, which are paid from a special fund set aside during plant operation.

> In **Slovakia**, Javys (State-owned company) is in charge of radioactive waste and spent-fuel management and of plant decommissioning. Medium- and low-level radioactive waste (decay time: 20-30 years for low-level and 300 years for medium-level) from nuclear plants in service or under decommissioning (just as radioactive waste coming from research centers, laboratories and hospitals) is conditioned (via vitrification and other processes) and then placed into the national storage facility; this facility, located near the Mochovce plant, has been in operation since 2001.
Conversely, for high-level radioactive waste (decay time: thousands of years), including spent fuel, no final geological storage site is available yet. At present, after completing its cycle, the fuel is stored for about three years into special pools (inside the plant) and then placed into a temporary storage facility at the Bohunice site. A study is under way for the creation of a final geological storage site, to become operational in about 30 years.

> In **Spain**, Enresa (State-owned company) is responsible for waste management and plant decommissioning.
Medium- and low-level radioactive waste is appropriately treated and then transferred to the final storage facility of El Cabril (province of Córdoba, Andalusia).
High-level waste, mostly consisting of spent fuel, is provisionally stored into pools or dry storage facilities at the sites of origin. The project for the centralized, above-ground, temporary storage facility of Villar de Cañas, where all the spent fuel from Spanish plants and other high-level radioactive waste not storable at El Cabril will remain for 60 years, is at its engineering and authorization stages. Construction is planned to begin in 2015 and end in 2017. This facility will make it possible to defer decisions about the delivery of spent fuel to a final geological storage site or about its reprocessing.
In the meantime, some temporary facilities were built near some plants to temporarily store spent fuel on site, taking into account the approaching saturation of the fuel pools. In particular, an on-site temporary dry storage facility has been in operation near the Trillo plant since 2002 and a similar facility went into service at the Ascó plant site in 2013 and accommodated the first loads of spent fuel.
As regards Almaraz, Vandellós and Cofrentes (Enel has no stake in the latter plant), the period estimated for saturation of the spent fuel pool goes beyond 2020; therefore, these plants need no temporary storage facilities.

Anyway, all the activities of waste management are based on quality criteria and standards, in line with the best practices of the sector, which ensure the protection of the environment, of the population and of future generations.

Training and research

Enel is already active in the following areas:

> **specialist training**, which remains intense, both for employees working at the headquarters and for those seconded to the sites of the Group in Spain and in Slovakia;

> **research strategy,** which uses the specific resources available within the Group in an integrated way, namely by coordinating the dialogue between the Spanish and Slovak teams, with a view to restoring a sound body of knowledge in this sector.

Furthermore, in 2013, Enel kept the vice chair of the Sustainable Nuclear Energy Technology Platform (SNETP) Governing Board, actively participating in its international activities.

To know more about the activities carried out in 2013 in the nuclear sector, the reader is referred to the sections of the Report dealing with Slovakia and Spain.

Gas exploration & extraction (Upstream Gas)

The Upstream Gas Division has the task of contributing to the coverage of the long-term gas requirements of the Group through its own share of gas production. Activities are presently focused on: development of the Group's portfolio of projects and search for new medium-long term opportunities for procuring gas for local markets. In particular, in the course of 2013, Enel sold its stake in the Russian SeverEnergia, which continues to be involved in projects in Algeria, Italy and Egypt.

Algeria:
South East Illizi project (operator: Repsol, partners: Enel, GDF Suez and Sonatrach): the first stage of the project (exploration) discovered two hydrocarbon fields; the current second

stage (exploration and demarcation), to be completed in the first half of 2015, will characterize the fields in view of their possible exploitation.

Based on the operational program, the areas of the drilling sites and for temporary accommodation of site personnel were environmentally restored at the end of the work. A consulting company (supported by the representatives from the Algerian Sonatrach who conducted a survey of the area) issued a detailed report certifying the completion of the restoration work. The overall cost of the environmental restoration and decommissioning activities at December 31, 2013 amounted to roughly US $ 700,000.

Isarene project: (partners: Sonatrach and Petroceltic) after the declaration of commerciality for the Ain Tsila natural-gas field, the project went into the development stage, which began with Front End Engineering Design (FEED).

Italy:
In 2013, Enel carried out 3D seismic surveys in Italy under the San Marco exploration permit, to identify potential fields through the emission of pressure waves (generated by small explosive charges or impulsive sources, e.g. thumper or weight drop trucks) and subsequent recording via appropriate microphones (geophones). The surveys blanketed an area of about 50 km^2 near Faenza, Lugo and Bagnacavallo and ended in September after about 4 months, with excellent acceptance by the local population and no event to be reported (zero incidents in terms of damage to people and the environment).

The surveys did not cause any impact on the investigated area, except for normal damage due to treading on farmland, driveways and inter-farm roads. An independent agronomist estimated these damages at about € 92,000 in total, which were shared among 187 farms.
Responses to an *ad-hoc* questionnaire circulated among the locals confirmed this result, which was achieved thanks to:
> particular operational practices, which minimized the impact on land;
> day-to-day planning of the work to be carried out (through constant contacts between the farmers and the contractor's permitting office), which took into account the requirements of routine farming practices in the area;
> Enel's compliance with the planning, environmental and communication requirements specified by the Emilia Romagna Region in its decision to exclude the project from the Environmental Impact Assessment (EIA).

In accordance with its own procedure, Enel conducted a joint technical and HSE audit of the contractor (Geotec, already ISO 14001- and OHSAS 18001-certified) both at its central offices and at its operational base site of Bagnacavallo. Enel detected no non-conformity with the standards of the International Association of Geophysical Contractors (IAGC) or with its own internal policies and the contractor satisfied Enel's requirements for improvement before the start of the work.

Furthermore, Enel initiated two EIA procedures for exploratory wells in Emilia Romagna: Rossetta 1 DIR (Ravenna) and Cisi 1 (Ferrara). The first "conference of services" and the delivery of the additional requirements for both projects took place during the year. Finally, in November 2013, the Environmental Impact Study concerning a third exploratory well (Lugatti 1 DIR, Ravenna) was submitted to the Region.

The EIA procedure for the d79F.-R-EN project (deep-water exploration in the Ionian Sea) was completed successfully with a positive opinion by the EIA technical commission.

Research & innovation

Introduction

Innovation is a key element to effectively respond to the challenges of the energy market, heralding its technological trends. For Enel, innovating means transforming its skills and expertise into corporate value, for the persons working within it and its stakeholders, generating innovative and sustainable solutions to improve its current business and create new opportunities for the future.

Innovation pursues the following strategic targets:
> maximizing the value of the Group's initiatives and generating a sustainable competitive advantage;
> developing skills, know-how and expertise, fostering the application and maximizing the deployment of the best technologies;
> developing technological solutions to improve the quality of service, promoting a wise use of energy and broadening offerings to final customers, anticipating their needs;
> maintaining international leadership in smart-grid technologies, renewables and low-emission power generation, favoring the development of projects of high environmental value;

> widening the internal and external network of technological excellence, creating and sustaining links of cooperation with the best technological development centers;
> stimulating and consolidating innovation as the linchpin of Enel's corporate culture.

Culture of innovation

Innovation is the mainstay of Enel's corporate culture. This is why promoting the culture of innovation is a priority at all levels of the organization.
Enel actively encourages the participation of employees in the process of innovation, by undertaking structured initiatives that favor the inflow of new ideas and that span from contests to innovation task forces and programs based on cooperative crowd-sourcing methodologies. This process may engender a flow of proposed projects that the innovation system translates into new solutions and business opportunities.
Enel is going to release its **Eidos-Market** platform, an application managing the ideas of its employees, enhancing the value of and extending the pioneering experience acquired within the Iberia and Latin America Division. Via the platform, Enel will apply the Open Innovation and Bottom-Up Innovation paradigms in a structured and cooperative way, by stimulating the emergence of and capturing ideas on some specific priority themes. The first challenges to be launched concern safety, team performance improvement, the environment and customer contacts.
Enel also organizes dedicated training programs, with the goal of providing its employees with useful tools to take part in the innovation process more effectively.
The multinational scale of and the cultural diversities existing within the Group represent a formidable resource for innovation. Enel enhances the value of this resource, by promoting the exchange of knowledge and experience acquired in the different socio-economic contexts where it is present. By so doing, Enel further enhances the value of successful innovative activities and activates an effective fertilization process, which pools the enormous potential of experiences acquired in the different realities where Enel operates and stimulates continuous improvement, creativity and innovation.

Enel fosters cross-flows of skills and know-how by resorting, among others, to the external world, taking initiatives to create, develop and maintain cooperation links with major international research centers and specific actions that support research and entrepreneurship. Prominent among these initiatives is **Enel Lab**, a contest for Italian and Spanish start-ups with innovative energy projects. Enel launched this contest to identify six start-ups of high innovation potential that will access an incubation program involving capital injection and a number of services to boost their growth. In this way, the winners of the contest will be able to develop their companies, benefiting from the services and full support from Enel and will have the opportunity of turning an innovation into a factual success. Enel Lab was among the winners of the European Excellence Awards 2013, hosted by the Communication Director magazine in partnership with the European Association of Communication Directors, which rewards the best European communication campaigns every year.

Innovation leadership model

The Enel Group aims to become a technological leader in the sector, by developing innovation projects producing value and promoting the creation of sustainable competitive advantages and tangible results.
The main tool with which the Group defines its strategies of innovation is the **Technology Map**. This tool identifies the key technologies on which to bet in the future, anticipating the evolution of and changes in energy policies and scenarios. The map also sets investment priorities in accordance with expected scenarios and market opportunities, contributing to the formulation of the Group-wide Business Plan.
Based on the Technology Map, Enel prepares a Group-wide **Innovation Plan**, a portfolio describing projects and investments to investigate, develop and roll out new technologies. The R&D+i projects are implemented in all business areas and for all technologies of interest.
In the course of 2013, Enel continued to develop **Strategic Research** programs, with a view to enhancing the value of synergies in its international operations, gaining an improved understanding of themes of strategic interest and accelerating technological innovation in new areas of interest to the energy sector.
In 2013, the Group invested **€ 76 million** in research and innovation.
The following are the main results of these activities divided by business area: Conventional generation, Renewables, Grid, Storage and Final Uses.

Conventional generation

In 2013, the Group invested € 77 million in research & innovation.

Enhancing the efficiency and flexibility of Enel's thermal plants is imperative to improve their generating and environmental performance, taking into account, among others, the massive penetration of renewables, which has considerably changed the electricity market scenario. In this regard, Enel is implementing multiple projects with a view to developing solutions to improve the operating flexibility of its generating mix, ensuring and constantly improving the performance and conversion efficiency of its plants.

Efficiency of power plants and abatement of pollutants

In 2013, Enel's activities were focused on the following areas: development of low-cost techniques to abate emissions of NO_x in peak-load gas-turbine plants, which ensure grid stability; development of tools to monitor and control gas- and coal-fired thermal plants so as to optimize their flexible operation, reducing their outages, consumption and emissions; study of processes enhancing the efficiency of plants by recovering waste heat and optimizing the related processes; study of new technological solutions (e.g. new materials) to raise the reliability of plants under flexible operating conditions.
Moreover, research in the environmental domain is intended to track and anticipate scientific breakthroughs in order to be proactive and identify possible improvement actions.
Thanks to its environmental skills and know-how, Enel can assess its impacts on en-

vironmental matrices (air, water, soil), going beyond the mere monitoring activity prescribed by the current legislative framework. One example is the study of the composition of fine particles to spot their sources and assess their effects on health and the environment.

Enel carries out various activities regarding the development of technologies to monitor emissions and assess their environmental impact. In 2013, Enel characterized emissions of macro- and micro-pollutants in high-efficiency flue-gas desulfurization systems, with the goal of identifying their scope for improvement and evaluating their performance over time. As to fine particulates, Enel developed procedures to assess the performance and residual lifetime of the materials of bag filters installed in the Group's plants and, in parallel, it experimented innovative materials at the Torrevaldaliga Nord power plant test site.

Enel is also conducting research on mercury emissions: in 2013, it went on with the monitoring and testing of innovative solutions for abating emissions and assessing site-specific options and participated in European platforms to define the best available technologies.

Enel is also active in characterization and analysis of ambient air quality. In particular, it carried out a first series of tests to validate an integrated method to determine the environmental impact of coal-fired thermal plants.

Different projects to optimize the operation of power plants are also in progress in Spain; among them is BIONATUR, a project aimed at validating the desulfurization technology by developing solid sorbents for contaminant removal.

In 2013, Enel also launched a new line of activity concerning water management in thermal power plants. This activity is focused on the identification of integrated solutions and/or new processes to cut the consumption of water resources. Of particular interest is the Laguna de Enfriamiento project in Chile, which is expected to assess a more efficient cooling system for thermal plants.

In 2013, the International Division implemented projects to raise the performance of and hold down emissions of pollutants from the Russian and Slovak plants.

In Russia, Enel's activities were concentrated on projects for the Reftinskaya plant, in order to find solutions optimizing combustion and reducing boiler slag.

At the plant of Nováky in Slovakia, Enel investigated technological solutions for curbing emissions of NO_x into the atmosphere. Always in Slovakia, Enel carried out research on the lifetime of power plant components with a view to improving methodologies to identify steam losses from heat exchangers and boilers.

Enhancement of the value of by-products from thermal generation

Enel is developing technologies for characterization and recovery of by-products from thermal generation. Projects in this field aim at identifying and extending potential markets, with a view to optimizing the management of these products. The study of innovative items based on by-products from thermal generation may result into alternatives of higher added value. In 2013, Enel was engaged in the Nero-Mattone project to demonstrate the feasibility of using coal ash (flyash and bottom ash) from thermal plants in the brick manufacturing industry, opening up new and sustainable uses of ash in addition to the consolidated ones in cement and concrete manufacturing. During 2013, with regard to research on by-products of high added value, Enel also completed the development of the manufacturing process for a new material (cellular geopolymer) consisting of bottom ash, with possible applications in the high energy-efficiency construction sector.

Carbon Capture and Sequestration (CCS)

In this area, Enel is rebalancing and refocusing its activities to capitalize on results achieved at the pilot scale. After being at the forefront of experimentation of these technologies for many years, Enel is carrying out a wide spectrum of activities, ranging from CO_2 capture in the flue gases of coal-fired plants (post-combustion capture) to gasification (pre-combustion capture) and solutions for geological storage of CO_2.
The main activities carried out in 2013 in the area of post-combustion capture strengthened the technological know-how acquired by Enel in its **pilot carbon-capture facility of Brindisi**, which gave a major contribution, in terms of competences, to building an industrial-scale demonstration facility and/or retrofitting existing plants.
Of significant interest is also the Spanish **OXY-CFB-300** project, which is geared to develop a flexible CCS technology. The work carried out as part of this project made it possible, among others, to identify and characterize in detail a geological site suitable for CO_2 storage, a precious asset for the future.
In the area of **combustion in oxygen**, Enel conducted additional pilot-scale activities at its experimental facility of Leghorn, with the goal of testing new burners and validating their design criteria. Moreover, jointly with ITEA, Enel completed a feasibility study on the application of the Isotherm pressurized oxy-combustion process to a full-scale 300-MW_e thermal facility.
Enel is also gaining further insight into other themes regarding the reduction of CO_2 emissions from conventional plants. In 2013, the **Fusina** (12 MW) plant continued its experimental operation. This is the first example in the world of a plant designed to be fired with pure hydrogen (from the Marghera petrochemical area) or with mixtures of hydrogen and methane in variable ratios. In conjunction with the partners of the European H2-IGCC project, Enel collected samples and carried out analyses on the main components of the plant, after its operation with hydrogen for over 2,000 hours, with positive results. Jointly with GE – Nuovo Pignone, supplier of the Fusina gas turbine, Enel completed the basic development of an innovative hydrogen burner capable of reducing the formation of nitrogen oxides to values comparable with those from methane combustion.

Diagnostics and advanced automation

Enel continued its development of advanced sensing, diagnostics and automation applications to enhance the reliability, security/safety and efficiency of its power plants and to minimize injuries at its construction and maintenance sites and during normal operation of its plants.
In 2013, Enel developed a program of activities aimed at consolidating, updating and extending its "Equipment Diagnostic System" for advanced diagnostics of the main equipment of thermal power plants. In particular, systems for the monitoring of coal feeders and the preventive diagnostics of coal mills, based on vibration signals, are being demonstrated in the **Brindisi Sud** power plant. Enel is also develop-

ing diagnostic tools to assess the remaining lifetime of materials and components under flexible operating conditions and a new system to analyse the quality of coal on the belt conveyors of thermal plants.

In 2013, with the support of experienced plant personnel, Enel issued new rules or amended existing rules on diagnostics of the main equipment of coal-fired power plants and of large-sized combined-cycle ones and began extending its diagnostic system to large-sized hydro power plants in Italy.

As to safety, it is worth mentioning the **Zero Accident Project (ZAP)**, through which Enel expects to zero injuries in all sites of construction and maintenance of in-service installations, by using innovative technologies. These technologies improve the control of workplace safety and health, by constantly monitoring the use of individual protection devices, the level of risk exposure, the status of workplaces and any interferences between different activities in the same workplace. In 2013, Enel selected the construction site of its **Federico II** power plant in Brindisi as pilot site for the application of the ZAP. The process, involving Enel's personnel, contractors and skilled workers working in the Brindisi construction site, is intended to increase not only the safety of the site but to fine-tune the new technologies used, thus contributing to their future large-scale application.

Construction site of the Brindisi plant selected as pilot site for the ZAP project.

Renewables

Renewable energy sources are one of Enel's main strategic levers to curb CO_2 emissions and, at the same time, to make its generating mix more competitive. Their growth potential in terms of installed capacity is strong, while efforts to deploy increasingly effective and efficient technologies in different geographic regions are intense. This is why Enel is committed to all the main technologies for electricity generation from renewables available to date and to identifying other ones for harnessing still unused resources, such as sea or ocean energy.

The main activities that Enel carried out in this area in 2013 were focused on power generation by solar thermodynamic, photovoltaic, wind, geothermal, biomass-fired, hydro, sea or ocean energy systems.

CSP (Concentrating Solar Power)

Enel completed the construction of and started up its "Archimedes" 5-MW_e concentrating solar power (CSP) plant at its site of Priolo Gargallo (Syracuse). The plant uses a binary mixture of molten salts (sodium and potassium nitrates), which flows through a special tube and receives the solar energy concentrated on linear parabolic collectors, whose surface is covered by mirrors. In 2013, the operation of the Archimedes plant was optimized thanks to the installation of new, advanced, receiver tubes. This made it possible to operate the solar field for about 4,000 hours and, as a result, to further fine-tune the operation of the plant, the generation of steam to be integrated with the combined cycle, and the key guidelines for Operation & Maintenance of systems using this technology. In 2013, Enel also conducted laboratory studies to develop and characterize a new mixture of salts with a lower melting point in order to overcome the current complexity of plant components and operation caused by the use of a mixture with a melting temperature of ~240 °C. A new independent system to test the new mixture was installed near the Archimedes solar field and equipped with an appropriate tank, a forced-air heat exchanger and other key innovative components (e.g. new solar collectors, receiver tubes, valves, etc.). Enel tested the new mixture under all admissible operating conditions, validating the energy performance of the technology and the reliability of key components, and optimizing the operation of the testing system.

Photovoltaics

In 2013, Enel went on with solar photovoltaic activities in its Catania laboratories. It identified innovative plant technologies and components for potential development, especially in the short-medium term, focusing on photovoltaic modules particularly suitable for architectural integration, i.e. Dye-Sensitized Solar Cells (DSSCs) and Luminescent Solar Concentrators (LSCs). Finally, Enel explored the possibility of architectural integration of semi-transparent thin-film photovoltaic modules by using curtain wall systems (outer coverings of buildings consisting of self-bearing steel-glass structures).

From the viewpoint of operational improvements, the Catania laboratories conducted activities aimed at developing predictive models for the degradation of photovoltaic modules, with a view to estimating the expected degradation based on standardized test procedures and validated models. The laboratories also went on with their activities concerning the assessment of the lifecycle of installations and their management at the end of their life.

In 2013, Enel inaugurated a new specimen of its "Diamond" solar photovoltaic facility near the site of the University of Rome "Sapienza" School of Architecture. The new facility combines photovoltaic panels with storage systems in a futuristic geodesic dome.

Optimized operation of the "Archimedes" plant thanks to the installation of new, advanced, receiver tubes.

Wind

In 2013, as regards power generation from wind sources, Enel went on with its project to refine models for predicting wind power generation in the short-medium term (up to 72 hours): physical models based on computational fluid dynamics (CFD) for new plants without historical generation data; and statistical models based on artificial neural networks (ANN) for plants with historical generation data.

All the major wind farms of Italy and Romania use these systems. An experimental activity is also being conducted jointly with weather data providers, to make increasingly accurate forecasts in view of a growing integration of renewables into the power system. Moreover, Enel is assessing the benefits resulting from the use of innovative systems to measure wind speed and direction.

During the year, Enel completed activities to put a two-blade wind turbine into experimental operation. The key innovations of the wind turbine, developed jointly with architect Renzo Piano, are reduced visual impact and related technical solutions. When there is no wind, the blades align vertically with the tower, making the turbine more compact and less visible. Additionally, thanks to the aerodynamic shape and extremely light weight of the blades, the wind turbine can harness even the lightest winds, increasing its yearly efficiency. The first specimen of the wind turbine, with a nominal capacity of 55 kW, was connected to the grid in the third quarter of 2013 and is now being tested at Enel's Molinetto (Pisa) site.

Geothermal energy

In 2013, Enel Green Power carried out the final design of its first solar thermodynamic plant (CSP) integrated with a binary-cycle geothermal plant (Stillwater, Nevada, US), in which the heat concentrated by linear parabolic mirrors is used to heat the geothermal fluid before being fed to primary heaters, thus increasing thermal capacity by 17 MW. The solar plant will be completed in the course of 2014.
As regards power generation from geothermal sources, the activity in 2013 was focused on the identification of parameters for testing a new alkalinizing agent for the cycling water.

Biomass

Enel's activities in 2013 were concentrated on the characterization of technologies for small-scale biomass facilities (100 kW_e-1 MW_e) offering high efficiency and flexibility. The projects in this area included both tests on an Externally Fired Micro Gas Turbine (EFMGT) technology at the experimental station of Leghorn and modeling exercises with a view to integrating experimental data and identifying improvements for existing technologies.
Enel also assessed biomass resources in Tuscany to identify an optimum set of small-scale biomass facilities, taking into account the availability of biomass, the economic aspects connected with its collection, transport and pre-treatment and the characteristics of local settlements. This activity was conducted as part of the **BioPower in Tuscany** project, funded by the same region and involving a wide number of companies, universities and research centers.
During the year, Enel completed the monitoring of Refuse-Derived Fuel (RDF) co-fired with coal (5% RDF, 95% coal) in unit 4 of its **Fusina plant**, investigating the behavior of a conventional plant when it is fueled by biomass for production of renewable electricity.
Another biomass project is "**Capim Elefante**" in Brazil, which is intended to improve and optimize the lifecycle of this herbaceous species and consequently improve the availability of biomass in the Brazilian market and in the other countries of South America.

Hydro

In 2013, Enel developed design solutions to optimize hydro power generation, by recovering energy from the release of the minimum in-stream flow.

Sea or ocean energy

In 2013, Enel put into operation a marine machine (R115) off the coast of Grosseto (at Punta Righini, Castiglioncello, Leghorn), whose technology was developed jointly with the company 40South Energy. The machine (expected yearly generation: 210 MWh), which extracts energy from wave motion, is highly reliable (thanks to out-of-water maintenance) and environment-friendly. Given the good results from the testing, Enel Green Power strengthened its partnership with 40South Energy, aiming at widening the supply of R115 machines and developing a new and larger model (2 MW).

Grid

Enel is spearheading numerous initiatives at global, European and Italian level to innovate the mechanisms of energy distribution and to continuously improve the operation of grids. The most important initiatives and the main projects in progress concern smart grids, which combine the use of conventional technologies with innovative digital solutions, making the operation of the power grid more flexible thanks to a more effective exchange of data.
One of the most immediate applications of smart grids is the integration of renewables, which contributes to attaining the environmental targets set by the European Union.

Smart Grids

In Italy, the **Isernia-Carpinone** project (innovative solutions for improving grid efficiency and quality of service to customers) is at an advanced stage. Ongoing tests are centered on: management of distributed generation systems connected to the MV grid; and experimentation of an MV storage system, an optimized electric-vehicle (EV) recharging station and Enel's "Smart Info" device (user terminal to receive consumption/generation data from one's own smart meter) enabling demand response applications.
Enel also completed its **Address** project, involving innovative solutions allowing customers to actively participate in the energy market. Active demand programs were field tested, and models proposed in previous stages were validated. The project ended in the first half of 2013 with an international event in Rome for the presentation of results.
With the goal of developing an action plan to implement active demand in Europe, Enel went on with the **Advanced (Active Demand Value ANd Consumer Experience Discovery)** project. Enel takes part in the project as coordinator, together with major European Distribution System Operators (DSOs). The project uses data and results from current demonstration projects, such as Enel Info+ in Isernia, as well as from other active-demand initiatives in Europe.
Enel is also in charge of the technical supervision of the European **Grid4EU** project, which commenced in November 2011 and will last four years. The project, including a total six demonstrators in as many European countries, has the goal of testing advanced smart-grid solutions on a large scale and under real operating conditions, with a view to accommodating distributed generation, supporting energy efficiency, enabling and integrating active demand and new uses of electricity. In particular, Enel Distribuzione's demonstration pilot in the province of Forlì-Cesena (Emilia Romagna) is focused on integration of MV-connected renewable-energy installations via an advanced monitoring and control system.
January 2013 marked the kick-off of **iGreenGrid (IntegratingG Renewables inthe EuropeEan Electricity Grid)**. The project, led by the leading DSOs in Europe, has the goal of identifying the best solutions to increase the hosting capacity for Distributed Renewable Energy Sources (DRESs).
Another project, **evolvDSO**, took off in September 2013. This project is expected to define, develop and validate methods and tools for the future roles of DSOs. By analysing future scenarios under different conditions of penetration of DRESs, energy mix, technology status and costs, energy demand increase/decrease forecasts,

evolvDSO will design new roles for DSOs, specifying, developing, testing and validating methods and tools in their different areas of activity (Planning/Scheduling, Operation and Maintenance).
At European level, Enel also shares best practices and participates in the definition of long-term strategies for a massive introduction of smart-grid technologies into the European power grid. As a member of EDSO for Smart Grids, the association of DSOs for the development of smart grids, Enel actively takes part in **EEGI (European Electricity Grid Initiative)**, a smart-grid research and development program with an investment of € 2 billion in demonstration projects.
Various smart-grid projects are also under way in Spain and Latin America, such as **ICONO** (Intelligent Control Network Operation) concerning the development of concepts for distributed-generation monitoring, grid automation, improvement of operating efficiency, reliability and security. Moreover, efforts are being undertaken as part of the European **ECCOFLOW** (Efficient YBCO Coated Conductor based Fault current Limiter for Operation in Electricity netWorks) project to develop new Superconducting Fault Current Limiters (SFCLs) and thus improve the security, reliability, efficiency and quality of the grid and facilitate the integration of renewables.

Energy Storage Systems (ESSs)

Storage of renewable energy is becoming one of the linchpins in the smart evolution of the power distribution grid and of the way in which energy is managed at residential and industrial level. Thanks to increasingly efficient storage systems, energy can be stored when it is more advantageous – or when renewables are abundant – and used when needed. The cross-cutting nature of this technology, which may be applied at multiple levels of the power system value chain, substantiates its high strategic importance. Equally strategic are also Enel's activities of ICT innovation, which cover multiple processes and thus provide key support to business activities.

In Italy, as part of its **Isernia** project, Enel installed a lithium ion storage system (1 MVA-500 kWh) into an MV/LV substation in partnership with Siemens. This multi-purpose storage system, integrated with a photovoltaic plant and the local recharging infrastructure for the electric vans of Enel's crews, will optimize the operation of recharging stations, provide ancillary services to the distribution grid and permit the black start (resupply in island operation) of part of the MV grid. A similar system of higher capacity (1 MVA-1 MWh) will be installed into a switching substation in the province of Forlì-Cesena, as part of the European **Grid4EU** project.

These applications add to those involving storage systems directly connected to the MV busbars of HV/MV substations. In these cases, storage systems are aimed at leveling power flows between the substation and the high-voltage grid upon changes of load and, above all, of generation by renewable power systems connected to the substation. Storage systems of this kind are being put in place under an interregional operational program in Apulia (Campi Salentina HV/MV substation: 2 MW-1 MWh ESS), Calabria (Chiaravalle HV/MV substation: 2 MW-2 MWh ESS) and Sicily (Dirillo HV/MV substation: 2 MW-1 MWh ESS). The ESSs, to be inaugurated in 2014, will make the prediction of power flows between distribution grids and the national transmission grid easier. Their technology is always based on lithium ion batteries, which have proved so far to be the most advantageous for storage systems of such a size.

In Spain, Endesa applies energy storage technologies in its Málaga Smart City (lithium-iron-phosphate ion batteries) and STORE (lithium ion battery on the Gran Canaria island, flywheel battery on La Gomera and ultracapacitors on La Palma) projects. Always in Spain, a feasibility study is under way to develop a Compressed Air Energy Storage (CAES) system. Enel also began procedures for procuring a storage system that will optimize electricity generation and distribution on the island of Ventotene. The system will be coupled with the diesel engines now being used on the island; thanks to a control system specially developed by Enel, these engines will operate at constant load, with considerable advantages in terms of fuel consumption and emissions. The installation and start-up of the storage system is scheduled in the second half of 2013.

Finally, at its experimental station of Leghorn, Enel is continuing the characterization of batteries and fast EV recharging posts. These activities enabled Enel to acquire strategic know-how on storage systems and thus identify optimum technologies and operating algorithms to meet the different requirements of electricity generation and management, optimizing the required investments and minimizing the risks associated with the use of innovative technologies.
Always in the area of energy storage, Enel completed the selection of Enel Green Power's generation sites and of possible industrial partners that can team up with Enel Green Power to develop advanced-control storage systems to be tested as resources for reduction of intermittency, energy management, energy shifting and provision of ancillary services. Enel plans to implement these projects in the course of 2014, benefiting, among others, from the know-how that it has acquired in this area.

Information & Communication Technology (ICT)

The year 2013 saw the birth, within Enel, of a dedicated ICT unit, in charge of developing, coordinating, steering and promoting innovative solutions, mostly based on digital technologies, thanks to knowledge of business goals and processes, applications and technologies. Particularly in this period, the phenomenon of consumerization and the availability of new and powerful technologies offer exciting opportunities to utilities.
By setting up a technological network together with the leading ICT companies in the world, research laboratories and some universities, Enel identified some innovative solutions, especially in the area of big data and advanced analytics. The first experimentation programs yielded interesting results in terms of new models for Predictive Maintenance of wind turbines or for detection of energy frauds (Non-Technical Losses). As regards customer relations, Enel tested new technologies for voice-of-customer listening based on social networks (Sentiment Analysis) and advanced analysis – on Internet channels – of the effectiveness of the tools put in place. Enel also experimented the use of a new paradigm for the analysis of customer data and behaviors: semantic analysis. Thanks to these new tools, Enel will be able to launch effective customer-oriented actions.
Particular emphasis was placed on customer involvement in ICT innovation. Enel thus started disseminating these practices and set up an enlarged group, the Innovation Lab, which cooperated with the University of Milan to implement the Digital Lab, a testing ground for new ideas relying on the Design Driven Innovation method.

End uses

To boost energy efficiency and achieve European CO_2 reduction targets in the medium-long term (2030-2050), Enel is developing innovative technologies and new services allowing customers to optimize and rationalize their electricity usage. Within this system, customers use digital devices making their electricity consumption transparent and encouraging their active participation in the electricity market and their rational use of electricity, with benefits to environmental sustainability and to the overall system, which becomes more accessible and more reliable.

Energy efficiency

The **Enel Info+** project went on in 2013 with the testing, for the first time on a large scale, of the **Smart Info** device, enabling customers to view their electricity consumption/generation data (recorded by a smart meter) and to become more aware of their usage patterns and of the need for taking on more energy-efficient behaviors. About 8,000 households will receive a kit consisting of: Smart Info device; Smart Info display; PC application called Smart Info Manager; and smartphone application called Smart Info Mobile. Enel will objectively assess the impact of the kit on consumption patterns, by comparing the load curves recorded during the test period with those of previous periods and conducting sociological investigations to capture qualitative and subjective aspects, too.

Another noteworthy project in this area is Energy@home, implemented jointly with Electrolux, Indesit Company and Telecom Italia. The project led to the development of an indoor smart-device data communication platform. The platform can provide services to manage home electricity usage, by more carefully monitoring & controlling the use and efficiency of household appliances, and thus to avoid demand peaks and grid overloads and to maximize electricity usage in low-cost hours. In 2012, the project resulted into the creation of the Energy@home association, whose goals are to encourage the use and development of this communication platform outside the four companies that launched the project and to initiate a 15-month pilot project involving about 50 customers.

Always in the area of energy efficiency, Enel launched the "ComeConsumo" (how do I use electricity?) project, allowing customers to view their real-time and historical electricity usage data at both local level and via the web. In 2012, Enel assessed the usage patterns of a sample of customers to determine the potential of this tool.

Various energy efficiency projects are also in progress in Spain; among them, the European **EnergyTic** (Technology, Information and Communication services for engaging social housing residents in energy and water efficiency), a demonstration project involving 1,000 households in France and 700 in Spain.

As regards energy efficiency enhancements in service-sector buildings, Enel completed the construction of a system to monitor the premises of its research site in Pisa, where the energy savings obtainable from different smart-home technologies are measured in the field. In the same site, Enel completed the construction of **DomusLab**, a laboratory to test home automation systems and assess technologies for building and managing homes in the near future.

Enel is also engaged in the European ENCOURAGE project, which is intended to develop technologies that optimize energy usage in service-sector buildings, focusing on optimized monitoring & control of indoor subsystems, but also providing adequate mechanisms for an effective interaction with the external world (other buildings, local producers, energy retailers and distributors).
Different projects are also being implemented in South America; prominent among them is "Auto Ecoelce" (from the name of Coelce, the local power distributor), i.e. the construction and testing of a self-service kiosk for collection and classification of recyclable materials, with real-time bonuses and on-line streaming of credits to customers' electricity bills.

Distributed generation

During 2013, Enel completed the first experimental stage of its Triangle-based Omni-purpose Building (TOB), a system that can provide renewable electricity to remote communities not connected to the power grid. The system (whose design was internationally patented by Enel) integrates PV modules and storage systems. It can serve rooms for education & training, refrigerators for drug storage in outpatients' clinics, systems of water purification and mobile phone recharging, PCs with Internet connection. Thanks to the experience acquired with this project, Enel designed a system for the creation of a micro-credit center, which is now under construction within the Cidade Inteligente Búzios in Brazil.
As to integration of distributed systems into the power grid, Enel took part in 2013 in the development of an experimental prototype called Smart User. The core of this prototype is an Active Demand Management system that can monitor, report and control generation and loads and actively interface with the external grid and the electricity market. By managing supply and demand in an intelligent way, the Smart User will yield economic benefits in terms of lower electricity costs and higher energy efficiency.

Another project of strong interest is Energrid in Spain, recognized as one of the most innovative ideas by Endesa's Scientific Novare Awards: a modular and open energy management platform relying on a distributed infrastructure that controls grid flows. A decentralized system, based on nodes (homes, businesses), manages generation and consumption. The system is also expected to improve energy management in buildings through a dialogue between consumers, producers and users. Thanks to the successful tests conducted in 2013, the system is being prepared for release into the market.

Electric mobility infrastructures

The Enel Group is strongly committed to setting up an innovative and technologically advanced network of smart infrastructures for recharging EVs, capable of favoring the dissemination of these vehicles and promoting sustainable mobility.
At the end of 2013, the recharging stations installed in Italy and in Spain were over 1,300 and about 300, respectively. All are remotely operated by the Electric Mobility Management (EMM) system, which supervises all the activities of recharging, software updating and diagnostics.
In 2013, the Memorandum of Understanding on e-mobility between Enel and the Emilia Romagna region was extended to 11 main cities and to all electricity distrib-

utors (Enel, Hera, Iren), giving rise to the first European project of e-mobility at regional scale: a network of over 100 interoperable smart-recharging infrastructures. Users may use a single card for all the recharging posts, even if they are connected to the grids of different distributors. Also the Umbria, Latium and Basilicata regions adopted this model of service for e-mobility. In particular, the Umbria region and 13 of its municipalities signed an accord with Enel to promote a fully sustainable regional tourism based on zero-emission itineraries (history, art, religion).
In Latium, e-mobility was extended from the metropolitan area of Rome to its hinterland (to support not only interoperability between the grids of Enel and Acea, but also sustainable commuting). In Basilicata, the city of Matera launched an innovative project of electric-car sharing to preserve its ancient historical center ("Sassi", considered as a World Heritage Site by Unesco).
In March 2013, an agreement signed between Enel and Eni opened new opportunities for country-wide e-mobility. The agreement, regarding the development of fast recharge (43 kW AC and 50 kW DC) posts to be installed in gas stations, has two strategic targets: investigating the possibility of lengthening the distance covered by EVs and identifying smart-grid solutions, namely EVs used as energy storage systems (vehicle-to-grid/V2G) for gas stations.
Finally, in December 2013, Enel and IKEA signed a Memorandum of Understanding on eco-friendly transport of passengers and goods. The first pilot project concerned the car parks of IKEA stores throughout Italy. Given the time spent shopping, these car parks are ideal for EV recharging. Consequently, IKEA car parks all over Italy were equipped with 72 recharging points, connected to Enel's grid.
At global level, Enel takes part in the following projects: **Green eMotion** (funded by the EU) to define a reference framework for e-mobility in Europe; the **Internet of Energy** (funded by the Artemis consortium) to develop a recharge station effectively integrating all what is needed to support communication with EVs in accordance with the new ISO 15118 standard; **Mobincity** (started in 2012 and funded under the EU's Seventh Framework Programme for Research - FP7), which will define evolved algorithms for managing smart charging, while minimizing impacts on the grid and maximizing the integration of renewables; **Unplugged** (initiated in 2012 and always funded under FP7), which will assess the development prospects of inductive charging.

Sustainable mobility projects in Spain

- Movele: deployment of EV recharging infrastructures and ZEM2All electric cars in 3 cities;
- Málaga: 200 EVs in 4 years with collection and analysis of usage data;
- Smart box, for integration of fast recharging stations with the EMM system.

In Spain, as early as in 2012, Enel provided the different companies of Endesa with its smart-charging infrastructure, equipped with the Electric Mobility Management (EMM) system and adapted to the Spanish needs.
Among the most relevant sustainable mobility schemes in Spain, it is worth mentioning: **Movele**, a Spanish Government initiative to roll out recharging infrastructures and disseminate the use of EVs in the cities of Barcelona, Málaga and Seville; **ZEM2All** (Zero Emissions Mobility to All), the demonstration project covered by an international agreement between the Spanish Government and a consortium of Japanese companies to support the introduction of 200 EVs in Málaga over a four-year period and the collection of information and market analyses on their use; **Circe**, a research project conducted in Zaragoza to develop a smart box facilitating the integration of fast charging stations with the EMM system.
Furthermore, Enel is cooperating with Endesa in a suite of projects for developing a fast EV recharging solution common to the overall Group. In Latin America, where interest in sustainable mobility is growing, Enel is promoting technologies already

successfully proven in Europe. E-mobility and own infrastructures are also at the core of smart-city initiatives undertaken by Ampla (Búzios, Brazil) and by Chilectra (Santiago, Chile) jointly with Enel. Finally, in Colombia, Enel supports Codensa in a sustainable mass transit project.

Smart cities

Smart City project: in 2013, completion in Málaga and Barcelona and take-off in Santiago.

Thanks to its know-how and innovative technologies, the Enel Group developed smart-city concepts in various parts of the world, by combining environmental protection, energy efficiency and economic sustainability into a single urban model. The first pilot schemes that are under way in Italy are located in **Genoa**, **Bari**, **Cosenza** and **L'Aquila**. Enel is supporting these municipalities in their development path towards smart cities, through measures that can turn the power grid into a smart grid, a factor enabling innovations and new services.

Additional areas of action concern e-mobility and active involvement of citizens by raising their awareness of electricity consumption. Indeed, Genoa and Bari (with 17 and 26 recharging points already installed, respectively), are among the first Italian cities with an EV recharging network infrastructure that will support the development and deployment of e-mobility.

In Bari and Cosenza, Enel and 8 other partners, including large companies (IBM, General Electric), SMEs (Elettronika and Asperience), Universities (University of Calabria and the Polytechnic University of Bari) and Research Centers (CNR and ENEA) are implementing the **RES NOVAE** project. This project, co-funded by the Ministry of Education, University and Research, has the goal of creating a sustainable and people-friendly urban environment. The project addresses the various dimensions of a city in a structured way, starting from energy distribution infrastructures, which are investigated, analyzed and implemented under a smart-grid approach.

Enel will also investigate, demonstrate and roll out tools to monitor, control and optimize the management of energy flows in buildings, without neglecting technological solutions that enable active participation of citizens in the electricity market, the so-called active demand. This research will also lead to the creation of an Urban Control Center, which will provide public administrations, citizens and other interested players with key energy and non-energy data about the urban environment, in view of pursuing adequate energy planning policies based on real data.

In December 2013, Enel launched another important smart-city project to be implemented in the city of L'Aquila (Abruzzi). This project will create the technological/infrastructural backbone for the development of L'Aquila according to smart-city concepts. Planned actions are as follows: strengthening of the current electricity infrastructure under the smart-grid model to integrate RES-E power plants and provide innovative services to citizens and to the public administration; development of a country-wide EV recharging network; provision of Smart Info devices to all citizens, enabling them to get data about and become more aware of their electricity usage and thus express a virtuous behavior in their electricity usage. These projects are aimed at creating a virtuous circle of skills and investments, with local spin-offs, supporting the city in its process of recovery after the terrible earthquake that hit it in 2009.

Enel is also active in EU-funded smart-city projects, such as **FP7 TRANSFORM** in partnership with the municipality of Genoa. The project involves other European cities

(Amsterdam, Hamburg, Copenhagen, Grand Lyon, Vienna) and industrial partners, such as ERDF and Siemens. The aim is to conceive an optimized methodology for urban energy planning, which can support public administrations in identifying areas of action for improving energy efficiency in the urban environment. Enel also signed Memoranda of Understanding with other Italian municipalities and foundations (Bologna, Pisa and Fondazione Torino Smart City) to provide support in implementing smart-city projects.

The Enel Group is implementing innovative smart-city projects also in Spain (Málaga and Barcelona), Brazil (Búzios) and Chile (Santiago). In particular, in 2013, it completed the installation of systems making part of the **Málaga Smart City** project and the **Barcelona Smart City** project and set in motion the **Santiago Smart City** project, under which the potential of smart grids and of new technologies will be tapped to manage the city in more efficient and more sustainable ways and to achieve higher energy savings.

In Brazil, **Cidade Inteligente Búzios**, the project for the first smart city in Latin America, went on. Technology, innovation and sustainability are the keywords underlying this project, under which Enel is converting the municipality of Armação dos Búzios (a tourist resort in Rio de Janeiro) into a model of sustainable energy management. At the end of 2013, Ampla's households had over 3,000 smart meters designed by Enel and manufactured by Landis+Gyr Brasil. Thanks to these meters, the citizens of Búzios may become aware of their electricity consumption and save on their bills under time-of-use rate plans. Additionally, lake Usina and one of the main streets of the city are already effectively lit by 130 **Archilede** LED lamps equipped with remote control. Búzios also has 2 EV recharging posts managed by Ampla via the innovative EMM system developed by Enel, as well as a power-driven water taxi system, the first in Latin America. Ampla is already using electric bikes to induce zero-emission behaviors among its customers and even the water taxi service connecting cities to beaches will become sustainable. Furthermore, in the course of 2013, the first grid automation and operation systems based on Enel's technologies were put in place, thereby improving service quality.

Direct participation of citizens, who will benefit from new technologies, is one of the milestones of Cidade Inteligente Búzios. Indeed, its community is involved in initiatives for a better future. For instance, Ampla's customers recycling waste can get discounts and bonuses on their electricity bills. Cidade Inteligente Búzios received some prestigious international awards, which recognized its value from the standpoint of environmental sustainability and social responsibility. In July 2012, KPMG selected the project among the top 10 in the world (in the urban energy infrastructure category), while in September the International DistribuTECH Brasil 2012 Conference gave it the "Project of the Year" award (in the small smart-city category).

Always in Latin America, in Santiago (Chile), a smart-city prototype is being built in the industrial and commercial hub of **Ciudad Empresarial/Huechuraba**.

The Santiago Smart City project is expected to demonstrate the applicability of Enel's advanced technological solutions and their factual contribution to sustainability, energy efficiency and CO_2 reduction in an entrepreneurial setting. Thanks to Enel's innovative solutions, existing services will be integrated into the Ciudad Empresarial (e.g. the first sustainable building in South America) and new eco-friendly services will be provided to the persons working in the area and to participants in the numerous meetings and conferences held there (e.g. efficient public lighting and transfers to the center of Santiago via electric buses). In December 2013, Santiago received the "Smartest City in Latin America" award from the Metering International magazine.

Promotion of end-use energy efficiency

Enel Distribuzione

Today, energy efficiency is one of the priorities of the Italian energy strategy. Also the new Energy Efficiency Directive confirms that it is one of the headline targets to be achieved as part of the EU's Climate Energy Package.

Pivotal to the achievement of these targets in Italy are white certificates (energy efficiency certificates/TEE). Under the national white certificates scheme, distributors are required to reach energy efficiency targets in energy end uses. Enel Distribuzione, as leading electricity distributor in Italy, is held under the scheme to attain about one half of the above targets. The savings achieved, after being assessed by the certifying entity, entitle the holder to a corresponding number of white certificates. These certificates (each is worth 1 tonne of oil equivalent) give proof of reduction of energy consumption.

In 2013, Enel Distribuzione entered into bilateral contracts, carried out purchase/sale transactions and established cooperation relations with companies and trade associations to promote energy efficiency projects and meet its energy efficiency obligations.

In particular, with a view to maximizing efforts to reach the above targets, Enel Distribuzione launched the second edition of its energy efficiency offerings via a dedicated web portal. These offerings are intended for all parties who/which wish to implement or invest in energy efficiency projects, mainly in the industrial and service sector. Interested parties must provide Enel Distribuzione with: applicant's identification data; technical data about the project; documents certifying adequate implementation and compliance of the project with the technical specifications indicated in the relevant regulation for projects to be submitted by Enel Distribuzione in view of acquiring white certificates. If the submitted project is approved, Enel Distribuzione will grant an initial financial incentive (single payment) to the contracting party; the incentive will be proportional to the savings that the project may generate and net of the costs incurred for development/management/promotion of the project. Therefore, any party may obtain the incentive, even if it/he/she is not eligible for the white certificates scheme.

Furthermore, to encourage end-use energy efficiency, Enel Distribuzione provides support to important partners of the industrial and service sectors in preparing applications for certification of white certificates and examining the energy-saving projects, interfacing directly with the agencies in charge of assessing them.

Enel Energia

In 2013, the Generation, Energy Management and Market Division intensified efforts to deploy products and services for sustainable development, energy efficiency and energy-saving awareness. A number of initiatives were put in place to induce both business and residential customers to adopt energy-efficient practices and reduce energy wastage and adverse environmental impacts.

With regard to electricity supply, Enel Energia broadened its range of green rate plans. In addition to those already in its portfolio (all-green, such as "Energia Pura"/residential/business and "Tutto Compreso Luce"/residential, or with optional green features), the company introduced "Semplice Luce", a green rate plan that encourages residential customers to change their usage patterns and rewards them with lower prices for usage below a given monthly threshold.

These rate plans guarantee the renewable origin of the sources used for generating the electricity supplied via Guarantees of Origin, in compliance with Directive 2009/28/EC. Offerings intended for households come with the neutralization of CO_2 emissions from the invoicing process and of those associated with the electricity that power plants purchase directly to cover their own consumption and requirements during outages. The related emissions of CO_2 are calculated by a third certifying entity and offset by the purchase and subsequent cancellation of a corresponding number of certificates (Verified Emissions Reductions - VERs - or Certified Emissions Reductions - CERs). Businesses opting for green rate plans may use a registered trademark ("Energia Pura") to show their care for the environment and make their partners aware of the need for using renewables.

In 2013, the company launched a campaign for the household market: customers choosing the new "Semplice Luce" rate plan received a free kit of high-efficiency light bulbs based on the LED technology.

With regard to energy services, Enel Energia set for itself the target of evolving towards a full energy-service provider. The year 2013 saw the kick-off of a pilot project for residential customers, called Energy Services Mass Market: a line of energy-efficient turn-key services ("Enel Green Solutions") that customers pay in instalments on their bills, relying on Enel Energia as a one-stop shop for all activities associated with the sale: installation, support for obtaining authorizations and incentives, warranty extension, maintenance. The products covered by the project include photovoltaic and solar thermal facilities, condensing boilers, heat-pump water heaters, heating & cooling systems. In 2014, this line of products and services will be offered all over Italy.

Enel Energia also provides large companies with customized energy consulting services under the Energy Performance Contracting approach: funding of energy upgrades through the sharing of actual savings. In 2013, business customers were offered the opportunity to optimize their energy performance, by using ICT platforms to monitor and analyze their electricity usage and advanced devices (sub-meters) to measure their electrical loads. Additionally, the company started projects of revamping of existing systems and infrastructures based on new technological solutions for energy efficiency enhancement; Poste Italiane and Trenitalia are among the key clients for these projects.

Enel Energia also continued to offer its "BollettaWeb" service, whereby customers receive invoices via email, thus reducing paper consumption and CO_2 emissions, and

its on-line "Easy Click-Web Data Management" service, through which companies may keep their electricity and gas usage under control.
Finally, the company continued to pursue the target of curbing emissions associated with its facilities and processes, by implementing a carbon neutrality project that involved many of its front offices ("Punto Enel") in 2013: thanks to an offsetting process, these front offices zero CO_2 emissions associated with their daily activities.

Enel.si

In 2013, Enel.si (belonging to Enel Green Power) was taken over by Enel Energia. The move caused Enel.si to reposition its activities and refocus its franchising network. As a result, most of its operations in 2013 were related to its integration into the Generation, Energy Management and Market Italy Division and to supporting the development of "Enel Energia's energy efficiency model".
Enel.si Srl will continue to develop and roll out photovoltaic and other renewable-energy facilities, energy-saving and energy efficiency products and services for residential and business customers. Given its new role within and business convergence towards Enel Energia, Enel.si will select a set of quality-oriented energy efficiency products for different customer segments, in order to increase the value to be transferred to its final customers.
To strengthen the role of Enel.si Srl within Enel Energia's energy efficiency model, the following initiatives are planned:

> development of customer-dedicated energy efficiency products and services to be included among its offerings;
> progressive integration of its franchising network to manage activities associated with the development of the photovoltaic and energy efficiency market in Italy;
> development of the skills of its partner network to promote its commercial strategy and to provide installation services connected with the sale of energy efficiency products.

In 2013, Enel.si proved to be, once again, the no. 1 Italian franchisor of solutions for power generation from renewables. At the end of 2013, its network included 189 active franchisees, i.e. less than in 2012; this decrease is due, above all, to the reorganization of the company and to the consequent streamlining of its network.
Thanks to its entry into the Generation, Energy Management and Market Italy Division, Enel.si will be able to use its expertise in synergy with Enel Energia and Servizio Elettrico, and to undertake aggressive strategies in offering and installing products that hold down electricity consumption and use renewable resources for power generation. In 2013, Enel.si offered turn-key solutions for: photovoltaic, solar thermal, mini-hydro and geothermal facilities, energy-efficient and electric mobility products. It identified a set of quality-oriented energy efficiency products for the retail segment. In the first half of 2013, the company launched a line of products based on the Onyx Solar colored photovoltaic glass and a home automation solution.
Sales in the photovoltaic market shrank significantly in 2013 vs. 2012. Indeed, the year 2012 saw a sharp increase in the installed base, driven by support schemes that still granted high incentives, even to large-sized plants. The impetus that the

5th feed-in scheme (August 2012) gave to small photovoltaic systems was further strengthened by the opportunity to combine the benefit of 50% tax deductions with net metering, thus favoring the dissemination of distributed generation.

In 2013, Enel.si Srl offered about 40 MW_p of photovoltaic modules on the market (15 MW_p delivered as kits to its franchising network): its turn-key "hassle-free PV" kit was a natural choice for a more and more retail-oriented market, i.e. Italy's mainstream photovoltaic market.

After reaching a peak in 2010, the number of yearly installations of solar thermal systems declined. In the segment of small solar thermal systems for household use, customers expressed preference for tax deductions (65%, confirmed until June 2014) over the benefits of the heating & cooling feed-in scheme introduced at the end of 2012.

Solar thermal kits were marketed in combination with thermodynamic solar panels.

To further cut down gas consumption, these offerings came with latest-generation condensing boilers, which use heat from exhaust gases and are thus more energy-efficient than standard boilers.

In the heating & cooling sector, Enel.si marketed new heat-pump water heaters, capable of heating a large amount of water by extracting energy from outside air and thus using electricity efficiently.

Offerings of highly energy-efficient products were extended with a broad array of class A inverter heat-pump heaters & coolers, remote controlled via a simple application for smartphones and tablets.

New LED light bulbs were offered as part of solutions for efficient electricity usage. These bulbs consume 70-80% less electricity than conventional ones and 40% less than compact fluorescent bulbs and have a very long life: from 25,000 to 50,000 hours.

In the process of business convergence towards Enel Energia, Enel.si retained the communication concepts adopted in 2012, counting on the related awareness to maximize the flow of contacts towards its franchising network and its website.

In 2013, the lead generation activity conducted in co-marketing with Monini (a national olive-oil producer) enhanced the brand image of Enel.si and of its line of products in the food sector.

Enel.si continued its participation in sector-specific events and initiatives, such as SolarExpo (now being held in Milan) and Elettrocity, as well as its partnership with the Luiss University of Rome, to promote e-moblity.

Enel Sole

Enel Sole is a leader in public lighting. In early 2009, it launched its first Archilede, a LED lighting system that had never been commercially available before, heralding its impact on other conventional technologies in terms of energy and lighting performance. At present, the installed base includes roughly **110,000** systems.

In the second half of 2012, encouraged by the success of Archilede, Enel Sole unveiled an evolved version of the product, called Archilede HP (High Performance). By using more and more innovative technologies, the Archilede HP street-lighting systems increased their lighting performance by nearly 50% with respect to their predecessor models, becoming cutting-edge products in the LED market. Enel Sole largely relied on this solution for public contracts, such as the "Servizio Luce 2" one awarded by Consip SpA (the public-procurement company owned by the Italian Ministry of Economy and Finance).

The installed base of Archilede HP includes about 50,000 systems.

Towards the end of 2013, the company broadened the Archilede product family by adding two new systems: Archilede Evo and Archilede S.

The new systems inherited most of the basic technology of the leading-edge Archilede HP. Their main features are: higher versatility of installation, good lighting performance (the lighting efficiencies of Archilede Evo and Archilede S are 83 and 86 lumens/Watt, respectively) and more competitive price than other commercially available (high-pressure sodium) lighting fixtures. So far, almost 5,000 Archilede Evo systems have been installed.

The activities carried out in 2013 were as follows:

> installation of about 51,400 Archilede lighting fixtures (of various models) in place of less efficient ones, saving about 18.6 GWh/year;
> installation of about 16,000 conventional (high-pressure sodium discharge) lighting fixtures in place of less efficient ones, saving about 4 GWh/year;
> installation of nearly 9,000 ballasts to regulate the flow of electricity to conventional lighting fixtures, saving 1 GWh/year with respect to fixtures with no ballast.

The yearly savings resulting from the above activities total about 23.6 GWh (corresponding to approximately 9,000 t of CO_2 emissions displaced).

EN26 Management of water resources

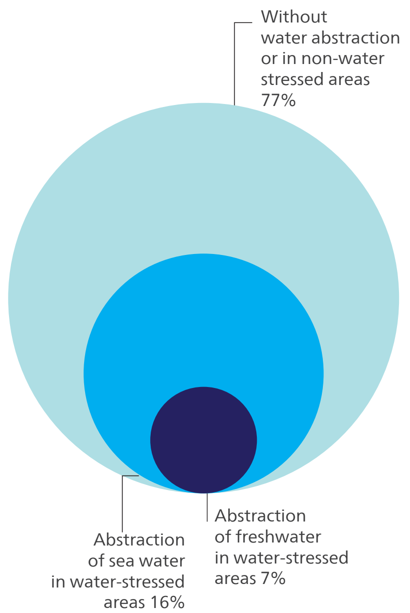
The issue of water resource management is taking on increasing importance. To manage water resources in the most sustainable way, Enel constantly monitors all of its production sites that are located in areas at risk of water scarcity.
Enel uses water resources for industrial purposes, such as cooling, desulfurization, nitrogen oxide abatement, etc. Production processes requiring the highest amount of water are thermal and nuclear power generation.
Overall consumption of water in 2013 was 189.6 million m^3, i.e. lower than in 2012 owing to a decrease in thermal generation. Specific consumption in 2013 was 0.64 l/kWh vs. 0.62 l/kWh in 2012. This increase is merely due to the revision of the calculation methodology used to estimate evaporation losses in some power plants that have a semi-open cooling cycle. In fact, if the figures for specific water consumption in 2013 were estimated with the methodology used in 2012, they would be about 6% lower than in 2012, i.e. Enel is on track to reach its target of reducing this consumption by 10% from its levels in 2010 by 2020.
In particular, activities of site monitoring and analysis take place at different levels:

> mapping of production sites in areas of potential water scarcity (average value of renewable water resources per person below FAO's reference value, i.e. 1,700 m^3), which are identified, among others, via a specific software program developed by the World Business Council for Sustainable Development;
> identification of "critical" production sites, i.e. using freshwater;
> identification of more efficient water management policies and practices, e.g. retrofits of plant systems or processes aimed, among others, at maximizing the use of liquid releases and sea water;
> monitoring of climate and vegetation data in each site.

Enel usually returns approximately 99% of the water that it abstracts [(5)] to its original water body and as little as about 7% of its total generation abstracts freshwater in water-stressed areas.
In 2013, Enel was the first utility to use Aqua Gauge, a software tool promoted by the Ceres network of US companies to assess corporate awareness of the risks associated with the impact on water resources.

Reduction of specific water consumption by about 6%, on track to reach the target by 2020.

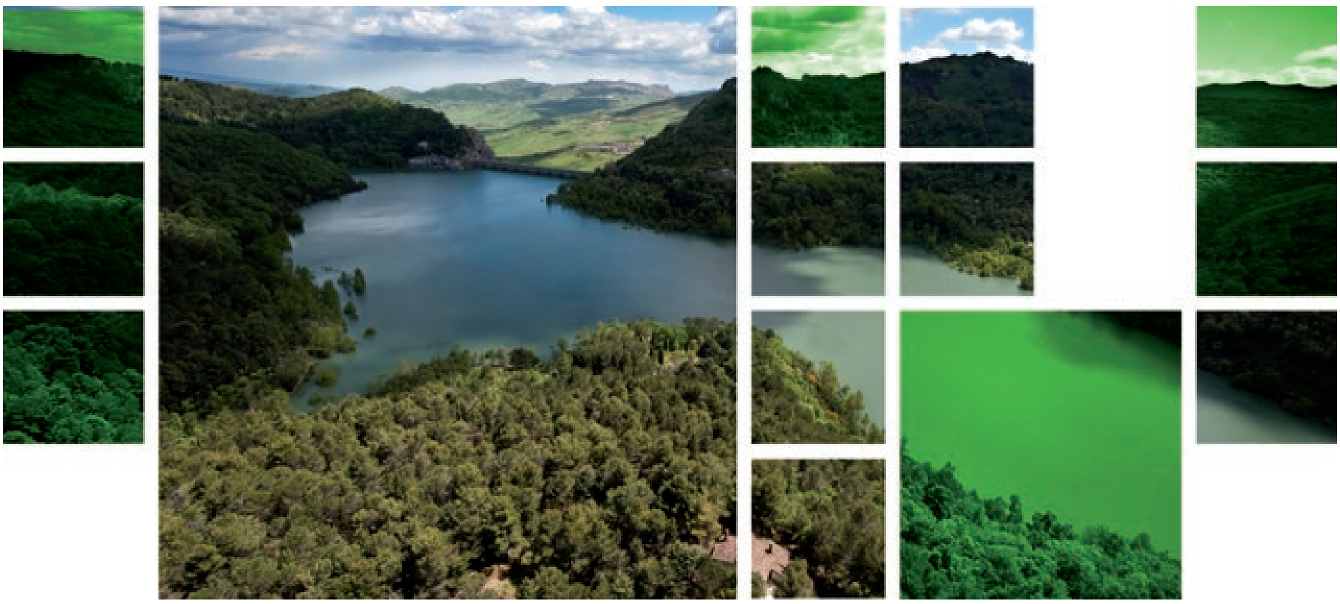
Percentage of total generation in water-stressed areas as of Dec. 31, 2013



(5) In this Report, "water abstraction" means the use of water for open-cycle cooling, closed-cycle cooling and "other industrial uses". The latter include: demineralized water used as heat carrier fluid; as-is and/or demineralized water in some systems abating SO_x and NO_x and in boiler clean-up; and make-up water in district heating networks.

Biodiversity conservation

Biodiversity conservation is one of the strategic targets of Enel's environmental policy. The Group promotes projects all over the world to support the conservation of ecosystems and natural habitats in the areas where it is present, not only as an industrial operator but also as an active player of the local social life.
In 2013, Enel completed the mapping of its biodiversity conservation activities and adopted a "Group-wide Plan for Biodiversity Conservation", consisting of 133 projects: 34 completed between 2011 and 2012 and 98 ongoing (investment since 2011: roughly € 21 million).
The projects, which are undertaken in the areas surrounding Enel's power plants and other installations, are of different type: monitoring surveys, projects of conservation, research and improvement, environmental offsets or remediation plans and socio-environmental studies.
Enel feels that any action regarding ecosystems should be hinged on a thorough knowledge of local equilibria. For each of its installations, Enel determined the proximity of international, national or local protected areas, the rationale behind their conservation, the presence of high-value ecosystems and of biotopes, animal or plant species being at risk of extinction and thus to be safeguarded, and assessed the related impacts. Knowledge of the species present in these areas allows Enel to identify those included in the IUCN (International Union for Conservation of Nature and Natural Resources) Red List of Threatened Species, their level of risk and the measures to be taken for their conservation. Results show that Enel's activities are carried out in full equilibrium with the natural environment, preserving biodiversity.
In many areas where Enel's installations are present, independent parties conduct land-, river- and sea-based biomonitoring surveys, by agreement with local institutions, to assess the influence on biodiversity and the adequacy of environmental offsets or enhancements.
The data on the protected areas where the Group carries out its activities and of the species included in the IUCN Red List are available at http://www.enel.com/it-IT/sustainability/environment/biodiversity/ and http://www.enel.com/en-GB/sustainability/environment/biodiversity/.



Enel's projects of biodiversity conservation

IUCN risk of extinction

Extinct		Threatened			At lower risk	
EX	EW	CR	EN	VU	NT	LC

For each project, the following data are generally reported: location/name, content (referring to the species shown in the first column, unless otherwise specified) and, between brackets, the project coordinator/s.

- C Compulsory project
- V Voluntary project
- C/V Compulsory/voluntary project

Europe

France

	Project	*GRI KPIs*
Montagu's harrier (*Circus pygargus*) LC C	Barrois area - Site of Community Importance for bird conservation: provision of nesting and feeding grounds for Montagu's harriers in the wind farm area (roughly 20 ha). In particular, the land surface is maintained by alternating rows of crops with rows of grass cover, so as to induce prey reproduction (micromammals, orthopterans and nesting birds). The project is implemented jointly with: local farmers, who refrain from fighting rodents and using pesticides; the permanent center for environmental initiatives (CPIE) and the hunters of the Aube department, who/which conduct surveillance activities; and the league for the protection of birds (LPO), the Montagu's harrier study and protection group (GEPB) and the Ardenne region, which carry out monitoring activities. The findings from these activities confirm that active protection of the nests of Montagu's harriers is needed, especially during hay harvesting, to favor their reproduction. [Enel Green Power].	**EN13**

Greece

	Project	*GRI KPIs*
Avian fauna C	Bird fauna monitoring scheme in the areas of the wind farms of Monastiri I, Monastiri II, Aspri Petra, Geraki and Soros in Thrace, Agyos Kirillios in Crete and Koutsoutis, located in Special Protection Areas. [Enel Green Power].	**EN13**

Italy

	Project	*GRI KPIs*
European otter (*Lutra lutra*) NT C	Upper Volturno river valley: habitat monitoring and protection; population estimates; demarcation of home ranges to be protected; creation of sighting points and educational signs. [Enel jointly with the Pianeta Terra association].	**EN13**
Northern pike (*Esox lucius*) LC C	La Casella thermal plant: yearly restocking of the Po river with 1,500 juveniles, as specified in the relevant water abstraction permit. [Enel Produzione].	**EU13**
Red kite (*Milvus milvus*) NT V	Mount Amiata area (Mount Amiata, Mount Penna and upper Albegna river valley) – southern Tuscany (Grosseto) – and Gola della Rossa and Frasassi regional natural park – Marche (Ancona): the main purpose of the project is to complete the rehoming of red kites, already started in the upper Albegna river valley and in the Frasassi park. The project consists of: relocating young red kites from other European countries, e.g. France (Corsica) and Switzerland; taking safety measures on over 40 km of power lines; installing more than 1,200 protective devices on pole heads; replacing conductors with insulated cables; and installing trapezoidal platforms where the birds can roost away from conductors. In 2012, young red kites coming from Corsica and from the canton of Fribourg (Switzerland) were released into the Mount Amiata area and the Gola della Rossa and Frasassi regional natural park. All the birds were fitted with GPS devices, capable of gathering a large number of data about their movements and of transmitting them to a fixed receiving station or to portable stations equipped with directional antennas. The data collected by this sophisticated GPS and stored into an appropriate database make it possible to know the exact location of the birds during the day and, after being processed, to gain further insight into their home ranges and nesting sites. [Amiata Mountain Community of the Grosseto area, Esino Frasassi Mountain Community and Enel Distribuzione].	**EN14**
Eel, trout, trout juveniles, cyprinids (various species including those at risk, e.g. Marble Trout - *Salmo trutta marmoratus*) and salmonids LC C	Various sites: restocking using various species of local fishes. [Enel Produzione and Enel Green Power].	**EU13**
Fluvial ecosystem C	Hydro plants: determination of minimum in-stream flows under an experimental technical program, which takes into account the hydromorphological and environmental features of local rivers and is conducted by agreement with the relevant authorities; river monitoring every six months. [Enel Produzione and Enel Green Power].	**EN14**
Ecosystem C	Thermal plants: Enel continues its program of environmental rehabilitation and restoration of contaminated sites in industrial areas considered to be at high industrial risk; these sites are designated as of "national interest" by Law 426/1998 and subject to the technical rules laid down in Legislative Decree 152/2006. In 2013, as regards thermal plants, Enel: > completed characterization studies in the Giugliano plant area, without evidence of exceedance of threshold concentrations of contamination; > went on with the planning & design of soil remediation measures and completed groundwater safety measures in the Assemini plant area; > continued the application of emergency measures for groundwater safety and conservation in the Piombino and Maddaloni plant areas; these measures add to those already completed in the La Spezia, Porto Marghera, Sulcis, Livorno and Portoscuso plant areas in previous years; > completed the risk assessment and analysis procedure for the internal areas of the La Spezia plant (the related monitoring activity is expected to start soon) and initiated the same procedure for the ash pond area; > completed the final design of environmental rehabilitation and restoration works in some areas of the Sulcis and Portoscuso plants, responding – among others – to the request for additions made by the Ministry of Environment, Land and Sea Protection; > was awaiting the authorization for the environmental rehabilitation of the Porto Marghera and Fusina plant areas and carrying out soil remediation in a specific area of the Porto Marghera plant; > initiated the procedure for awarding a contract for soil remediation in the Priolo Gargallo and Brindisi plant areas; > completed the environmental rehabilitation of the Augusta plant area and was awaiting the related certificate of completion. During 2013, the Ministry of Environment resolved upon a new project of demarcation of the sites of national interest where the La Spezia, Giugliano and Maddaloni plants are located; the responsibility for the project was assigned to the relevant region. [Enel Produzione].	**EU13**
Landscape C	Sulcis: the main goal of the project is to restore a semi-natural area with soil and vegetation characteristics similar to those of the surrounding environment. The project area is expected to cover at least 10,000 m^2. [Enel Produzione].	**EN13**

Italy

	Project	GRI KPIs
Bird fauna C	Various sites: installation of perches/nest-boxes on power line towers; insulation of power lines; specific solutions to avoid bird collision with power lines. [Enel Distribuzione].	**EN14**
Marine, freshwater and wetland ecosystems C	Porto Corsini plant (Ravenna): monitoring survey of the Pialassa Baiona lagoon over a surface area of 1,100 ha. At the end of the 2013 reporting period, results were good. The next monitoring survey will be conducted in 2014. [Enel Produzione].	**EN14**
C	Priolo Gargallo plant: agreement with the managed nature reserve of the Priolo salt flats (RNO Saline di Priolo) to conserve the wetland. [Enel Produzione].	**EN13**
C	Brindisi thermal plant: the province of Brindisi periodically monitors the water body facing the plant. The surveys are based on bathymetric and geomorphological characterization and subsequent collection of biological samples for biomarker analysis and of sediment samples to determine grain size, carry out toxicity tests and characterize the planktonic component. Finally, the data are processed under Beyond-BACI (Before and After Control Impact) procedures in order to quantify anthropogenic effects. [Enel Produzione].	**EN14**
Landscape C	Santa Barbara thermal plant: environmental restoration of the former coal mine area adjoining the power plant. [Enel Produzione].	**EN13**
Flora, fauna, ecosystem and landscape C	Pietrafitta thermal plant: the methodology used to mitigate the visual impact of the plant makes part of a project of revegetation of about 330 ha in total (including about 10 ha corresponding to the former coal bunker area, whose greening was completed in 2011). Enel continues to maintain the row of tall trees previously planted to create a barrier for visual impact mitigation. Every year, the provincial administration of Perugia conducts a survey of bird populations in the protected area. [Enel Produzione]. Enel goes on with the environmental restoration of the protected area and the cultivation of previously restored areas. Monitoring processes include: determination of emissions of pollutants into the atmosphere; sampling and analyses of waste waters; and monitoring of groundwater. [Enel Produzione].	**EN14**

Portugal

	Project	GRI KPIs
Avian fauna and bats C	In all the wind farm sites, collisions of avian fauna and bats are continuously monitored. [Enel Green Power].	**EN14**
Iberian wolf (*Canis lupus signatus*) VU C	Portugal: agreement with local institutions for conservation of the Iberian wolf. Enel participates in a fund to finance programs of: reforestation of farmland with autochthonous species; maintenance of forested areas; increased availability of food and shelters for prey; promotion and improvement of prey diversity and availability; reduction of disturbance to Iberian wolves by introducing banned hunting areas. [Enel Green Power and ACHLI – association for conservation of the Iberian wolf habitat].	**EN13**

Romania

	Project	GRI KPIs
White stork (*Ciconia ciconia*) LC V	In 2013, mounting of 7 circular platforms on power distribution line towers to favor nesting. [Enel Distributie Dobrogea and Enel Distributie Banat].	**EN13**
Saker falcon (*Falco cherrug*) VU V	This species of falcon has a tendency to nest on high-voltage power line supports. Enel took part in the conservation of this raptor by installing GPS devices. The first joint action involved the application of identity rings to three young individuals of this vulnerable species which is nesting in the country. Moreover, for the first time in Romania, one of the three young raptors was equipped with a latest-generation GPS locator, which records data on daily movements and transmits them to specialists for subsequent analyses. The results of these analyses will help to protect this species and improve the understanding of its migratory routes. The application of the tracking system involved an entire crew of Enel, as the nest was placed on an HV power line tower managed by Enel Distributie Banat in the Torontalului plain (Timis county). In 2012, new activities of conservation of Saker falcons were conducted (installation of 34 nests on the HV power line poles of Enel Distributie Banat and application of 55 insulating sheaths on MV power lines in the area of Ianova, Timis county). The goal of these activities was to provide Saker falcons with good habitats after their migration from the Hungarian regions to the area of Banat, in accordance with observations made by the Milvus Association with which Enel cooperates. In 2013, insulating sheaths were mounted on 28 MV power line towers of Enel Distributie Banat in the areas of Ianova and Lovrin (Timis county). The Milvus NGO provided the necessary materials. [Milvus Association and Enel Distributie Banat].	**EN13**

Romania

	Project	GRI KPIs
Flora and ecosystem V	In 2012, 60 volunteers (Enel and MaiMultVerde association) took part in planting 700 oak trees in the Comana natural park (designated as Ramsar site) in the Giurgiu county, as part of the Mega Tree project. The action was undertaken to support the Comana and Giurgiu Forestry Departments. The project went on in 2013 with maintenance of the planted area and planting of 4,000 oak and elm trees by 140 volunteers. [Enel Energie Muntenia, Enel Distributie Muntenia and non-profit MaiMultVerde association].	**EN13**

Russia

	Project	GRI KPIs
Fish fauna V	The pumps of the open-cycle cooling system may disturb fishes in the Ivankovskoe basin (Konakovskaya plant - KGRES - site), in the Barsuchkovsky canal (Nevinnomysskaya plant - NGRES - site), as well as in the Isetskoe and Reftinsky basins. Particular emphasis is placed on mitigation of this impact. Consequently, fish protection measures are being tested near the pumping stations (water aeration in intake points and electrical pulses to prevent fishes from swimming in the intake area). [OGK-5].	**EN 14**
Lacustrine ecosystems V	A biological and chemical study of lake Isetskoe (Sredneuralskaya plant - SGRES - site) is planned. In 2011, a bathymetric study was carried out, while in 2012 a physical-biological investigation on the use of the natural resources of the basin (watershed survey) was conducted. In 2013, mathematical simulations were carried out with a view to working out a strategy of mitigation of possible thermal impacts (due to the increase of water temperature). [OGK-5].	**EN 14**
Grass carp (*Ctenopharyngodon idella*) and macrophytes (*canna, eyhornia*) C	To prevent the proliferation of lacustrine vegetation in the Isetskoe basin, use is made of a biological method, i.e. floating structures which contain fishes (grass carp, eating the upper aqueous vegetation) and macrophytes (*canna*, *eyhornia*, etc., reducing the presence of nutrients for phytoplankton). [OGK-5].	**EN 13**

Slovakia

	Project	GRI KPIs
Golden eagle (*Aquila chrysaetos*) LC V	High Tatras national park: protection, removal of threats, collection of blood samples for genetic analyses and rehabilitation of wounded eagles, monitoring and mapping of hunting grounds, microchip tagging and identification of nesting sites. Enel also initiated a cooperation project with the Tourist Club for educational initiatives. The latest years have been negative for this species, as only 8 pairs were observed in the park. [Slovenské elektrárne].	**EN13**
Alpine marmot (*Marmota marmota latirostris*), Peregrine falcon (*Falco peregrinus*), Grey wolf (*Canis lupus*), European lynx (*Lynx lynx*) LC V Tatra chamois (*Rupicapra rupicapra tatrica*) CR C	High Tatras national park: as part of a project of cooperation with national parks to conserve the biodiversity of threatened species, emphasis was placed on five species. Results indicate increases in the number of: chamois, from 532 in 2007 to 1,096 in 2012; marmots (relocated from the western to the eastern part of the park), totaling 32 in their new home ranges; peregrine falcons, from 11 pairs in 2008 to 16 in 2012. In 2011, a project of monitoring, support and conservation of two other threatened species, the grey wolf and the European lynx, took off. In 2012, 12 European lynxes and 20 grey wolves were recorded. The project was extended to 2013, owing to difficulties in monitoring the night-time activity of these species. [Slovenské elektrárne].	**EN13**

Spain

	Project	GRI KPIs
Mollusks V	International commitment to research on *Dreissena polymorpha*, an invading exotic species which occurs in various Spanish water bodies. This is a freshwater bivalve zebra mollusk, similar to the common mussels and autochthonous of the Black Sea and Caspian Sea. This non-edible mollusk is known to withstand salty water and to rapidly reproduce and propagate. Fluvial navigation and maritime transport have facilitated the spreading of this species, causing serious economic and ecological effects, including interference with feeding, growth, movement, breathing and reproduction of other species (in particular, mussels and clams). The project was completed in 2013. [Endesa].	**EN14**

Spain	*Project*	*GRI KPIs*
Egyptian vulture (*Neophron percnopterus*) EN C/V	Canary Islands: monitoring of measures adopted in previous years (e.g. bird diverters and anti-shock devices) to mitigate the risk of bird collision with and electrocution from overhead MV power lines in Fuerteventura and Lanzarote. [SEO-BirdLife and Endesa Distribución].	**EN14**
Dupont's lark (*Chersophilus duponti*) NT C	Castilla y León: environmental monitoring scheme aimed at drawing up a plan for protection of Dupont's lark (Padul wind farm). Activities of management of habitats for this species are under way. The municipality of Padul (province of Granada) hosts half of the Dupont's lark population in Andalusia (its main shelter area), where its status is considered to be "threatened". In view of the above, during the planning & design stage of the Padul wind farm, Enel put forward a proposal for the creation of an ecological reserve for this species, with the following goals: > determining the pairs of larks in the area and their breeding success; > identifying the favorite habitat of the species in the area; > studying the feeding habitat of the species and the related availability of prey; > detecting possible predators and their possible impact on the species in the area; > proposing appropriate conservation and rehabilitation measures. As a result, in December 2010, an ecological reserve for Dupont's lark was created under an agreement between the municipality of Padul (owner of the area), Enel Green Power España (funding entity) and the Estación Ornitológica of Padul (manager of the reserve). [Fundación Patrimonio Natural de Castilla y Léon and Enel Green Power].	**EN 13**
Brown bear (*Ursus arctos*) LC V	Cantabria: genetic study to assess the movements of the bear and investigate the genetic print of some sub-populations. [Enel Green Power and Fundación Oso Pardo]. Northern Spain: cooperation agreement to implement various projects of conservation of Brown bears and of rural development in northern Spain. [Endesa and Fundación Oso Pardo].	**EN 13**
Raptors V	Pyrenees: yearly satellite monitoring of a wounded raptor. [Endesa and Catalan Institute for Birds of Prey Conservation].	**EN14**
Avian fauna V	Andalusia and Extremadura: under the 2008 agreement with the Government of Andalusia (co-funding of the LIFE+Nature and Biodiversity project of conservation and management of special protection areas for the birds of the Andalusian steppe), the European Commission's LIFE Committee selected the project of identification of critical points of birds' collision with and electrocution from power lines. Development of other research projects in conjunction with research centers and public institutions. [Endesa Distribución].	**EN14**
Cinereous vulture (*Aegypius monachus*) V	Pyrenees: project of rehoming of the cinereous vulture into the Pyrenean and pre-Pyrenean area. [Endesa, Trenca Association and Fundación Biodiversidad].	**EN14**
Raptors C	Villahermosa del Río (province of Castellón): management of raptor shelter areas. [Enel Green Power].	**EN14**
Fluvial ecosystems V	Lower Ebro: design and installation of a system to control the release of water from large hydro power generation basins, with a view to preserving the lower Ebro ecosystem and avoiding the massive growth of macrophytes. [Endesa].	**EN13**
Terrestrial ecosystems C/V	Natural park of Serralada Litoral (province of Barcelona): Endesa Distribución supported studies on three species: European honey buzzard (*Pernis apivorus*), short-toed snake-eagle (*Circaetus gallicus*) and northern goshawk (*Accipiter gentilis*).The company is also adapting its distribution grid to prevent raptors' collisions with and electrocution from power lines in the natural park. [Endesa Distribución].	**EN13**
Fluvial/lacustrine ecosystems and fish fauna V	Paleoarctic ecozone: comparative study of the Paleoarctic ecozone (Spanish and Mongolian lakes) and of the biodiversity of entomostracan crustaceans, to identify reference ecological conditions for Iberian water bodies. Development of a catalog of semi-arid wetlands in Mongolia; the catalog includes more than 500 investigated water bodies and three new species of planktonic crustaceans. [Endesa].	**EN13**
Fluvial ecosystems C/V	Pyrenees: studies have been conducted since 2012 to investigate the environmental impact resulting from the demolition of the Font Grossa dam owing to structural deterioration. The project has, among others, the goal of restoring fluvial continuity downstream of the Lladres basin. Partial demolition was completed in September-October 2012. [Endesa].	**EN13**

North America

United States

United States	Project	GRI KPIs
Flora, fauna, ecosystem and landscape V	Caney river wind farm (Kansas): a native environment conservation plan was launched to safeguard wildlife, preserve and restore the tall grass prairie and other important habitats and encourage research on new approaches to environmental protection in Kansas. [Enel Green Power jointly with the National Fish and Wildlife Foundation].	**EN13**
American shad (*Alosa sapidissima*) V	Lowell hydroelectric project: in 2011, in response to the concerns of the fisheries agency, the presence of shads in the turbine outlet area was tracked via a 3D acoustic system. Previous studies had only investigated their passage inside the lifting system. Results confirmed migratory behaviors and will be used to plan a further evaluation of the system, with a view to improving the upstream migration of this species. [Enel Green Power North America and Federal and State Fisheries Agencies].	**EN13**
American eel (*Anguilla rostrata*) V	In 2012, a permanent concrete structure was built to permit the migration of eels up the Merrimack river. [Enel Green Power North America and Federal and State Fisheries Agencies].	**EN13**
Atlantic salmon (*Salmo salar*) V	Lawrence hydroelectric project: the new pneumatically-controlled inflatable crest gate makes it possible to monitor fish migration. Lowering of the crest gate at different points eliminates the attraction effect caused by the current. To assess the effectiveness of the system, the number of salmons swimming upstream for spawning is counted. In the spring of 2011, 402 adults of Atlantic salmon were counted. The caught salmons are delivered to the US Fish and Wildlife Service for restocking the Merrimack river basin and other areas of New England. [Enel Green Power North America and Federal and State Fisheries Agencies].	**EN14**
Fish fauna C	South Berwick hydroelectric project (Maine): in the spring of 2011, the New Hampshire Fish and Game Department placed a fish counter near the fish ladder on the Salmon Falls river. This is the site where fishes migrate every year to lay eggs. Over 3,400 fishes were counted in 2011. The caught fishes will be used for restocking the watershed. [New Hampshire Fish and Game Department-NHFGD and Enel Green Power North America].	**EN14**
Avian fauna and bats V	Rocky Ridge wind farm (Oklahoma): in 2012, Enel launched a voluntary strategic plan to further protect birds and bats and, in parallel, implemented a program of employees' awareness & training. [Enel Green Power North America].	**EN14**
Bactrian wapiti (*Cervus canadensis*) C	Cove Fort geothermal plant (Utah): development of a plan jointly with federal agencies to minimize the impact of steam lines on local fauna migratory routes (elks and Bactrian wapitis). [Enel Green Power North America, US Forest Service-USFS and Bureau of Land Management-BLM].	**EN14**

Latin America

Argentina

Argentina	Project	GRI KPIs
Avian fauna V	Arroyito hydro plant: in 2012, Enel went on with its program of monitoring & control of third-party access to the lagoon area downstream of the plant. This area is home to migratory birds and thus to be protected. [Endesa].	**EN13**

Latin America

Argentina

	Project	GRI KPIs
Terrestrial ecosystems V	El Morejón natural reserve: the Reserva Privada El Morejón (approximately 80 km from Buenos Aires and 5 km from the town of Campana) is a protected area covering 341 ha, 38 of which are occupied by the new Manuel Belgrano thermal power plant. The project, implemented jointly by the plant management and the Fundación de Historia Natural Félix de Azara, resulted into the creation of a 110 ha area for conserving the flora and fauna of the Campana region. The project is intended not only to safeguard the local environment but also to organize environmental awareness & training sessions. The management of the Manuel Belgrano plant will also organize school trips to the reserve, in order to disseminate knowledge of and promote this initiative of stewardship of the local flora and fauna. [Endesa].	**EN13**

Brazil

	Project	GRI KPIs
Flora C	Cachoeira hydro plant: the project of restoration of a riparian forest, damaged by agropastoral activities, in the areas surrounding the storage basin continued in 2013. The forest controls water flows, acts as a filter for sediment and nutrients, reduces landslides and erosion and provides protection and food to aquatic fauna, birds and mammals. In 2010, about 50,000 autochthonous species of trees and shrubs were sown over a total surface of 30 ha in the States of Goias and Minas Gerais. The surface already reforested in previous years, with about 90,000 individuals of typical species of the local savanna, amounts to 54 ha. Additionally, studies are conducted on wild fauna and fish fauna to understand their migration dynamics. [Endesa].	**EN13**
Flora V	Sustainable rural communities: project of conservation, forest management and sustainable forestry in the Caatinga Biosphere Reserve (State of Ceará). These initiatives add to more specific ones which have the goal of easing the transition of farmers' families and small coal- and wood-processing firms to sustainable practices for growing crops (including energy crops). [Endesa].	**EN13**
Brown-throated parakeet (*Aratinga pertinax*) LC C	Protection of the indigenous fauna of the State of Ceará: the project consists in designing and installing nest boxes for reproduction of this species. The brown-throated parakeet is one of the most threatened species of parrot in South America, with an estimated population of 250 individuals. The contribution given by Aquasis (NGO), which is implementing the species conservation program, amounted to about € 16,000. In 2010, with the first nest occupied, one brood of 5 individuals was recorded. In 2011, 7 nests were occupied and 38 individuals were counted. In 2012, 16 nests were occupied and 79 individuals were counted. In 2013, 68 new individuals were born. [Endesa].	**EN13**
Flora C	Biomonitoring: continuous monitoring of water quality and precipitation, with a view to keeping the quality and quantity of water in the plant areas at acceptable levels for the survival of aquatic and terrestrial species. Monitoring & control of macrophyte populations to maintain the equilibrium of the aquatic ecosystem (habitat and species) inside impoundments. Monitoring and management of forests to preserve their biodiversity and maintain a wildlife corridor. Access to forests is controlled to prevent indiscriminate hunting and fishing. [Enel Green Power].	**EN13**
Flora, fauna, ecosystem and landscape C	Wind farms of Cristal, Modelo and Dos Ventos (Caatinga): environmental monitoring to identify local species and the potential negative impact of the construction project and put in place possible mitigation measures. The Caatinga Province is a biotope hosting particular types of autochthonous vegetation and thus requiring special conservation measures. [Enel Green Power].	**EN13**

Chile

	Project	GRI KPIs
Flora V	Taltal thermal plant: determination of the effects of NO_x and SO_2 emissions via biomonitoring and use of new biotic and abiotic environmental components on parcels of land which represent the biodiversity of flora and fauna in the Paposo area ecosystem. [Endesa].	**EU13**
Flora and fauna V	Improvement of farming and animal husbandry practices among the Atacameñas indigenous communities, with the key goal of inducing a sustainable use of the locally scarce water resources. [Enel Green Power].	**EU13**

Chile

	Project	*GRI KPIs*
Flora, fauna, ecosystem and landscape V	Cooperation with the San Ignacio del Huinay Foundation (created by Endesa) and the Pontificia Universidad Católica de Valparaíso: in this area of about 34,000 ha, located in the Hualahuié municipality and extending from the Comau (or Leptoeu) fjord (province of Palena) to Argentina, the foundation devotes itself to the conservation of the rainforests of the planet and to the study of marine invertebrates (49 new species classified), conducting microbiological investigations on hot springs, flora and fauna surveys and limnological studies of previously uninvestigated water bodies. These activities led to identify very numerous new species and ecosystems in areas of particular interest. In 2012, the foundation worked to pursue its targets: creating a nursery of indigenous forest species, conserving the marine protected area and issuing publications thereon. [Endesa].	**EN13**
Poultry and mammalian fauna C	Tarapacá thermal plant: quarterly monitoring of poultry and marine mammals to identify impacts on processes of migration and settlement of the different species. In 2013, 22 poultry and 2 mammalian species were monitored. [Endesa].	**EN14**

Colombia

	Project	*GRI KPIs*
Flora, fauna, ecosystem and landscape V	Cartagena thermal plant: in 2011, 1.5 ha of land around the lagoon located in the plant area were reforested. In 2012, the 2nd stage of the biodiversity project was implemented; this stage analyzed the biological connectivity of the ecosystem and updated the flora and fauna inventory. Thanks to this activity, the plant area now plays a very important role for the passage of high-mobility species, such as poultry (migratory and resident) and flying mammals, and as a shelter for all the observed terrestrial species. An informational brochure was also published. 2013: flora and fauna characterization. [Endesa and Instituto de Ciencias, Universidad Nacional de Colombia].	**EN13** **EN14**
Flora, fauna and ecosystems V	Betania basin: project of conservation, characterization and enhancement of the value of ecosystems located on the left bank of the Magdalena river (flora and fauna characterization, landscape restoration and creation of an eco-trail). Native species were sown along the eco-trail, improving fish habitats (and feeding opportunities) and strengthening the development of the ecosystem. In 2013, jointly with local authorities and communities, about 360,000 individuals of autochthonous fish species were seeded. [Endesa].	**EN13**
Flora, fauna and ecosystems C	Guavio river hydroelectric basin: program of conservation and sustainable power generation to protect water resources, biodiversity and the environment in the area of influence of the basin (2008), jointly with Corporación Autónoma Regional del Guavio, Fundación Patrimonio Natural and the Fund for Biodiversity and Protected Areas. In 2011, 10 ha around the basin were reforested; efforts continued to manage and protect 33 ha of polyphytic grassland with water springs, agroforestry systems for coffee growing and riparian areas. 15 ha of adjoining land were added to the program in 2012. In particular, in 2013, 12 ha were reforested. Since the start of the program, 43.5 ha have been reforested. [Centro Nacional de Investigaciones del Café and Endesa].	**EN13**
Wetlands, mangroves and forests V	Codensa: planting of 10,000 autochthonous trees over a surface of 0.1 km^2 in the Hacienda Canoas-Minas (Soacha municipality) as a voluntary pledge to offset office paper consumption. This activity makes part of a much more ambitious project ("Bosque de Endesa") of reforestation of an area of roughly 7 km^2. [Endesa].	**EU13**
Flora V	Cava Muña: under an environmental management and restoration plan, the quarry faces were revegetated over an area of 1.9 ha. The quarry was used to extract material for works of improvement of the dams of the Muña basin, which stores the water needed by the Pagua power plants. A poultry fauna characterization study began in 2012. The study is expected to estimate the value of environmental regeneration of the basin, by using native poultry fauna as an indicator of ecosystem improvement. In 2013, the following activities were conducted: > awarding of contracts for management and surveillance of the site, creation of educational trails, installation of protective barriers around the site; > reforestation with 7,400 trees and maintenance of previously reforested areas; > value creation (employees' visits, publication of news for internal and external use, presentations during meetings and conferences); > submission of an ecological regeneration plan to environmental authorities; > contractual arrangements to characterize biodiversity work projects. [Endesa].	**EU13**

Mexico

	Project	*GRI KPIs*
Fish fauna V	El Gallo hydro plant: restocking of the basin serving the plant, jointly with local anglers' communities and institutions. [Enel Green Power].	**EU13**
Iguana V	El Gallo hydro plant: protection of some individuals of protected and threatened animal species (iguana), which settled in the plant area to escape predation by the local population. [Enel Green Power].	**EU13**

Panama

	Project	GRI KPIs
Flora, fauna, ecosystem and landscape V	Fortuna forest reserve: administration of 19,500 ha of forest, a national protected area with important animal species (large mammals, birds, reptiles, etc.) and plant species. Surveillance and patrolling of critical areas to prevent damage to and crimes against flora and fauna; communication to local communities, authorities and representatives (through meetings and brochures) about the most significant features of the area, prohibited activities and national legislation on management of the resources of the reserve; periodical bathymetric surveys to determine the level of siltation of the basin; organization of research activities (starting with biodiversity monitoring in the Fortuna site) with the involvement of national- and international-standing institutes. These activities indicated, among others, the presence of near-threatened species, such as the jaguar. [Enel Green Power jointly with the Smithsonian Tropical Research Institute and the National Conservancy Association].	EN13 EU13 EN15

Peru

	Project	GRI KPIs
Flora, fauna, ecosystem and landscape V	Chimay hydro plant: a 36-month biodiversity study (using fixed monitoring stations) was started in the area of influence of the plant in the 3rd quarter of 2010. 270 species of terrestrial vegetation were censused; none of them proved to be endemic or threatened. Species of terrestrial fauna significant for their habitat and very sensitive to the impact of agriculture, the wood industry and hunting were identified (pacarana). With regard to the avian fauna, 124 species, 36 families and 16 orders were recorded in the basin of the plant. Out of a total of 124 species, only 26 are nationally or internationally protected and none is included in the IUCN Red List. 7 species of herpetofauna were observed in the study area. 2013 is the 3rd consecutive year of monitoring. [Endesa].	EN 14

Mapping of environmental compliance

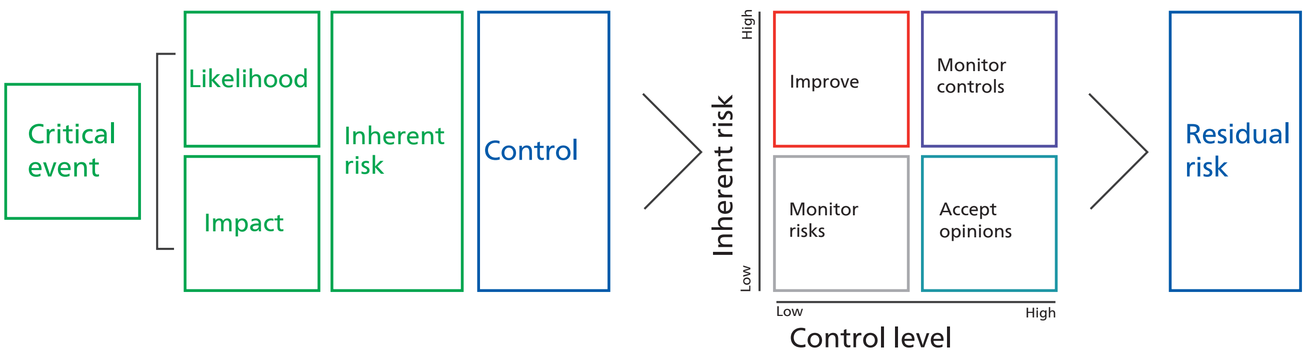
In 2013, the Group completed its painstaking assessment and quantification of the risks associated with environmental compliance (mapping of environmental compliance). In 2013, in line with the acceleration of the implementation plan (started in 2010), Enel completed the coverage of over 500 sites all over the world (initially scheduled by 2014). The success of this commitment is owed, among others, to the upgrade of the IT systems supporting the process, which was finalized during 2013.

The Mapping of Environmental Compliance (MAPEC) methodology enables the Enel Group to identify, analyze and map the potential risks associated with the governance of environmental issues, in terms of strategy, reputation, financial resources and recipient environment, during the operation of its installations for power generation (excluding nuclear) and distribution.

Analyses are carried out on a yearly basis so as to reflect possible changes in Enel's internal and external context. These analyses are conducted by the "owners" of processes with an environmental impact, who are identified within the various sites and companies of the Group.
The methodology, based on predetermined criteria, consists of the following fundamental steps:

1. inherent risk assessment: assessment of the likelihood of occurrence of a critical event and of its impact under predefined criteria, assuming no control activities for risk mitigation;
2. control level assessment: assessment of the effectiveness of existing risk management and control activities aimed at managing or mitigating the risk;
3. residual risk calculation: the residual risk, i.e. Enel's exposure to the risk, is obtained when a reduction based on the control level is applied to the inherent risk.

Development of a management and response strategy



The purpose of the project is to provide the management with qualitative data and useful inputs for its decision-making and investment planning processes. Under the project, the performance of the various sites (belonging to different technological and legislative/regulatory contexts) is assessed vs. Enel's best practices, in view of convergence towards the best environmental performance practices.

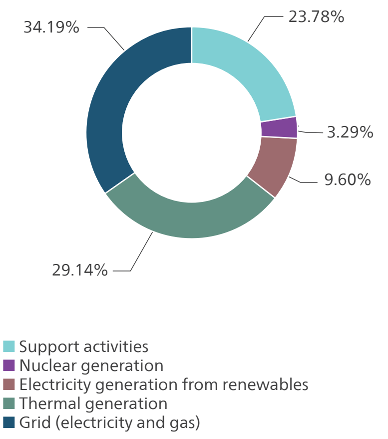
In 2013, the assessment covered 555 sites and 35 companies of the Group in 20 countries:

> 20 coal-fired thermal plants;
> 20 combined-cycle thermal plants;
> 48 oil/gas-fired thermal plants;
> 4 biomass-fired thermal plants;
> 1 CHP plant;
> 123 hydro generation groups;
> 5 geothermal generation groups;
> 21 solar PV plants;
> 157 wind farms;
> 156 electricity distribution sites.

Awareness, Training & Education

Environmental awareness, training & education initiatives are core elements of the yearly plan for improving the skills and know-how of Enel's human resources.
In 2013, Enel developed education modules for its environment-dedicated personnel: in the overall Group, 79,830 person-hours of sessions were delivered, mostly on environmental management systems.
This value is in line with historical ones, substantiating the goal of building employee awareness of environmental issues, making persons accountable for the consequences of their decisions on the environment and promoting sustainable practices inside and outside workplaces.

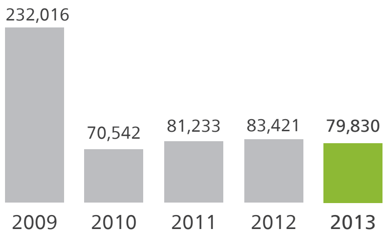
Distribution of environmental training & education activities in 2013
Total: 79,830 (person-hours)



Awareness activities inside and outside Enel

Enel's Intranet site has a thematic section with CEO's messages, environmental policy, Environmental Reports, data on environmental management systems, as well as environmental procedures issued at different organizational levels.
Environment-dedicated personnel may have access to the environmental reporting application and thus to the environmental performance data of installations operated or activities carried out by Enel in different geographic areas. Links to the environmental pages of Enel's Intranet and Internet sites are also posted. Enel's websites (http://www.enel.it/it-IT/azienda/ambiente/ and http://www.enel.com/en-GB/sustainability/environment/) have a comprehensive section dedicated to environmental themes.

Environmental training & education
(person-hours)



The page gives access to: Enel's Environmental Reports (available also in navigable form from 2009 on), environmental policy, initiatives to counter climate change, commitment to biodiversity conservation, EMAS and ISO 14001 environmental management systems, renewables, energy efficiency and innovative projects, especially those concerning emission abatement.

Business/line of activity (person-hours in 2013)

23,100	7,609	2,612	27,108	19,401	79,830
Thermal generation (including CHP)	Electricity generation from renewables	Nuclear generation (including CHP)	Electricity distribution	Environmental support	

Geographic area (person-hours in 2013)

18,593	13,732	11,998	17,948	17,559	79,830
Italy	Spain	Russia	Rest of Europe	American continent	

Group's environmental results

Enel in the world

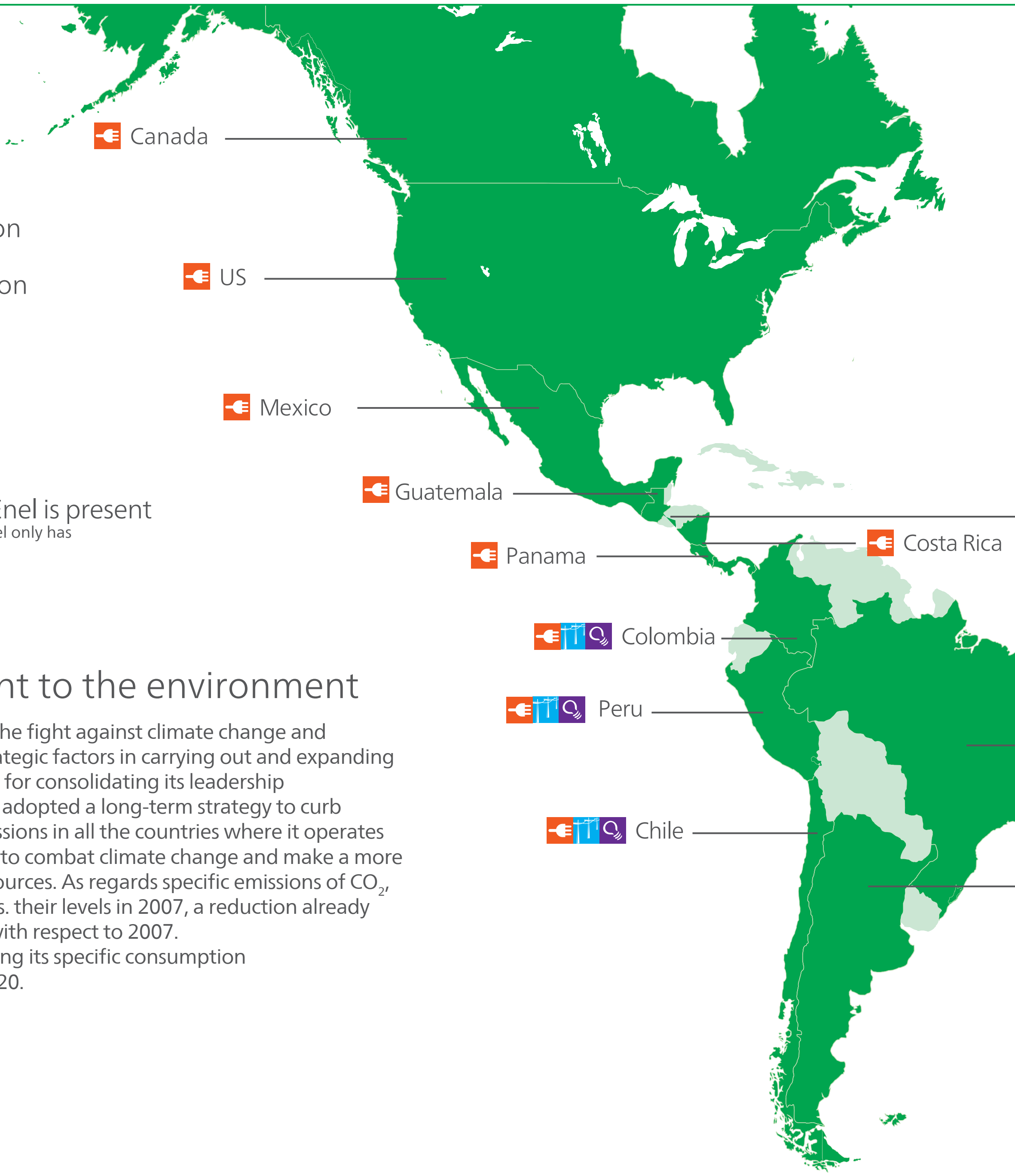
Upstream gas

Electricity generation

Electricity distribution

Sale

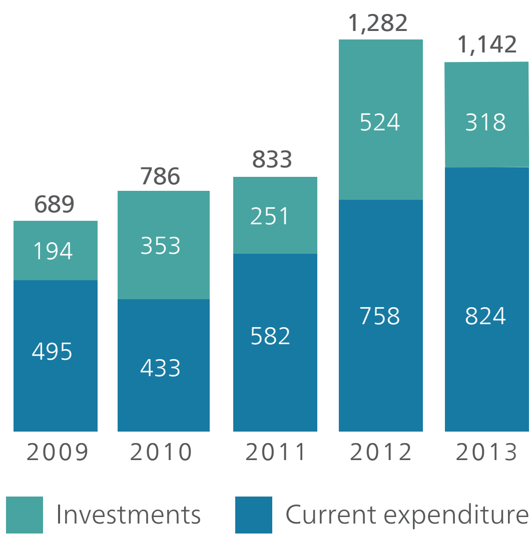
Countries in which Enel is present
(excluding countries where Enel only has representative offices)



Enel's commitment to the environment

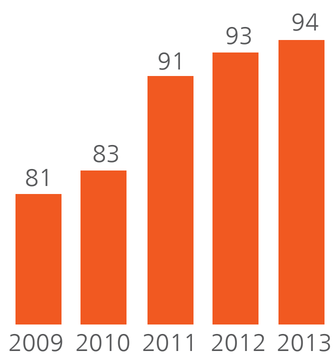
Enel regards the environment, the fight against climate change and sustainable development as strategic factors in carrying out and expanding its operations and as key drivers for consolidating its leadership in energy markets. This is why it adopted a long-term strategy to curb and offset greenhouse-gas emissions in all the countries where it operates through a number of initiatives to combat climate change and make a more rational and efficient use of resources. As regards specific emissions of CO_2, Enel cut them by 16% in 2013 vs. their levels in 2007, a reduction already higher than its target by 2020 with respect to 2007.
Enel is also committed to reducing its specific consumption of water by 10% on 2010 by 2020.

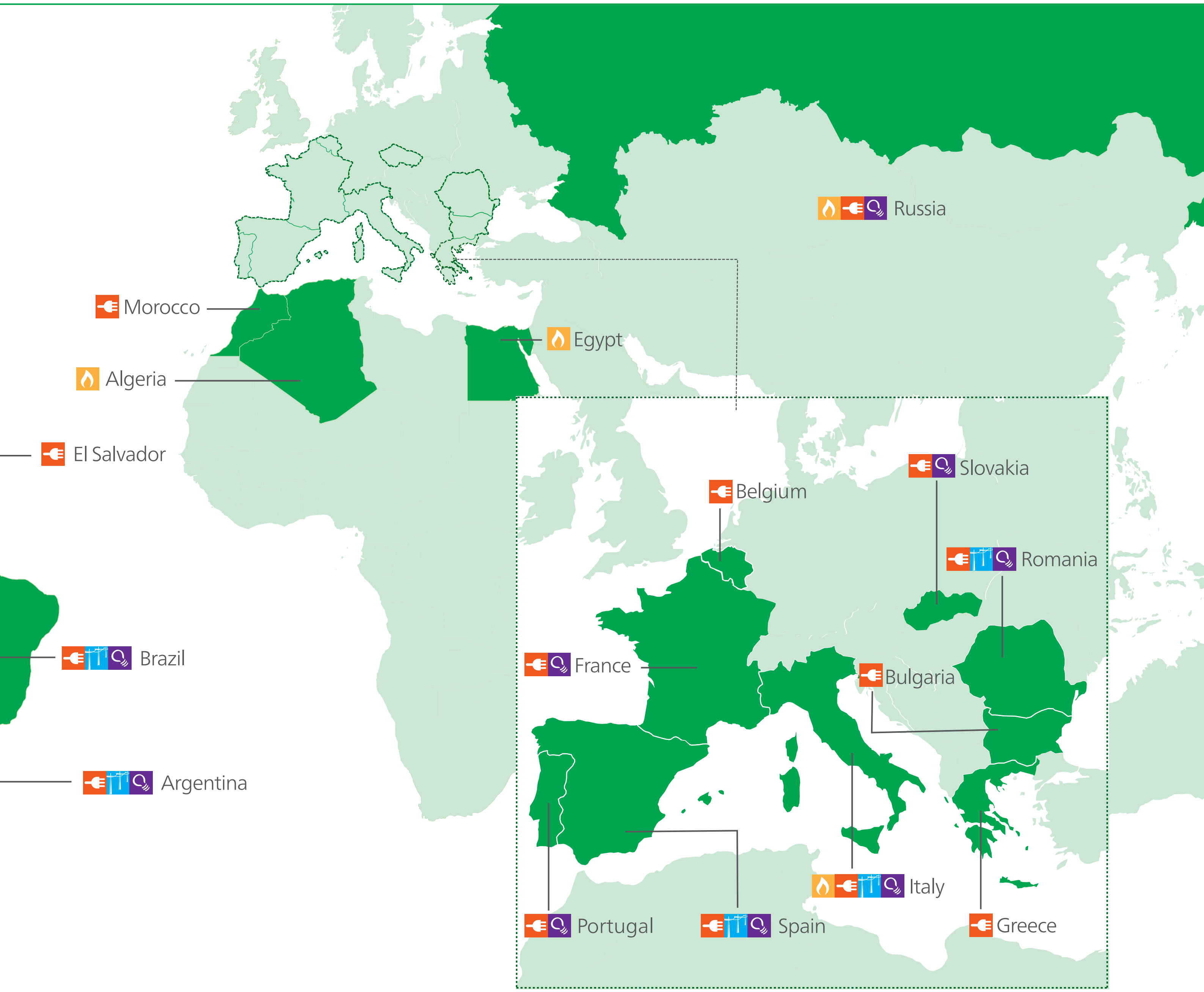
Financial resources allocated to environmental protection *(million €)*



ISO 14001-certified net maximum capacity

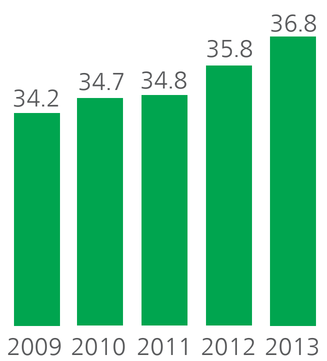
(% coverage)





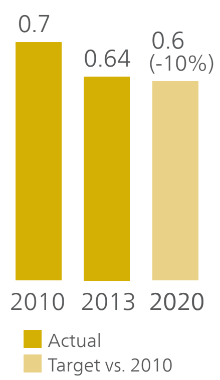
Renewable generating mix

(GW net installed)



Net specific consumption of water for industrial uses

(liters/kWh net)

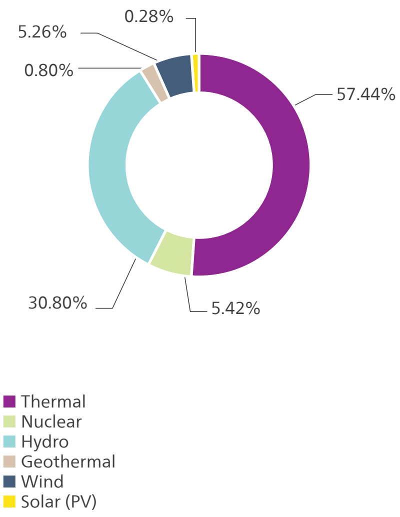


Specific emission of CO_2

(gCO_2/kWh total net)

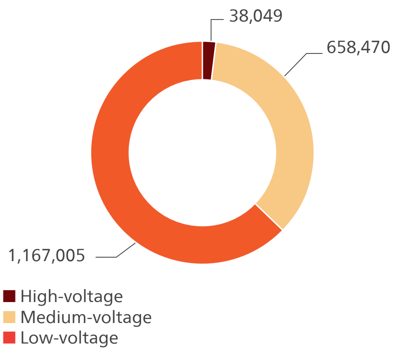
Net maximum electrical capacity of power plants as of Dec. 31, 2013

Total: 98,917 MW



Circuit-length of power lines as of Dec. 31, 2013

Total: 1,863,524 km



Electricity generation (especially thermal) is the activity of Enel that has the most significant effects on and interactions with the environment. However, this Eco-Balance also takes into consideration the other activities that Enel carries out in the world and quantifies their environmental aspects in aggregated form.

The data of the Eco-Balance are divided into the following four parts [1], each of which shows not only absolute data, but also specific performance indicators for:

> status data;
> resources;
> processes and products;
> emissions, liquid releases and waste.

For each item, the Eco-Balance provides and comments on the data regarding the past five years. To facilitate the understanding and assessment of the Eco-Balance, the following graphs and tables summarize the key data of Enel's installations in the world as of December 31 of each of the years from 2009 to 2013 ("status data").

The status data and the absolute values of resources, processes and products, emissions, liquid releases and waste are accompanied by appropriate indicators (ratios between homogeneous or heterogeneous quantities). These indicators express Enel's environmental performance over time, whatever the volume of activities in each year. Details on their nature and commentaries, if any, on their trends are provided.

Details on absolute data and indicators are shown in the datasheets and tables pertaining to each country where Enel is present.

(1) In the tables of this section and in those of the individual countries, the expression "various activities" means a number of activities (not all of which are present in the different contexts) which contribute – albeit to a minor extent – to the following:
> consumption of fuels (in this case, the activities are mining & extracting, fuel storage & handling, geothermal drilling, operation of auxiliary boilers and emergency generating sets in business or lines of activities other than thermal generation, service and real-estate management);
> consumption of electricity (in this case, the activities are mining & extracting, fuel storage & handling, service and real-estate management);
> CO_2 emissions (in this case, the activities are mining & extracting, fuel storage & handling, geothermal drilling, operation of auxiliary boilers and emergency generating sets in business or lines of activities other than thermal generation, service and real-estate management);
> waste production (in this case, the activities are mining & extracting, fuel storage & handling, service and real-estate management).

Status data

Absolute values

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	1,070	1,112	1,125	1,171	1,257
thermal	no.	102	103	103	101	101
nuclear	no.	5	5	5	5	5
hydro	no.	768	811	789	797	815
geothermal	no.	34	35	35	35	35
wind	no.	155	151	175	192	207
solar (photovoltaic)	no.	6	7	18	41	94
Net maximum electrical capacity	MW	82,916	85,913	85,123	85,518	86,690
thermal	MW	46,046	47,832	46,836	46,316	46,398
nuclear	MW	3,522	3,514	3,527	3,535	3,556
hydro	MW	30,279	31,033	30,265	30,435	30,464
geothermal	MW	742	775	769	769	795
wind	MW	2,303	2,731	3,619	4,394	5,200
solar (photovoltaic)	MW	23.9	27.4	108	171	278
Combined heat & power installations						
Power plants	no.	22	22	24	23	22
thermal	no.	20	20	22	21	20
nuclear	no.	2	2	2	2	2
Net maximum electrical capacity	MW	11,283	11,360	12,212	12,220	12,227
thermal	MW	9,521	9,544	10,394	10,404	10,413
nuclear	MW	1,762	1,816	1,818	1,816	1,814
Useful thermal capacity	million kcal/h	3,340	3,329	3,613	3,577	3,472
thermal	million kcal/h	2,876	2,865	3,149	3,113	3,008
nuclear	million kcal/h	464	464	464	464	464
Power lines (circuit-length)						
Total	km	1,785,270	1,803,359	1,826,801	1,853,359	1,863,524
high-voltage	km	38,705	36,882	37,118	37,779	38,049
medium-voltage	km	638,698	645,479	651,084	657,545	658,470
low-voltage	km	1,107,866	1,120,999	1,138,599	1,158,035	1,167,005
Gas pipelines						
Total	km	3,440	0	0	0	0
high-pressure	km	1,007	0	0	0	0
medium-pressure	km	1,596	0	0	0	0
low-pressure	km	837	0	0	0	0
Mining & extracting activities						
Mines	no.	8	8	7	8	8
coal	*no.*	*5*	*4*	*3*	*4*	*5*
brown coal	*no.*	*3*	*4*	*4*	*4*	*3*
Amount of fuels extractable since the start of activities	Mt	60.0	399	402	403	404
Areas occupied by excavations and other activities	ha	5,351	4,448	4,510	4,435	4,372

		2009	2010	2011	2012	2013
coal mines	*ha*	*5,341*	*4,438*	*3,756*	*1,148*	*1,165*
brown-coal mines	*ha*	*10.0*	*10.0*	*754*	*3,287*	*3,207*
Real-estate & service management						
Vehicle fleet						
service vehicles	no.	16,185	15,858	16,007	14,380	15,708
special vehicles	no.	2,537	2,164	2,054	2,096	2,094
vehicles for both private and service use	no.	1,244	1,153	1,911	2,529	2,467
Gross real-estate surface area	thousand m^2	1,836	2,549	40,777	41,382	40,723

Changes in Enel's assets

In the past five years, Enel has recorded major changes in its assets, which are reflected in the status data.

> In 2009, most of the high-voltage distribution grid in Italy was transferred from Enel Distribuzione to Terna under the agreement signed on December 29, 2008.

> In February of the same year, Enel completed the acquisition of Endesa by transferring some hydro and wind power plants in Portugal and Spain to Acciona, as part of the deal under which Acciona sold its stake in Endesa to Enel.

> In September 2009, Enel sold Enel Rete Gas, which is no longer part of the Group's consolidated assets.

> In 2009, the Enel Group started its operations in Ireland (thermal generation) through Endesa and extended those in Bulgaria (wind generation) through Enel Green Power.

> In the same year, Enel Green Power inaugurated its first two wind farms in Romania.

> In 2010, the Group sold its gas grid assets in Spain and its high-voltage grid in the Canary and Balearic Islands (consequently, it does no longer own gas pipelines).

> In 2011, Enel Green Power increased its net maximum capacity by about 800 MW thanks to the commissioning of wind farms in France, Greece, Portugal, Romania, Spain and the United States, and of photovoltaic plants in Italy, Greece and the United States.

> At the end of June 2011, Enel finalized the sale of its Maritza plant, a brown coal-fired thermal plant with a net maximum capacity of 808 MW.

> Always in 2011, Enel Produzione's consolidated holdings in the company HDE (headquartered in Trento) and in the two plants of San Floriano Egna and Stramentizzo decreased from 100% to 49% and 33%, respectively; the latter plants were acquired by the company San Floriano Energy (headquartered in Bolzano). As a result, Enel Produzione's net maximum hydro capacity was down by about 800 MW.

> Moreover, in the last months of 2011, Enel's holding (51%) in Deval and Vallenergie was sold to CVA.

> At the end of March 2012, the Group started activities in Belgium (thermal generation) through its International Division, by commissioning a combined-cycle plant with a net maximum capacity of about 400 MW.

> At the end of October 2012, Enel finalized the sale of Endesa Ireland Ltd's assets: Great Island, Rhode, Tarbert and Tavanaghmore, four oil-/gas-fired thermal power plants with an overall net maximum capacity of 1,013 MW.

> During 2013, Enel continued to develop renewables, in particular through Enel Green Power, whose net maximum capacity was up by over 900 MW thanks to the commissioning of wind farms in France, Spain, Brazil, Chile and the United States, of photovoltaic plants in Italy, Greece, Romania and the United States and of hydro plants in the United States.

> In the course of 2013, Enel Green Power finalized the sale of the Saint Félicien biomass-fired plant in Canada, with an overall capacity of 21 MW.

Key Performance Indicators - KPIs

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Land								
LV cable lines								
overhead	% of entire LV grid	43.1	45.4	46.6	48.8	48.4	12.25	-0.91
underground	% of entire LV grid	33.2	33.2	33.4	34.0	34.1	2.84	0.17
Total cable lines	**% of entire LV grid**	**76.3**	**78.6**	**79.9**	**82.9**	**82.5**	**8.16**	**-0.47**
MV cable lines								
overhead	% of entire MV grid	2.03	2.08	1.88	2.39	3.08	51.80	28.58
underground	% of entire MV grid	30.5	30.4	30.9	31.2	31.3	2.92	0.50
Total cable lines	**% of entire MV grid**	**32.5**	**32.5**	**32.8**	**33.6**	**34.4**	**5.97**	**2.50**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	59.1	60.6	61.6	63.8	63.9	8.21	0.19

EN29 Overhead and underground cables in power lines

As regards land and landscape protection, Enel pursues two main strategies to mitigate the impact of construction of new grids and revamping of old ones:

> underground cables in low-, medium- and high-voltage lines;

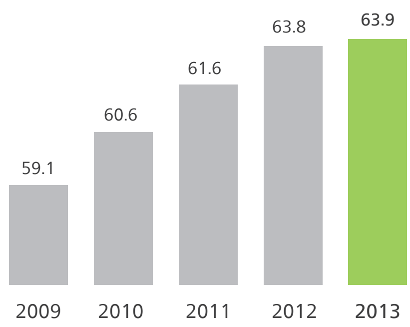
> helically-twisted cables (elicord) in low- and medium-voltage lines; the cable consists of three twisted and insulated phases.

Underground cables are used in built-up areas in place of bare conductors. The use of twisted cables in overhead lines mitigates their overall visual impact because: i) the cable is less visible than three separate conductors; and ii) it can cross forested areas, fully integrating into the vegetation thanks, among others, to the smaller space requirements of its supports.

The percentage ratio of the length of overhead and underground cables in power lines to the total length of power lines expresses the level of mitigation of the visual impact of power lines.

This ratio continues to grow and, in 2013, it was up by 0.1 percentage points on 2012, with a total value of approximately 63.9%.

Overhead and underground cables in HV+MV+LV distribution lines
(% of total length)



EN29 Transport vehicles

The status data table displays the data of the Group's vehicles. The impact of the Group's vehicle fleet is due to fuel consumption, as well as to polluting and greenhouse-gas emissions into the atmosphere (calculated as direct emissions under the "various activities" heading). Enel is seeking to mitigate this impact by switching to certified vehicles having a higher efficiency (e.g. Euro 5). Enel also assesses the indirect impact resulting from the use of transport vehicles by suppliers/contractors of some categories of products/services. The goal of the assessment is to reward companies that have adopted more environmentally sustainable practices (e.g. all other conditions being equal, preference is given to ISO 14001-certified or EMAS-registered ones).

EN16-EN17 The table below displays the indirect emissions due to: i) transport (scope 3) of coal by sea and by rail and of other fuels (gas oil, RDF, biomass), waste and other materials by road; ii) consumption of electricity (scope 2, see § "EN4 Primary electricity") in electricity distribution, fuel handling, coal extraction and real-estate management; and consumption of electricity purchased from the grid by hydro power plants (the latter data have been collected since 2012).

CO_2 emissions from coal transport by sea are estimated from the quantity transported (in 2013, it was equivalent to 63.8% of the total coal used), considering Panamax ships with a tonnage of 67,600 t, covering an average distance of 700 nautical miles in 22 days of cruising, with a consumption of 35 t/day of fuel oil and a CO_2 emission factor of 3.2 kg/l of burnt oil.

CO_2 emissions from transport of coal by rail are estimated from the quantity transported (in 2013, it was equivalent to 33.9% of the coal used), considering trains with a carrying capacity of 1,100 t, covering an average distance of 1,400 km, with a consumption of 6.9 kWh/t every 100 km of travel and the country's average specific CO_2 emission factor (source: Enerdata).

In the case of coal extraction, emissions of methane are calculated on the basis of the emission factors reported in the "2006 IPCC Guidelines for National Greenhouse Gas Inventories". These factors, which are different for surface mining (1.2 m^3/t) and deep mining (18 m^3/t), are multiplied by the tonnes of fuel extracted (50% for surface mining and 50% for deep mining).

The 100-year Global Warming Potential (GWP) used for methane (25) is specified in the "IPCC Fourth Assessment Report: Climate Change 2007".

CO_2 emissions due to transport of expendables, gas oil, solid biomass, RDF and waste are estimated from the quantities of raw materials transported, considering trucks with a tonnage of 28 t, covering an average round-trip distance of 50 km, with a consumption of 1 liter of gas oil every 3 km of travel and a CO_2 emission factor of 3 kg/l of burnt gas oil.

EN16* EN17		2009	2010	2011	2012	2013
Total emissions	**kt**	**6,437**	**6,211**	**7,520**	**8,869**	**7,860**
Indirect CO_2 emissions (scope 2 EN16)	kt	232	245	332	1,140	825
Indirect CO_2 emissions (scope 3 EN17)	kt	6,205	5,966	7,188	7,729	7,036
from transport of coal by rail	kt	544	525	647	488	446
from transport of coal by sea	kt	483	440	581	899	828
from coal extraction	kt	5,151	4,974	5,933	6,313	5,739
from transport of materials	kt	2.2	2.1	2.3	2.2	1.9
from transport of other fuels (gas oil, biomass, RDF)	kt	4.7	4.2	3.8	3.3	3.5
from transport of waste	kt	20.5	20.5	20.8	23	18

* Excluding direct emissions (see page 110: EN16 Total greenhouse gases).

Resources

Absolute values

		2009	2010	2011	2012	**2013**
EN1 EN3 **Fossil fuels**						
Thermal generation						
fuel oil	thousand t	3,104	2,625	2,328	2,423	2,105
	thousand toe	3,045	2,562	2,234	2,368	2,053
HS	*thousand t*	*6.92*	*4.36*	*0*	*0*	*0*
	thousand toe	*6.57*	*4.14*	*0*	*0*	*0*
MS	*thousand t*	*256*	*191*	*107*	*94.2*	*11.1*
	thousand toe	*248*	*185*	*103*	*90.8*	*10.7*
LS	*thousand t*	*2,180*	*2,186*	*2,032*	*2,056*	*1,994*
	thousand toe	*2,137*	*2,128*	*1,942*	*2,005*	*1,942*
VLS	*thousand t*	*661*	*245*	*189*	*273*	*100*
	thousand toe	*654*	*245*	*189*	*272*	*100*
gas oil	thousand t	1,950	1,612	1,349	1,088	1,313
	thousand toe	1,995	1,663	1,373	1,091	1,322
natural gas	million m^3	9,146	9,746	10,159	8,826	7,256
	thousand toe	7,862	8,410	8,815	7,584	6,169
technologically captive use	*million m^3*	*7,806*	*8,719*	*9,284*	*8,115*	*6,650*
	thousand toe	*6,725*	*7,540*	*8,076*	*6,999*	*5,655*
of which in combined-cycle units	million m^3	7,257	8,057	8,553	7,217	6,085
	thousand toe	6,255	6,969	7,440	6,208	5,180
non-technologically captive use	*million m^3*	*1,339*	*1,027*	*875*	*711*	*606*
	thousand toe	*1,136*	*870*	*738*	*586*	*514*
coal	thousand t	20,598	17,535	23,538	26,896	23,950
	thousand toe	11,800	10,060	13,361	15,146	13,615
brown coal	thousand t	7,915	9,048	2,698	2,047	1,623
	thousand toe	1,440	1,556	856	639	517
coke-oven gas	million m^3	0.003	0.009	0.009	0.004	0.001
	thousand toe	0.003	0.010	0.010	0.005	0.001
Total	**thousand toe**	**26,142**	**24,251**	**26,638**	**26,830**	**23,675**
	TJ	**1,094,528**	**1,015,346**	**1,115,297**	**1,123,308**	**991,229**
Thermal generation (CHP)						
fuel oil	thousand t	89.4	62.9	68.2	82.5	35.3
	thousand toe	87.0	61.2	66.9	79.2	32.7
MS	thousand t	59.7	50.0	33.6	52.2	29.8
	thousand toe	56.4	48.4	32.9	50.2	27.9
LS	thousand t	29.7	12.9	34.6	30.3	5.46
	thousand toe	30.5	12.8	34.0	29.0	4.82
gas oil	thousand t	0.003	0.150	0.137	0.104	0.000
	thousand toe	0.004	0.136	0.069	0.094	0.000

		2009	2010	2011	2012	2013
natural gas	million m^3	6,185	6,778	7,523	7,131	6,712
	thousand toe	5,018	5,505	5,730	5,769	5,425
technologically captive use	*million m^3*	*65.6*	*105*	*403*	*1,061*	*1,010*
	thousand toe	*56.1*	*88.1*	*331*	*867*	*825*
of which in combined-cycle units	million m^3	51.0	88.4	359	1,020	1,010
	thousand toe	42.5	73.1	295	830	825
non-technologically captive use	*million m^3*	*6,119*	*6,673*	*7,120*	*6,070*	*5,702*
	thousand toe	*4,962*	*5,417*	*5,399*	*4,903*	*4,600*
coal	thousand t	11,993	13,933	12,821	13,291	12,541
	thousand toe	5,073	5,494	5,208	5,285	4,992
brown coal	thousand t	2,308	2,273	2,424	2,292	2,200
	thousand toe	571	575	600	501	538
Total	**thousand toe**	**10,749**	**11,636**	**11,604**	**11,635**	**10,987**
	TJ	**450,042**	**487,156**	**485,843**	**487,123**	**459,993**
Various activities	thousand toe	56.5	43.2	44.6	42.9	36.4
Grand total	**thousand toe**	**36,948**	**35,930**	**38,287**	**38,507**	**34,698**
	TJ	**1,546,937**	**1,504,310**	**1,603,009**	**1,612,215**	**1,452,746**
EN1 EN3 **Hydrogen**						
Thermal generation	thousand m^3	0.000	3.54	1.06	3.32	0.000
	thousand toe	0.000	0.881	0.263	0.828	0.000
EN1 EN3 **Biomass and waste**						
Thermal generation						
Solid biomass	t	223,616	267,666	351,679	353,337	516,970
	toe	70,717	83,211	112,022	112,727	153,228
Liquid biomass	t	336	350	423	1,709	699
	toe	331	298	360	1,530	622
Biogas	thousand m^3	33,104	37,442	38,266	18,948	33,923
	toe	13,197	14,846	15,134	6,188	10,959
RDF	t	55,235	46,136	56,106	58,398	62,617
	toe	23,027	19,377	23,839	24,527	26,850
Thermal generation (CHP)						
Solid biomass	t	411,188	424,854	381,428	361,451	72,355
	toe	91,910	95,706	85,754	84,379	20,001
Grand total	**thousand toe**	**199**	**213**	**237**	**229**	**212**
	TJ	**8,339**	**8,936**	**9,927**	**9,603**	**8,862**
EN1 EN3 **Nuclear fuel**						
Nuclear generation						
Uranium	t	79.7	36.4	90.4	100	73.9
	thousand toe	6,191	6,040	6,857	7,349	6,579
Nuclear generation (CHP)						
Uranium	t	36.0	37.4	38.5	35.5	33.4
	thousand toe	3,727	3,782	3,972	3,997	4,058
Grand total	**thousand toe**	**9,918**	**9,822**	**10,828**	**11,346**	**10,636**
	TJ	**415,258**	**411,246**	**453,350**	**475,045**	**445,323**
EN1 EN3 **Geothermal fluid**						
Total fluid extracted	thousand t	76,375	93,280	94,292	91,696	91,393
net of reinjected fluids	*thousand t*	*28,462*	*27,486*	*26,878*	*27,808*	*28,244*
Used for electricity generation	thousand t	70,982	87,968	87,873	86,991	85,361
EN4 **Primary electricity**						
Various activities	million kWh	163	175	235	317	334

		2009	2010	2011	2012	2013
EN8 **Water for industrial uses** (1)						
From rivers (including second-flush rainwater)	million m^3	156	134	136	143	147
From wells	million m^3	17.7	18.2	17.7	14.6	15.2
From aqueducts	million m^3	15	8.99	8.90	8.95	7.64
Total abstraction from inland waters	**million m^3**	**189**	**161**	**163**	**166**	**170**
From the sea (as-is)	million m^3	8.60	8.31	7.80	3.84	0.86
From the sea (desalinated)	million m^3	9.30	9.71	10.3	9.71	10.1
EN10 From waste waters (used inside plants)	million m^3	16.9	23.7	12.8	11.9	8.67
Total consumption	**million m^3**	**223**	**203**	**194**	**192**	**190**
for thermal generation	million m^3	116	104	98	96	81
for thermal generation (CHP)	million m^3	62.1	53.1	48.7	46.5	45.5
for nuclear generation	million m^3	1.47	1.40	1.81	1.93	16.9
for nuclear generation (CHP)	million m^3	40.4	41.0	43.7	44.5	44.1
for nuclear generation	million m^3	0.211	0.059	0.047	0.001	0.001
for fuel storage & handling	million m^3	0.051	0.042	0.043	0.042	0.062
for mining & extracting activities	million m^3	3.09	2.92	2.11	2.18	1.93
EN8 EN21 **Open-cycle cooling water**						
For thermal generation (simple and CHP)	million m^3	22,837	23,635	23,150	20,471	19,371
For nuclear generation (simple and CHP)	million m^3	2,435	2,988	2,417	2,563	2,537
Total	**million m^3**	**25,271**	**26,622**	**25,567**	**23,034**	**21,907**
Water for non-industrial uses						
Real-estate & service management	million m^3	4.64	2.68	3.60	2.92	2.31
EN1 **Expendables**						
Resins	t	504	276	270	219	4,942
Hydrazine	t	83.4	68.0	68.7	67.5	71.4
Carbohydrazide	t	296	31.9	29.2	48.6	24.9
Hydrogen peroxide	t	0.231	0.749	1.10	1.07	2.55
Ammonia	t	20,567	15,669	18,363	20,371	17,274
Limestone for flue-gas desulfurization	t	1,097,191	1,028,003	1,108,004	1,039,550	810,315
Magnesium oxide	t	326	279	235	181	212
Sodium hypochlorite	t	5,827	4,488	6,497	8,356	5,474
Chlorine dioxide	t	0.51	0.88	0.71	285	154
Ferrous sulfate	t	272	279	311	381	549
Ferrous chloride	t	41.0	20.2	34.7	135	94.9
Trisodium phosphate	t	35.6	33.1	31.9	36.4	25.7
Lime	t	33,374	25,337	22,601	18,429	16,592
Ferric chloride	t	1,239	1,233	1,280	1,441	1,356
Polyelectrolyte	t	120	112	144	205	218
Sulfuric & hydrochloric acids	t	15,111	13,554	15,220	15,233	15,988
Caustic soda	t	32,118	30,623	35,557	54,970	66,376
Bentonite	t	1,739	518	937	709	1,599
Barite	t	471	216	0.000	60.6	27.0
Geothermal cement	t	4,559	2,905	2,254	2,161	6,065
Lubricating oil	t	17,702	7,239	7,174	6,755	73,355
Dielectric oil	t	1,383	1,333	1,149	25,896	3,003
Printing paper	t	1,284	1,218	1,251	1,159	984
Other	t	12,519	42,753	44,844	32,482	18,901
Total	**t**	**1,246,764**	**1,176,189**	**1,266,257**	**1,229,135**	**1,043,606**
for thermal generation	t	1,090,140	1,043,834	1,115,797	1,023,471	856,842
for thermal generation (CHP)	t	108,781	90,661	104,965	115,959	104,612

(1) Including water consumption for closed-cycle cooling and other industrial uses and excluding the one for open-cycle cooling.

		2009	2010	2011	2012	**2013**
for nuclear generation	t	1,047	1,108	1,403	1,713	1,200
for nuclear generation (CHP)	t	6,361	6,145	6,776	5,769	6,085
for hydro generation	t	797	562	639	527	2,099
for geothermal activities	t	30,557	28,185	31,924	51,339	67,164
for wind generation	t	1,395	57	0	550	598
for fuel storage & handling	t	712	169	186	209	362
for electricity distribution	t	624	956	743	25,670	1,111
EN1 PCB survey (1)						
Equipment & transformers with PCBs > 500 ppm (excluding oil)	t	999	81.8	37.0	38.2	38.2
Oil with PCBs > 500 ppm contained in equipment & transformers	t	340	5.90	1.08	1.45	0.730
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding oil)	t	20,377	24,766	19,525	18,084	18,186
Oil with PCBs > 50 ppm and ≤ 500 ppm contained in equipment & transformers	t	4,382	6,238	4,590	5,153	4,661
Recycling of materials						
Sulfuric acid (brine, a by-product from production of demineralized water via osmosis)	%	0.000	0.000	0.460	0.190	0.000
Limestone for flue-gas desulfurization	%	0.000	0.000	0.372	0.195	0.169
Ferric chloride (sludge from waste water treatment)	%	0.000	0.000	0.312	0.689	0.000
Filtered lubricating oil	%	0.000	0.000	4.08	4.21	0.550
Filtered dielectric oil	%	10.3	59.4	52.7	93.3	99.2

(1) The erratic trend of the five-year series is due to the opposite effects (of positive and negative sign) of changes in the perimeter of reporting. Comments about these changes are given in the chapters devoted to the individual countries where the Group operates.

EN1 EN3 Fuels

The near totality of fuels (mostly of fossil origin) are used for thermal generation.

> The consumption of fuel oils is indicated on the basis of their sulfur content (HS = high: > 2.5%; MS = medium: > 1.3% and ≤ 2.5%; LS = low: > 0.5% and ≤ 1.3%; VLS = very low: ≤ 0.5%).

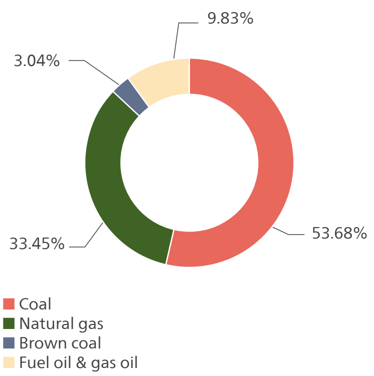
> Coal and brown coal are used in power plants usually equipped with flue-gas desulfurizers and denitrification systems.

> Gas oil, a high-cost fuel, is used on an exceptional basis: i) in single-cycle gas-turbine power plants that are not connected to the natural-gas grid (as an emergency fuel in the other gas-turbine power plants); ii) in diesel-engine power plants (supplying some small Italian islands); iii) in start-up of steam-cycle power plants, auxiliary boilers and emergency generating sets.

> The consumption of natural gas is broken down on the basis of its uses: non-technologically captive (when the use of gas is a corporate choice) and technologically captive (when gas feeds single-cycle, combined-cycle or repowering gas turbines, for which it is the only practicable option).

> The contribution of non-fossil fuels consists of:
- refuse-derived fuel (RDF), co-fired with coal;
- solid biomass, used as main fuel or co-fired with coal;
- biodiesel, used in some gas-turbine units located on small Italian islands;
- biogases, used in some small installations with alternative engines located in Spain.

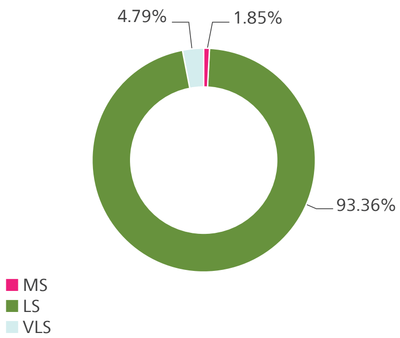
Fossil-fuel consumption for thermal generation (simple and CHP) in 2013
Total: 34.7 Mtoe



Natural gas and start-up gas oil feed the boilers which heat the fuel oil contained in storage tanks (heating fluidifies fuel oil before its transfer to destination).
Small quantities of gas oil are also used for driving geothermal drilling equipment and in emergency generating sets, which are present in practically all of Enel's installations. Fuel consumption, measured and certified in each installation, is expressed both in metric units (thousand tonnes or million cubic meters) and in energy potential (tonnes or thousand tonnes of oil equivalent – toe or ktoe – and thousand billions of Joules – Terajoules – TJ). To sum the various contributions, use is instead made of the corresponding energy potential.
The consumption of fossil fuels in the overall Group declined from ~39 Mtoe in 2012 to ~35 Mtoe in 2013, owing to lower thermal generation.
The fuel mix showed an increase in the share of coal (of about 0.5 percentage points), a decrease in brown coal (of about 1 percentage point) and an increase in gas oil (of about 1 percentage point).
With respect to 2012, the consumption of oil products with different sulfur content was as follows: high-sulfur oil was equal to zero again, while medium-sulfur oil continued to drop (from ~5.8% to ~1.8) in favor of low-sulfur oil (from ~83% to ~93.4%). The share of very low-sulfur oil diminished from ~11% to ~5%.

Fuel-oil consumption for thermal generation in 2013

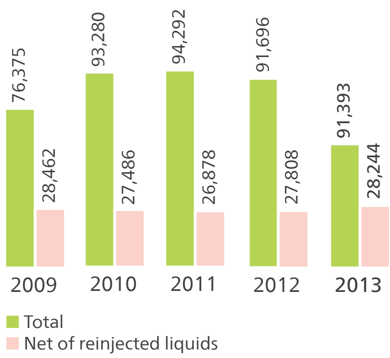
Total: 2.1 million t



EN1 EN3 Geothermal fluid

Geothermal fluid, in the form of steam at adequate pressure (4-18 bar) and temperature (160-230°C), is the energy source for geothermal generation. If the extracted fluid has thermodynamic properties unsuitable for geothermal generation, it may be used for the same purpose in an indirect way, by resorting to binary cycles (e.g. in North America, where the geothermal resource is a low-salinity brine at a temperature of 135-165°C), or it may be employed in non-electric uses. In the case of Enel, these uses are now limited to the supply of heat (especially for greenhousing and district heating, but also as process heat in the food industry). For the supply of heat, use is also made of the fluid that becomes available after expansion in Enel's only geothermal unit equipped with an atmospheric-exhaust turbine.
The production capability of geothermal fields is mostly sustained by the reinjection of fluids into geothermal reservoirs. These fluids consist of: water entrained by steam and separated from it at the well outlet; steam condensed after its expansion in the turbines; and liquid remaining after use in the primary circuits of binary cycles and after non-electric uses. Reinjection and extraction of fluids into/from the deep subsoil do not jeopardize shallow aquifers, which are isolated from wells by casings, cemented to the soil and between them.
The difference between the total fluid extracted and the liquids reinjected is due to: incondensibility of the gases contained in geothermal steam; vaporization and entrainment of condensates in cooling towers (by far the largest contribution) and inevitable losses.
In 2013, 98.4% of the overall geothermal fluid extracted was used for electricity generation.

Consumption of geothermal fluid (thousand t)



EN1 EN3 Nuclear fuel

Nuclear fuel is the fissile material forming the core of the reactor; for instance, enriched natural uranium, in assemblies of sealed metal rods, represents the energy source for nuclear power generation.

Reload is needed when, after being utilized in the reactor for a few years, the fuel has a lower content of fissile uranium and loses its efficiency. Reload is usually carried out on a 12-, 18- or 24-month basis, but only replacing a fraction of the core. Fuel is loaded into the core, shuffling the remaining assemblies that have not been unloaded, so as to optimize fuel utilization. The content of fission products (high-activity and "long-lived" radioactive waste) in spent fuel is as little as about 3%. The remaining components are: unused uranium (about 96%), which is recovered via reprocessing and may be used for generating new fuel; and plutonium (about 1%), which is a by-product resulting from nuclear reactions and radioactive decays of U238. The plutonium isotopes (Pu239 and Pu241) are fissile. These isotopes may be recycled and used to prepare fresh fuel: MOX, a mixture of U235 and fissile elements of plutonium; the content of fissile plutonium in MOX is around 7-9%, approximately equivalent to uranium oxide fuel enriched to 4.5% in U235.

In a nuclear power plant, fuel management consists of three stages:

> procurement and dry transport of fresh nuclear fuel;
> storage of fresh fuel inside the plant, preparation of reload (reactor refueling), reload (replacing spent fuel with fresh fuel), start-up tests, monitoring of operation, unloading of spent fuel from the reactor and storage into the reactor pools (water serves as a shield against radiation from spent fuel and cools down spent fuel by removing its decay heat) prior to transfer to temporary storage facilities, both on-site or off-site (spent fuel may be stored into other pools or, in dry form, into shielded casks);
> organization of the transfer of spent fuel, temporarily stored in pools or in dry storage facilities, to reprocessing facilities or to the final storage site, where available; the transfer of spent fuel from the temporary storage facility to reprocessing or final storage facilities is necessary after a certain number of years of operation of the plant in order to avoid saturation of the capacity of temporary storage facilities.

EN4 Electricity consumption by activity

Electricity is used as energy raw material in fuel-oil storage & handling, mining & extracting activities and real-estate management.

It is used to pump fuel oil into pipelines, to handle solid fuels and to light, heat and cool buildings, respectively.

In electricity distribution, electricity is used for the operation of grids.

The amounts of net electricity generation and of electricity wheeled on distribution grids (see "Processes and products") already take into account own consumption and losses.

The following table displays the amount of electricity used for fuel storage & handling, mining activities, real-estate management and services for the overall Group. It also includes electricity consumed for pumping.

Indirect electricity consumption by activity [1]

		2011	2012	2013
Fuel storage & handling	GJ	28,631	34,254	30,208
	GWh	8.0	9.5	8.4
Electricity distribution	GJ	2,161,001	1,851,458	1,863,738
	GWh	600.3	514.3	517.7
Real-estate management	GJ	767,729	1,079,640	1,147,842
	GWh	213.3	299.9	318.8
Mining	GJ	49,334	27,972	24,584
	GWh	13.7	7.8	6.8
Pumping (hydro)	GJ	15,523,200	16,110,000	15,922,800
	GWh	4,312	4,475	4,423
Total consumption of electricity	**GJ**	**3,006,695**	**2,993,324**	**3,066,372**
	GWh	**835**	**832**	**851.8**

(1) excluding electricity consumption for pumped-storage hydro plants.

The higher indirect consumption in real-estate management is related to the larger number of offices surveyed. As to electricity distribution and mining, the lower consumption is due to the reduction of the volume of activities. The decrease in consumption for fuel storage & handling is justified by a smaller volume of activities, which is related in turn to lower thermal generation from fossil fuels (coal storage & handling).

EN8 Water for industrial uses

Water is consumed above all in thermal and nuclear power plants, especially to make up for the amounts lost in the generation process of steam-turbine power plants and in closed-cycle wet cooling tower systems, but also to carry out clean-up jobs (namely of boilers) and to feed auxiliaries and desulfurizers.

To a much lesser extent, water is used:

> in geothermal activities for preparing the drilling slurry; the amounts of water used in these activities are very variable, depending on the type of activity (e.g. drilling of new wells, rehabilitation or deepening of existing ones) and on the characteristics of the geological formations crossed (by contrast, the functioning of cooling towers does not require water, since it is based on revaporization of part of the condensates from the steam discharged by turbines);

> in fuel-oil storage & handling, especially for preparing demineralized water; this water is used to make up for the amount lost in the closed-cycle production of steam for heating and fluidifying fuel oil before its transfer to destination.

Water consumption for industrial uses does not include the water used for open-cycle cooling of thermal power plants, because it is returned to the original water body with negligible chemical changes and minimum temperature variations (always within the limits mandated by law).

The data show:

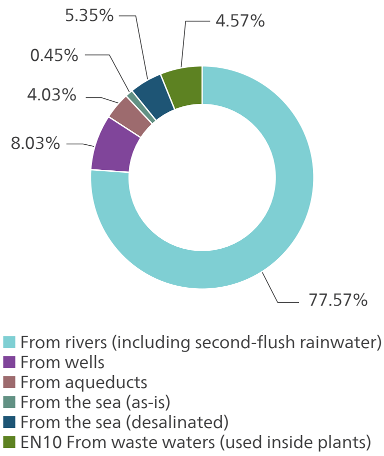
> the gradual decrease of consumption from 2009 to date;

> the high contribution of sea water (~6%) and surface water(~78%) thanks to their use in: closed-cycle cooling systems of nuclear power plants in Slovakia and Spain; and closed-cycle cooling and ash handling systems of thermal power plants in Slovakia and Russia (in the latter case, only for ash handling);

> the high recovery of waste waters, which cover 4.6% of consumption.

Coverage of water consumption for industrial uses in 2013

Total: 190 million m^3



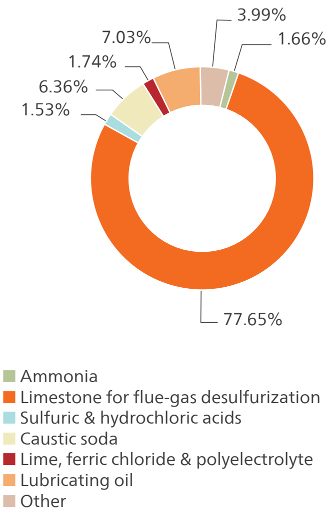
EN1 Expendables

Expendables, mostly used in thermal and nuclear power plants and in geothermal drilling, complete the list of resources.

The following are the chief ones and their most common uses.

> Resins are used to produce (via ion exchange) the high-purity water needed for the thermal cycle of steam-cycle and nuclear power plants.
> Hydrazine, carbohydrazide and hydrogen peroxide are used for deoxygenation and pH balancing of thermal-cycle water and steam.
> Ammonia, too, is used to balance the pH of the thermal-cycle water, but above all as reagent in the flue-gas denitrification process.
> Limestone is the reagent for the flue-gas desulfurization process.
> Magnesium oxide is injected into the flue-gas circuits of thermal plant boilers that are fed with vanadium-containing fuel, in order to prevent corrosion of heat-transfer surfaces due to the indirect action of vanadium.
> Sodium hypochlorite, chlorine dioxide, ferrous sulfate, ferrous chloride and trisodium phosphate are occasionally added to the cooling water of steam-cycle power plants to prevent deposits and fouling or to protect condenser tube surfaces from corrosion.
> Lime, ferric chloride and polyelectrolyte are mainly used in waste water treatment, thanks to their neutralizing and/or flocculating properties.
> Sulfuric acid, hydrochloric acid and caustic soda are most commonly used in the regeneration of ion-exchange resins and in the clean-up of equipment, but also in waste water treatment. In geothermal activities, soda has various applications, including as an additive in the slurries used in the drilling of wells.
> Bentonite is a type of clay used as slurry for the drilling of geothermal wells.
> Barite is used in some cases to thicken bentonite slurries, thereby improving their effectiveness when drilling into mechanically unstable rock formations.
> Geothermal cement is used for joining the steel walls of new wells and for permanently plugging no longer used ones.
> Printing paper is used in different formats in office activities. An increasing share of this paper derives from processes of recycling of used paper.
> "Other" expendables (antifouling, defouling, deoxidizing, antifoam, detergent and antifreezing agents, carbon dioxide, bottled hydrogen, etc.), just as lubricating oil and dielectric oil, are used in the generality of installations.

Expendables in 2013
Total: 1,044 thousand t



The figures shown for expendables are obtained from the accounting records of purchases, which are held in each installation. Given the small size of stocks and the high number of installations surveyed, the amounts purchased are practically equivalent to those consumed.

A number of factors make it extremely difficult to interpret the trends of most of the expendables at aggregated level: plurality of business or lines of activities, multiple uses of many materials, variety of installation configurations and the fact that the consumption of some products is often independent of the basic operating parameters of the installations involved. Limestone is an exception. Together with ammonia, it plays a key role among expendables. However, unlike ammonia, limestone has a single use: in the flue-gas desulfurizers which are installed in coal-fired power plants of larger size. This material is acquired, among others, from the paper industry (which produces a large amount of calcareous slurries) and recycled within the Group.

Recycling of materials (%)

	2009	2010	2011	2012	2013
Sulfuric acid (1)		0.7	0.5	0.2	-
Limestone for flue-gas desulfurization (2)	1.1	1.3	0.4	0.2	0.2
Printing paper (3)	52.2	56	54.4		43.6
Ferric chloride (4)		0.5		0.7	-
Dielectric oil (5)	11.5	59	93	93.3	99.2
Lubricating oil (6)	1.1	3	1	4.2	0.5

(1) Brine (by-product from production of demineralized water via osmosis), used in place of sulfuric acid.
(2) Limestone (slurries from the paper industry), reused in flue-gas desulfurization.
(3) Paper (containing 75% of recycled fibers), purchased in the market.
(4) Sludges from waste water treatment, reused in place of ferric chloride in water treatment.
(5) Dielectric oil, decontaminated from PCBs and reused, or filtered and reused.
(6) Lubricating oil, filtered and reused.

EN1 Survey of PCBs contained in equipment

The survey makes it possible to identify the location of the amounts of oil with a PCB content > 500 ppm or > 50 and ≤ 500 ppm, contained in equipment and transformers. The related trends are affected by the progressive participation of the various countries in this activity (ended in 2010) and by the addition of HV/MV transformers and neutral compensators in the Spanish distribution survey in 2012 and 2013.

Key Performance Indicators - KPIs

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Resource conservation and quality								
EN1 EN3 Net heat rate of thermal generation	kcal/kWh	2,228	2,191	2,162	2,179	2,182	-2.09	0.18
EN1 EN3 Net heat rate of thermal generation (CHP)	kcal/kWh	2,151	2,182.0	2,162	2,100	2,093	-2.67	-0.35
EN1 EN3 Net heat rate of geothermal generation	kcal/kWh	6,022	6,422	6,234	6,209	6,067	0.74	-2.29
EN1 EN3 Net efficiency of hydro generation from pumped storage	%	77.7	77.4	68.8	63.9	82.6	6.82	29.96
EN4 Consumption of electricity for distribution grid operation	% of electricity distributed	0.101	0.060	0.143	0.124	0.128	26.73	3.23
EN8 Net specific consumption of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	0.987	0.937	0.788	0.780	0.746	-24.42	-4.36
excluding contribution of as-is sea water	liters/kWh	0.914	0.863	0.725	0.749	0.738	-19.26	-1.47
EN8 Net specific consumption of water for industrial uses in thermal generation (CHP)	liters/kWh	1.23	0.989	0.900	0.834	0.865	-29.73	3.72
EN8 Net specific consumption of water for industrial uses in nuclear generation	liters/kWh	0.065	0.051	0.072	0.072	0.652	903	806
EN8 Net specific consumption of water for industrial uses in nuclear generation (CHP)	liters/kWh	2.95	2.88	2.93	2.97	2.90	-1.83	-2.36
EN8 Totale net specific consumption of water for industrial uses	liters/kWh	0.746	0.670	0.650	0.621	0.636	-14.75	2.42
EN8 Coverage of consumption of water for industrial uses								
from rivers (including second-flush rainwater)	% of consumption	69.4	66.0	70.3	74.3	77.6	11.75	4.39
from wells	% of consumption	7.13	7.60	8.14	6.62	7.03	-1.35	6.14
from aqueducts	% of consumption	6.50	4.42	4.58	4.64	4.02	-38.15	-13.29
Total from inland waters	**% of consumption**	**83.0**	**78.0**	**83.0**	**85.6**	**88.6**	**6.72**	**3.57**
from the sea (as-is)	% of consumption	3.85	4.10	4.02	2.00	0.455	-88.18	-77.27
from the sea (desalinated)	% of consumption	4.16	4.79	5.30	5.06	5.34	28.25	5.35
EN10 from waste waters (used inside plants)	% of consumption	7.56	11.7	6.58	6.23	4.57	-39.57	-26.61

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	8.49	7.31	6.02	6.36	6.02	-29.14	-5.44
gas oil	% of total fuel consumption	5.41	4.64	3.59	2.83	3.81	-29.51	34.59
natural gas	% of total fuel consumption	34.9	38.8	38.0	34.7	33.4	-4.19	-3.66
coal	% of total fuel consumption	45.7	43.3	48.6	53.1	53.7	17.36	1.06
brown coal	% of total fuel consumption	5.45	5.94	3.81	2.96	3.04	-44.19	2.67
HS fuel oil	% of total fuel oil consumption	0.210	0.158	0.000	0.000	0.000	-100.00	-
MS fuel oil	% of total fuel oil consumption	9.71	8.90	5.91	5.76	1.85	-80.96	-67.91
LS fuel oil	% of total fuel oil consumption	69.2	81.6	85.9	83.1	93.4	34.93	12.31
VLS fuel oil	% of total fuel oil consumption	20.9	9.33	8.20	11.1	4.80	-77.05	-56.88
natural gas, technologically captive use	% of total natural gas consumption	52.7	54.8	57.8	58.9	55.9	6.15	-5.11
of which in combined-cycle units	% of total natural gas consumption	48.9	50.6	53.2	52.7	51.8	5.92	-1.74
natural gas, non-technologically captive use	% of total natural gas consumption	47.3	45.2	42.2	41.1	44.1	-6.84	7.32
Geothermal fluid for electricity generation	% of total geothermal fluid extracted	97.9	98.3	98.0	100.6	98.4	0.45	-2.24

EN1 EN3 The **net heat rate of simple thermal generation** defines the average quantity of fuels (expressed here in terms of energy) consumed by thermal power plants to generate 1 kWh net. In the past few years, its trend in the overall Group and in the individual countries was the result of opposite effects: the growing amount of electricity absorbed by systems abating emissions into the atmosphere; the entry into operation of new high-efficiency combined-cycle power plants (in Italy and Spain); the full consolidation of Endesa in 2009; and initiatives of improvement of the efficiency of thermal power plants undertaken over the years.
Its value in 2013 was in line with the one of 2012.

EN1 EN3 The **net heat rate of combined heat & power (CHP) thermal generation** defines the average quantity of fuels (expressed here in terms of energy) consumed by CHP thermal plants to generate 1 kWh_{eq} net (i.e. from generation of both electricity and heat, expressed in kWh).
In this case, the value was down by roughly 7 kcal/kWh on 2012.

EN1 EN3 The **net heat rate of geothermal generation** defines the average quantity of geothermal steam (expressed here in terms of energy) used by geothermal power plants to produce 1 kWh net.
In the calculation, the residual energy content of the fluid used for supply of heat (fluid becoming available after expansion in the geothermal unit equipped with an atmospheric-exhaust turbine) is subtracted from the energy content of the endogenous fluid.

The decrease in this rate is due to the higher utilization of the more efficient plants, whose generation has gradually replaced the one of the less efficient plants.

EN1 EN3 The **net heat rate of nuclear generation (simple and CHP)** is obtained from the energy content of the steam used to generate 1 kWh net and 1 kWh_{eq} net, respectively.

EN1 EN3 The **net efficiency of hydro generation from pumped storage** expresses, in percentages, the ratio of net electricity generated by pumped-storage hydro power plants to electricity consumed for pumping.

EN4 The **consumption of electricity for grid operation** is expressed as a percentage of the total amount distributed.

EN8 The **net specific consumption of water for industrial uses in simple thermal generation** expresses the amount of water consumed per kWh thermal net. Since 2013, for a Spanish plant using a particular cooling process, also the consumption due to evaporation has been estimated: owing to this change in the methodology of calculation, the figure for 2013 is overestimated; if this figure were estimated with the methodology used in 2012, it would be about 6% lower than in 2012, in line with Enel's commitment to reducing this consumption by 10% from its levels in 2010 by 2020.

EN8 The **net specific consumption of water for industrial uses in CHP thermal generation** expresses the amount of water consumed per kWh thermal net. In 2013, specific consumption slightly rose owing to a non-optimal operation of some units in Russia.

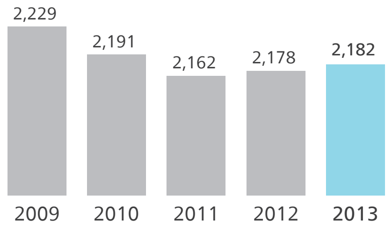
EN8 The **net specific consumption of water for industrial uses in nuclear generation** expresses the amount of water consumed per kWh nuclear net. Since 2013, for a Spanish plant using a particular cooling process, also the consumption due to evaporation has been estimated: owing to this change in the methodology of calculation, the figure for 2013 is overestimated.

EN8 The **net specific consumption of water for industrial uses in CHP nuclear generation** expresses the amount of water consumed per kWh_{eq} nuclear net. Thanks to water-saving policies, this indicator decreased by more than 2% in 2013.

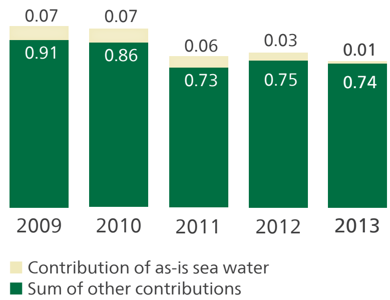
EN8 The **net specific consumption of water for industrial uses in overall heat & power generation** expresses the amount of water used to generate 1 kWh net. In spite of the change introduced by the above-mentioned methodology, if the figure for 2013 were estimated with the same methodology as the one used in the previous year, it would be about 6% lower, in line with Enel's commitment to reducing this consumption by 10% from its levels in 2010 by 2020.

EN8 The **coverage of consumption of water for industrial uses** expresses the percentage contribution of the different water sources (inland waters, sea water, waste waters). The total contribution of inland waters (rivers, wells and aqueducts) went up owing to lower utilization of as-is sea water and waste waters.

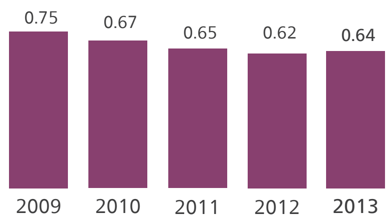
Net heat rate of simple thermal generation (kcal/kWh)



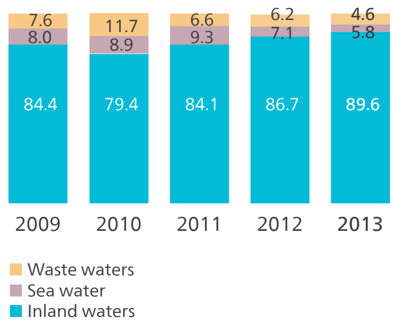
Net specific consumption of water for industrial uses in simple thermal generation (liters/kWh)



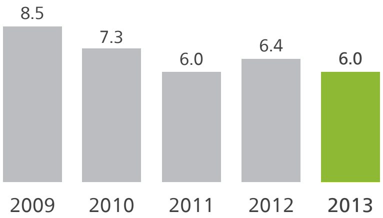
Net specific consumption of water for industrial uses in overall heat & power generation (liters/kWh)



Coverage of consumption of water for industrial uses (%)



Relative consumption of **fuel oil** (% of total consumption of fossil fuels for thermal generation)



EN10 It is worth stressing that, in some cases, waste waters may be unsuitable for reuse, which would require frequent clean-up and maintenance of the served loads. In these cases, reuse is avoided, with a consequent decrease in the amount of reusable waste waters.

EN3 The **fossil fuel mix** (see § "Fuels") was practically in line with the one of 2012.

EN3 The share of endogenous fluid used for electricity generation accounts for the near totality of the fluid extracted.

Processes and products

Absolute values

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	**million kWh**	**159,006**	**156,072**	**168,250**	**170,175**	**152,528**
simple	million kWh	117,290	110,671	123,230	123,158	108,486
fuel oil & gas oil	*million kWh*	*20,601*	*18,074*	*16,977*	*14,458*	*14,419*
natural gas	*million kWh*	*42,959*	*45,249*	*45,983*	*41,026*	*33,322*
of which in combined-cycle units	million kWh	37,729	40,132	41,025	37,183	30,127
coal	*million kWh*	*48,238*	*41,706*	*56,707*	*64,986*	*58,623*
brown coal	*million kWh*	*5,492*	*5,642*	*3,563*	*2,687*	*2,123*
combined with heat generation	million kWh	41,716	45,401	45,020	47,018	44,042
fuel oil & gas oil	*million kWh*	*119*	*60*	*91*	*113*	*15*
natural gas	*million kWh*	*19,176*	*21,153*	*22,676*	*23,866*	*22,311*
coal	*million kWh*	*20,780*	*22,549*	*20,517*	*21,446*	*20,185*
brown coal	*million kWh*	*1,640*	*1,639*	*1,738*	*1,593*	*1,531*
From waste (non-biodegradable fraction)	**million kWh**	**51.9**	**30.8**	**39.4**	**47.1**	**17.8**
From hydrogen	**million kWh**	**0.0**	**2.2**	**0.28**	**1.5**	**0.0**
From renewables	**million kWh**	**85,682**	**86,898**	**79,906**	**81,300**	**89,223**
biomass and biodegradable fraction of waste	million kWh	491	553	641	658	332
simple	*million kWh*	*334*	*351*	*443*	*457*	*275*
combined with heat generation	*million kWh*	*157*	*202*	*198*	*201*	*57*
geothermal	million kWh	5,150	5,278	5,568	5,492	5,581
hydro from natural flows	million kWh	75,621	75,971	67,368	65,815	70,690
wind	million kWh	4,392	5,069	6,274	9,139	12,314
solar (photovoltaic)	million kWh	28	27	56	196	305
Hydro from pumped storage	**million kWh**	**5,890**	**5,127**	**2,965**	**2,858**	**3,653**
Nuclear generation	**million kWh**	**35,685**	**41,153**	**39,517**	**41,378**	**40,591**
simple	million kWh	22,630	27,620	25,177	26,967	25,967
combined with heat generation	million kWh	13,055	13,534	14,340	14,411	14,624
Total	**million kWh**	**286,314**	**289,284**	**290,678**	**295,760**	**286,013**
simple	million kWh	231,386	230,147	231,120	234,131	227,290
combined with heat generation	million kWh	54,927	59,137	59,558	61,630	58,723
Electricity consumption for pumping	million kWh	7,580	6,628	4,312	4,475	4,401
Useful heat output (combined with power generation)						
In thermal power plants	**million kcal**	**7,338,791**	**7,017,506**	**7,616,600**	**7,374,153**	**7,296,378**
fossil fuels	million kcal	7,315,748	6,984,982	7,582,254	7,319,929	7,270,898
biomass and biodegradable fraction of waste	million kcal	23,042	32,524	34,346	54,224	25,481
In nuclear power plants	**million kcal**	**541,146**	**596,857**	**527,923**	**504,474**	**504,078**
Total	**million kcal**	**7,879,937**	**7,614,363**	**8,144,523**	**7,878,627**	**7,800,457**
	million kWh	**9,164**	**8,856**	**9,472**	**9,163**	**9,072**
Fuel storage & handling						
Fuel transferred to destination	t	10,144	4,510	15,216	75,641	70,847

		2009	2010	2011	2012	**2013**
Heat generation	million kcal	8,700	6,769	4,550	9,888	8,331
Geothermal drilling						
Extent	m	27,816	15,498	19,214	12,090	19,441
Electricity distribution						
Electricity distributed	million kWh	417,851	185,603	419,500	413,902	403,979
EN4 Electricity consumption for grid operation	million kWh	421	112	600	514	518
Mining & extracting activities						
Mining						
Fuel extracted in the reporting year	million t	2	2	1	1	1
Areas restored in the year (geomorphology, hydrogeology and landscape)						
Areas revegetated with plant, shrub and tree species	ha	23	0	283	268	122
Areas occupied by water bodies	ha	234	0	74	8	9
Areas restored since the start of activities (geomorphology, hydrogeology and landscape)						
Areas revegetated with plant, shrub and tree species	ha	2,287	2,904	3,345	3,552	3,651
Areas of high landscape-cultural value	ha	132	132	139	139	139
Areas occupied by water bodies	ha	509	509	1,042	1,107	1,012
Areas occupied by infrastructure (roads, canals, aqueducts, power lines)	ha	98	92	95	140	140
Areas awaiting final restoration	ha	271	207	1,550	1,538	97
Market						
Open market						
Residential segment						
Green offerings						
Customers	no.	1,364,507	1,581,542	2,105,968	2,713,621	2,799,968
Power sold	million kWh	3,032	5,258	6,138	7,473	7,700
Time-of-use offerings						
Customers	no.	187,943	286,920	232,004	34,993	38,663
Power sold	million kWh	868	781	676	96	106
Total						
Customers	no.	1,703,764	2,454,591	2,867,588	3,233,598	3,925,069
Power sold	million kWh	4,322	6,657	8,370	8,973	9,915
Business segment						
Green offerings						
Customers	no.	367,527	407,884	190,630	182,637	172,267
Power sold	million kWh	3,950	5,901	3,874	3,109	2,796
Time-of-use offerings						
Customers	no.	569,217	690,075	862,021	890,278	986,781
Power sold	million kWh	16,786	17,227	17,524	15,839	15,828
Total						
Customers	no.	1,063,456	1,134,254	1,105,714	1,126,111	1,232,711
Power sold	million kWh	29,580	24,559	23,022	20,686	20,143
Large customers' segment						
Green offerings						
Customers	no.	7,925	5,612	654	77	2,483
Power sold	million kWh	986	126	94	164	193
Time-of-use offerings						
Customers	no.	38,115	46,518	46,851	42,107	26,816
Power sold	million kWh	8,088	7,419	5,615	5,827	4,960

		2009	2010	2011	2012	2013
Total						
Customers	no.	52,545	58,720	51,173	45,294	35,538
Power sold	million kWh	10,290	8,960	7,916	8,536	10,754
Very large customers' segment						
Total						
Customers	no.	134	119	67	123	19,232,463
Power sold	million kWh	30,471	25,771	25,765	39,868	54,025
Standard-offer market						
Household customers' segment						
Time-of-use offerings						
Customers	no.	187,982	7,126,590	19,722,959	19,125,443	18,766,536
Power sold	million kWh	617	17,312	44,927	43,008	36,016
Total						
Customers	no.	25,135,660	24,313,927	23,304,781	22,380,167	21,723,647
Power sold	million kWh	53,082	50,656	51,864	49,141	41,216
Non-household customers' segment						
Time-of-use offerings						
Customers	no.	3,091,587	3,855,927	3,856,615	3,792,986	3,721,317
Power sold	million kWh	18,245	20,212	22,481	21,952	18,194
Total						
Customers	no.	4,607,488	4,458,415	4,318,693	4,161,178	3,968,176
Power sold	million kWh	26,767	25,209	26,265	25,431	20,821
Total green offerings	**million kWh**	**7,968**	**11,285**	**10,106**	**10,747**	**10,689**
Total time-of-use offerings	**million kWh**	**44,604**	**62,951**	**91,224**	**86,721**	**75,104**
Overall power sold						
high-voltage	million kWh	33,266	26,220	26,583	35,652	52,650
medium-voltage	million kWh	22,202	18,292	14,522	17,844	17,216
low-voltage	million kWh	112,372	109,443	104,232	99,139	88,842
Total	**million kWh**	**167,841**	**153,955**	**145,337**	**152,634**	**158,708**
Total RECS certificates canceled	**no. (MWh)**	**7,968,119**	**11,148,877**	**10,106,362**	**10,733,184**	**10,631,409**

Enel's activities are today focused on electricity generation and distribution. Other activities include geothermal drilling, fuel storage & handling, mining, electricity sales, as well as service and real-estate management.

Electricity generation

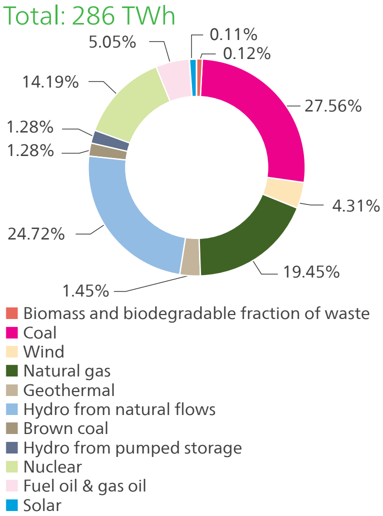
With regard to electricity generation, it is worth pointing out that:

> the various contributions are net of electricity consumed by power plant auxiliaries and of losses in the main transformers (net generation);

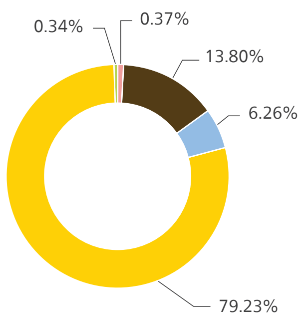
> the above-mentioned net generation does not necessarily match the amount of electricity sold posted in the consolidated financial statements, as the latter value also takes into account the electricity distributed but not directly produced by the power plants of the Group;

Net electricity generation (simple and CHP) by source in 2013

Total: 286 TWh



Net electricity generation from renewables in 2013
Total: 89.2 TWh



> generation from RDF (refuse-derived fuel) is distinguished into: i) the one obtained from the non-biodegradable fraction of waste; and ii) the one obtained from the biodegradable fraction of waste and regarded as generation from renewables;
> hydro generation from pumped storage is the electricity that is produced, in peak-load hours, through the falling of water previously pumped from a lower reservoir to an upper reservoir, using electricity surpluses arising in low-load hours (pumped storage is the only available option for storing significant amounts of electricity, albeit indirectly);
> combined heat & power generation (CHP) takes place in both thermal and nuclear power plants;
> actually available generation is the overall net generation, i.e. after deducting the electricity consumed for pumping.

In the past year, total available electricity generation decreased, in spite of an about 9 TWh increase in electricity generation from renewables.

EN4 Electricity distribution

The typical data of this activity are the electricity wheeled on the distribution grid and the own consumption of electricity.
The former is the overall electricity delivered to end users connected to the grid. Own consumption is the consumption of electricity required for the operation of the grid.

Fuel storage & handling

This activity, which is carried out far from thermal plant sites, is aimed at storing and handling fuels:
> liquid fuels: oil and gas-oil storage tanks and pipelines;
> solid fuels: coal and brown-coal bunkers located in dedicated port terminals.

The amounts of products transferred to destination and of heat generation only refer to fuel oil, which may be carried via pipelines and which needs heat for fluidification.
For this activity, the Eco-Balance shows, in particular, the use of resources, the consumption of primary energy, the consumption of electricity and the production of emissions, liquid releases and waste.

Geothermal drilling

This activity is aimed at making available endogenous fluid for geothermal power generation.
Geothermal drilling involves the use of technologies and know-how in which Enel is a worldwide leader.
The extent of yearly drilling represents, in some way, the volume of activity.

Nevertheless, it should be emphasized that operating conditions – and thus consumption of energy and expendables and production of waste and residues – may vary significantly, depending on the nature of the rock formations that are crossed.

Mining & extracting activities

These activities are carried out in the mines from which coal and brown coal are extracted.

The Eco-Balance reports not only the extractable amount of fuel (among the "Status data"), but also the activities of geomorphological, hydrogeological and landscape restoration. In particular, the Eco-Balance displays the use of resources, the consumption of primary energy, the consumption of electricity and the production of emissions, liquid releases and waste.

Market

This is the activity of sale of both green power and time-of-use power, which has positive effects on the environment:

> in the case of green rate plans, customers pay a small extra amount to finance the development of renewables;

> time-of-use rate plans shift electricity demand to off-peak hours.

Service & real-estate management

This activity refers to the management of the vehicle fleet and of buildings.

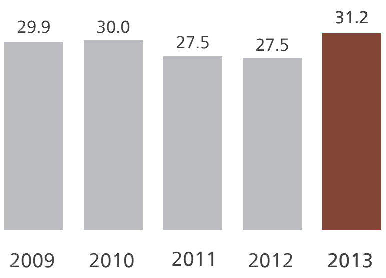
The typical data of this activity are fuel consumption, uses of water and resources and production of waste.

Key Performance Indicators - KPIs

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Electricity generation from renewables								
Thermal from biomass & biodegradable fraction of waste	% of total generation	0.171	0.191	0.220	0.223	0.116	-32.16	-47.98
Geothermal	% of total generation	1.80	1.82	1.92	1.86	1.95	8.45	5.06
Hydro from natural flows	% of total generation	26.4	26.3	23.2	22.3	24.7	-6.42	11.07
Wind and solar (photovoltaic)	% of total generation	1.54	1.76	2.18	3.16	4.41	186	39.83
Total	**% of total generation**	**29.9**	**30.0**	**27.5**	**27.5**	**31.2**	**4.24**	**13.49**
Market								
Residential segment								
Green power sold	% of power sold	70.2	79.0	73.3	83.3	77.7	10.70	-6.76
Time-of-use power sold	% of power sold	20.1	11.7	8.1	1.1	1.1	-94.66	0.19
Business segment								
Green power sold	% of power sold	13.4	24.0	16.8	15.0	13.9	3.95	-7.65
Time-of-use power sold	% of power sold	56.7	70.1	76.1	76.6	78.6	38.47	2.62
Large customers' segment								
Green power sold	% of power sold	9.58	1.41	1.19	1.93	1.80	-81.23	-6.55
Time-of-use power sold	% of power sold	78.6	82.8	70.9	68.3	46.1	-41.32	-32.43
Household customers' segment								
Time-of-use power sold	% of power sold	1.16	34.2	86.6	87.5	87.4	7,413	-0.16
Non-household customers' segment								
Time-of-use power sold	% of power sold	68.2	80.2	85.6	86.3	87.4	28.20	1.23
Overall power sold								
high-voltage	% of power sold	19.8	17.0	18.3	23.4	33.2	67.38	42.02
medium-voltage	% of power sold	13.2	11.9	10.0	11.7	10.8	-17.99	-7.21
low-voltage	% of power sold	67.0	71.1	71.7	65.0	56.0	-16.39	-13.82
Total green power sold	**% of power sold**	**4.75**	**7.33**	**6.95**	**7.04**	**6.74**	**41.88**	**-4.35**
Total time-of-use power sold	**% of power sold**	**26.6**	**40.9**	**62.8**	**56.8**	**47.3**	**78.07**	**-16.71**

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Mining & extracting activities								
Yield of the site (open-pit mine)	million m^3 of moved soil/million t of extracted mineral	4.17	3.80	2.68	2.45	2.86	-31.47	16.69
Percentage of moved soil used to restore the area	%	0.000	2.49	2.39	5.44	27.7	0	409

Electricity generation from renewables vs. total electricity generation (%)



In 2013, **electricity generation from renewables**, expressed as a percentage of total electricity generation, sharply rose, reaching 31.2% of total generation.

> **Green power sold**, expressed as a percentage of total power sold to each customer segment of the open market (residential, business and large customers) was slightly down on 2012.

> **Time-of-use power sold**, expressed as a percentage of total power sold to each customer segment (open market: residential, business and large customers; standard-offer market: household and non-household customers) decreased in 2013 vs. 2012.

Emissions

Absolute values

		2009	2010	2011	2012	**2013**
Emissions into the atmosphere						
EN20 SO_2						
thermal generation	thousand t	132	103	117	122	105
thermal generation (CHP)	thousand t	156	184	164	181	167
fuel storage & handling	thousand t	0.000	0.000	0.000	0.000	0.000
Total	**thousand t**	**288**	**287**	**281**	**302**	**272**
EN20 NO_x						
thermal generation	thousand t	163	127	150	153	133
thermal generation (CHP)	thousand t	98.8	125	109	99.0	94.5
fuel storage & handling	thousand t	0.002	0.000	0.001	0.002	0.001
Total	**thousand t**	**261**	**251**	**259**	**252**	**228**
EN20 Particulates						
thermal generation	thousand t	8.43	6.68	6.30	5.46	4.90
thermal generation (CHP)	thousand t	120	148	104	97	109
fuel storage & handling	thousand t	0.000	0.000	0.000	0.000	0.000
Total	**thousand t**	**129**	**155**	**110**	**102**	**114**
EN16 CO_2 (scope 1)						
fossil-fired thermal generation (from combustion)	thousand t	86,759	78,512	87,098	90,278	80,655
fossil-fired thermal generation (from desulfurization)	thousand t	411	401	401	369	291
Total from fossil-fired thermal generation	thousand t	87,170	78,913	87,499	90,647	80,946
non-fossil-fired thermal generation (from fossil carbon)	thousand t	39.7	33.1	40.3	41.9	42.7
total from thermal generation	thousand t	87,210	78,946	87,540	90,689	80,989
fossil-fired thermal generation (CHP) (from combustion)	thousand t	34,732	37,066	35,650	36,744	34,243
Total from thermal generation (CHP)	thousand t	34,732	37,066	35,650	36,744	34,243
fossil-fired thermal generation (CHP) (from desulfurization)	thousand t	37.6	35.0	39.4	45.6	41.7
total from thermal generation (CHP)	thousand t	34,770	37,101	35,689	36,789	34,285
Various activities	thousand t	166	143	122	149	111
Total	**thousand t**	**122,145**	**116,191**	**123,351**	**127,628**	**115,384**
EN16 SF_6						
electricity generation	kg	1,378	1,619	2,729	2,247	1,839
	thousand t of CO_2 equivalent	31.4	36.9	62.2	51.2	41.9
electricity distribution	kg	4,649	4,678	4,659	4,546	4,431
	thousand t of CO_2 equivalent	106	107	106	104	101
Total	**kg**	**6,027**	**6,297**	**7,388**	**6,793**	**6,270**
	thousand t of CO_2 equivalent	**137**	**144**	**168**	**155**	**143**

		2009	2010	2011	2012	2013
EN16 CH_4						
gas distribution, mining & extracting activities	thousand t	1.57	1.52	0.84	0.74	0.65
	thousand t of CO_2 equivalent	39.3	38.0	20.9	18.6	16
EN16* Total greenhouse gases (CO_2, SF_6, CH_4)	**thousand t of CO_2 equivalent**	**122,322**	**116,372**	**123,540**	**127,801**	**115,543**
EN20 H_2S geothermal generation (fluid)	thousand t	10.21	10.38	9.17	8.96	6.37
EN16 CO_2 geothermal generation (fluid)	thousand t	1,876	1,829	1,804	1,724	1,723
EN18 Avoided CO_2 emissions						
Due to hydro generation from natural flows	thousand t	56,680	52,609	46,758	47,101	54,730
Due to geothermal generation	thousand t	3,861	3,883	4,138	4,289	4,619
Due to wind and solar generation	thousand t	3,610	4,129	5,158	7,367	9,805
Due to generation from biomass & biodegradable fraction of waste	thousand t	372	413	483	505	279
Due to generation from renewables	**thousand t**	**64,523**	**61,035**	**56,537**	**59,262**	**69,432**
Due to generation from hydrogen	thousand t	0.000	1.54	0.195	1.10	0.000
Due to nuclear generation (simple and CHP)	**thousand t**	**34,041**	**36,997**	**36,274**	**37,674**	**34,615**
Total	**thousand t**	**98,564**	**98,033**	**92,811**	**96,938**	**104,047**
EN20 Radioactive emissions into the atmosphere						
Noble gases						
nuclear generation	TBq	24.0	15.2	40.7	72.6	40.2
nuclear generation (CHP)	TBq	6.56	8.51	10.45	7.72	5.95
Total	**TBq**	**30.6**	**23.7**	**51.1**	**80.4**	**46.1**
Iodine 131						
nuclear generation	MBq	258	88.8	31.3	106	32.5
nuclear generation (CHP)	MBq	0.56	0.61	0.98	0.66	0.73
Total	**MBq**	**258**	**89**	**32**	**106**	**33**
Aerosols β and γ						
nuclear generation	MBq	18,401	6,567	5,976	2,534	132
nuclear generation (CHP)	MBq	20.8	18.7	16.0	28.5	15.6
Total	**MBq**	**18,421**	**6,586**	**5,992**	**2,563**	**147**
Aerosol α						
nuclear generation	kBq	63.7	31.4	39.2	28.8	33.9
nuclear generation (CHP)	kBq	22.6	6.49	3.58	1.52	1.82
Total	**kBq**	**86.3**	**37.9**	**42.8**	**30.4**	**35.8**
Strontium 89 and 90						
nuclear generation	kBq	8,482	2,896	1,838	869	176
nuclear generation (CHP)	kBq	91.5	74.7	64.7	55.0	70.4
Total	**kBq**	**8,573**	**2,971**	**1,903**	**924**	**247**
EN21 Waste waters (discharged quantity)						
thermal generation	million m^3	48.8	39.7	36.9	47.6	54.1
thermal generation (CHP)	million m^3	40.6	39.8	30.9	31.7	27.1
nuclear generation	million m^3	158	158	190	1.74	1.62
nuclear generation (CHP)	million m^3	8.2	9.1	9.3	9.3	8.8
Total in electricity generation	million m^3	255	247	268	90	92
Fuel storage & handling	million m^3	0.037	0.027	0.048	0.076	0.155
Total	**million m^3**	**255**	**247**	**268**	**90.4**	**91.7**

* EN16 Total greenhouse gases, excluding indirect emissions from electricity consumption (see page 90).

Emissions into the atmosphere

The emissions of some substances into the atmosphere have a polluting effect, while those of other substances contribute to the greenhouse effect.
The emissions into the atmosphere, which are quantitatively most significant and typical of Enel's industrial activities, are as follows: in the first category, sulfur dioxide (SO_2), nitrogen oxides (NO_x) and particulates; and, in the second category, carbon dioxide (CO_2), sulfur hexafluoride (SF_6) and methane (CH_4).

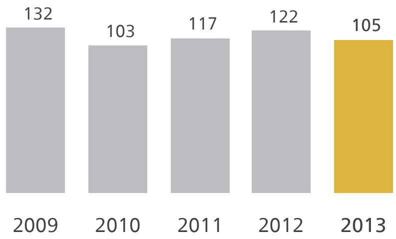
EN20 SO_2, NO_x and particulates originate from the combustion process and mostly come from thermal and CHP thermal power plants. SO_2 is abated by desulfurizers in large coal-fired power plants. Emissions of SO_2 may be prevented by using high-grade fuels with low or very low sulfur (LS and VLS, respectively).
Emissions of NO_x are controlled through the generalized use of advanced combustion systems (prevention measures) and their constant tuning, whereas post-combustion abatement is based on denitrification systems installed in coal- and oil-fired power plants.
Particulates are abated by particulate collection systems – usually based on electrostatic precipitators, but also on more efficient bag filters, which are suitable for coal-fired power plants only – in almost all power plants.
The amounts of emissions are calculated by multiplying their concentrations in the flue gases (generally continuously monitored) by the volumes of the gases.
NO_x are expressed in terms of NO_2 equivalent.

Greenhouse-gas emissions – Scopes 1, 2 and 3

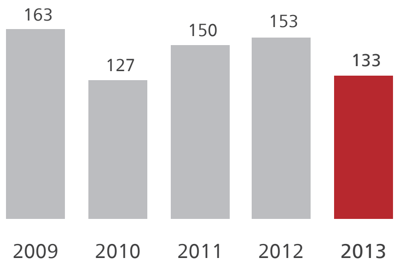
The World Business Council for Sustainable Development (WBCSD) categorizes direct and indirect greenhouse-gas (GHG) emissions and their origin into three broad scopes.
Scope 1: all direct GHG emissions from sources that are owned or controlled by the company, e.g. emissions directly resulting from production.
Scope 2: indirect GHG emissions from consumption of purchased electricity, e.g. emissions from the plant where such electricity is generated; these emissions typically depend on the national mix used to generate the electricity supplied to and purchased from the grid.
Scope 3: other indirect GHG emissions that are a consequence of the activity of the company, but occur at sources not owned or controlled by the same company, e.g. emissions from extraction of materials or transport of purchased fuels.

EN16 GHG emissions, Scope 1: CO_2 is the typical product of combustion and, as such, the near totality of it comes from thermal power plants (simple and CHP). Small amounts – reported here in view of the attention paid to the greenhouse effect – also derive from: geothermal drilling (combustion of gas oil feeding the diesel engines of drilling equipment); emergency generating sets installed in the generality of Enel's installations (combustion of gas oil); fuel storage & handling (use of fuels for producing process steam); and service & real-estate management (combustion of gasoline, natural gas and gas oil).
CO_2 is also contained in the reaction products from the process of desulfurization of the flue gases outgoing from the boilers of some thermal power plants.

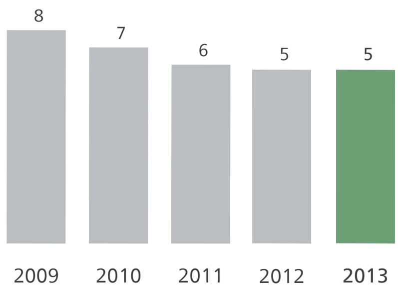
SO_2 emissions from simple thermal generation (thousand t)



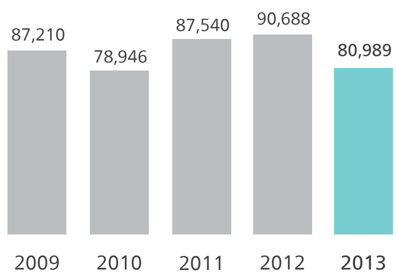
NO_x emissions from simple thermal generation (thousand t)



Particulate emissions from simple thermal generation (thousand t)

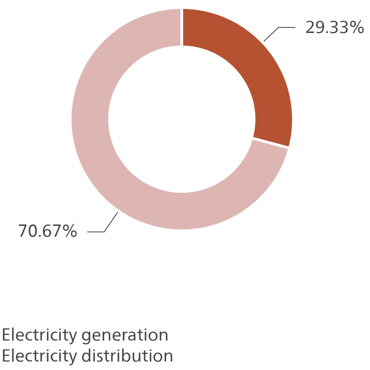


CO_2 emission from simple thermal generation (thousand t)



Finally, also natural gas distribution contributes to CO_2 emissions: as CO_2 is a minor constituent of natural gas, it is present in the losses from the distribution grid.
Since the implementation of Directive 2003/87/EC (establishing a scheme for greenhouse emission allowance trading within the Community), the following procedure has been used for computing CO_2 emissions: for the fuels and installations covered by the scheme (and required to monitor and report their emissions), the calculation is based on analyses (carbon content of fuel, calorific value, carbon content of ash) conducted on the individual lots of fuel; in the other cases (fuels and installations not covered by the scheme), Enel uses the reference parameters of the latest national GHG inventories.
The amount of CO_2 from the desulfurization process is computed stoichiometrically from the amount of limestone used.
The reduction of specific emissions of CO_2 in 2013 is due to the increase in the share of electricity generation from renewables (+~9 TWh), including hydro (higher hydraulicity than in 2012). Thanks to the combined effect of higher generation from renewables and higher utilization of the most efficient thermal plants, net specific emissions of CO_2 vs. total electricity generation dropped by 6%.
For emissions, Scope 2 and 3, see page 90.

Origin of emissions of SF_6 in 2013
Total: 6,270 kg



EN16 SF_6 is used in high- and medium-voltage electrical equipment as an insulant and for electric arc extinction; in these applications, it is irreplaceable.
Its emissions into the atmosphere are due to leaks from the above equipment. These emissions are determined with a complex procedure, which takes into account replenishments (difference between the weight of SF_6 contained in the bottles used for replenishment, at the start and end of the year, increased by the weight of SF_6 contained in the bottles purchased or acquired during the year and decreased by the weight of SF_6 contained in the bottles transferred during the year), including those carried out by third parties. In the very rare event of breakage of SF_6-containing equipment, its nominal SF_6 content is considered as leakage.
Given the particular care with which SF_6 is removed from end-of-life equipment, the above procedure provides fairly reliable data.
These emissions are expressed in weight of SF_6 and in weight of CO_2 equivalent, in terms of Global Warming Potential (GWP). The 100-year GWP value that has been used (22,800) is the one specified in the "IPCC Fourth Assessment Report: Climate Change 2007".
When expressed in CO_2 equivalent, the values of SF_6 appear to be extremely low as against Enel's overall GHG emissions.
At local level, the variability of SF_6 emissions from one year to the other is largely due to the occasional character of the above-mentioned replenishments.

EN16 CH_4 comes from:
> coal extraction, since methane is naturally contained in coal seams.

The emissions are determined on the basis of the IPCC emission factors ("2006 IPCC Guidelines for National Greenhouse Gas Inventories"). These factors, which are different for surface mining (1.2 m^3/t) and deep mining (18 m^3/t), are multiplied by the tonnes of fuel extracted. The 100-year GWP that has been used (25) is the one specified in the "IPCC Fourth Assessment Report: Climate Change 2007".
When expressed in CO_2 equivalent, CH_4 emissions account for a very low share of Enel's overall GHG emissions.

EN16 As to CFC-11 equivalent, the following points should be made.
The ozone layer (O_3) filters most of the biologically harmful ultraviolet solar rays (UV-B). Most of the ozone-depleting substances are controlled under the Montreal Protocol. They include chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), halon and methyl bromide. The emissions of these substances are expressed in tonnes of CFC-11 equivalent.
CFC-11 is used to measure and compare the various substances on the basis of their ozone-depleting potential. These substances are used, in particular, as coolants in air-conditioning systems and as extinguishing agents.
Their emissions into the atmosphere are due to leaks from equipment. They are determined with a complex procedure, which takes into account replenishments, and are expressed in emitted weight and CFC-11-equivalent weight, in terms of Global Warming Potential (GWP). The 100-year GWP indicated in the "IPCC Fourth Assessment Report: Climate Change 2007" is equal to 4,750 for CFC-11. These emissions correspond to roughly 18,000 t of CO_2. When expressed in CO_2 equivalent, these values appear to be extremely low as against Enel's overall GHG emissions.

EN20 With regard to "minor" pollutants (e.g. metals), Enel conducted extensive programs of monitoring of their concentrations in the flue gases released by its thermal power plants, under different conditions of types of fuel and abatement systems. Results indicate that these concentrations comply – with wide margins – with the point-source emission limits mandated by the national legislation of the countries where Enel operates. Since 2013, the Enel Group has included the emissions of the main micro-pollutants (including mercury) among its environmental reporting data. However, no data expressing the amounts actually emitted have become available to date. Therefore, these data will be reported in subsequent editions of the Environmental Report.
Separate considerations should be made about the gases contained in geothermal steam. Since these gases are incondensable, they are emitted into the atmosphere when steam condenses in cooling towers after its expansion in turbines.
These gases are:

EN20 EN16

> hydrogen sulfide (H_2S), the only potentially polluting substance (offensive odor) which is present in significant amounts in geothermal fluid;
> carbon dioxide (CO_2).

A wide debate is under way over the natural or anthropogenic origin of these gaseous emissions. The International Geothermal Association supports their natural origin: as spontaneous emissions are present in diffuse form in geothermal areas, geothermal power plants only convey them in concentrated form, thereby reducing natural ones. The IPCC Guidelines for national GHG inventories do not include CO_2 emissions from geothermal generation among those to be censused. However, Italy includes these CO_2 emissions in its national reports on GHG emissions. In this Environmental Report, CO_2 and H_2S emissions from geothermal generation are reported for the sake of information completeness. Their values are estimated on the basis of periodical analyses and measurements of the composition and flow rate of geothermal steam used by power plants.
Thanks to abatement systems, H_2S emissions prove to be lower than those that would be naturally present in geothermal areas without geothermal power plants.

In line with the IPCC Guidelines, the Eco-Balance does not report the emissions of CO_2 from the share of thermal generation obtained from biomass and from the biodegradable fraction of RDF (containing non-fossil carbon). Indeed, these emissions counterbalance the CO_2 that biomass (organic component of waste or used on as-is basis) absorbs during its growth.

However, CO_2 emissions from combustion of the non-biodegradable fraction (containing fossil carbon) of RDF are reported.

Moreover, Scope 1 calculations exclude CO_2 and CH_4 emissions resulting from the decomposition of organic matter in the hydro power generation basins managed by the Group and in its waste water treatment systems, since no homogeneous and consistent criterion has yet been found to report these emissions for the overall Group.

Avoided CO_2 emissions

Avoided CO_2 emissions are an indicator of the environmental benefits arising from the mix of resources used for production processes and from the efficiency of the full cycle, going from utilization of the resources to end uses of the various products.

The tables display the CO_2 emissions that the Enel Group avoided thanks to renewable and nuclear generation, rather than from the otherwise necessary fossil-fired thermal generation.

These emissions are determined by multiplying electricity generation from each renewable or nuclear source by the average specific CO_2 emissions from fossil-fired thermal power plants in the various countries where the Group is present. Failing thermal power plants, reference is made to the national average specific emissions of Enerdata's database (http://services.enerdata.eu).

Overall avoided emissions are calculated as the sum of the emissions avoided in the various geographic areas.

In the case of hydro power, reference is made only to generation from natural flows, excluding the contribution of pumped-storage power plants.

In 2013, the overall Group avoided about 104 million tonnes of CO_2 emissions (about 69 million tonnes thanks to electricity generation from renewables and roughly 35 thanks to nuclear generation). The percentage ratio of the overall CO_2 emissions that Enel avoided thanks to generation from renewables to those which would have been produced by electricity generation activities, failing the contribution of renewables [avoided CO_2/(actual CO_2+avoided CO_2)], was equal to roughly 38%. If also the contribution of nuclear generation is considered, then this percentage is higher than 47%.

EN20 Radioactive emissions into the atmosphere (nuclear generation)

Nuclear fission produces unstable (radioactive) isotopes, which turn into stable isotopes – also through subsequent decays – and release energy in the form of ionizing radiation with different properties and penetrating power.

"Activity" is defined as the number of disintegrations of a given amount of radioactive material per unit time. It is measured in Becquerel (Bq): 1 Bq = 1 disintegration per second. When activity refers to contamination of a given surface, it is expressed in Bq per unit surface area (Bq/cm^2). When it refers to volume (e.g. contamination of air or water), it is expressed in Bq per unit volume (Bq/cm^3). Likewise, in the case of contamination of environmental matrices, such as soil, food, etc., reference is made to activity per unit mass (Bq/kg). As the Becquerel is a very small unit of measurement, radioactivity is very often indicated in multiples of Becquerel.

Radioactive decays produce alpha (α) and beta (β) radiation, consisting of electrically charged particles, as well as gamma (γ) radiation, consisting of electromagnetic waves, which are also present in nature owing to natural radioactivity.

α particles (helium nuclei) are relatively heavy and slow and have a low penetrating power, so that they can be blocked by less than 10 cm of air or merely by a sheet of paper.

β particles (electrons) are lighter and faster and their penetrating power is higher than the one of α particles; however, this power is so small that the particles can be blocked by a thin metal sheet: a few millimeters can stop them, whereas in air a few meters would be needed.

γ radiation is more penetrating and energetic and is stopped only by a thick layer of concrete, lead or steel.

Under normal operating conditions, the emissions of a nuclear power plant, mainly from the degassing units of the primary loop, flow to the chimney stack through the ventilation system of the reactor containment and other buildings.

Radioactive discharges are subject to particularly strict limits that are set by the competent authorities taking into account environmental susceptibility. They are expressed in terms of: i) dose commitments to the persons supposedly most exposed ("critical group"); in this case, they are many orders of magnitude lower than the contribution due to natural radioactivity; and ii) dose limits to the population.

The total activity of the discharged radioactive aerosols and gases is continuously monitored at the stack of the plant.

The following isotopes are usually detected and included in the discharge limits:

- noble gases: Ar41, Kr85, Kr85m, Kr87, Kr88, Xe133, Xe133m and Xe135;
- iodine 131;
- α aerosols (α emitters): Pu238, Pu239+Pu240 and Am241;
- β aerosols (β emitters): Sr89 and Sr90;
- γ aerosols (γ emitters): Cr51, Mn54, Co57, Co58, Fe59, Co60, Zn65, Nb95, Zr95, Mo99, Ru103, Rh106, Ag110m, Sb122, Sb124, Cs134, Cs137, Ce141 and Ce144;
- tritium and C14.

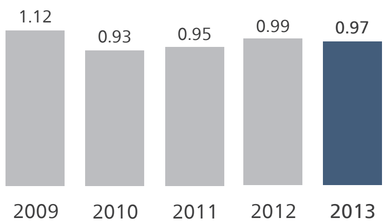
The abnormal pattern of radioactive emissions into the atmosphere in 2009 (iodine 131, Sr89-Sr90, β and γ aerosols) is due above all to: i) natural deterioration (from 2007 on) of fuel elements in the Garoña plant (Castilla y León) and technology used (Boiling Water Reactor – BWR), different from the one of the other plants (Pressurized Water Reactor – PWR); indeed, the type of reactor weighs not only on the amount of isotopes produced but also on their distribution in the gaseous effluents; and ii) replacement of fuel rods (in 2009) in all of the Spanish plants, except for Ascó II.

Key Performance Indicators - KPIs

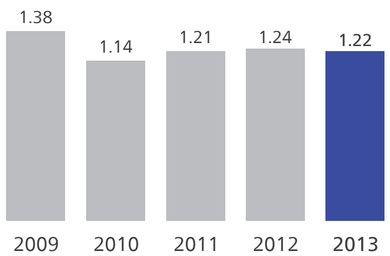
		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Specific emissions into the atmosphere								
EN20 SO_2 (thermal generation)	g/kWh thermal net	1.12	0.929	0.950	0.985	0.969	-13.40	-1.62
EN20 NO_x (thermal generation)	g/kWh thermal net	1.38	1.14	1.21	1.24	1.22	-11.44	-1.29
EN20 Particulates (thermal generation)	g/kWh thermal net	0.072	0.060	0.051	0.044	0.045	-37.50	2.27
EN16 CO_2 (thermal generation)	g/kWh thermal net	741	711	708	733	744	0.45	1.52
EN20 SO_2 (thermal generation - CHP)	g/kWh thermal net	3.10	3.43	3.03	3.24	3.17	2.32	-1.98
EN20 NO_x (thermal generation - CHP)	g/kWh thermal net	1.96	2.32	2.01	1.77	1.80	-8.32	1.30
EN20 Particulates (thermal generation - CHP)	g/kWh thermal net	2.38	2.75	1.92	1.73	2.08	-12.72	20.10
EN16 CO_2 (thermal generation - CHP)	g/kWh thermal net	690	690	660	659	652	-5.48	-1.12
EN20 SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	0.975	0.964	0.937	0.992	0.923	-5.33	-6.96
EN20 NO_x (total from thermal generation - simple and CHP)	g/kWh total net	0.884	0.843	0.862	0.827	0.771	-12.78	-6.77
EN20 Particulates (total from thermal generation - simple and CHP)	g/kWh total net	0.435	0.519	0.367	0.335	0.387	-11.03	15.52
EN16 CO_2 (total from thermal generation - simple and CHP)	g/kWh total net	413	389	411	418	391	-5.38	-6.56
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.555	0.820	0.940	0.768	0.698	25.77	-9.11
EN20 H_2S (geothermal fluid)	g/kWh geothermal net	1.98	1.97	1.65	1.63	1.14	-42.46	-30.09
EN20 CO_2 (geothermal fluid)	g/kWh geothermal net	364	347	324	314	309	-15.21	-1.63
Specific radioactive emissions into the atmosphere								
Nuclear generation								
Noble gases	kBq/kWh	1.00	1.00	2.00	3.00	2.00	100	-33.33
Iodine 131	kBq/kWh	11.0	3.00	1.00	4.00	1.00	-90.91	-75.00
Aerosols β and γ	mBq/kWh	813	238	237	94.0	5.00	-99.38	-94.68
Aerosol α	µBq/kWh	3.00	1.00	2.00	1.00	1.00	-66.67	0.00
Strontium 89 and 90	µBq/kWh	375	105	73.0	32.0	7.00	-98.13	-78.13
Nuclear generation (CHP)								
Noble gases	kBq/kWh	0.5	1.000	1.000	1.000	0.5	-	-50.00
Iodine 131	mBq/kWh	0.04	0.05	0.07	0.05	0.00	-	-
Aerosols β and γ	mBq/kWh	2.00	1.00	1.00	2.00	1.00	-50.00	-50.00
Aerosol α	µBq/kWh	2.00	0.5	0.2	0.1	0.1	-100.00	-
Strontium 89 and 90	µBq/kWh	7.00	5.00	4.00	4.00	5.00	-28.57	25.00

Specific emissions into the atmosphere

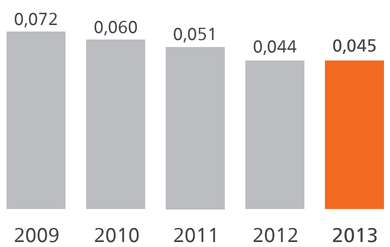
Specific SO_2 emissions from simple thermal generation (g/kWh thermal net)



Specific NO_x emissions from simple thermal generation (g/kWh thermal net)



Specific particulate emissions from simple thermal generation (g/kWh thermal net)



In electricity generation, specific emissions into the atmosphere express the amounts of the typical and significant substances emitted into the atmosphere (SO_2, NO_x, particulates and CO_2) per kWh net of electricity generation or per kWh net of electricity and heat generation (in the case of CHP).

These emissions include:

1. **specific emissions from simple thermal generation**: emissions of SO_2, NO_x, particulates and CO_2 into the atmosphere per kWh net of electricity generated in thermal plants;
2. **specific emissions from CHP thermal generation**: emissions of SO_2, NO_x, particulates and CO_2 into the atmosphere per kWh net of electricity and heat generated in CHP thermal plants;
3. **specific emissions from simple and CHP thermal generation vs. total electricity and heat generation**: emissions of SO_2, NO_x, particulates and CO_2 into the atmosphere per kWh net of electricity and heat generated with all the technologies available within the Group (nuclear, thermal and renewable).

The trend of the first two indicators reflects: i) for SO_2, NO_x and particulates, the cumulated effect of the fuel mix, of the efficiency of thermal power plants and of direct prevention and abatement measures; and ii) for CO_2, the cumulated effect of the fuel mix, of the efficiency of thermal power plants and of the marginal contribution of the desulfurization process.

The third indicator expresses the emission efficiency per unit of electricity generated by all of Enel's power plants, considering not only the cumulated effect of the fuel mix and of the efficiency of the overall generating mix, but also the contribution of sources which do not emit atmospheric pollutants. This indicator thus describes the overall effectiveness of environmental policies aimed at reducing polluting emissions, both through investments in thermal generation and deployment of renewables. In 2013, higher electricity generation from renewables caused specific emissions of NO_x and SO_2, referred to total electricity generation, to decline slightly, whereas specific emissions of particulates grew owing to the lower efficiency of electrostatic precipitators in the thermal plant of Reftinskaya, which is being revamped. Conversely, specific emissions of NO_x and SO_2, referred to thermal generation, remained steady around last year's value thanks, among others, to higher utilization of the most efficient thermal plants. In the next few years, all pollutants are expected to progressively decrease, thanks to a number of measures concerning the overall generating mix and, in particular, to the progressive modernization of the Russian plant of Reftinskaya.

Relative SF_6 emissions, which pertain to all electric activities, express the ratio of the yearly emissions of SF_6 to the year-end volume of SF_6 contained in in-service & in-stock equipment, as well as in the bottles used for replenishments.

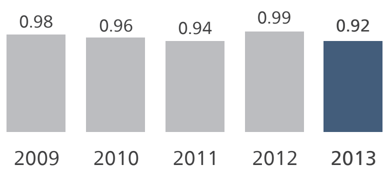
The percentages of SF_6 over the years have small fluctuations, owing above all to the occasional character of replenishments. However, they all lie below the value reported in the literature and suggested by the IPCC Guidelines for national GHG inventories (1%).

EN20 EN16

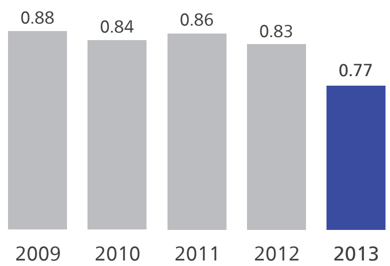
Specific emissions from geothermal generation – bearing in mind the considerations made about their origin – are entirely attributed to electricity generation, on the assumption that no steam is lost during drilling and that the fluid used in non-electric applications is liquid (i.e. without gases, except those dissolved in it). These emissions express:

> for H_2S, the cumulated effect of the composition of geothermal steam, of the efficiency of geothermal power plants and of abatement systems; the installation of these systems (beginning in 2011) has clear effects also on the specific emissions of 2013 (-30% on 2012);
> for CO_2, the cumulated effect of the composition of geothermal steam and of the efficiency of geothermal power plants.

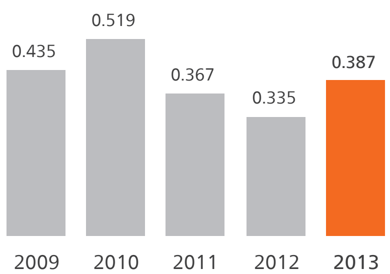
Specific SO_2 emissions from thermal generation (simple and CHP) vs. total electricity and heat generation (g/kWh total net)



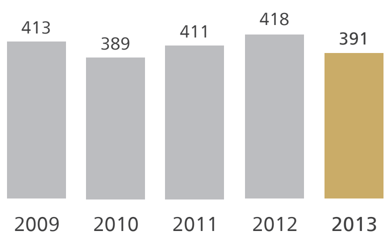
Specific NO_x emissions from thermal generation (simple and CHP) vs. total electricity and heat generation (g/kWh total net)



Specific particulate emissions from thermal generation (simple and CHP) vs. total electricity and heat generation (g/kWh total net)



Specific CO_2 emissions from thermal generation (simple and CHP) vs. total electricity and heat generation (g/kWh total net)



Waste waters

Absolute values (1)

		2009	2010	2011	2012	2013
EN21 **Conventional polluting load in waste waters discharged by installations**						
Metals and compounds (expressed as metal equivalents)						
thermal generation	kg	66,132	85,846	10,046	6,963	27,347
in some plants with an overall capacity of	MW	27,934	26,765	26,482	24,995	29,069
thermal generation (CHP)	kg	53,085	42,430	46,111	64,873	85,838
in some plants with an overall capacity of	MW	6,979	6,979	5,135	5,145	5,191
nuclear generation	kg	70.3	104	15.2	249	230
on an overall capacity of	MW	3,522	3,514	3,527	3,535	3,556
nuclear generation combined with heat generation	kg	158	366	257	567	651
on an overall capacity of	MW	1,762	1,816	1,818	1,816	1,814
Total electricity generation	kg	119,444	128,746	56,430	72,651	114,065
Fuel storage & handling	kg	7.70	4.00	22.3	35.1	78.9
Total	**kg**	**119,452**	**128,750**	**56,452**	**72,686**	**114,144**
Total nitrogen (expressed as N)						
thermal generation	kg	286,230	337,125	67,282	557,984	43,923
in some plants with an overall capacity of	MW	28,147	27,716	26,136	25,841	28,228
thermal generation (CHP)	kg	0.000	0.000	34.1	371	100
in some plants with an overall capacity of	MW	0.000	0.000	2,277	2,318	2,297
nuclear generation	kg	17,612	5,888	10,664	10,293	9,088
on an overall capacity of	MW	3,522	3,514	3,527	3,535	3,556
nuclear generation combined with heat generation	kg	34,566	32,130	33,275	34,847	39,592
on an overall capacity of	MW	1,762	1,816	1,818	1,816	1,814
Total electricity generation	kg	338,409	375,143	111,255	603,496	92,702
Fuel storage & handling	kg	12.6	45.0	57.5	108	580
Total	**kg**	**338,421**	**375,188**	**111,312**	**603,604**	**93,282**
Total phosphorus (expressed as P)						
thermal generation	kg	16,625	23,217	12,110	39,899	9,938
in some plants with an overall capacity of	MW	21,970	24,233	25,795	24,830	25,732
thermal generation (CHP)	kg	0.000	0.000	75.0	21.5	0.000
in some plants with an overall capacity of	MW	0.000	0.000	21.4	21.4	0.000
nuclear generation	kg	118	1,189	1,152	1,085	712
on an overall capacity of	MW	3,522	3,514	3,527	3,535	3,556
nuclear generation combined with heat generation	kg	2,213	2,491	2,721	2,257	1,555
on an overall capacity of	MW	1,762	1,816	1,818	1,816	1,814
Total electricity generation	kg	18,956	26,897	16,059	43,263	12,205
Fuel storage & handling	kg	1.85	3.00	23.0	83.8	134
Total	**kg**	**18,958**	**26,900**	**16,082**	**43,347**	**12,338**
COD						
thermal generation	kg	335,660	347,461	240,730	559,362	253,590
in some plants with an overall capacity of	MW	26,654	28,898	25,720	25,164	26,343
thermal generation (CHP)	kg	72,306	79,815	94,625	802,574	661,867

		2009	2010	2011	2012	2013
in some plants with an overall capacity of	MW	1,255	1,275	1,234	1,255	1,234
nuclear generation	kg	2,714	24,125	29,400	25,773	37,227
on an overall capacity of	MW	3,522	3,514	3,527	3,535	3,556
nuclear generation combined with heat generation	kg	111,648	140,870	134,170	168,912	179,154
on an overall capacity of	MW	1,762	1,816	1,818	1,816	1,814
Total electricity generation	kg	522,329	592,271	498,925	1,556,621	1,131,838
Fuel storage & handling	kg	397	375	7,691	14,279	35,268
Total	**kg**	**522,726**	**592,646**	**506,616**	**1,570,899**	**1,167,106**
BOD						
thermal generation	kg	75,016	118,955	810,493	311,870	77,861
in some plants with an overall capacity of	MW	21,126	21,177	19,858	19,200	19,916
thermal generation (CHP)	kg	14,208	15,874	16,724	187,468	135,429
in some plants with an overall capacity of	MW	3,508	1,275	3,511	1,255	3,531
nuclear generation	kg	1,792	4,623	7,986	4,624	4,369
on an overall capacity of	MW	3,522	3,514	3,527	3,535	3,556
nuclear generation combined with heat generation	kg	17,605	16,021	21,474	24,469	25,459
on an overall capacity of	MW	1,762	1,816	1,818	1,816	1,814
Total electricity generation	kg	108,621	155,473	856,677	528,430	243,119
Fuel storage & handling	kg	167	119	2,581	3,970	10,921
Total	**kg**	**108,787**	**155,592**	**859,258**	**532,401**	**254,039**
EN21 **Radionuclides in waste waters discharged by plants**						
Tritium						
nuclear generation	GBq	57,746	71,013	78,993	112,192	48,943
nuclear generation combined with heat generation	GBq	21,621	19,359	20,960	21,358	21,632
Total	**GBq**	**79,367**	**90,372**	**99,953**	**133,550**	**70,575**
Corrosion and fission products						
nuclear generation	GBq	21.7	9.8	19.0	22.8	18.1
nuclear generation combined with heat generation	GBq	0.032	0.035	0.038	0.042	0.041
Total	**GBq**	**21.8**	**9.9**	**19.1**	**22.8**	**18.2**

(1) The variability of the data in the five-year period is due to the change in the number of plants (defined in the table by the overall capacity in MW) on which the analysis has been made.

EN21 Waste waters

Waste waters include residual waters for industrial uses and meteoric waters collected from the outdoor areas of thermal power plants, when they are susceptible to oil contamination. They are treated on a regular basis and always if they are to be returned to surface water bodies. After treatment, waste waters are in part used inside power plants – thereby contributing to coverage of water consumption for industrial uses – and in part released into surface water bodies. The volumes of waste waters are estimated by referring to the potential capability and utilization of water treatment systems, as well as to the modes of operation of the industrial installation to which these systems belong. Obviously, waste waters reflect the trend of water requirements for industrial uses, with a few deviations due, above all, to the variability of precipitation.

EN21 Polluting load of waste waters

Waste waters carry substances that alter the physico-chemical characteristics of the receiving water bodies, thus causing a potentially negative impact on ecosystems and affecting subsequent water uses (e.g. drinking, farming and recreation).
In the case of Enel, the extent of the problem is much smaller than in other industries, such as the chemical one. Nevertheless, the applicable legislation specifies strict limits for concentration of pollutants, with which Enel complies by using adequately sized treatment systems. Waste waters are distinguished on the basis of their characteristics (acidic/alkaline, oily, ammonia-containing, coming from desulfurizer drains, meteoric, gray water) and separately treated. After treatment, some of their parameters (e.g. conductivity, pH, turbidity, dissolved oxygen and oil content) are continuously monitored. This activity ensures compliance with legislative limits, as treatment is repeated until compliance is reached.
Also the waste waters that are reused inside power plants (contributing to the coverage of water requirements for industrial uses) usually need prior treatment to conform to the applicable legislation. The use of environmental management systems (certified or to be certified) makes it possible to record the mass emissions of typical and quantitatively significant pollutants (metals and compounds, nitrogen and compounds, phosphorus and compounds), as well as COD (Chemical Oxygen Demand) and BOD (Biochemical Oxygen Demand) in the waste waters released by almost all installations (except for some small thermal power plants).

These data are obtained by multiplying the measured concentrations by the volumes of the released waste waters. The variability of the data of the five-year series is due to the change in the number of plants (defined in the table by the overall capacity in MW) on which the analysis has been made.

EN21 Radionuclides in waste waters (nuclear generation)

The most common sources of radionuclide-containing waste waters are laundries, decontamination areas and leakage from primary loop components. Before being discharged, waste waters are analyzed to determine their level of radioactivity. Their discharge is allowed only if their radionuclide concentrations (corrosion/activation & fission products and tritium) do not exceed the limits mandated by the applicable legislation or specified in the authorizations for releases into water bodies.
The following radioactive isotopes are monitored:

> corrosion, activation and fission products: the same radionuclides as those measured in aerosols (α, β and γ emitters);

> tritium.

In this report, the activity of the radionuclides contained in the discharged waste waters (obtained by multiplying their measured concentrations by the volumes of the discharged waste waters) is expressed in billions of Becquerel (GBq).

Key Performance Indicators - KPIs

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Specific conventional polluting load of waste waters discharged by plants (thermal generation)								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net	na	1.67	0.194	0.154	0.599		1,613
Total nitrogen (expressed as N)	mg/kWh thermal net	na	6.63	1.41	12.1	1.02		-91.58
Total phosphorus (expressed as P)	mg/kWh thermal net	na	0.520	0.235	0.878	0.285		-67.54
COD	mg/kWh thermal net	na	6.21	5.33	13.4	6.47		-51.79
BOD	mg/kWh thermal net	na	3.00	23.9	10.4	3.06		-70.50
Specific conventional polluting load of waste waters discharged by plants (thermal generation - CHP)								
Metals and compounds (expressed as metal equivalents)	mg/kWh	na	0.985	1.40	1.85	2.64		42.83
Total nitrogen (expressed as N)	mg/kWh	na	0.000	0.004	0.043	0.012		-72.09
Total phosphorus (expressed as P)	mg/kWh	na	0.000	0.360	0.101	0.000		-100.00
COD	mg/kWh	na	27.3	35.2	289	276		-4.38
BOD	mg/kWh	na	5.44	1.40	67.4	12.6		-81.29
Specific conventional polluting load of waste waters discharged by plants (nuclear generation)								
Metals and compounds (expressed as metal equivalents)	mg/kWh	0.003	0.004	0.001	0.009	0.009	200	0.00
Total nitrogen (expressed as N)	mg/kWh	0.778	0.213	0.424	0.382	0.350	-55.01	-8.38
Total phosphorus (expressed as P)	mg/kWh	0.005	0.043	0.046	0.040	0.027	440	-32.50
COD	mg/kWh	0.120	0.873	1.168	0.956	1.430	1.095	50.00
BOD	mg/kWh	0.079	0.167	0.317	0.171	0.168	113	-1.75
Specific conventional polluting load of waste waters discharged by plants (nuclear generation - CHP)								
Metals and compounds (expressed as metal equivalents)	mg/kWh	0.012	0.026	0.017	0.038	0.043	258	13.16
Total nitrogen (expressed as N)	mg/kWh	2.53	2.26	2.23	2.32	2.60	3.05	12.05
Total phosphorus (expressed as P)	mg/kWh	0.162	0.175	0.182	0.150	0.102	-37.04	-32.00
COD	mg/kWh	8.16	9.90	8.97	11.3	11.8	44.37	4.59
BOD	mg/kWh	1.29	1.13	1.44	1.63	1.67	30.17	2.57
Net specific polluting load of radionuclides in waste waters								
Nuclear generation								
Tritium	kBq/kWh	2.55	2.57	3.14	4.16	1.89	-26.14	-54.69
Nuclear generation (CHP)								
Tritium	kBq/kWh	1.58	1.36	1.40	1.42	1.42	-10.00	-0.14

EN21 Specific polluting load of waste waters

This item expresses the amount (per kWh net of thermal generation, simple or CHP) of the typical and significant polluting substances and of the parameter values of the waste waters from thermal and nuclear power plants which are returned to water bodies.
Obviously, this load is chiefly dependent on the efficiency of waste water treatment systems and cannot be easily correlated with other factors concerning power plants and their modes of operation.

Construction site activities

The Enel Group is also engaged in planning, design, construction and upgrade of installations through Enel Green Power (listed on the Italian exchange) and the following divisions: Generation and Energy Management; Engineering and Research; Iberia and Latin America. Within Enel Green Power, the Engineering and Construction staff function takes care of planning, designing and implementing the projects included in the plan of investment (on both existing and new installations), within the set time limits and costs and in accordance with legislative/regulatory and corporate rules on environmental protection, health and safety.
Within the Engineering and Research Division, the Plant Design & Construction and Nuclear business lines are in charge of managing projects for both conventional and nuclear power plants (from feasibility studies to construction), respectively. The related strategies seek to use the best available technologies at the global scale, with a view to ensuring the technological development and enhancing the efficiency of plants, including through adequate and innovative research projects.
In 2013, under the new G4 Guidelines (issued by the Global Reporting Initiative and applicable as from 2015), Enel started disclosing the main environmental performance indicators of its activities in construction sites that are associated with the environmental aspects that it directly manages. The disclosure process will then be extended to the environmental aspects directly managed by contractors.

Significant environmental impacts due to construction site activities		Total
Construction sites surveyed	no.	50
Consumption of electricity (6 sites only)	MWh	26
Consumption of fuels (7 sites only)	toe	2,311
Emissions of CO_2 from combustion (7 sites only)	tCO_2	1,262
Expendables (11 sites only)		
- Iron	t	10,174
- Sands	t	10,899
- Cement	t	32,645
- Other	t	375
Water consumption (10 sites only)	m^3	701,210
Production of non-hazardous waste (13 sites only)	t	716
Delivery of non-hazardous waste to recovery operators (13 sites only)	t	227
Production of hazardous waste (13 sites only)	t	4,536
Delivery of hazardous waste to recovery operators (13 sites only)	t	2
Recovery of waste (13 sites only)	%	4.4%

Waste

Absolute values

		2009	2010	2011	2012	2013
EN22 **Non-hazardous special waste**						
Coal bottom ash						
fossil-fired thermal generation (simple and CHP)						
production	t	680,732	640,309	678,165	695,857	622,267
delivery to recovery operators	t	111,219	106,876	286,778	207,244	257,947
Coal flyash						
fossil-fired thermal generation (simple and CHP)						
production	t	7,838,149	8,435,452	8,301,381	8,936,906	7,429,912
delivery to recovery operators	t	2,259,685	1,814,307	2,226,832	2,335,140	2,174,052
Oil bottom ash						
fossil-fired thermal generation (simple and CHP)						
production	t	63.0	1.84	0.000	0.000	99.0
delivery to recovery operators	t	0.000	1.84	0.000	0.000	0.000
Other non-hazardous ash						
fossil-fired thermal generation (simple and CHP)						
production	t	3,511	6,352	6,310	6,235	6,319
delivery to recovery operators	t	0.000	0.000	6,310	0.000	6,319
Gypsum from desulfurization						
fossil-fired thermal generation (simple and CHP)						
production	t	1,698,998	1,563,570	1,978,796	1,806,912	1,353,257
delivery to recovery operators	t	328,029	577,405	533,579	517,920	509,949
Other						
production						
electricity generation & geothermal drilling	t	812,714	565,439	352,988	359,040	335,935
electricity distribution	t	208,474	193,385	259,602	219,597	207,284
various activities	t	7,091	3,038	1,233	2,389	27,835
Total	**t**	**1,028,280**	**761,862**	**613,822**	**581,026**	**571,054**
delivery to recovery operators						
electricity generation & geothermal drilling	t	85,743	111,333	82,453	61,644	115,278
electricity distribution	t	42,687	46,975	133,851	80,628	93,859
various activities	t	3,019	2,669	1,115	2,136	27,443
Total	**t**	**131,450**	**160,977**	**217,418**	**144,408**	**236,580**
Total						
production						
electricity generation & geothermal drilling	t	11,034,167	11,211,124	11,317,640	11,804,950	9,747,789
electricity distribution	t	208,474	193,385	259,602	219,597	207,284
various activities	t	7,091	3,038	1,233	2,389	27,835
Total	**t**	**11,249,733**	**11,407,546**	**11,578,474**	**12,026,936**	**9,982,908**

		2009	2010	2011	2012	**2013**
delivery to recovery operators						
electricity generation & geothermal drilling	t	2,784,676	2,609,923	3,135,951	3,121,948	3,063,546
electricity distribution	t	42,687	46,975	133,851	80,628	93,859
various activities	t	3,019	2,669	1,115	2,136	27,443
Total	**t**	**2,830,382**	**2,659,567**	**3,270,917**	**3,204,712**	**3,184,848**
EN22 **Hazardous special waste**						
Oil flyash						
fossil-fired thermal generation (simple and CHP)						
production	t	1,122	1,352	1,395	1,289	1,197
delivery to recovery operators	t	753	909	1,080	0.080	0.000
Other hazardous ash						
fossil-fired thermal generation (simple and CHP)						
production	t	8.17	8.90	31.0	16.6	0.000
delivery to recovery operators	t	0.190	8.6	0.000	0.000	0.000
Other						
production						
electricity generation & geothermal drilling	t	48,248	49,060	36,350	46,843	58,446
electricity distribution	t	20,488	22,727	22,414	39,338	12,994
various activities	t	1,481	176	638	104	853
Total	**t**	**70,217**	**71,963**	**59,402**	**86,285**	**72,293**
of which with PCBs						
electricity generation & geothermal drilling	*t*	*133*	*3.38*	*6.83*	*123*	*2.24*
electricity distribution	*t*	*61*	*81*	*529*	*81*	*178*
various activities	*t*	*403*	*1.07*	*3.97*	*2.54*	*114*
Total	***t***	***597***	***85.8***	***540***	***206***	***294***
delivery to recovery operators						
electricity generation & geothermal drilling	t	6,075	8,959	21,418	17,245	10,722
electricity distribution	t	15,837	17,586	15,624	31,482	11,129
various activities	t	312	16.0	130	17.0	49.0
Total	**t**	**22,225**	**26,561**	**37,171**	**48,744**	**21,899**
of which with PCBs						
electricity generation & geothermal drilling	*t*	*52.7*	*2.30*	*1.03*	*122*	*2.24*
electricity distribution	*t*	*28.9*	*14.0*	*475*	*20.7*	*90.8*
various activities	*t*	*0.000*	*0.574*	*2.74*	*1.44*	*2.70*
Total	***t***	***81.6***	***16.9***	***479***	***145***	***95.8***
Total						
production						
electricity generation & geothermal drilling	t	49,378	50,421	37,776	48,149	59,643
electricity distribution	t	20,488	22,727	22,414	39,338	12,994
various activities	t	1,481	176	638	104	853
Total	**t**	**71,347**	**73,324**	**60,828**	**87,591**	**73,490**
delivery to recovery operators						
electricity generation & geothermal drilling	t	6,829	9,876	22,498	17,245	10,722
electricity distribution	t	15,837	17,586	15,624	31,482	11,129
various activities	t	312	16	130	17.0	49.0
Total	**t**	**22,978**	**27,478**	**38,251**	**48,744**	**21,899**

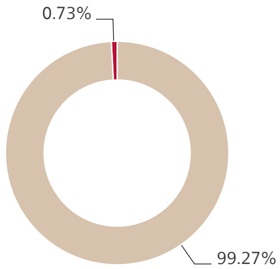
		2009	2010	2011	2012	**2013**
EN22 Total special waste						
production						
electricity generation & geothermal drilling	t	11,083,546	11,261,545	11,355,416	11,853,099	9,807,432
electricity distribution	t	228,963	216,111	282,016	258,935	220,278
various activities	t	8,572	3,214	1,870	2,493	28,688
Total	**t**	**11,321,080**	**11,480,871**	**11,639,302**	**12,114,527**	**10,056,398**
delivery to recovery operators						
electricity generation & geothermal drilling	t	2,791,504	2,619,799	3,158,449	3,139,193	3,074,268
electricity distribution	t	58,524	64,561	149,475	112,110	104,988
various activities	t	3,332	2,685	1,244	2,153	27,492
Total	**t**	**2,853,360**	**2,687,045**	**3,309,168**	**3,253,456**	**3,206,748**
EN22 Radioactive waste (1)						
Low-, intermediate- and high-level: stored inside plants						
nuclear generation (simple and CHP)						
liquid	m^3	2,643	2,540	2,240	2,040	1,864
solid	m^3	2,953	1,528	1,449	1,529	1,503
solid	t	310	307	278	285	296
Low- and intermediate-level: production						
nuclear generation (simple and CHP)						
liquid	m^3	90.2	76.2	56.6	35.0	48.8
of which: fraction not storable in off-site surface or subsurface sites	*m^3*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
solid	m^3	220	238	289	482	197
of which: fraction not storable in off-site surface or subsurface sites	*m^3*	*0.000*	*33.4*	*32.3*	*45.1*	*40.8*
solid	t	31.7	29.3	31.0	31.4	29.9
High-level: production						
nuclear generation (simple and CHP)						
liquid	m^3	0.000	0.000	0.000	0.000	0.000
solid	m^3	22.1	4.62	8.81	23.9	0
solid	t	1.01	12.1	11.7	56.3	64.8

(1) The two units of measurement (m^3, tonnes) refer to the same amount of solid radioactive waste.

EN22 Special waste

Special waste in 2013

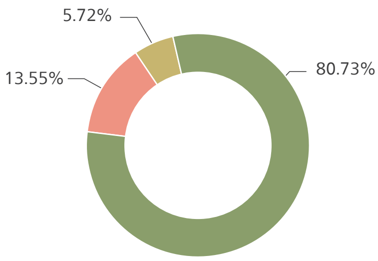
Total production: 10.06 million t



- Non-hazardous
- Hazardous

Non-hazardous special waste in 2013

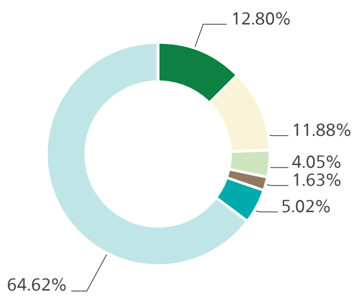
Total production: 9.98 million t



- Coal ash (bottom and flyash) and heavy oil
- Gypsum from desulfurization
- Other

Hazardous special waste in 2013

Total production: 73,490 t



- Machinery & equipment
- Used oils
- Used batteries
- Fuel-oil flyash
- Sludges from geothermal cooling towers
- Not included in the previous categories

Special waste represents part of the waste produced by Enel's activities, as specified in the national legislation applicable in the countries where the Group operates.
For the classification of waste into non-hazardous and hazardous, Enel refers to EU legislation.

> Non-hazardous special waste (shown in the relevant pie chart) includes: i) the most representative waste items (indicated with their names in the "Waste" table: coal ash, both flyash and bottom ash, and gypsum from desulfurization; and ii) "other" waste items (cumulated in the same table) that are individually inventoried or grouped as "not included in the previous categories".

The typical items that are individually inventoried are: machinery & equipment and their parts; sludges from water treatment (waste waters and waters from dredging or septic tanks); materials removed by Enel from the trashracks of hydro power plant intake structures; the portion of alluvial sediments – mechanically removed from hydro basins upon emptying – which is not reused locally, because it is not classified as inert or classified as inert without a specified use; drill cuttings from geothermal activities; and packaging materials (paper and cardboard, wood, glass, plastics and metal). The waste "not included in the previous categories" consists of: i) items of a general or exceptional nature, both liquid (e.g. aqueous waste from groundwater remediation) and solid (e.g. waste from fuel storage and preparation in coal-fired thermal power plants, absorbents, filtering materials, rags and protective clothing, batteries and accumulators, paper and cardboard, wires and cables, miscellaneous components, iron and steel, wood, insulating materials, bituminous mixes, plastics, copper, bronze, brass, saturated or exhausted ion-exchange resins, waste equivalent to non-separately collected municipal waste, inorganic waste, mixed waste from building and demolition activities, waste from primary filtering and screening processes, waste from cooling water treatment, salts and their solutions, soil and rocks, exhausted toner cartridges, glass); and ii) other items produced in low amounts but also individually inventoried, such as fuel-oil bottom ash and other ash.

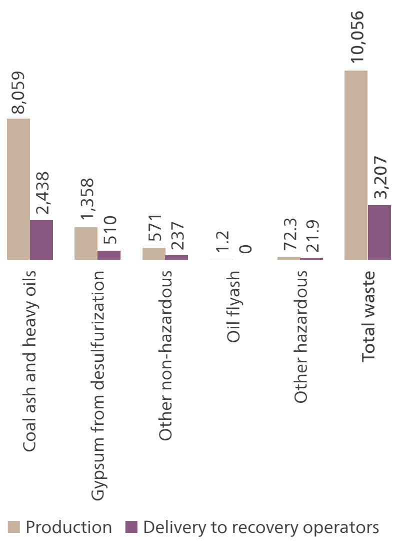
> Hazardous special waste comprises: i) fuel-oil flyash (indicated with its name in the "Waste" table as the most representative item); ii) "other" typical waste items, which are individually indicated only in the relevant pie chart and individually inventoried; these items include: PCB-contaminated equipment (e.g. transformers, capacitors and their parts); waste oils; used batteries; asbestos-containing materials; sludges from condensation of geothermal steam; waste from material contaminated by geothermal fluids); or iii) other waste items of a general or exceptional nature (oil-stained clothing, dirt and deposits, soil from remediation works, oil-in-water emulsions, etc.) that are grouped as "not included in the previous categories".
"Delivery to recovery operators" means the waste that is transferred to operators authorized to recover waste. The remaining waste items are disposed of by authorized operators.
The waste data are those yearly reported to the waste inventory (for activities carried out within the European Union) or obtained from the qualitative and quantitative characteristics of the waste indicated in the relevant records.

The results show that:

> the production of most of the ash is obviously correlated with fuel consumption and characteristics, as well as with the presence of more or less effective treatment systems (bag filters or electrostatic precipitators); however, the amount of ash depends on various factors, such as: frequency of ash removal from flue-gas ducts and from the hoppers of boilers and of particulate collectors; possible "watering" of the ash to prevent the formation of dust during its temporary storage in the plant site; combustion of flyash in the upper part of boiler furnaces in the case of dual oil-gas firing; the production of gypsum naturally reflects limestone consumption in the flue-gas desulfurization process;

> the waste "not included in the previous categories" includes:
  - solid waste: in the case of electricity generation, packaging materials containing residues of or contaminated by hazardous substances, absorbents, filtering materials, rags and protective clothing contaminated by hazardous substances, fluorescent tubes and other mercury-containing waste; in the case of electricity distribution, soil from clean-up of accidental oil spills;
  - liquid waste, mostly consisting of rainwater potentially contaminated by oils and collected in the vats underlying the transformers of high-voltage/medium-voltage substations in the electricity distribution grid.

Main categories of special waste in 2013 (thousand t)



Radioactive waste (nuclear generation)

The radioactive waste produced in Slovakia is treated in State-owned facilities.
Both liquid and solid radioactive waste items are classified into the following categories:

> low-level (e.g. clothing, paper towels, laboratory equipment used in areas where radioactive material is handled) and intermediate-level (e.g. contaminated equipment, sludges and resins from various treatment processes); this waste produces less than 2 kW/m^3 of residual heat and may be further distinguished into:
  - "short-lived", the waste that, after conditioning, qualifies under the requirements for off-site surface or subsurface storage (specified average concentration of alpha-emitting nuclides: below 400 Bq/g);
  - "long-lived": the waste that, after conditioning, does not qualify under the requirements for off-site surface or subsurface storage (specified average concentration of alpha-emitting nuclides: equal to or greater than 400 Bq/g);

> high-level: waste releasing more than 2 kW/m^3 of residual heat; it is not allowed to be placed into off-site surface or subsurface storage sites; production of this waste is very small under the normal operating conditions of a nuclear power plant (e.g. metal waste and corrosion products removed during clean-up of the reactor core). Solid waste is sorted on the basis of its activity and classified as follows:
  - burnable technological waste;
  - compactable technological waste;
  - suitable for other treatment, such as fragmentation and cementing.

The waste is characterized and, depending on its type, it may be decontaminated, dried, cut, low-pressure compacted and finally packaged in drums or plastic bags.

These drums or bags are temporarily segregated into shielded enclosures and then fed to treatment systems. The waste that cannot be stored into off-site surface or subsurface sites and remains in the plant site is placed into stainless steel containers. Another category of solid waste, whose activity decreases rapidly (e.g. filters of the reactor ventilation system), may be disposed of as special waste (normal industrial waste) immediately or after an adequate period of decay within the plant.

Liquid waste mostly consists of concentrated solutions resulting from the treatment of waste waters via vaporization (see "Radionuclides in waste waters (nuclear power generation)" in the "Waste waters" chapter) and of drainage from systems, tubes, pipes and floors of the reactor building. Other contaminated liquid waste includes waste oils, oils separated from waters, solvents, etc.

In Spain, radioactive waste management is covered by a general radioactive waste plan, which is drawn up by Empresa Nacional de Residuos Radiactivos (Enresa) and approved by the Ministry of Industry. The current plan was approved in July 2006.

Two categories of radioactive waste are considered:

> low- and intermediate-level waste with "short-lived" β-γ radiation and limited content of "long-lived" α emitters; this waste is treated, solidified (if liquid) and conditioned in 220-liter drums in the nuclear power plants (resins, concentrates, sludges, dried sludges and filters are cementified, while compactable waste is supercompacted); once the waste has been accepted by Enresa, it is delivered to the El Cabril facility for final storage;

> high-level waste with higher concentration of "long-lived" emitters and creation of considerable amounts of residual heat; the basic strategy (applying also to some intermediate-level waste not suitable for being finally stored into the El Cabril facility) is to deliver this waste to a centralized, temporary dry storage facility operated by Enresa.

The tables display the most significant absolute data on radioactive waste: production of low-/intermediate- and high-level waste in the year, distinguishing in both cases between liquid and solid waste.

The production of solid intermediate- and low-level radioactive waste has an upward trend until 2012 owing to activities of maintenance and efficiency enhancement of Spanish plants. The production of solid high-level radioactive waste grew in 2013 especially as a result of the replacement of fuel rods and of their temporary storage into the pools of some Spanish plants.

Key Performance Indicators - KPIs

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN22 Specific waste production								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	70.0	69.3	59.0	56.7	47.2	-32.62	-16.82
Coal and brown-coal ash (thermal generation)	g/kWh net from fuel oil & gas oil	0.054	0.075	0.082	0.089	0.083	53.70	-6.74
Oil bottom ash (thermal generation)	g/kWh net from fuel oil & gas oil	0.058	0.075	0.082	0.089	0.090	55.17	1.12
Coal and brown-coal ash (thermal generation - CHP)	g/kWh net from coal and brown coal	204	231	234	242	229	12.47	-5.45
EN22 Specific production of radioactive waste								
Nuclear generation								
low- and intermediate-level								
liquid	mm^3/kWh net	0.000	0.000	0.000	0.021	0.370	-	1,662
solid	mm^3/kWh	9.70	8.62	11.5	17.9	7.60	-21.64	-57.46
high-level								
solid	mg/kWh net	0.000	0.370	0.406	2.08	2.48	-	19.20
	mm^3/kWh	0.975	0.167	0.350	0.887	na	na	na
Nuclear generation (CHP)								
low- and intermediate-level								
liquid	mm^3/kWh eq. net	6.59	5.36	3.78	2.29	2.58	-60.95	12.25
solid	mg/kWh eq. net	2.32	2.06	2.07	2.09	1.97	-15.11	-6.07
high-level								
solid	mg/kWh eq. net	0.074	0.135	0.101	0.012	0.023	-68.92	91.67
EN22 Low-, intermediate- and high-level radioactive waste stored inside plants								
liquid	% in volume of production since the start of operation	58.2	53.6	46.7	42.2	38.2	-34.42	-9.55
solid	% in weight of production since the start of operation	32.8	30.8	27.0	26.9	27.3	-16.74	1.67
	% in volume of production since the start of operation	69.9	27.1	25.1	25.9	25.3	-63.85	-2.37
EN22 Waste recovery								
Non-hazardous special waste								
Coal and brown-coal ash	% production	27.8	21.2	28.0	26.4	30.2	8.52	14.44
bottom ash	% production	16.3	16.7	42.3	29.8	41.5	154	39.18
flyash	% production	28.8	21.5	26.8	26.1	29.3	1.50	11.99
Gypsum from desulfurization	% production	19.3	36.9	27.0	28.7	37.7	95.18	31.47
Other non-hazardous special waste								
electricity generation & geothermal drilling	% production	10.6	19.7	23.4	17.2	34.3	225	99.87
electricity distribution	% production	20.5	24.3	51.6	36.7	45.3	121	23.32
fuel storage & handling, gas distribution	% production	21.4	88.7	100	85.7	98.6	361	15.01
Total	**% production**	**12.8**	**21.1**	**35.4**	**24.9**	**41.4**	**224**	**66.69**
Total non-hazardous special waste								
electricity generation & geothermal drilling	% production	25.2	23.3	27.7	26.4	31.4	24.53	18.84
electricity distribution	% production	20.5	24.3	51.6	36.7	45.3	121	23.32
fuel storage & handling, gas distribution	% production	21.4	88.7	100	85.7	98.6	361	15.01
Total	**% production**	**25.2**	**23.3**	**28.3**	**26.6**	**31.9**	**26.80**	**19.73**

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Hazardous special waste								
Oil flyash	% production	67.1	67.2	77.4	0.0	0.0	-100	-100
Other hazardous special waste								
electricity generation & geothermal drilling	% production	12.6	18.3	58.9	36.8	18.3	45.69	-50.17
electricity distribution	% production	77.3	77.4	69.7	80.0	85.6	10.80	7.02
fuel storage & handling, gas distribution	% production	0.000	17.6	49.6	73.4	47.2	-	-35.71
Total	**% production**	**31.7**	**36.9**	**62.6**	**56.5**	**30.3**	**-4.29**	**-46.38**
Total hazardous special waste								
electricity generation & geothermal drilling	% production	13.8	19.6	59.6	35.8	18.0	29.98	-49.81
electricity distribution	% production	77.3	77.4	69.7	80.0	85.6	10.80	7.02
fuel storage & handling, gas distribution	% production	0.00	17.6	49.6	73.4	47.2	-	-35.71
Total	**% production**	**32.2**	**37.5**	**62.9**	**55.6**	**29.8**	**-7.47**	**-46.45**
Total special waste								
electricity generation & geothermal drilling	% production	25.2	23.3	27.8	26.5	31.3	24.46	18.36
electricity distribution	% production	25.6	29.9	53.0	43.3	47.7	86.46	10.08
fuel storage & handling, gas distribution	% production	20.6	80.2	97.5	85.6	97.4	374	13.77
Total	**% production**	**25.2**	**23.4**	**28.4**	**26.9**	**31.9**	**26.52**	**18.74**

EN22 Specific production of waste

Ash and gypsum from desulfurization (both from thermal generation, simple and CHP) are the only categories of waste which have a significant correlation with the volume of activities.
The tables show the overall production of coal ash and oil ash per kWh net (thermal generation, simple or CHP) generated from each of the two fuels.
The use of better quality fuels (lower amount of ash produced) and the generalized application of advanced particulate collection technologies (higher amount of flyash collected) have opposite effects, which are accompanied by fluctuations that depend on contingent circumstances, as previously pointed out with reference to the waste production figures in absolute terms.
Specific production of liquid medium- and low-level radioactive waste in simple nuclear generation (Spanish nuclear plants) over the five-year period shows an upward trend in the past three years, owing to activities of plant maintenance and efficiency enhancement.
Net specific production of coal and brown-coal ash from thermal generation was down by roughly 17% on 2012 (47.2 g/kWh in 2013), whereas the one of coal and brown-coal ash from CHP thermal generation was down by about 5%.

For nuclear generation, the tables show two indicators that are typical of the sector:

> production of radioactive waste (distinguished by activity and state of aggregation) per unit of electricity produced in the year;
> ratio of the amount of liquid and solid radioactive waste stored in the plant site to the overall amount of the same waste produced since the beginning of operation of the plant.Specific production of liquid intermediate- and low-level radioactive waste in CHP nuclear plants over the five-year period has a declining trend owing to retrofits of sewage and drainage systems in Slovak plants, which have made it possible to recirculate liquid radioactive waste (containing boric acid) inside the plants and thus to avoid its discharge.

The trend of specific production of liquid intermediate- and low-level radioactive waste in simple nuclear generation (Spanish nuclear plants) over the five-year period is to be ascribed to activities of plant maintenance and efficiency enhancement carried out over the years.
In 2013, specific production of solid high-level radioactive waste in simple nuclear generation grew slightly owing, above all, to the replacement of fuel rods and to their temporary storage into the pools of some Spanish plants.

EN22 Special waste recovery

For the main categories of special waste, this indicator expresses the ratio of the quantities delivered to recovery operators to the quantities produced.

In 2013, special waste recovery increased owing, among others, to the higher amount of gypsum and ash recovered from coal- and brown-coal-fired plants; in particular, the higher recovery of ash reflects a higher demand by the building industry, especially in Italy.

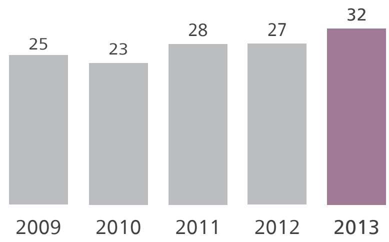
The erratic pattern of hazardous and non-hazardous waste production (especially from the technological cycles producing lower amounts thereof) is to be ascribed, above all, to the nature of this waste, because it originates from operation & maintenance activities, which generate different types of waste over the years with different opportunities of recovery.

The following are the methods used for disposing of and recovering the waste produced:

> Methods of disposal
  - specially engineered landfill (e.g. placement into lined, discreet cells which are capped and isolated from one another and the environment) for non-recovered ash and gypsum;
  - incineration on land (for biological waste).

> Methods of recovery
  - used principally as a fuel or other means to generate energy (oil ash, dirty rags and other burnable waste);
  - regeneration/recovery of solvents (waste from chemical laboratories);
  - recycling/reclamation of metals and metal compounds;
  - recycling/reclamation of inorganic materials (recovered ash and gypsum);
  - regeneration (oils and batteries).

Total waste recovery
(% of waste production)



EN24 Weight of transported, imported, exported or treated waste deemed hazardous under the terms of the Basel Convention Annex I, II, III and VIII, and percentage of transported waste shipped internationally

The overall weight of hazardous waste delivered by Enel or on behalf of Enel to recovery or disposal operators coincides with the amounts of the individual types of waste produced during the year, except for the amounts temporarily remaining in authorized storage deposits, in the waste production sites. All the amounts of waste are delivered to authorized waste management operators. Enel does not import or export waste.

For details, see indicator EN22.

Recovery of packaging materials

To carry out its activities, the Enel Group purchases a broad range of products and raw materials in the market. These items are packaged in containers of different shape and materials.

The pursuit of environmental management policies throughout the Group and the dissemination of ISO 14001-certified or EMAS-registered environmental management systems (with emphasis on performance) improve the sorting of waste and, consequently, the recovery of packaging materials.

Packaging materials are separately collected (paper and cardboard, wood, plastics, metals and glass). Metal waste is sold, whereas the other separately-collected items of waste are disposed of at zero or extremely low costs.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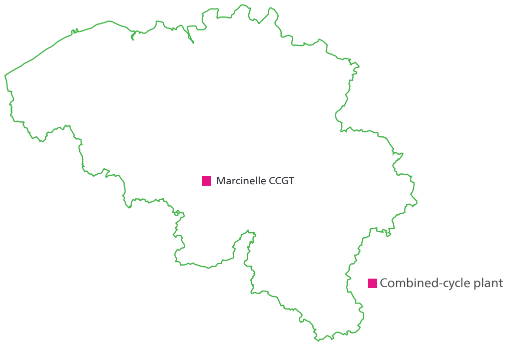
Europe

Belgium

Thermal power generation

Marcinelle Energie SA



The Numbers

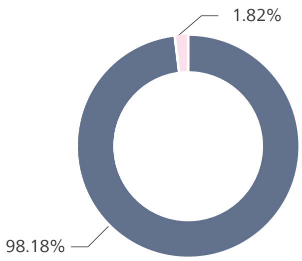
Power plants	Net capacity (MW)	Generation (million kWh)
1	406	1,373

Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Combined-cycle gas turbines	**1**	**1**	**406**

Fuel consumption

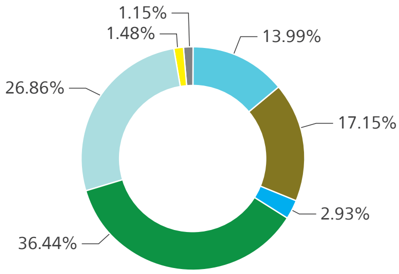
Total: 211,924 t of oil equivalent



- Natural gas
- Gas oil

Expendables

Total: 269.46 t



- Sulfuric & hydrochloric acids
- Other
- Ammonia
- Lime, ferric chloride & polyelectrolyte
- Sodium hypochlorite, chlorine dioxide, ferrous sulfate, ferrous chloride & trisodium phosphate
- Lubricating oil
- Caustic soda

Waste waters

Discharged: 822,184 m^3

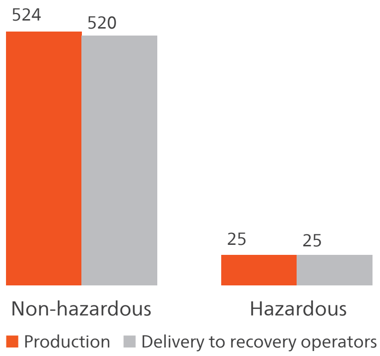
Waste waters include meteoric waters that are susceptible to pollution and are therefore fed to treatment systems before being discharged or used.

Water for industrial uses (100% from rivers)

Total consumption: 1,538,600 m^3

Special waste

Total production: **549 t**
Total delivery to recovery operators: **545 t**



Emissions into the atmosphere

CO_2: **513,616 t**

Highlights of 2013

The decrease in consumption of water for industrial uses and, more generally, of some expendables (used, above all, for conditioning the cycle) is mainly due to the fact that, in 2013, the Marcinelle plant was in full start-up mode and, for a long time, not in commercial operation.
Moreover, many outages during the year (e.g. the one of the sodium-hypochlorite batching system) involved much more significant boiler drainage than under normal operating conditions.

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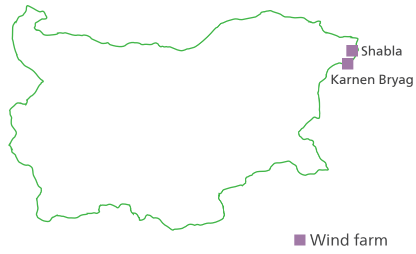
Enel operates in Belgium through Marcinelle Energie SA (thermal power generation).

Bulgaria

Wind power generation

Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
2	42	86

Power installations

	Power plants no.	Net maximum electrical capacity MW
	2	42

Equivalent yearly hours of utilization*

Wind: **2,048 hours**

* Yearly generation/capacity ratio.

Avoided CO_2 emissions (t)

Due to wind generation: **99,806**

Emissions from the otherwise necessary fossil-fired thermal generation.

Highlights of 2013

Enel operates in Bulgaria through Enel Green Power (wind power generation).

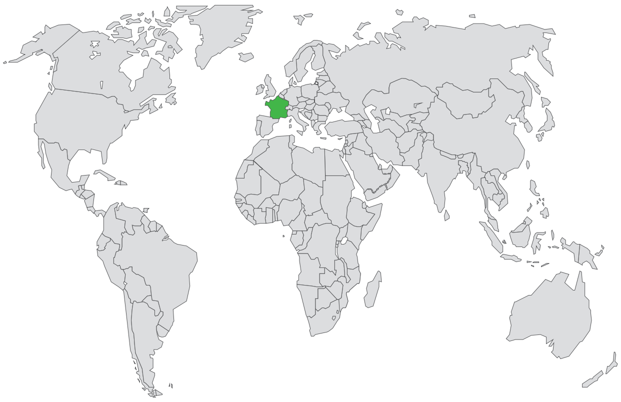
Enel Green Power owns wind farms with a net maximum capacity of 42 MW.

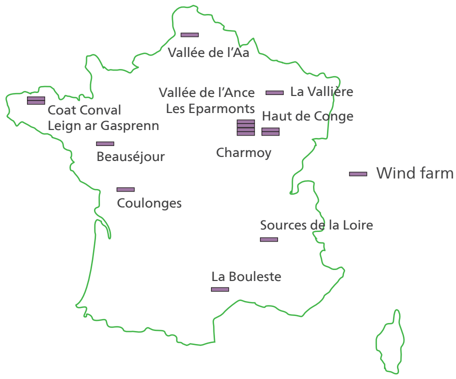
EN18 Wind power displaced nearly 100,000 t of CO_2 emissions into the atmosphere (about 2% more than last year) thanks to a proportional increase in generation.

France

Wind power generation

Enel Green Power SpA





The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
19	186	362

Power installations

	Power plants no.	Net maximum electrical capacity MW
WIND	**19**	**186**

Equivalent yearly hours of utilization*

Wind: **1,968 hours**

* Yearly generation/capacity ratio.

Avoided CO_2 emissions (t)

Due to wind generation: **218,704**

Emissions from the otherwise necessary fossil-fired thermal generation.

Highlights of 2013

In the next few years, Enel Green Power will seize additional development opportunities in France, through a pipeline of hydro, solar and wind power projects totaling more than 1,000 MW.

Enel operates in France through Enel Green Power, which owns wind farms with a net maximum capacity of 186 MW.

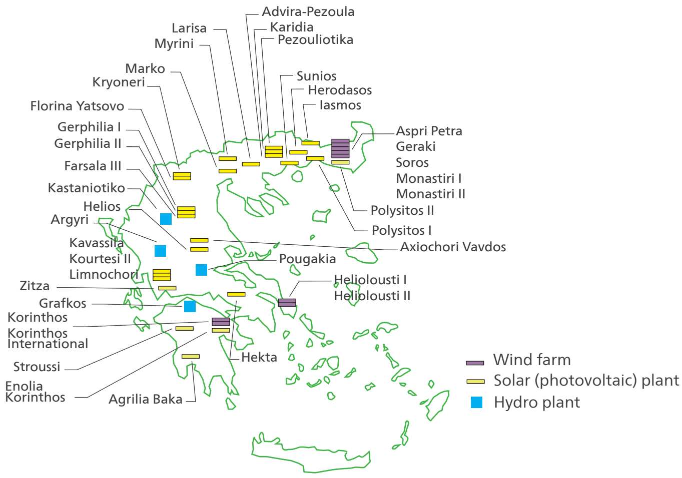
In 2013, Enel Green Power put two wind farms (each of 8 MW) into service: La Vallière (8 MW) in the Loire valley region and Vallée de l'Aa (8 MW) in the Nord-Pas-de-Calais one. It also increased the capacity of its Haut de Conge wind farm by 4 MW.

EN18 Wind power displaced about 218,704 t of CO_2 emissions into the atmosphere.

Greece

Hydro, wind and solar (photovoltaic) power generation

Enel Produzione SpA
Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
50	290	575

Power installations

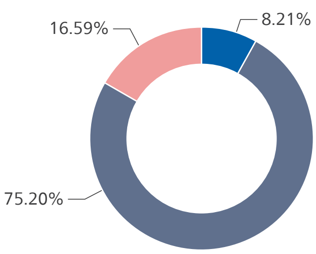
HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	5	0	19

WIND	Power plants no.	Net maximum electrical capacity MW
	17	200

SOLAR PHOTOVOLTAIC	Power plants no.	Net maximum electrical capacity MW
	28	71

Net electricity generation

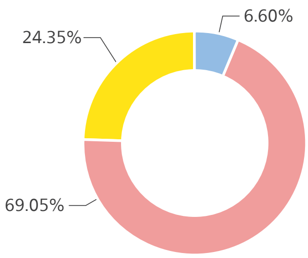
Total: 575 million kWh



Hydro from natural flows
Wind
Solar (photovoltaic)

Net maximum electrical capacity

Total: 290 MW



Total hydro
Total wind
Total solar (photovoltaic)

Equivalent yearly hours of utilization*

Wind: **2,160 hours**

Solar (photovoltaic): **1,351 hours**

Hydro: **2,466 hours**

* Yearly generation/capacity ratio.

Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	39,244
Due to wind generation	359,359
Due to solar (photovoltaic) generation	79,285
Total	**477,888**

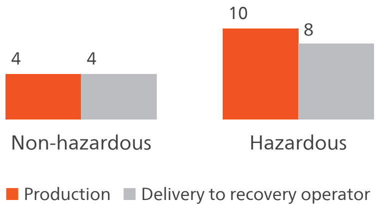
Expendables

Total: 3.48 t

Special waste

Total production: **14 t**

Total delivery to recovery operators: **12 t**



Other data

Wind & solar photovoltaic generation

Wind systems

Surface area occupied by platforms, service roads, buildings: **116.65 ha**

Solar (photovoltaic) systems

Surface area occupied by modules: **80.42 ha**

Total surface area affected by the installations: **246.89 ha**

Highlights of 2013

Enel operates in Greece through Enel Green Power (hydro, wind and solar photovoltaic power generation).

EN5 EN6 EN18 Enel Green Power Hellas commissioned the following photovoltaic power plants, with an overall net maximum capacity of over 48 MW:

> Gephyria I and II and Farsala III (totaling 4.5 MW) in Thessaly;
> Kryoneri and Florina Yatsovo (totaling 3.3 MW) in western Macedonia;
> Axiochori, Vavdos and Helios (totaling 13.6 MW) in central Macedonia;
> Avdira-Pezoula, Karidia, Pazouliotika, Herodasos, Polysitos I, Iasmos and Sounio (totaling 17.5 MW) in Thrace;
> Hekta (2 MW) in central Greece;
> Zitza (1 MW) in Epirus;
> Stroussi (6.4 MW) in western Greece.

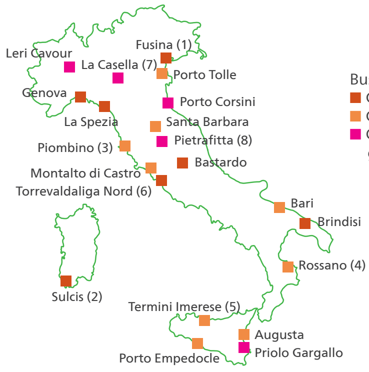
Enel also increased the capacity of its wind farm of Prophet Helias by 0.9 MW.

EN18 Renewable power plants (wind, hydro and photovoltaic) displaced about 478,000 tonnes of CO_2 emissions into the atmosphere (14% more than last year) thanks to a proportional increase in generation.

Italy

Thermal power generation

Enel Produzione SpA



Business Unit
- Generation from coal
- Generation from fuel oil and gas
- Combined-cycle and gas-turbine generation

Power plants
(1) Fusina, Porto Marghera.
(2) Sulcis, Portoscuso, Assemini.
(3) Piombino, Livorno, Portoferraio, Capraia.
(4) Rossano, Mercure.
(5) Termini Imerese, Alicudi, Filicudi, Malfa, Panarea, Santa Marina Salina, Stromboli, Vulcano.
(6) Torrevaldaliga Nord, Ventotene.
(7) La Casella, Alessandria, Carpi.
(8) Pietrafitta, Camerata Picena, Campomarino, Giugliano, Larino, Maddaloni.

The Numbers

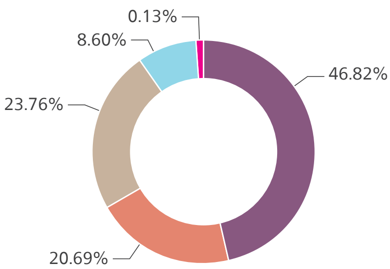
Power plants	Net capacity (MW)	Generation (million kWh)
43	24,664	41,355

Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Steam (condensing)	16	43	11,551
Steam repowered with gas turbines	2	8	5,102
Combined-cycle gas turbines	7	15	5,859
Single-cycle gas turbines	9	27	2,120
Alternative engines	9	40	32
	43	**133**	**24,664**

Net maximum electrical capacity

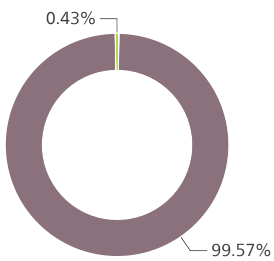
Total: 24,664 MW



- Steam (condensing)
- Steam repowered with gas turbines
- Combined-cycle gas turbines
- Single-cycle gas turbines
- Alternative engines

Net electricity generation

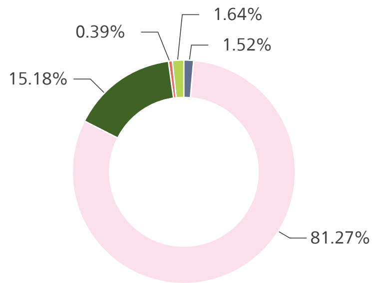
Total: 41,355 million kWh



- From fossil fuels
- From biomass & waste

Fuel consumption

Total: 9,576,749 t of oil equivalent



- Biomass & waste
- Coal
- Natural gas
- Gas oil
- Fuel oil

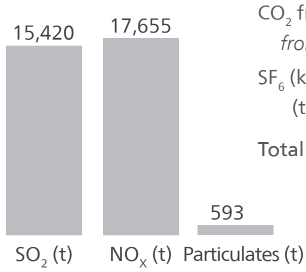
Waste waters

Discharged: **6,035,260 m³**
Used inside plants: **2,392,514 m³**

Avoided CO_2 emissions (t)

Due to electricity generation from biomass and biodegradable fraction of waste: **134,813**

Emission into the atmosphere



CO_2 (t)	34,579,650
CO_2 from desulfurization (t)	145,768
from combustion	*34,433,882*
SF_6 (kg)	758.86
(t of CO_2 equivalent)	16,846,692
Total (t of CO_2 equivalent)	34,596,497

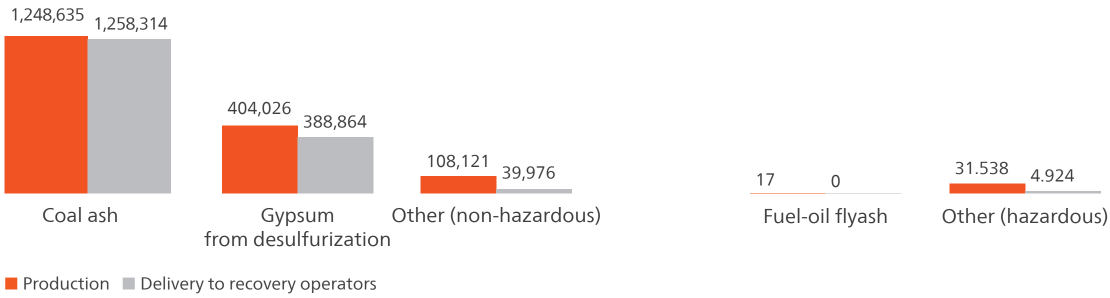
Special waste

Total production: **1,792,336 t**

Total delivery to recovery operators: **1,692,077 t**

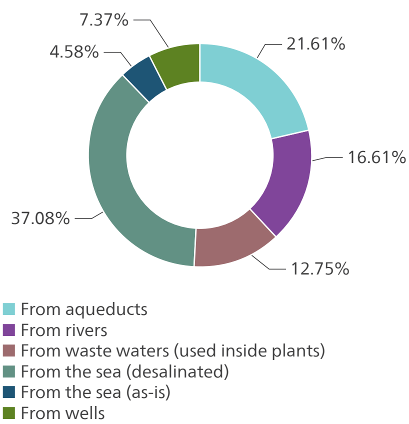
Non-hazardous
Production: 1,760,781 t
Delivery to recovery operators: 1,687,153 t

Hazardous
Production: 31,555 t
Delivery to recovery operators: 4,924 t



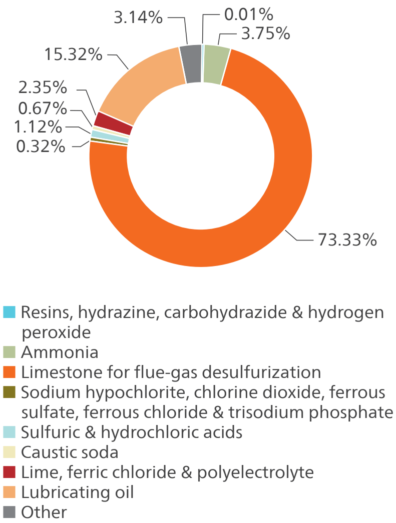
Water for industrial uses

Total consumption: 18,862,000 m³
Total abstraction from inland waters: 8,577,465 m³



Expendables

Total: 436,489.55 t



Fuel-oil storage & handling

The Thermal Generation Business Area operates an integrated fuel-oil storage & handling facility in Ravenna. The facility (IICO), which is equipped with pumping and heating systems, supplies fuel oil via a pipeline to the Porto Tolle power plant.

Overall length of supply pipelines, from sea terminal and from AGIP dock: **28 km**
Capacity of storage tanks: **183,630 m³**
Length of transfer pipeline to Porto Tolle: **92 km**
Fuel oil transferred to Porto Tolle: **70,847 t**
Heat generation - 15 bar and 210 °C steam: **8,331 million kcal**
Electricity consumption: **1.4 million kWh**

In the following pages, the other flow data (consumption of natural gas and gas oil, expendables, water for industrial uses, waste waters, emissions into the atmosphere and into water bodies, waste) are included among the thermal generation data.

Italy

Electricity generation from renewables

Enel Produzione SpA
Enel Green Power SpA

The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
623	15,262	31,534

GEOTHERMAL	Power plants no.	Generating units no.	Net maximum electrical capacity MW
Condensing	32	34	723
Atmospheric exhaust	0	1	0
	32	**35**	**723**

Power installations

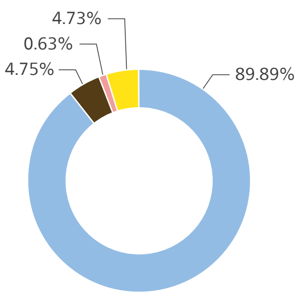
HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	318	336	1,907
Pondage/reservoir	168	178	4,538
Pure/mixed pumped storage	18	19	7,245
	504	**533**	**13,690**

WIND	Power plants no.	Net maximum electrical capacity MW
	32	**720**

SOLAR PHOTOVOLTAIC	Power plants no.	Net maximum electrical capacity MW
	55	**129**

Net maximum electrical capacity

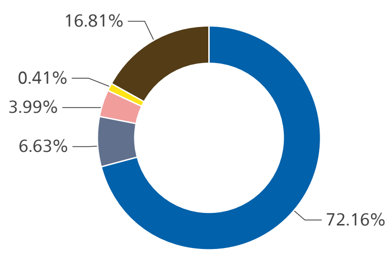
Total: 15,262 MW



- Total hydro
- Total geothermal
- Total solar (photovoltaic)
- Total wind

Net electricity generation

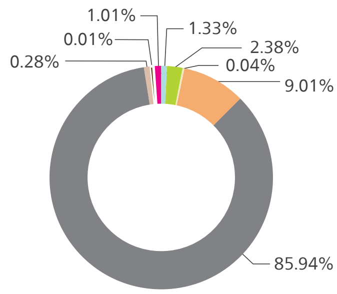
Total: 31,534 million kWh



- Hydro from natural flows
- Hydro from pumped storage
- Wind
- Solar (photovoltaic)
- Geothermal

Expendables

Total: 67,322 t



- Hydrochloric acid
- Bentonite
- Barite
- Geothermal cement
- Caustic soda
- Lubricating oil
- Dielectric oil
- Other

Equivalent yearly hours of utilization*

7,329 geothermal

3,531 hydro

1,750 wind

1,347 solar photovoltaic

* Yearly generation/capacity ratio (excluding hydro from pumped storage).

Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	19,025.346
Due to geothermal generation	4,431.831
Due to wind generation	1,053.002
Due to solar photovoltaic generation	108.232
Total	**24,618.41**

Emissions into the atmosphere

SF_6 - all types of generation (kg)	376
(t of CO_2 equivalent)	8,358
CO_2 (t)	9,111
H_2S - from geothermal fluid (t)	6,367
CO_2 - from geothermal fluid (t)	1,723,340

Geothermal fluid

Total fluid extracted: **48,939,000 t**

net of reinjected liquids: **28,244,170 t**

Steam used for electricity generation: **42,907,430 t**

Fluid used directly for supply of heat: **617,280 t**

Total fluid used for supply of heat: **617,280 t**

Gas oil

2,881 toe

Total consumption

Special waste

Total production: **40,236 t**

Total to delivery operators: **16,574 t**

Other data

Hydro

Emptied reservoirs

Quantity: **7**

Alluvial sediments removed by flushing them out through bottom outlets: **66,900 m^3**

Alluvial sediments removed by mechanical equipment: **97,041.01 m^3**
(of which reused locally: **97,041.01 m^3**)

Fish ladders: **43**

Fish restocking campaigns

Quantity: **49**

Restocked fish: **2,487,344** individuals

in addition to: **90,085 kg**

Geothermal activities

Drilled wells

New: **6**

Rehabilitated: **6**

Extent of drilling: **19,441 m**

In-service wells: **489**

for steam production: 304

for reinjection: 67

for other uses: 118

Solar (photovoltaic) activities

Solar (photovoltaic) systems

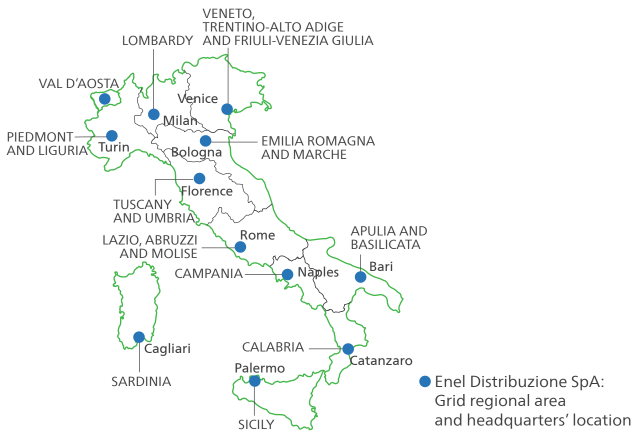
Surface area occupied by modules: **12 ha**

Total surface area affected by the installations: **25.1 ha**

Italy

Electricity distribution

Enel Distribuzione SpA



The Numbers

Substations	Capacity (MVA)	Lines (km)
575,502	196,314	1,132,011

Enel Distribuzione has an ISO 14001-certified environmental management system in place, which extends to its entire organization.

General data

Municipalities served: **7,539**
Surface area served: **276,324.47 km²**
Customers connected to the grid: **31,662,076**

Resource consumption

Expendables: **135.3 t**
Gas oil: **162.36 toe**

Electricity

Total electricity distributed:
230,014.94 million kWh

Own consumption for grid operation:
395.45 million kWh

Emissions into the atmosphere

SF_6: **3,572 kg** (79,298 t of CO_2 eq)
CO_2: **506 t**
Total greenhouse gases **79,804** t of CO_2 eq

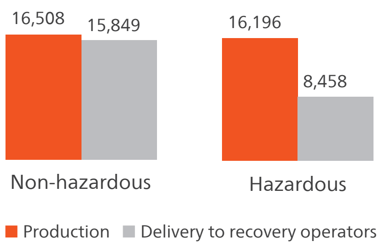
Power installations

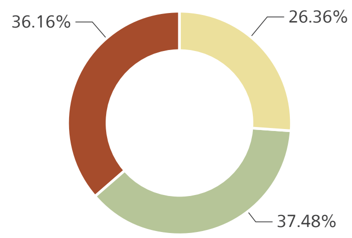
SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	2,159	103,708
Satellite substations and MV units	508	
MV/LV	438,376	80,440
MV/MV	134,459	12,166
	575,502	**196,314**

LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	**Total**
HV	0	0	0	**0**
LV	105,542.19	411,203.74	265,878.1	**782,624.03**
MV	192,849.11	13,120.3	143,417.09	**349,386.5**
	298,391.3	**424,324.04**	**409,295.19**	**1,132,011**

Special waste

Total production: **32,704 t**
Total delivery to recovery operators: **24,307 t**





Highlights of 2013

The increase in the number of installations is due to the fact that, in 2013, Enel Green Power reported 37 photovoltaic plants (each, of 20 kW, installed in an HV/MV substation) as separate systems whereas, in 2012, it had reported them as a single system.

In 2013, total electricity generation declined (-~1.5 TWh) as a consequence of the persistent contraction of demand resulting from the economic crisis, although electricity generation from renewables was up by 5 TWh on 2012, driven by hydro generation (higher hydraulicity during the year).

Enel operates in Italy through: Enel Produzione (thermal and renewable power generation); Enel Green Power, Hydro Dolomiti Energia (HDE), SE Hydropower (SEH) and San Floriano Energy (renewable power generation); Enel Distribuzione and Deval (electricity distribution); and the Market Division (sale of electricity and gas).

EN1 The decrease of the main expendables used for thermal generation and, namely, limestone for flue-gas desulfurization and ammonia for denitrification, is to be correlated with lower generation in 2013.

EN1 EN3 Overall consumption of fossil fuels in thermal generation was down by roughly 13% owing to lower generation from gas and coal. The use of biomass was up by roughly 44%.
Contributors to this growth were:
> refuse-derived fuel (RDF), co-fired with coal;
> solid biomass, used as main fuel or co-fired with coal;
> biodiesel, used in some gas-turbine units in small islands.

In the fossil fuel mix, coal went up, while gas and fuel oil went down. In particular, the contribution of LS oil (in place of MS oil) was up by ~25 percentage points.

EN5 EN6 EN18 Enel Green Power Italia commissioned:
> over 21 MW of photovoltaic plants (Serre Persano, Campania; Chieti and Bolognano, Abruzzi);
> the new binary-cycle geothermal unit of Nuovo Bagnore 3 (1 MW), Tuscany;
> and a new biomass-fired plant (80 kW) in the province of Mantua, Lombardy..

EN6 EN7 EN18 In 2013, the Market Division strengthened its commitment to deploying products and services oriented at sustainable development, energy efficiency and energy-saving awareness. New initiatives were focused on the residential and business segments to encourage efficient use of energy and diminish wastage and negative impacts on the environment. With respect to 2012, the amount of electricity sold under green rate plans remained practically unaltered, whereas the electricity sold under time-of-use rate plans was down by about 13 TWh.

EN8 EN10 Thanks to careful water management and to the improvement plan described in detail under indicator EN26, specific consumption of water was down by ~8% (including the contribution of as-is sea water) and by ~7.5% (excluding the contribution of as-is sea water) on 2012.
In absolute terms, the amount of waste waters reused totaled 2.4 million m^3. This figure excludes make-up water for the closed-cycle cooling system of the Fusina

thermal plant (Venice), which comes entirely from the waste water treatment system of the local municipally-owned company (about 1,116,200 m^3 in 2013).

The following are the results achieved in terms of specific emissions of major pollutants into the atmosphere.

EN16 Net specific CO_2 emissions, referred to total electricity generation, fell to 474 g/kWh (-7%) thanks to higher electricity generation from renewables (mainly hydro).

EN20 The higher share of power plants equipped with more efficient flue-gas desulfurization systems in the generating mix caused net specific emissions of SO_2 referred to thermal generation alone to decrease, while those of NO_x and particulates remained unaltered. Specific emissions of H_2S from geothermal generation continued to drop (-30% on 2012) thanks to the effect of AMIS abatement systems.

EN18 In 2013, CO_2 emissions displaced by carbon-free generation amounted to roughly 25 million tonnes.

EN22 In 2013, the Infrastructure and Networks Division went on with its special project (started in 2005) of decontamination/disposal of equipment containing oil with PCBs (above 50 ppm). Decontamination/disposal of equipment containing oil with a PCB content of above 500 ppm was completed as early as in 2007, ahead of the legislative time limit (2009). From the start of the project to the end of 2013, the pieces of contaminated equipment (power transformers, measuring transformers, capacitors, bushing insulators, circuit-breakers, etc.) covered by the plan diminished by about 30,000 (about 500 in 2013).

The percentage of waste delivered to recovery operators in 2013 was over 93%. The rise (roughly +13%) on 2012 is mainly due to the higher amount of gypsum from desulfurization and coal flyash recovered, reflecting in turn the recovery of demand by the building sector, which started in 2012.

EN 23 Spills:

Italy	*Description*	*Impact and mitigation*
Enel Produzione Amount: **0.05 m³**	**Hydro Emilia-Toscana Business Unit** Accidental spill of an estimated amount of about 50 l of gas oil, caused by C.S.I. Srl, during maintenance jobs at the La Penna dam (Arezzo, Tuscany); the spill partially involved surface waters.	In accordance with emergency procedures, appropriate measures were readily taken to retain the spill and remove the spilled material.
Amount: **7.24 m³**	**Hydro Sicilia Business Unit** 3 oil spills (total volume: 7.24 m³) were reported at the Guadalami plant (spill from the piping of the hydraulic system of unit 1 and 2 turbines).	A specialized firm carried out remediation work.
Enel Distribuzione Amount: **109.72 m³**	**Various locations** Oil spills, mostly from pole-mounted transformers, owing to tampering/thefts. These accidental spills, which generally involve limited areas, fall within the scope of the simplified procedure referred to in Article 249 of Legislative Decree 152/06.	After the spill, Enel notifies the pollution hazard to the relevant authorities, taking emergency safety measures and collecting samples of soil from the affected area. Based on findings from laboratory analyses, Enel adopts remediation measures or, if the set limits are exceeded, rehabilitation projects. To minimize this type of environmental incident, Enel is exploring the possibility of installing resin-insulated dry-type transformers.

EN26

Environmental enhancements

Water

> Enel Produzione: water savings by: i) increasing the recovery of waste waters thanks to high standards of maintenance of water treatment and recycling systems; ii) reusing waste waters as make-up waters in cooling towers; iii) continuing the program of construction of crystallization systems for waste waters from desulfurizer drains in coal-fired plants; and iv) installing systems to treat waste waters by osmosis.

Emissions

> Enel Produzione: improved emission abatement in thermal generation by: using very low-sulfur fuel oil (in particular, heavy fuel oil with very low sulfur content in the Augusta plant, province of Syracuse, Sicily) to reduce SO_2; and replacing burners with new low-NO_X ones (Priolo Gargallo plant, in the same province). Moreover, the company obtained the authorization for and opened the construction site for the environmental upgrade of the Porto Empedocle power plant; the project will result into the installation of a gas-turbine plant in place of unit 2 heavy-fuel-oil-fired steam plant (to be demolished).

> Enel Green Power: launch of "our eco-friendly construction site", a project involving environmentally sustainable measures in a first pilot site, e.g. use of materials with low environmental impact (biodegradable oils, sand-blasting with vegetable abrasives, etc.) and/or with the Ecolabel logo (ceramics and paints), and offsetting of CO_2 emitted during construction through the purchase of certificates.

> Enel Green Power: increased availability of AMIS systems with consequent reduction of emissions of H_2S, As and Hg into the atmosphere.

> Enel Servizi continued its vehicle-fleet renovation project, by replacing service vehicles with certified fuel-efficient ones (Euro 5) and partially replacing vehicles for both private and service use; the average level of emissions from its fleet of vehicles for both private and service use fell by an estimated about 400 t of CO_2. Partial removal of R22 in office air conditioning systems.

Materials and Resources

> Enel Produzione: in the liquid-release treatment system, use of sludges in place of ferric chloride in the secondary neutralizer and of brine from vaporizers for pH balancing (Priolo Gargallo plant).

- Enel Green Power and Enel Produzione: progressive replacement of polluting and toxic products with biodegradable and atoxic ones (hydrazine with carbohydrazide, biodegradable oil and grease in place of mineral oil).
- Enel Servizi: sharp reduction in paper consumption; almost complete removal of non-shared printers; and complete replacement of shared printers with more technologically advanced ones.

Landscape

- Environmental regeneration of the areas surrounding installations; demolition of disused structures (Santa Barbara thermal plant, province of Arezzo, Tuscany) completed.

Waste

- Enel Produzione and Enel Green Power (geothermal energy): continuing of the plan of removal of all asbestos-containing materials.
- In all activities, constant search for new opportunities to recover waste and packaging materials.
- Replacement and disposal of PCB-contaminated transformers and equipment, whose oil was decontaminated and recycled.
- Enel Servizi: reduction of hazardous waste (project for zeroing non-separately collected waste).

Renewables

- Upgrade of plants and harnessing of minimum in-stream flows: Pieve and Sampeyre plants, owned by Enel Produzione (Hydro Piemonte Business Unit); Ala, Mori, Malga Bissina, Costabrunella II and Ponte Pià plants, owned by HDE; consequent increase in energy efficiency and acquisition of green certificates.

Noise

- Preliminary studies, noise measuring surveys and mitigation of noise emissions in various sites.
- Enel Servizi: increased number of electric vehicles; abatement of noise in workplaces thanks to new printers; and abatement of outdoor noise thanks to noise-proofing measures and replacement of obsolete equipment with technologically advanced ones.

Soil

- Enel Produzione: in some sites, improvement of hazardous-substance storage basins; removal and remediation of tanks for heavy fuel oil.

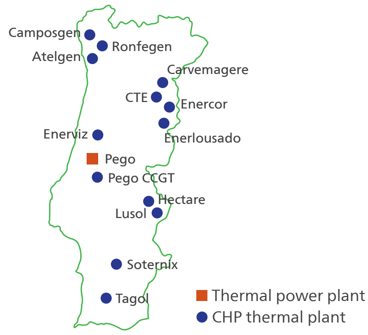
Other

- Enel Green Power: launch of a campaign to replace single-chamber boilers with double-chamber ones in offices.
- Enel Servizi: preference of hotels that are ISO 14001-certified and have electric-car recharging posts.
- Reduction of paper archives (document digitization).

Portugal

Thermal power generation,
simple and CHP

Endesa SA
Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
15	1,103	1,500

Power installations

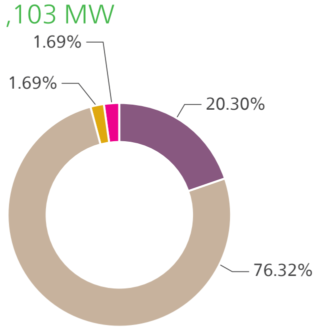
	Power plants no.	Units no.	Net maximum electrical capacity MW
Steam (condensing)	1	2	224
Combined-cycle gas turbines	1	2	841
Single-cycle gas turbines for CHP	1	2	19
Alternative engines for CHP	12	16	19
	15	**22**	**1,103**

Useful heat output (combined with power generation)

Total: 316,549.62
million kcal
(equal to 368 million kWh)

Net maximum electrical capacity

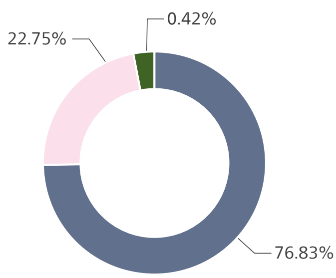
Total: 1,103 MW



Steam (condensing)
Combined-cycle gas turbines
Single-cycle gas turbines for CHP
Alternative engines for CHP

Fuel consumption

Total: 356,510 t of oil equivalent

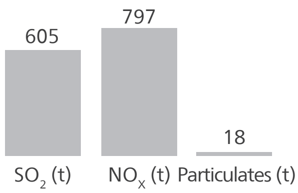


Coal
Natural gas
Fuel oil

Waste waters

Discharged: **325,712 m³**

Emissions into the atmosphere

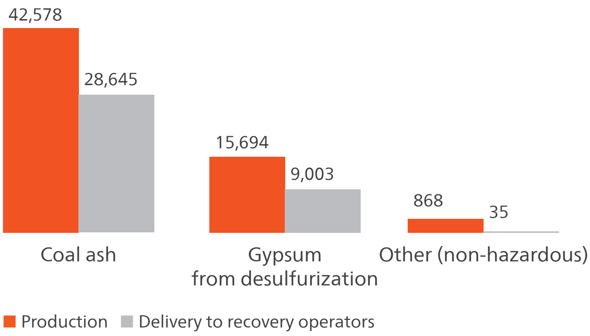


CO_2 (t)	1,159,258
CO_2 from desulfurization (t)	3,846
from combustion	*1,155,412*
Total (t of CO_2 equivalent)	1,159,258

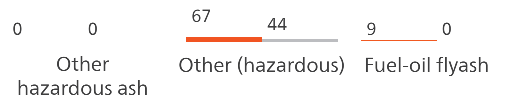
Special waste

Total production: **59,216 t**
Total delivery to recovery operators: **37,727 t**

Non-hazardous
Production: 59,140 t
Delivery to recovery operators: 37,683 t

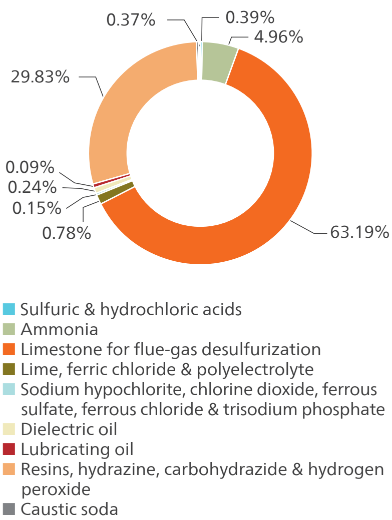


Hazardous
Production: 76 t
Delivery to recovery operators: 44 t



Expendables

Total: 15,520.25 t



Water for industrial uses

Total consumption: 4,517,650 m³
Total abstraction from inland waters: 4,517,650 m³

Portugal

Wind power generation

Enel Green Power SpA

The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
14	126	346

Power installations

	Power plants no.	Net maximum electrical capacity MW
WIND	14	126

Avoided CO_2 emissions (t)

Due to wind generation: **298,212**

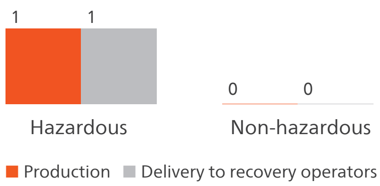
Equivalent yearly hours of utilization*

Wind: **2,747 hours**

* Yearly generation/capacity ratio.

Special waste

Total production: **1 t**
Total delivery to recovery operators: **1 t**



Other data

Wind generation

Wind systems

Surface area occupied by platforms, service roads, buildings: **15.35 ha**

Highlights of 2013

EN1 EN3 In the 2013 fossil fuel mix, the share of coal went up (nearly 77% of total fuel consumption) owing to a very low utilization (for market reasons) of the combined-cycle thermal plant of Pego.

EN8 EN10 Specific water consumption rose for the same reason.

The following are the results achieved in terms of specific emissions of major pollutants and CO_2 into the atmosphere.

EN16 Net specific emissions of CO_2, referred to total electricity generation, slightly decreased owing to, among others, higher wind power generation and use of natural gas as single fuel in CHP plants.

EN20 Net specific emissions of SO_2 and particulates increased owing to a higher share of coal in the total fuel mix (see EN1 EN3), whereas specific emissions of NO_x dropped by 22% mainly as a result of the use of natural gas as single fuel in CHP plants.

EN18 In 2013, wind power generation displaced about 298,000 tonnes of CO_2 emissions into the atmosphere.

EN22 In 2013, waste delivered to recovery operators accounted for 64% of the total waste produced, in line with the value recorded in 2012.

Enel operates in Portugal through Endesa and Enel Green Power (thermal and wind power generation).

EN26

Environmental enhancements

Materials

> Endesa: replacement of toxic materials with less harmful ones (e.g. hydrazine).

Water

> Water was saved by using the closed-cycle cooling system more efficiently and by reusing its drainage waters in the desulfurization process.

Waste

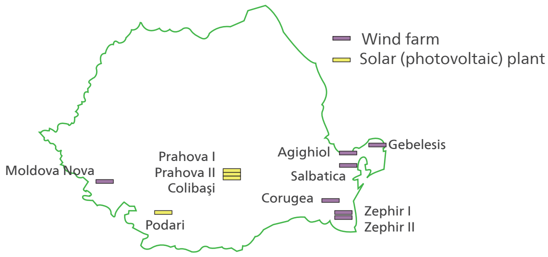
> Endesa: recovery of almost all of the waste produced. Gypsum is sold as a by-product.

Other

> Awareness & training courses focused on environmental emergencies and subsequent assessment of personnel members’ capability of response thereto.

Romania

Renewable power generation | Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
11	534	1,080

Power installations

	Power plants no.	Net maximum electrical capacity MW
WIND	**7**	**498**
SOLAR PHOTOVOLTAIC	**4**	**36**

Avoided CO_2 emissions (t)

Due to wind generation	**1,054,367**
Due to solar photovoltaic generation	**7,066**
Total	**1,061,433**

Equivalent yearly hours of utilization*

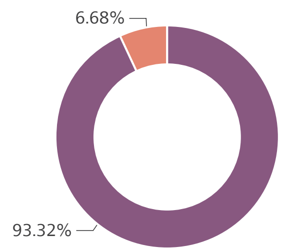
Wind: **2,153 hours**

Solar (photovoltaic): **201 hours**

* Yearly generation/capacity ratio.

Net maximum electrical capacity

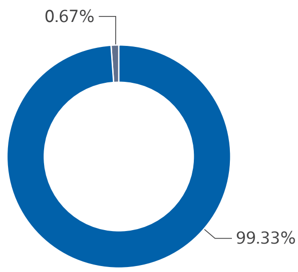
Total: 534 MW



Total wind
Total solar (photovoltaic)

Net electricity generation

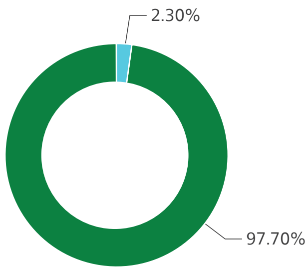
Total: 1,081 million kWh



Wind
Solar (photovoltaic)

Expendables

Total: 8.7 t

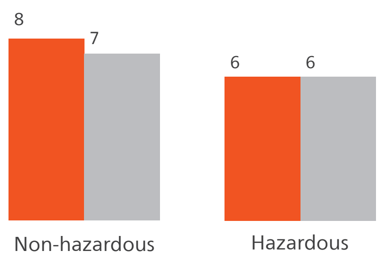


Dielectric oil
Lubricating oil

Special waste

Total production: **14 t**

Total delivery to recovery operators: **13 t**



Production | Delivery to recovery operators

Romania

Electricity distribution

Enel Electrica Banat SA
Enel Electrica Dobrogea SA
Enel Electrica Muntenia Sud SA

Counties (and corresponding company district) served
- Enel Distributie Banat
- Enel Distributie Dobrogea
- Enel Distributie Muntenia
- Headquarters

The Numbers

Substations	Capacity (MVA)	Lines (km)
21,684	21,201	90,906

Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	283	12,989
Satellite substations and MV units	220	136
MV/LV	21,043	7,375
MV/MV	138	702
	21,684	**21,201**

LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	6,317	-	269	**6,586**
MV	15,192	14,004	20,201	**49,397**
LV	22,253	133	12,537	**34,923**
	43,761	**14,137**	**33,007**	**90,906**

General data

Municipalities served: **2,854**
Surface area served: **62,492 km²**
Customers connected to the grid: **2,672,231**

Resource consumption

Expendables: **77.2 t**
- lubricating oil: 0.6 t
- dielectric oil: 76.6 t

Gas oil: **47.8 toe**

Electricity

Total electricity distributed:
13,996 million kWh

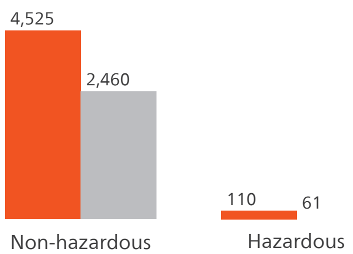
Own consumption for grid operation:
19.9 million kWh

Emissions into the atmosphere

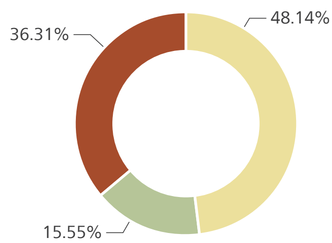
SF_6: **13.2 kg** (293 t of CO_2 eq)
Co_2: **150 t**
Total greenhouse gases **443 t** of CO_2 eq

Special waste

Total production: **4,635 t**
Total delivery to recovery operators:
2,521 t



Production ■ Delivery to recovery operators



Highlights of 2013

EN5 EN6 EN18 In 2013, Enel Green Power commissioned the following photovoltaic plants, thus increasing its net maximum capacity in Romania by 36 MW:

> Prahova I (9.4 MW) and II (9.8 MW) in the Muntenia region;
> Colibaşi (6.5 MW) in the Muntenia region;
> Podari (10 MW) in the Oltenia region.

In Romania, Enel is active in wind and solar (photovoltaic) power generation (through Enel Green Power), electricity distribution (through Enel Distributie Banat, Enel Distributie Dobrogea and Enel Distributie Muntenia) and sale of electricity (through Enel Energia and Enel Energia Muntenia).

EN6 Commercial activities include time-of-use rate plans, which encourage night-time electricity usage, thus enhancing the overall efficiency of the power system, diminishing wastage and negative impacts on the environment. In 2013, the percentage of power sold under these rate plans with respect to total electricity sold slightly diminished, whereas the percentage of power sold under the green rate plans (introduced into the market since the end of 2012) rose.

EN18 Wind power generation (+82% on 2012) and photovoltaic power generation by the new plants avoided 1,061,433 tonnes of CO_2 emissions.

EN22 The percentage of waste recovery dropped from 68% to about 54%. This drop is due, above all, to a higher production of waste items (not always recoverable) from demolition and construction works in Distributie Dobrogea's Tulcea district.

EN 23 Spills:

Romania	*Description*	*Impact and mitigation*
Enel Distributie Dobrogea Amount: **0.140** m³	Explosion of a high-voltage circuit-breaker in the substation of Uricani (Hunedoara county, Transylvania). A second spill was caused by the leakage of one transformer.	Treatment of the affected area (about 20 m²) with biodegradable absorbent material.

EN26

Environmental enhancements

Waste

> Enel Distributie Banat, Enel Distributie Dobrogea and Enel Distributie Muntenia continued their partnership with Recolamp (a non-profit organization) to recover worn or broken lighting fixtures. In 2013, about 304 kg of lamps and fluorescent tubes were delivered to Recolamp. Moreover, always in partnership with Recolamp, the program was extended to the collection of used batteries by placing appropriate containers in the main office sites of the three companies.

Noise

> As a result of a litigation with a private party, Enel Distributie Dobrogea will replace one MV/LV transformer in January 2014.

> Enel Distributie Banat installed special rubber supports beneath the transformers of MV/LV substations to reduce noise levels to below admissible limits.

> Enel Distributie Muntenia completed the construction of noise barriers in the HV substation of Salaj (Bucharest). Moreover, it replaced a noisy transformer with a less loud one and replaced 16 noisy fans in two HV transformers in the Toporaşi (Bucharest) substation.

> 88 surveys were conducted to monitor noise emissions (75 surveys during the installation of the grid in particularly sensitive populated areas).

Other

> Replacement of PCB-contaminated oil in the Lovrin station with new oil. The contaminated oil was delivered to an authorized operator.

> In 2013, soil and groundwater monitoring surveys continued near 8 substations: Banat (Uricani, Satchinez, Fratelia, Lugoj); Dobrogea (Bucu and Slobozia Nord); Muntenia (Călugăreni Comana).

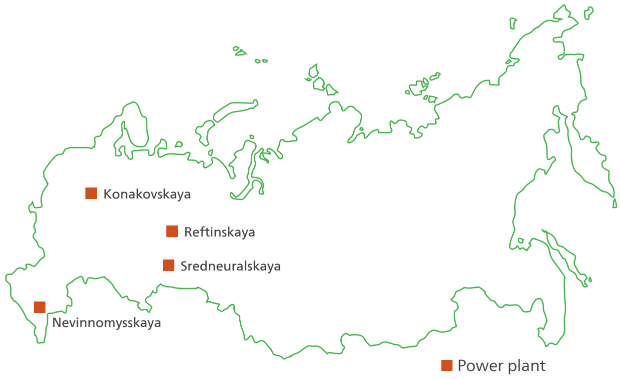
> Lab analyses confirmed no contamination in 7 of the 8 sites. Some contamination (below alarm limits) was observed at the site of Fratelia, where the soil was treated with absorbents; the follow-up analysis will be carried out in 6 months.

> Samples of groundwater collected at the site of Dudeşti (Muntenia) showed no contamination.

Russia

Combined heat & power thermal generation

OGK-5



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
4	9,107	41,901

Power installations

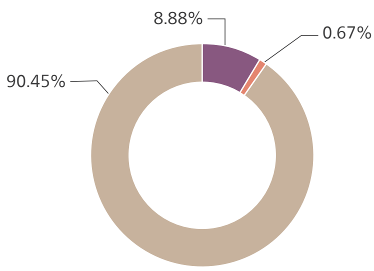
	Power plants no.	Units no.	Net maximum electrical capacity MW	Useful thermal capacity 10^6 kcal/h
Steam (condensing) with intermediate extraction of fluid for CHP	4	36	8,237	-
Steam (back-pressure) for CHP	0	3	61	-
Combined-cycle gas turbines for CHP	0	2	809	-
	4	**41**	**9,107**	**646**

Useful heat output (combined with power generation)

Total: 6,459,134 million kcal (equal to 7,512 million kWh)

Net maximum electrical capacity

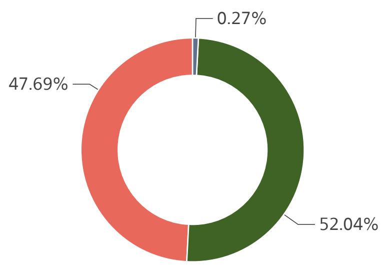
Total: 9,107 MW



- Steam (condensing) with intermediate extraction of fluid for CHP
- Steam (back-pressure) for CHP
- Combined-cycle gas turbines for CHP

Fuel consumption

Total: 10,253,280 t of oil equivalent

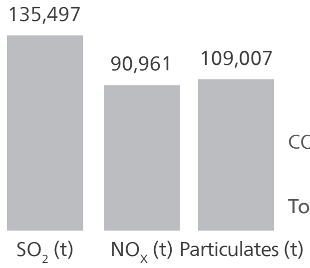


- Fuel oil
- Natural gas
- Coal

Waste waters

Discharged: **23,849,849 m³**
Used inside plants: **5,746,207 m³**

Emissions into the atmosphere



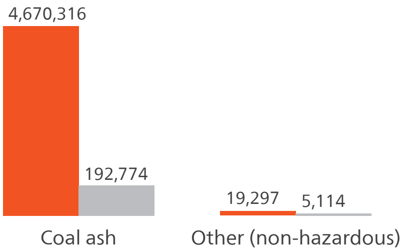
CO_2 (t)	31,500,503
from combustion	*31,500,503*
Total (t of CO_2 equivalent)	31,500,503

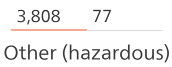
Special waste

Total production: **4,693,421 t**
Total delivery to recovery operators: **197,965 t**

Non-hazardous
Production 4,689,613 t
Delivery to recovery operators: 197,888 t

Hazardous
Production 3,808 t
Delivery to recovery operators: 77 t

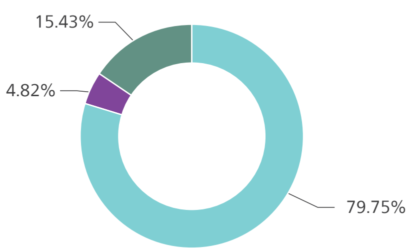




Production Delivery to recovery operators

Water for industrial uses

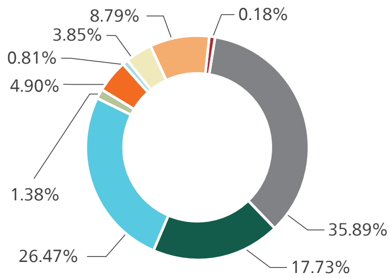
Total consumption: 37,250,441 m3
Total abstraction from inland waters: 31,504,234 m3



From rivers
From wells
From waste waters (used inside plants)

Expendables

Total: 7,930 t



Caustic soda
Resins, hydrazine, carbohydrazide & hydrogen peroxide
Lubricating oil
Dielectric oil
Sodium hypochlorite, chlorine dioxide, ferrous sulfate, ferrous chloride & trisodium phosphate
Lime, ferric chloride & polyelectrolyte
Ammonia
Sulfuric & hydrochloric acids
Other

Highlights of 2013

In Russia, Enel is involved in thermal power generation (through OGK-5) and sale of electricity (through RusEnergoSbyt).

EN1 EN3 The fuel mix remained practically unaltered as against 2012. However, generation fell from 45 TWh to 42 TWh.
The heat rate dropped from 2,081 kcal/kWh in 2012 to 2,075 kcal/kWh in 2013, thanks to the contribution of new and more efficient combined-cycle units in the plants of Sredneuralskaya and Nevinnomysskaya.

EN5 Installed capacity rose as a result of measures that improved the efficiency of two units in the plant of Nevinnomysskaya and increased their capacity by 55 MW in total (9 MW and 46 MW, respectively).

EN8 EN10 In 2013, in spite of lower thermal generation, the consumption of water for industrial uses slightly increased. Specific consumption of water passed from 0.704 liters/kWh in 2012 to 0.754 (+7%) in 2013. The increase was due, above all, to a deep overhaul of units 5 and 6 in the Reftinskaya plant, which involved a number of hydraulic tests and multiple start-ups during the year with consequent steam losses.
Also the plant of Sredneuralskaya recorded an increase in its consumption of water for industrial uses owing to repair jobs and related washing-up in its district heating system.

The following are the results achieved in terms of specific emissions of CO_2 and major pollutants into the atmosphere.

EN16 Net specific emissions of CO_2, referred to overall electricity and heat generation, continued to decline, albeit slightly (from 644 to 637 g/kWh), thanks to the combined effect of: the environmental upgrade of unit 5 (coal-fired) in the Reftinskaya plant; the lower fuel-oil consumption in all plants; and the slight increase in the share of natural gas (in the total fuel mix) due to its consumption by the two high-efficiency CCGTs in the Sredneuralskaya and Nevinnomysskaya plants.

EN20 The increase of specific emissions of NO_X (+2% on 2012) is to be ascribed to the new calculation methodology introduced in the Russian plants and approved by the local authority at the end of 2012. Net specific emissions of particulates mounted by about 20% owing to the lower efficiency of electrostatic precipitators in the units of the Reftinskaya thermal plant, except for unit 5, which was environmentally upgraded. In contrast, the decrease in specific emissions of SO_2 is to be attributed to the reduction (-1%) of the sulfur content of the coal used by the Reftinskaya plant.

EN22 The decrease in non-hazardous waste recovery in 2013 was due to the lower amount of coal flyash recovered in the Reftinskaya plant. Indeed, the drop in the sale of ash was due to the operational acceptance testing of the Dry Ash Removal System (DARS) and of a new system for sorting coal flyash at the outlet of the old wet ash removal system.

EN23 Spills:

Russia	*Description*	*Impact and mitigation*
Amount: **0.2 m^3**	Reftinskaya: 1) Oil spill from the cooling system of one 300-MW unit. The water body involved was lake Reftinskoe. 2) Two oil spills from the cooling system of the stator of two generators. The water body involved was lake Reftinskoe. Sredneuralskaya: 1) Oil spill from the cooling system of feed pump 15. No water body was involved.	All the spills were reported to the competent authorities. Only 3 of the 4 spills reached the water body (lake Reftinskoe). The oily products were detected on the fish farming cages. The products were removed by using absorbent materials. The fourth spill in the boiler room was removed with appropriate absorbent materials and subsequently disposed of in accordance with the applicable environmental/waste management legislation.

EN26

Environmental enhancements

Water

> Reftinskaya (RGRES): the project of recovery of water filtration lost in the ash pond makes it possible to reuse this water (avoiding further use of freshwater) as make-up water in the wet ash removal system.

Emissions

> Reftinskaya: revamping of unit 5 with installation of low-NO_x burners and particulate bag filters is still under way. In 2013, another 30 ha of the ash pond were covered with clay to prevent the dispersal of diffuse particulates. In 2013, the design of bag filters to be installed in unit 7 was completed and also the contract for replacement of the old electrostatic precipitators of unit 4 was signed.

Waste waters

> Sredneuralskaya (SGRES): in 2013, a feasibility study was initiated on optimization of water consumption and of releases. The main goal of the project is to analyze and summarize real water budget data and put in place actions to improve the plant's water performance. The final report of the study is expected in February 2014. Furthermore, a new purification system is planned to be installed by 2019.

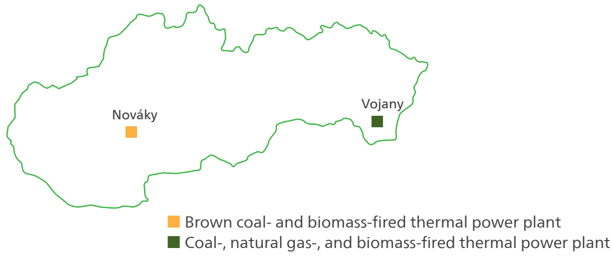
Waste

> In the Reftinskaya plant, the construction of a dry ash removal system (scheduled to become operational in the second quarter of 2014) is still in progress. The system will increase the amount of ash recovered by up to 1 million tonnes per year. However, it should be considered that ash recovery is strongly affected by demand by the related market. Amendments are being made to the Russian legislation to stimulate demand for ash to be reused. In 2013, OGK-5 forged a joint venture with three Russian scientific institutes to promote the development of a strategy for ash recovery. The goal is to achieve an increasing trend of ash recovery from 380,000 tonnes per year in 2014 up to 1 million in 2020.

Slovakia

CHP thermal generation

Slovenské elektrárne AS



The Numbers

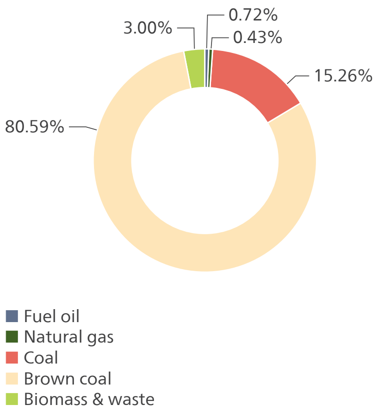
Power plants	Net capacity (MW)	Generation (million kWh)
2	1,254	1,901

Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW	Useful thermal capacity 10^6 kcal/h
Steam (condensing) with intermediate extraction of fluid for CHP	**2**	**13**	**1,254**	**211**

Fuel consumption

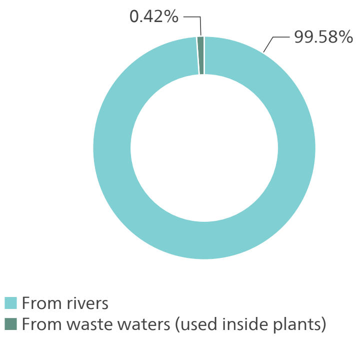
Total: 667,289 t of oil equivalent



Water for industrial uses

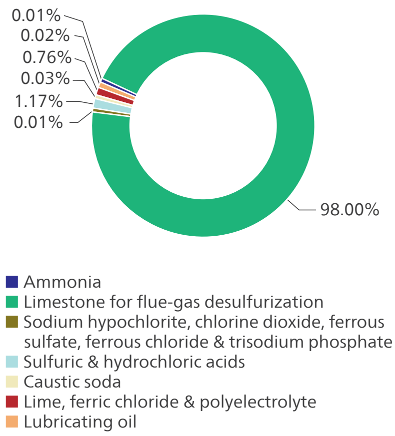
Total consumption: 7,913,007 m^3

Total abstraction from inland waters: 7,879,699 m^3



Expendables

Total: 96,682 t



Net electricity generation

1,901 million kWh

Useful heat output (combined with power generation)

377,682 million kcal
equal to 439 million kWh

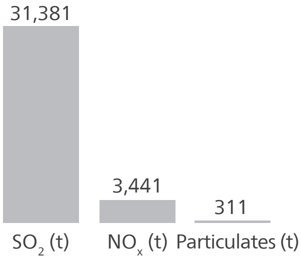
Waste waters

Discharged: **3,276,949 m³**
Used inside plants: **33,308 m³**

Avoided CO_2 emissions (t)

Due to electricity generation from biomass: **46,942**

Emissions into the atmosphere



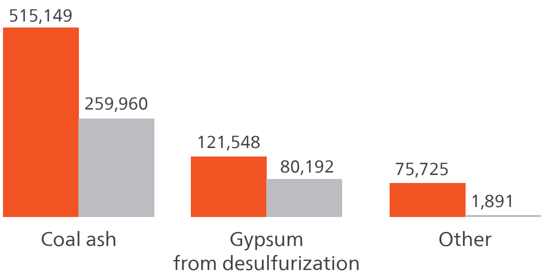
CO_2 (t)	2,684,529
from combustion	*2,642,878*
from desulfurization	*41,651*
Total (t of CO_2 equivalent)	2,685,845

Special waste

Total production: **713,810 t**
Total delivery to recovery operators: **342,095 t**

Non-hazardous
Production: 712,421 t
Delivery to recovery operators: 342,043 t

Hazardous
Production: 1,389 t
Delivery to recovery operators: 52 t

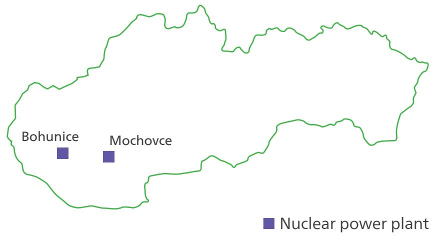


■ Production ■ Delivery to recovery operators

Slovakia

CHP nuclear generation

Slovenské elektrárne AS



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
2	1,814	14,624

Power installations

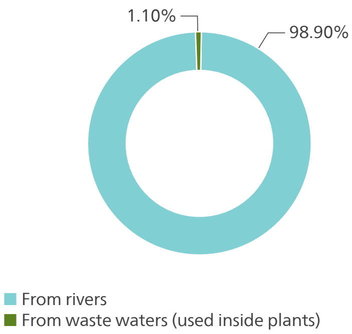
	Power plants no.	Units no.	Net maximum electrical capacity MW	Useful thermal capacity 10^6 kcal/h
Steam (condensing)	**2**	**4**	**1,814**	**464**

Useful heat output (combined with power generation)

Total: 504,078 million kcal (equal to 586 million kWh)

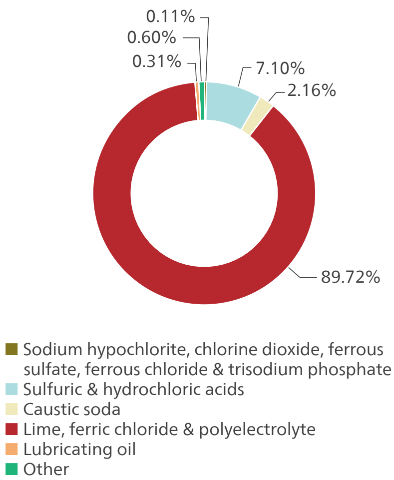
Water for industrial uses

Total consumption: 44,070,248 m^3
Total abstraction from inland waters: 43,584,662 m^3



Expendables

Total: 6,085 t



Radionuclides in discharged waste waters

Tritium

21,632 GBq

Waste waters

Discharged: **8,751,000 m³**
Used inside plants: **482,586 m³**

Avoided CO_2 emissions (t)

Due to nuclear generation: **12,523,364**

Radioactive emissions into the atmosphere

Aerosol α 1.82 kBq

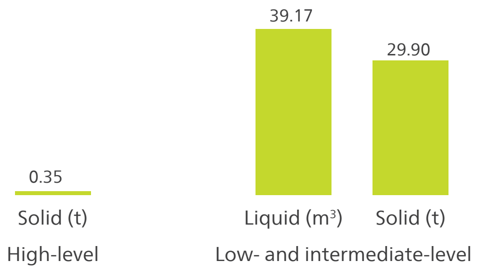
Aerosols β and γ 15.64 MBq

Noble gases 5.95 TBq

Iodine 131 0.727 MBq

Strontium 89 and 90 70.44 kBq

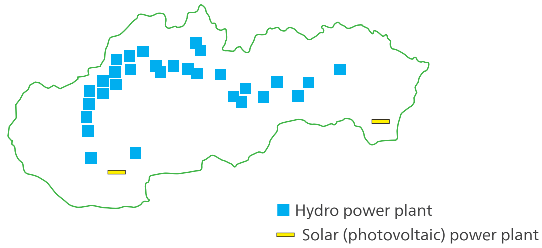
Radioactive waste



Slovakia

Hydro and solar (photovoltaic) power generation

Slovenské elektrárne AS



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
36	2,330	4,761

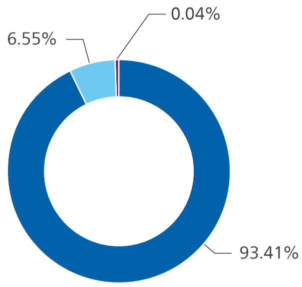
Power installations

HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	16	43	1,042
Pondage/reservoir	14	31	279
Pure/mixed pumped storage	4	15	1,007
	34	**89**	**2,328**

SOLAR (PHOTOVOLTAIC)	Power plants no.	Net maximum electrical capacity MW
	2	**2**

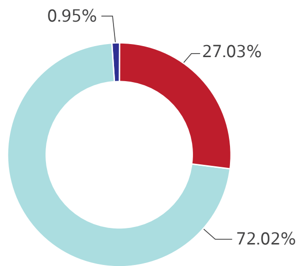
Net electricity generation

Total: 4,761 million kWh



Expendables

Total: 103 t



Equivalent yearly hours of utilization*

1,022 Solar (photovoltaic)

3,365 Hydro

* Yearly generation/capacity ratio.

Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	3,661,638
Due to solar photovoltaic generation	1,601
Total	**3,663,239**

Emissions into the atmosphere

SF_6 - all types of generation (kg)	48
(t of CO_2 eq)	1,061
CO_2 (t) from gas-oil combustion	11
Total (t)	1,072

Gas oil

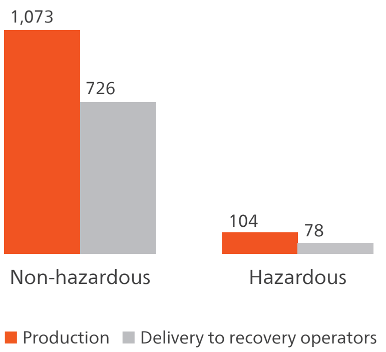
3.3 toe

Total consumption

Used for feeding emergency generating sets.

Special waste

Total production: **1,176 t**
Total delivery to recovery operators: **805 t**



Highlights of 2013

Overall electricity generation recorded a slight increase (+3% on 2012) thanks, above all, to a higher contribution of hydro, nuclear and biomass-fired generation, which more than offset the decrease in generation from fossil fuels (-14%), especially from coal and brown coal.

In Slovakia, Enel is engaged (through Slovenské elektrárne) in thermal, nuclear (both CHP) and renewable (hydro and solar photovoltaic) power generation.

EN1 EN2 With regard to expendables, the consumption of limestone, ammonia, caustic soda, lubricating and dielectric oils diminished owing, above all, to lower thermal generation by the Vojany plant. The lower consumption of the above oils is also due, in part, to their treatment and reuse in some plants. For instance, at the Vojany plant, waste oils are cleaned mechanically and electrostatically. At the nuclear plant of Bohunice, used dielectric oils are filtered and degasified.

EN22 The decrease in the production of gypsum (-30%) with respect to 2012 is due both to the lower amount of coal and brown coal used for thermal generation and to the use of coal of better quality (with a lower sulfur content).

EN16 EN20 Net specific emissions of all macro-pollutants, referred to thermal generation, continued to drop in 2013, thanks to a longer period of co-firing with biomass in the Nováky plant. This result is also reflected by specific emissions (including those of CO_2) referred to total electricity generation owing, above all, to the increased share of renewable and nuclear generation.

EN18 In 2013, avoided CO_2 emissions totaled over 16 million tonnes. The decrease with respect to 2012 does not reflect the reality of facts (overall increase of electricity generated by biomass-fired, hydro and nuclear plants); indeed, the reference value of specific emissions of CO_2 from thermal generation at country level (source: Enerdata), used to calculate avoided emissions, was lower in 2013 than in 2012 (823.37 g/kWh vs. 979.00 g/kWh) and more than offset the increase of renewable (hydro and biomass) and nuclear generation.

EN8 Specific consumption of water in CHP thermal generation continued to decrease sharply (-~6% on 2012). This improvement, adding to last year's excellent water performance, is mainly due to the final passage from closed-cycle to open-cycle cooling in the Vojany plant.

EN22 The production of liquid intermediate- and low-level radioactive waste recorded a slight increase. This is only due to a different concentration of boric acid in liquid waste with respect to 2012, which made it necessary to recalculate the volumes of liquid waste with a standard concentration of 120 g/kg. Indeed, at the Mochovce plant, the recalculation led to correct the above volumes by an estimated 7.5 m^3.
Specific production of liquid intermediate- and low-level radioactive waste in 2013 reflects the above considerations. Conversely, the amount of solid intermediate- and low-level radioactive waste produced in CHP nuclear plants diminished due to a slower rate of replacement of reactor metal internals.

EN19 Ozone-depleting substances:

R22

Emission: **46 kg, equivalent** to about **2.53 kg** of CFC-11. This amount was determined on the basis of gas replenishments in the air conditioning systems of the plants of Mochovce, Nováky and Vojany.

EN26

Environmental enhancements

Materials and resources

In the flue-gas desulfurization process, the reuse of sludges (containing calcium carbonate from the paper industry) on a regular basis saves a considerable amount of natural limestone.

Emissions

In 2013, the amount of biomass (72,355 tonnes), used in co-firing in the fluidized-bed boilers of the Nováky and Vojany plants, displaced 46,942 tonnes of CO_2.

Waste

In 2013, the sale of waste items (metals, ash, gypsum from desulfurization and sludges from water treatment) via electronic auctions went on. The sale of ash had a slight recovery as compared to previous years.

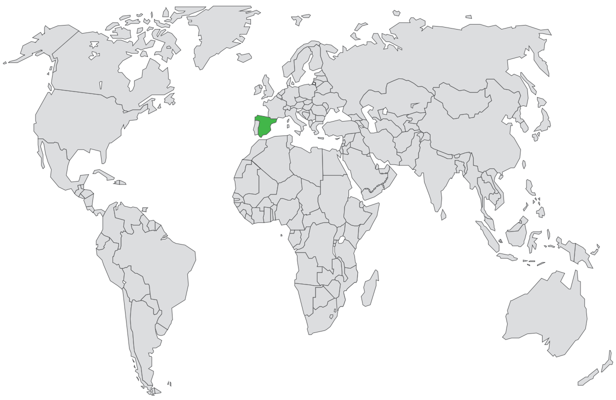
Other

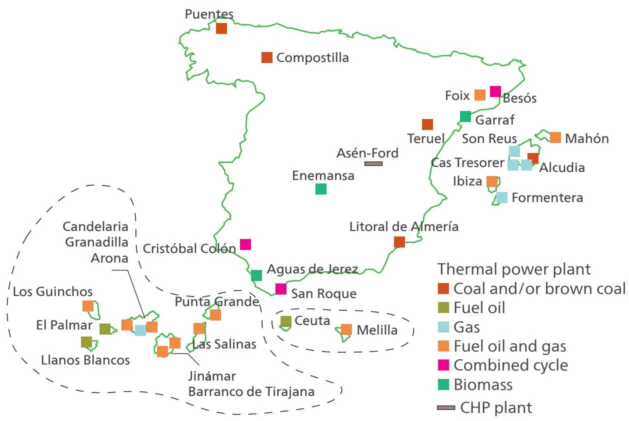
In 2013, the One-Company project (started in 2012) led to update the documentation of the environmental management systems and to assess environmental compliance (MAPEC) via a new software tool (SAS).

Spain

Thermal power generation (simple and CHP)

Endesa SA
Enel Green Power SpA





The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
33	12,897	33,067

Useful heat output (combined with power generation)

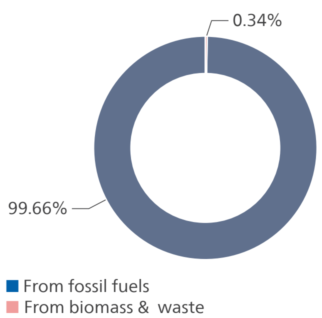
Total: 143,013 million kcal
equal to 166 million kWh

Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Steam (condensing)	8	30	6,179
Steam (condensing) with intermediate extraction of fluid for CHP	0	2	0
Steam (back-pressure) for CHP	0	0	4
Combined-cycle gas turbines	9	14	4,635
Combined-cycle gas turbines for CHP	0	1	8
Single-cycle gas turbines	5	41	1,221
Single-cycle gas turbines for CHP	1	1	2
Alternative engines	10	106	847
	33	**195**	**12,897**

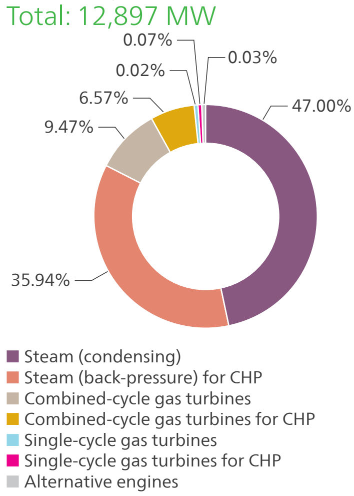
Net electricity generation

Total: 33,067 million kWh



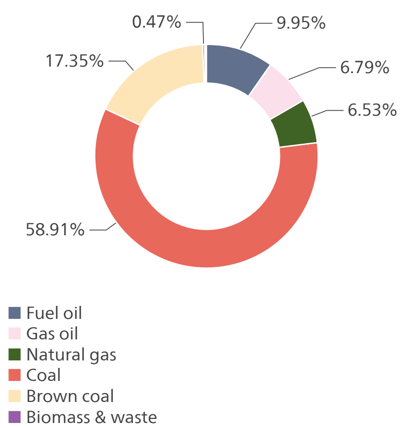
Net maximum electrical capacity

Total: 12,897 MW



Fuel consumption

Total: 640,000 t of oil equivalent



Waste waters

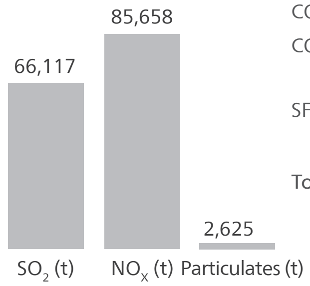
Discharged: **40,914,122 m³**
Used inside plants: **2,392,514 m³**

Waste waters include meteoric waters that are susceptible to pollution and are therefore fed to treatment systems before being discharged or used.

Avoided CO_2 emissions (t)

Due to electricity generation from biomass and biodegradable fraction of waste: **96.82**

Emissions into the atmosphere



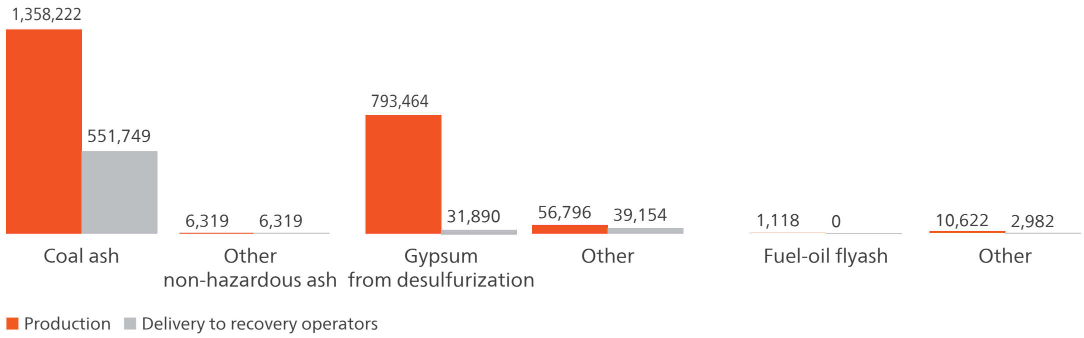
CO_2 (t)	28,157,766
CO_2 *from desulfurization* (t)	138,390
from combustion	*28,019,376*
SF_6 (kg)	202.87
(t of CO_2 equivalent)	4,503.74
Total (t of CO_2 equivalent)	**28,162,270**

Special waste

Total production: **2,226,541 t**
Total delivery to recovery operators: **632,094 t**

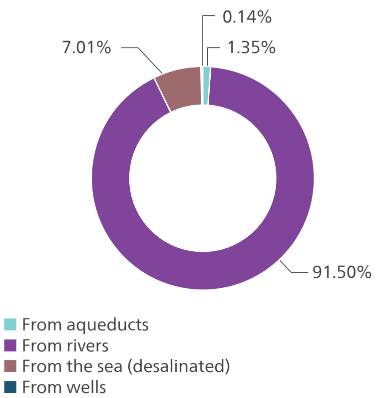
Non-hazardous
Production: 2,214,801 t
Delivery to recovery operators: 629,112 t

Hazardous
Production: 11,740 t
Delivery to recovery operators: 2,982 t



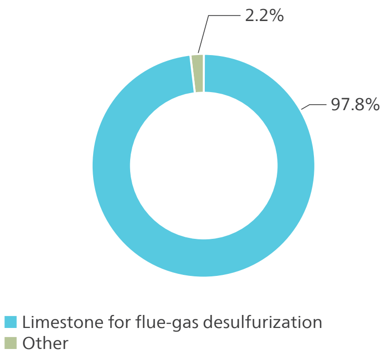
Water for industrial uses

Total consumption: 39,789,450 m³
Total abstraction from inland waters: 36,998,350 m³



Expendables

Total: 388,046 t



Coal storage & handling

Endesa manages three port terminals in Ferrol, Carboneras and Los Barrios for the storage & handling of coal to be used by its plants of Puentes (Ferrol) and Almería (Carboneras) and by E.ON's thermal plant of Los Barrios. Coal is usually transferred to the plants by trucks.

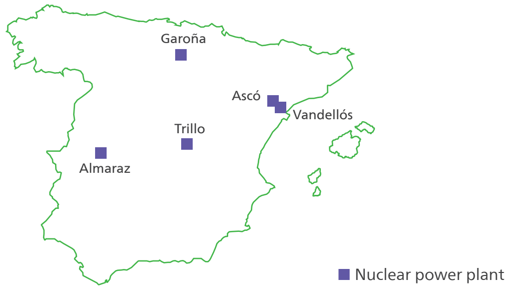
Distance from Ferrol to Puentes: about **60 km**
Distance from Carboneras to Almería: about **1 km**
Distance from Los Barrios to E.ON's plant: about **3 km**
Total coal transferred to the plants: **6,767,099 t**
Total electricity consumption: **6.9 million kWh**

In the following pages, the other flow data (consumption of natural gas and gas oil, expendables, water for industrial uses, waste waters, releases into the atmosphere and into water bodies, waste) are included among the thermal generation data.

Spain

Nuclear power generation

Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
5	3,556	25,967

Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Steam (condensing)	**5**	**7**	**3,556**

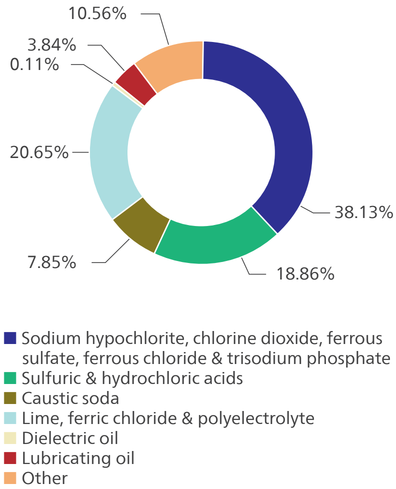
Water for industrial uses

Total consumption: 16,939,292 m³

Total abstraction from inland waters: 16,929,802 m³

Expendables

Total: 1,200.03 t



Radionuclides in discharged waste waters

Corrosion and fission products

18.12 GBq

Tritium

48,943 GBq

Waste waters

Discharged: **1,623,552 m³**
Used inside plants: **9,490 m³**

Waste waters include meteoric waters that are susceptible to pollution and are therefore fed to treatment systems before being discharged or used.

Radioactive emissions into the atmosphere

Aerosol α 33.94 kBq

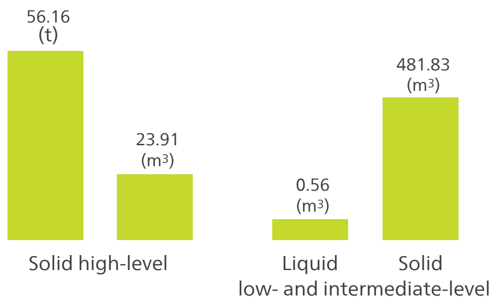
Aerosols β and γ 131.54 MBq

Noble gases 40.17 TBq

Iodine 131 32.46 MBq

Strontium 89 and 90 176.09 kBq

Radioactive waste

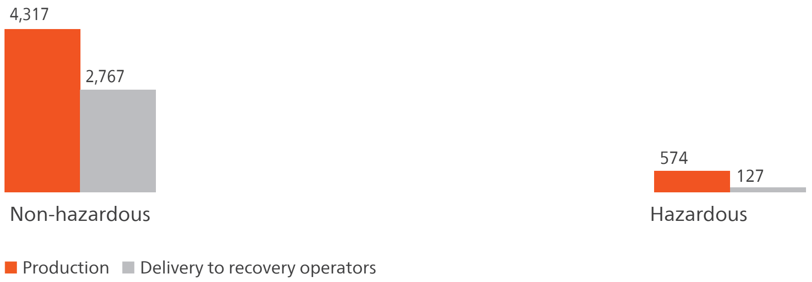


Special waste

Total production: **4,891 t**
Total delivery to recovery operators: **2,894 t**

Non-hazardous
Production: 4,317 t
Delivery to recovery operators: 2,767 t

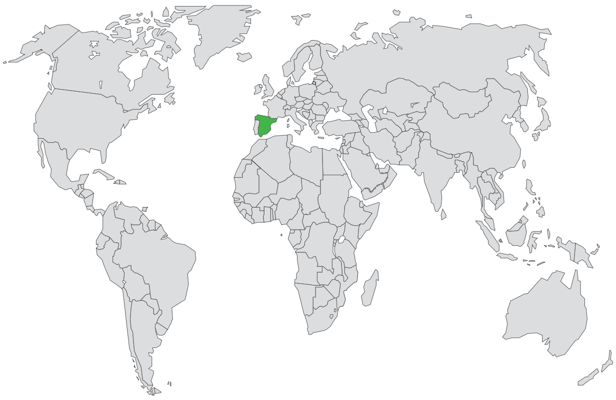
Hazardous
Production: 574 t
Delivery to recovery operators: 127 t

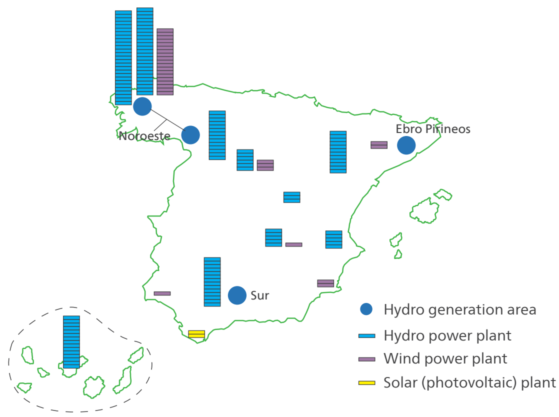


Spain

Electricity generation from renewables

Endesa SA
Enel Green Power SpA





The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
220	6,387	13,838

Power installations

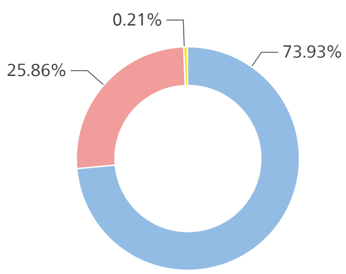
HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	54	88	450
Pondage/reservoir	77	142	2,904
Pure/mixed pumped storage	6	17	1,368
	137	**247**	**4,722**

WIND	Power plants no.	Net maximum electrical capacity MW
	80	**1,652**

SOLAR PHOTOVOLTAIC	Power plants no.	Net maximum electrical capacity MW
	3	**13**

Net maximum electrical capacity

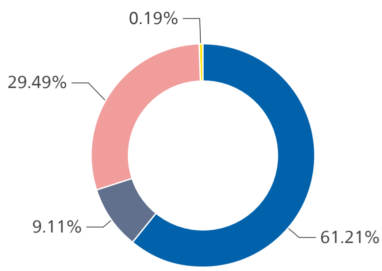
Total: 6,387 MW



Hydro
Wind
Solar (photovoltaic)

Net electricity generation

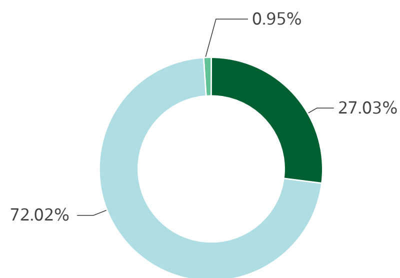
Total: 13,734 million kWh



Hydro from natural flows
Hydro from pumped storage
Wind
Solar (photovoltaic)

Expendables

Total: 104.376 t



Dielectric oil
Lubricating oil
Other

Equivalent yearly hours of utilization*

2,453 wind

1,992 solar photovoltaic

2,506 hydro

* Yearly generation/capacity ratio (excluding hydro from pumped storage).

Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	7,151.19
Due to wind generation	3,446.32
Due to solar photovoltaic generation	22.71
Total	**10,620.22**

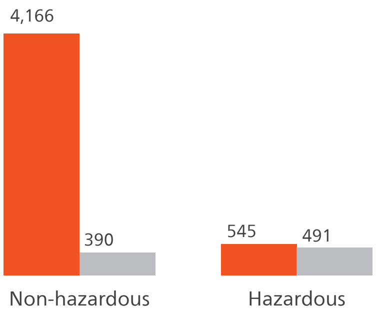
Emissions into the atmosphere

SF_6 - all types of generation (kg)	2
(t of CO_2 equivalent)	39
CO_2 (t)	112

Special waste

Total production: **4,711 t**

Total delivery to recovery operators: **881 t**



■ Production ■ Delivery to recovery operators

Other data

Hydro generation

Fish ladders: **15**

Wind & solar photovoltaic activities

Wind systems

Surface area occupied by platforms, service roads, buildings: **205 ha**

Solar (photovoltaic) systems

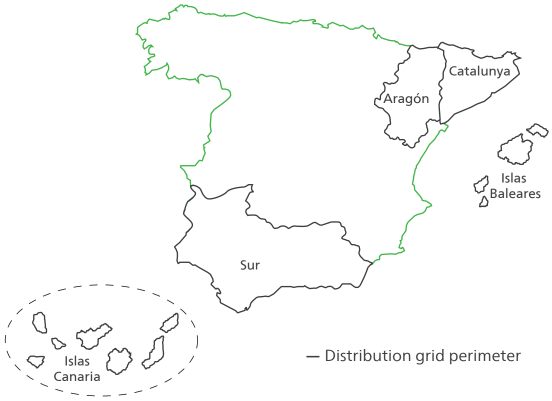
Surface area occupied by modules: **30 ha**

Total surface area affected by the installations: **41 ha**

Spain

Electricity distribution

Endesa SA



The Numbers

Substations	Capacity (MVA)	Lines (km)
165,367	143,782	323,631

General data

Municipalities served: **3,543**
Surface area served: **219,933.47 km²**
Customers connected to the grid: **1,551,821**
(supplied: 1,551,821)

Resource consumption

Expendables: **165.16 t**
Gas oil: **442.78 toe**

Electricity

Total electricity distributed:
98,456 million kWh

Own consumption for grid operation:
3.98 million kWh

Emissions into the atmosphere

SF_6: **283.75 kg** (6,299 t of CO_2 equivalent)

CO_2: **1,357 t**

Total greenhouse gases **7,657 t** of CO_2 equivalent

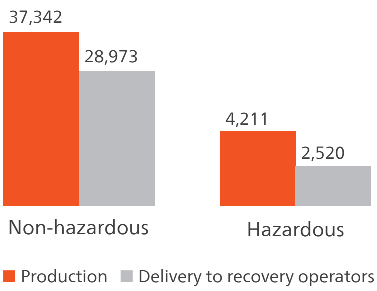
Power installations

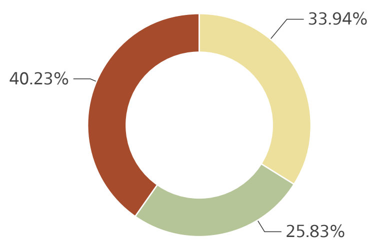
SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	234	2,216
Satellite substations and MV units	5	23
MV/LV	997	82,576
MV/MV	164,131	52,966
	165,367	**143,782**

LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	18,820.66	-	744.94	**19,565.6**
MV	77,596.67	-	39,945.61	**117,542.28**
LV	13,421.25	83,604.51	89,497.58	**186,523.34**
	109,838.57	**83,604.51**	**130,188.13**	**323,631**

Special waste

Total production: **41,553 t**
Total delivery to recovery operators:
31,492 t





Highlights of 2013

Total generation was down by more than 9 TWh owing, above all, to a decrease of more than 6 TWh in coal-fired thermal generation.

In Spain, Enel operates through Endesa (thermal, nuclear and renewable power generation, electricity distribution and sale) and Enel Green Power (renewable power generation and combined heat & power generation in small plants).

EN1 EN3 As to the use of non-fossil fuels in thermal generation:

> solid biomass from the processing of olive stones (used as main fuel) fell slightly (from ~36,685 toe to ~35,327 toe);
> biogases from landfills and waste water treatment systems rose from ~6,000 toe to ~11,000 toe.

The use of fossil fuels in thermal generation declined from 9,688 ktoe in 2012 to 7,608 ktoe in 2013. In the fossil fuel mix, coal and natural gas were down by ~2 and ~1 percentage points, respectively, whereas fuel oil (almost exclusively LS) and gas oil were both up by ~2 percentage points.

EN5 EN6 EN18 Enel Green Power España commissioned new wind farms with an overall capacity of over 83.5 MW:

> Las Angosturas and Los Madronales (province of Málaga, Andalusia);
> Sierra del Cortado (province of Soria, Castile and Leon).

EN16 EN20 Higher thermal generation from coal and brown coal caused specific emissions of macro-pollutants, referred to thermal generation, to go up; the only exception was NO_x, which slightly decreased thanks to the installation of low-NO_x burners in some plants.

The abnormal pattern of radioactive emissions into the atmosphere in 2008 and 2009 (iodine 131, Sr89-90, β and γ aerosols) is chiefly due to the natural deterioration (from 2007 on) of fuel elements in the Garoña plant (province of Burgos, Castile and Leon) and to its technology (Boiling Water Reactor - BWR), different from the one used in the other plants (Pressurized Water Reactor - PWR). Indeed, the type of reactor affects the amount of isotopes produced and their distribution in gaseous effluents. Also the replacement (in 2009) of fuel rods in all the Spanish nuclear plants, except Ascó II (province of Tarragona, Catalonia), had an impact on radioactive emissions.

EN18 In 2013, CO_2 emissions displaced by carbon-free generation amounted to some 33 million tonnes, of which 22 due to nuclear generation and about 11 due to generation from renewables.

EN22 In 2013, the percentage of recovery of waste increased owing to a higher recovery of ash from coal- and brown coal-fired generation, reflecting the recovery of demand by the building sector.

Specific production of liquid intermediate- and low-level radioactive waste in the five-year period is related to plant maintenance and efficiency enhancements, whereas the production of solid high-level radioactive waste is due to the replacement of fuel rods.

EN19 Ozone-depleting substances (emissions determined on the basis of gas replenishments in air conditioning systems):

HCFCs
Ascó nuclear plant: 0.047 t, equivalent to 2.35 kg of CFC-11.

Halon
Garoña nuclear plant: 0.022 t, equivalent to 1.329 kg of CFC-11.

R22
Punta Grande diesel plant: 0.0012 t; Ascó nuclear plant: 0.72 t; Almaraz nuclear plant: 0.216 t; Trillo nuclear plant: 0.6633 t; and Garoña nuclear plant: 0.12 t. The individual values are totally equivalent to 94.6 kg of CFC-11.

Freon
Ascó nuclear plant: 0.195 t; Vandellós II nuclear plant: 0.65 t, resulting from replacement of air conditioning systems; Almaraz nuclear plant: 0.724 t; and Trillo nuclear plant: 1.221 t. The individual values are totally equivalent to 2.232 t of CFC-11.

EN23 Spills:

Spain	*Description*	*Impact and mitigation*
Amount: **1.752 m³**	**Vandellós II nuclear plant**: oil spill during demolition of some transformers; spill of anti-scaling agents during batching; leakage of ammonia owing to breakage of a valve; oil spill from a waste collection tank; glycol spill during maintenance jobs. **Ascó nuclear plant**: oil spill in the conventional area of the plant.	Application of the contingency plan: containment, absorption and collection of spilled material.
Amount: **4.882 m³**	**Litoral de Almería thermal plant**: gas-oil spill in the truck unloading area; oil spill from a conveyor belt reducer; waste spill into the soil in the parking area of industrial cleaning vehicles. **Melilla diesel plant**: fuel-oil spill owing to breakage of a valve in the fuel feeding area during cleaning of a sludge tank.	Clean-up and rehabilitation of affected areas and management of the collected material by an authorized operator.

EN 26 Environmental enhancements

Water

> Litoral de Almería diesel plant: recovery of drainage water for reuse in the desulfurization process. Teruel thermal plant: reuse of drainage water from cooling towers in the desulfurization process. Punta Grande diesel plant: installation of meters to check water consumption by contractors. Puentes CCGT plant: shortening of start-up time (operating flexibility measures) to reduce natural gas and water consumption. Trillo nuclear plant: 3% decrease of water abstraction from the Cifuentes river. Enel Green Power: project of reuse of water in biomass-fired plants.

Emissions

> Compostilla thermal plant: installation of nebulizers to minimize the formation of particulates upon unloading of flyash and bottom ash. Teruel thermal plant: replacement of two mills in units 1 and 3 with more efficient ones, thereby saving electricity and lowering CO_2 emissions. Punta Grande diesel plant: upgrades of units 4 and 5 to curb NO_x emissions. Noroeste and Ebro-Pirineos hydro generation groups: replacement of some SF_6-insulated circuit-breakers with vacuum ones. Almaraz and Trillo nuclear plants: replacement of systems to abate HCFC emissions. Distribución Andalucía Oriental: replacement of 10 air conditioning systems containing R22.

Materials and resources

> San Roque CCGT plant: lower consumption of natural gas thanks to the shortening of the plant start-up time. Ebro-Pirineos hydro generation group: replacement of conventional oils and greases in various installations with biodegradable products; replacement of transformers and breakers with new resin-insulated and vacuum ones. Trillo and Almaraz nuclear plants: 20% reduction of paper consumption. Las Salinas diesel plant: 1% reduction of specific fuel consumption by unit 6 through the installation of a booster (turbocompressor). This measure makes it possible to generate up to 0.4 MW of additional power thanks to the use of part of the energy contained in the turbine exhaust gases.

Waste

> Litoral de Almería thermal plant: replacement of a thermal insulation system with a removable and reusable one; replacement of a thermal insulation system containing asbestos with one without asbestos; minimized use of sol-

vents. Besos CCGT plant: 65% decrease of the volumes of sludges and other liquid releases via a second settling stage in lamellar separators. Las Salinas diesel plant: replacement of 2 transformers containing PCB with PCB-free ones. Cristóbal Colón CCGT plant - hazardous waste: 70% decrease of electrical/electronic equipment through better control of its useful lifetime.

> Non-hazardous waste: 80% decrease of materials contaminated by oils/greases thanks to the use and reuse of absorbents of better quality: 92% reduction of oily waters.

Noise

> Sant Maurici hydro plant (Ebro-Pirineos hydro generation group): replacement of plant access doors and use of insulated glazing to abate noise from the plant. Distribución Canarias: replacement of fans in the Guanarteme substation. Distribución Andalucía Occidental y Extremadura: noise abatement in 5 substations; replacement of 2 transformers and installation of one silencer. Distribución Andalucía Oriental: replacement of 5 transformers; application of an insulating system in one distribution station; installation of 3 anti-vibration systems; revamping of ventilation systems in 9 distribution stations.

> Distribución Andalucía Centro: insulation of 2 transforming stations; replacement of 4 transformers; installation of 5 anti-vibration systems in transformers; replacement of the ventilation system in one transforming station; installation of an anti-vibration system in the ventilation circuit of one transforming station.

Liquid releases

> Compostilla thermal plant: management of leachate from the new non-hazardous waste site.

> Litoral de Almería thermal plant: elimination of releases from boiler drains and their reuse in the desulfurization process.

> Puentes CCGT plant: improvement of the alarm system to ensure that waste waters in the treatment system comply with the set pH and temperature parameter values.

> Ebro-Pirineos hydro generation group: elimination of points of discharge of sewage waters and installation of sealed sewage-water tanks.

> Almaraz nuclear plant: 50% decrease in the amount of NH_3 discharged into the Arrocampo basin with respect to the yearly average amount discharged in the period from 2005 to 2010. Enel Green Power: installation of 12 sealed septic tanks in the wind farm sites of Peña Forcada/Do Vilán, Careón, Peña Armada, San Andrés/Capelada, Couto de San Sebastián, Corzán, Coriscada, Touriñán, Peña Ventosa/Chao do Tenón, Barbanza, Castelo and Leboreiro.

Renewables

> Litoral de Almería thermal plant: commissioning of a 100-kW photovoltaic facility located in the plant area.

Other

> Litoral de Almería thermal plant site: R&D project - facility for CO_2 capture by microalgae to treat part of the flue gases released by the plant. R&D project: testing of the Bionatur technology for efficient desulfurization and capture of heavy metals from the plant flue gases.

> Teruel thermal plant: study for revegetating the non-hazardous waste site of Corta Barrabasa.

> Compostilla thermal plant: environmental restoration of old and disused landfills; second stage of enlargement of hoppers for minimizing coal flyash and bottom ash.

> Las Salinas diesel plant: improvement of the visual impact of the plant; enlargement of the roof covering the hazardous waste site by 35 m^2 to further protect it from sunlight.

> Distribución Canarias: installation of bird diverters.

> Ebro-Pirineos hydro generation group: studies on noise emissions; construction of liquid release confinement systems in plants.

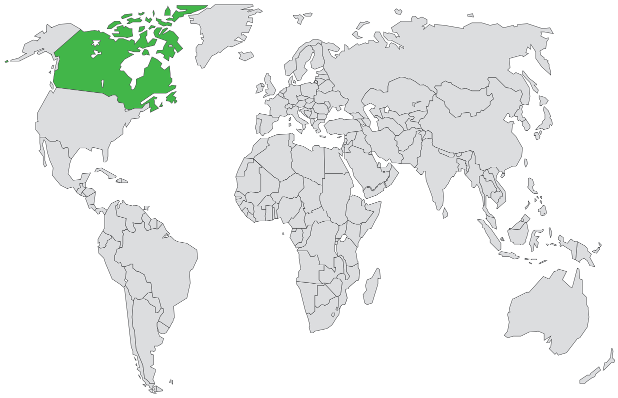
EN29 As regards land and landscape protection, insulated-cable power lines increased by roughly 0.4 percentage points, with obvious advantages in terms of visual impact and prevention of avian fauna electrocution (even in case of overhead cables).

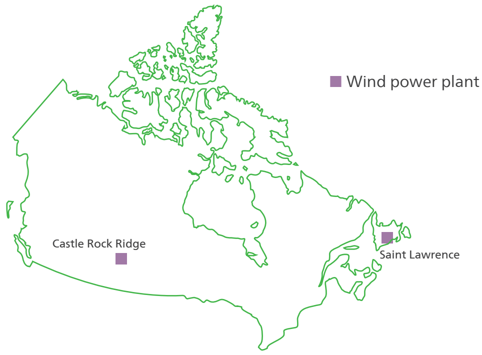
North America

Canada

Wind power generation

Enel Green Power SpA





The Numbers

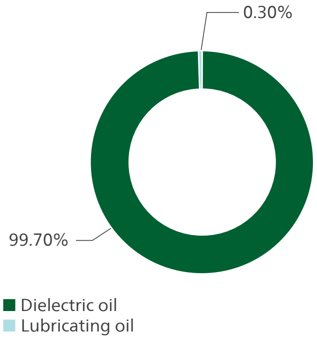
Power plants	Net capacity (MW)	Generation (million kWh)
2	103	313

Power installations

Power plants no.	Net maximum electrical capacity MW
2	103

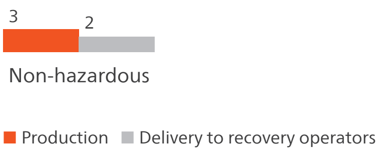
Expendables

Total: 0.33 t



Special waste

Total production: **3 t**
Total delivery to recovery operators: **2 t**



Equivalent yearly hours of utilization*

Wind: **3,035 hours**

* Yearly generation/capacity ratio.

Avoided CO_2 emissions (t)

Due to wind generation: **203,189**

Highlights of 2013

EN5 EN6 EN18 In 2013, total CO_2 emissions displaced by carbon-free generation amounted to more than 203,000 tonnes. All of these emissions were avoided thanks to wind power generation, as the Saint Félicien biomass-fired plant was sold in the course of 2013.

In Canada, Enel is engaged in wind power generation (through Enel Green Power).

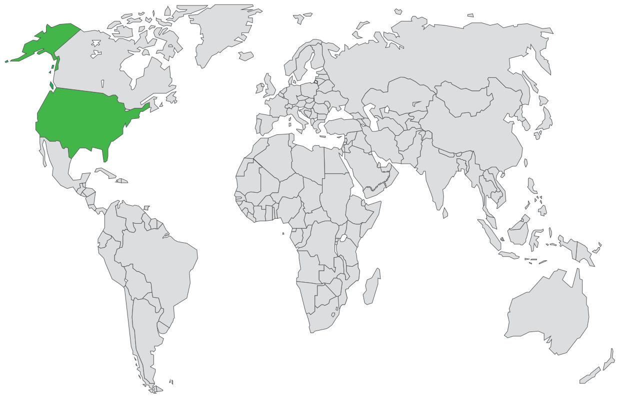
EN20 The erratic trends of total and specific emissions of NO_X and particulates in the years from 2009 to 2012 may be attributed to the discontinuous monitoring of emissions from the Saint Félicien biomass-fired plant and to the consequent results of the computation of annual mass quantities, obtained by multiplying the average concentrations by the annual flue-gas volumes. This inevitably involves inaccuracies that are due to fluctuating concentrations associated with the variable generating outputs of plants.

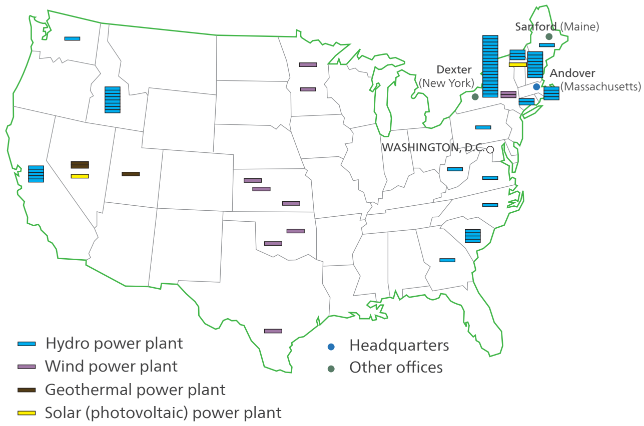
EN22 The recovery of non-hazardous waste hit more than 70% of the total.

United States

Hydro, wind, geothermal and solar (photovoltaic) power generation

Enel Green Power SpA





The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
96	1,580	4,913

GEOTHERMAL	Power plants no.	Units no.	Net maximum electrical capacity MW
Binary cycle	**3**	**9**	**72**

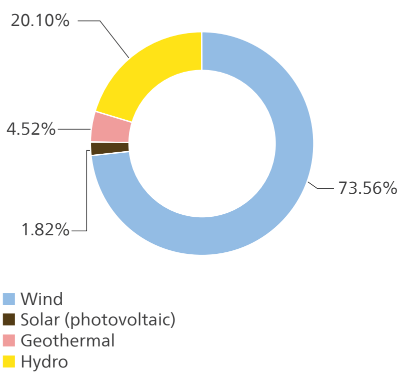
Power installations

HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	66	78	291
Pondage/reservoir	1	1	27
	67	**79**	**318**

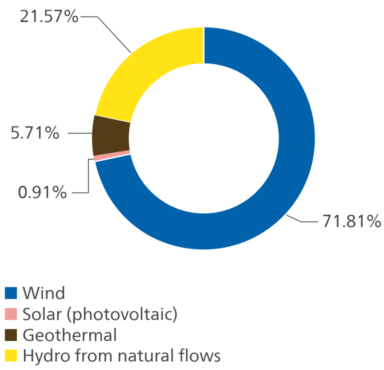
WIND	Power plants no.	Net maximum electrical capacity MW
	24	**1,162**

SOLAR PHOTOVOLTAIC	Power plants no.	Net maximum electrical capacity MW
	2	**29**

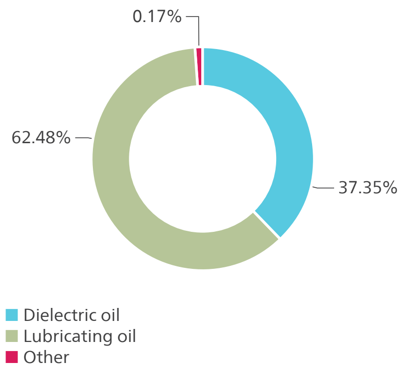
Net maximum electrical capacity
Total: 1,580 MW



Net electricity generation
Total: 4,913 million kWh



Expendables
Total: 573 t



Equivalent yearly hours of utilization*

3,036 wind

1,549 solar photovoltaic

3,922 geothermal

3,336 hydro

* Yearly generation/capacity ratio.

Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	706,447
Due to geothermal generation	186,930
Due to wind generation	2,352,514
Due to solar photovoltaic generation	29,747
Total	**3,275,638**

Emissions from the otherwise necessary fossil-fired thermal generation. The contribution of geothermal generation has been calculated on the assumption that the related CO_2 emissions are of natural origin.

Emissions into the atmosphere

CO_2 (t) from combustion of gas oil in emergency generating sets	998

Geothermal fluid

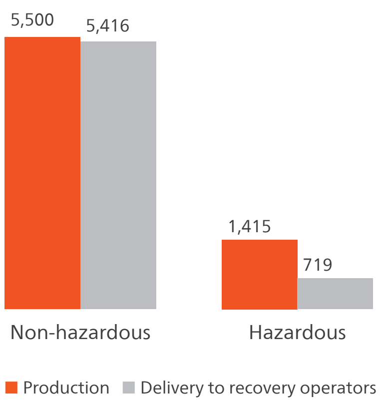
Total fluid extracted: **42,454,000 t**

Steam used for electricity generation: **42,454,000 t**

Special waste

Total production: **6,915 t**

Total delivery to recovery operators: **6,135 t**



Other data

Geothermal activities

New drilled wells: **1**

In-service wells: 25

for steam production: 13

for reinjection: 12

Highlights of 2013

In the United States, Enel operates through Enel Green Power North America (hydro, geothermal, wind and solar photovoltaic power generation).

Total electricity generation from renewables was up by about 1,400 GWh (+40.2%) on 2012, thanks above all to a higher share of wind and hydro generation (new wind farms of Prairie Rose and Chisholm View and new hydro plant of Cherokee Falls). The new plants of Cove Fort (geothermal) and Sheldon Springs (photovoltaic) contributed, albeit in a marginal way, to the higher generation.

EN5 EN6 EN18 Enel Green Power North America increased its net maximum capacity by:

- roughly 439.5 MW thanks to the entry into operation of the wind farms of Prairie Rose and Chisholm View in Minnesota and Oklahoma, respectively;
- 2.4 MW thanks to the entry into operation of the photovoltaic plant of Sheldon Springs in Vermont;
- 4.1 MW thanks to the entry into operation of the hydro plant of Cherokee Falls in South Carolina;
- 25 MW thanks to the entry into operation of the geothermal plant of Cove Fort in Utah.

EN18 In 2013, CO_2 emissions displaced by carbon-free generation amounted to roughly 3.3 million tonnes (about 32% more than in 2012).

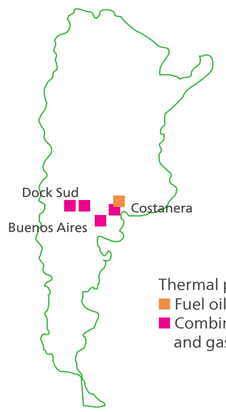
EN22 The recovery of non-hazardous waste was close to 100%, because this type of waste proved to be entirely recoverable (materials removed from the trashracks of hydro plants). The recovery of hazardous waste climbed from 11% in 2012 to 51% in 2013.

Latin America

Argentina

Thermal power generation

Endesa SA



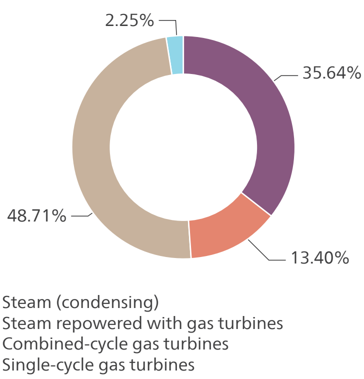
The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
5	3,075	13,426

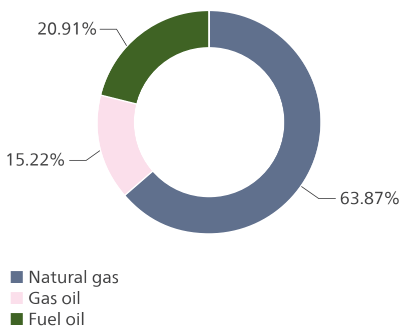
Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Steam (condensing)	1	6	1,096
Steam repowered with gas turbines	-	1	412
Combined-cycle gas turbines	3	7	1,498
Single-cycle gas turbines	1	2	69
	5	**16**	**3,075**

Net maximum electrical capacity
Total: 3,075 MW



Fuel consumption
Total: 2,591,707 t
of oil equivalent



Water for industrial uses
total consumption

2,879,910 m^3

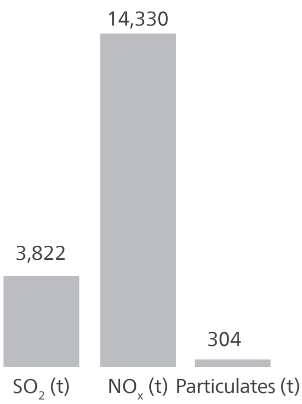
Abstraction from inland waters

Waste waters

1,674,129 m^3

Discharged

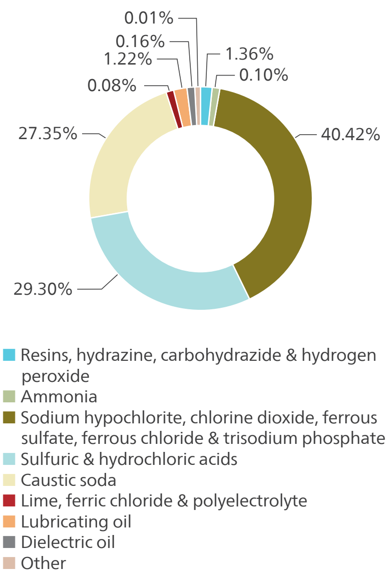
Emissions into the atmosphere



CO_2 (t)	6,834,412
from combustion	*6,834,412*
Total (t of CO_2 equivalent)	6,834,412

Expendables

Total: 7,469 t

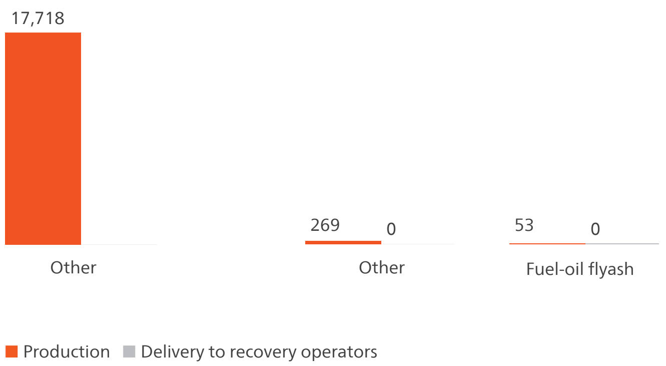


Special waste

Total production: **18,041 t**
Total delivery to recovery operators: **0 t**

Non-hazardous
Production: 17,718 t
Delivery to recovery operators: 0 t

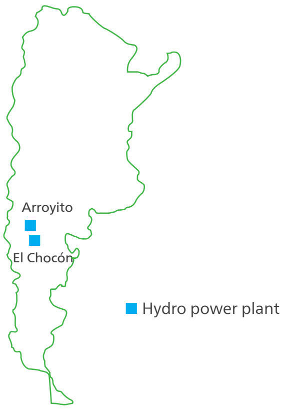
Hazardous
Production: 323 t
Delivery to recovery operators: 0 t



Argentina

Hydro power generation

Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
2	1,328	2,317

Power installations

	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Pondage/reservoir	**2**	**2**	**1,328**

Expendables

Total: 0.35 t

Avoided CO_2 emissions (t)

Due to hydro generation from natural flows: **1,179,460**

Emissions from the otherwise necessary fossil-fired thermal generation.

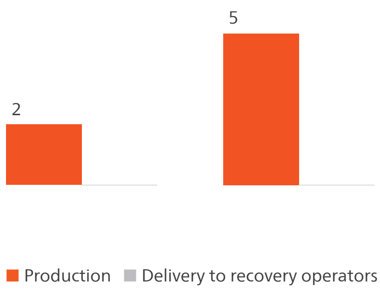
Equivalent yearly hours of utilization*

Hydro: **1,745 hours**

* Yearly generation/capacity ratio.

Special waste

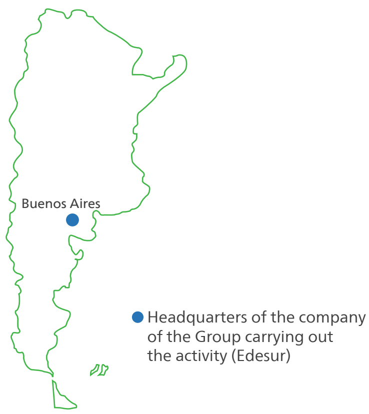
Total production: **7 t**
Total delivery to recovery operators: **0 t**



Argentina

Electricity distribution

Endesa SA



The Numbers

Substations	Capacity (MVA)	Lines (km)
23,394	17,445	24,553

General data

Municipalities served: **13**

Surface area served: **3,309 km²**

Customers connected to the grid: **2,444,013** (supplied: 2,443,318)

Resource consumption

Expendables: **2.47 t**

Electricity

Total electricity distributed: **14,953 million kWh**

Own consumption for grid operation: **25.28 million kWh**

Emissions into the atmosphere

SF_6: **366.8 kg** (8,143 t of CO_2 equivalent)

CO_2: **657 t**

Total greenhouse gases: **8,800** t of CO_2 equivalent

Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	200	11,599
MV/LV	23,194	5,846
	23,394	**17,445**

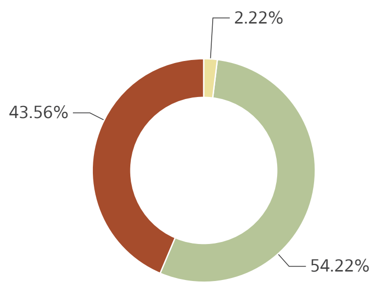
LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	546	-	569	**1,115**
LV	-	3,343	4,074	**7,417**
MV	-	9,969	6,052	**16,021**
	546	**13,312**	**10,695**	**24,553**

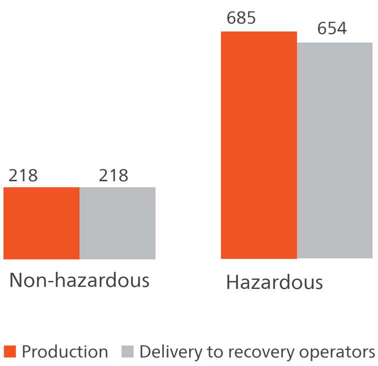
The organization has an ISO 14001-certified environmental management system in place.

Special waste

Total production: **903 t**

Total delivery to recovery operators: **872 t**





Highlights of 2013

EN1 EN3 The fuel mix changed in favor of gas oil (+~7%) to the expense of natural gas (-~7%), whereas fuel oil remained stable with respect to 2012. Total electricity generation was up by roughly 1 TWh, thanks above all to higher generation from gas oil. Renewable power generation dropped instead by about 0.5 TWh.

EN8 Net specific requirements of water for industrial uses in thermal generation declined by about 3% thanks to specific improvements to power installations (see EN26).

Owing to the change in the mix of fuels:

EN16 net specific emissions of CO_2, referred to total electricity generation, were up by 7% (+29 g/kWh);

EN20 net specific emissions of macro-pollutants, referred to thermal generation alone, increased by ~17% (NO_X) and ~53% (particulates). Conversely, specific emissions of SO_2 decreased by ~26% thanks to the use of very-low sulfur fuel oil in the Costanera plant.

EN18 CO_2 emissions displaced by hydro generation were equal to approximately 1.2 million tonnes (about 15% less than in the previous year) owing to lower generation from renewables.

EN19 Ozone-depleting substances (emissions determined on the basis of gas replenishments in air conditioning systems):

R22

Emission: **279 kg, equivalent to 15 kg of CFC-11**.

Freon

Emission: **80 kg, equivalent to 64 kg of CFC-11**.

EN22 Overall recovery of waste reached 4.6%.

In Argentina, Enel operates through Endesa (thermal and hydro power generation, electricity distribution and sale).

EN26 Environmental enhancements

Materials and resources

> Edesur: internal and external energy-saving awareness campaign.

Water

> Edesur: internal water-saving awareness campaign.

> Costanera: adoption of a system to monitor and control water consumption.

Emissions

> Edesur: internal and external energy-saving awareness campaign.

> Costanera: installation of a system injecting water into the combustion chamber to hold down NO_X.

Noise

> Edesur: replacement of some fans of HV/MV transformers with more technologically advanced ones.

> Costanera: installation of silencers for steam-turbine units.

Waste

> Edesur: awareness and training actions to improve waste management.

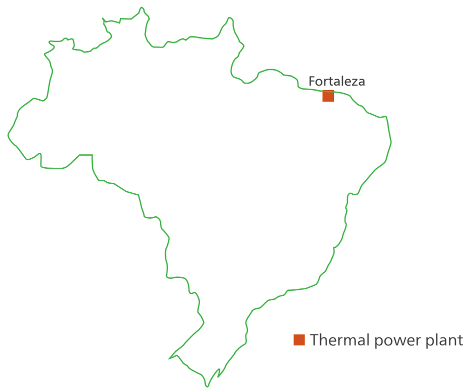
> Costanera: hazardous waste monitoring and control system.

Other

> Edesur: participation in e-mobility studies.

Brazil

Thermal power generation Endesa SA



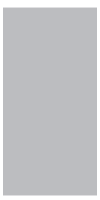
The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
1	314	2,588

Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Combined-cycle gas turbines	1	3	206
Repowered with gas turbines	-	-	108
	1	**3**	**314**

Emissions into the atmosphere



Emissions into the atmosphere

CO_2 (t)	885,570
from combustion	*885,570*
Total (t of CO_2 eq)	885,570

Waste waters

Discharged: 689,396 m^3

Waste waters include meteoric waters that are susceptible to pollution and are therefore fed to treatment systems before being discharged or used.

Water for industrial uses

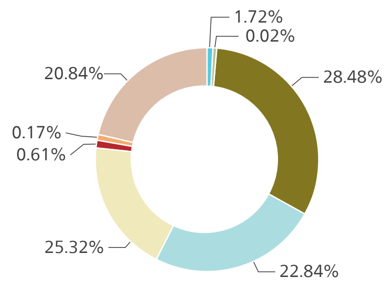
Total consumption: 3,231,350 m^3
Total abstraction from inland waters: 3,231,350 m^3

Fuel consumption

Total: 457,288 t of oil equivalent

Expendables

Total: 227.96 t



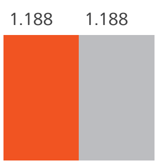
- Resins, hydrazine, carbohydrazide & hydrogen peroxide
- Ammonia
- Sodium hypochlorite, chlorine dioxide, ferrous sulfate, ferrous chloride & trisodium phosphate
- Sulfuric & hydrochloric acids
- Caustic soda
- Lime, ferric chloride & polyelectrolyte
- Lubricating oil
- Other

Special waste

Total production: **1,198 t**
Total delivery to recovery operators: **1,198 t**

Non-hazardous
Production: 1,188 t
Delivery to recovery operators: 1,188 t

Hazardous
Production: 10 t
Delivery to recovery operators: 10 t



Other (non-hazardous)

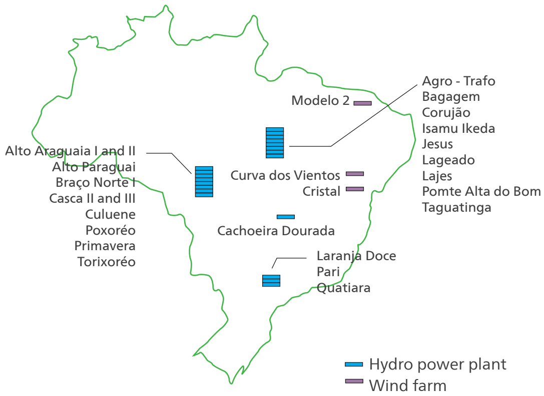
Other (hazardous)

Production Delivery to recovery operators

Brazil

Hydro and wind power generation

Endesa SA
Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
24	839	2,905

All the power plants are ISO 14001-certified.

Power installations

HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	**2**	**1**	**754**
Pondage/reservoir	**19**	**10**	**1**
	21	**11**	**755**

	Power plants no.	Net maximum electrical capacity MW
WIND	**3**	**84**

Equivalent yearly hours of utilization*

Hydro: **3,849 hours**

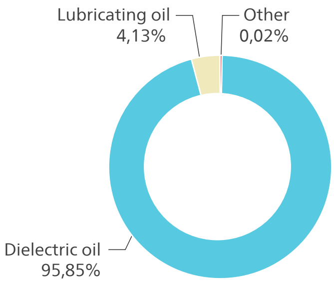
* Yearly generation/capacity ratio.

Gas oil

Total consumption: **1 toe**

Expendables

Total: 130.3 t



Net electricity generation

Total: **2,905 million kWh**

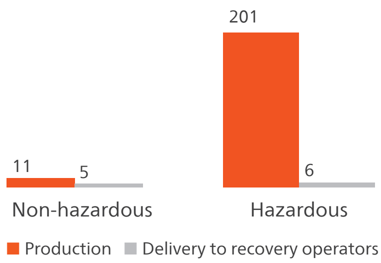
Avoided CO_2 emissions (t)

Due to hydro generation from natural flows: **994,019**

Emissions from the otherwise necessary fossil-fired thermal generation.

Special waste

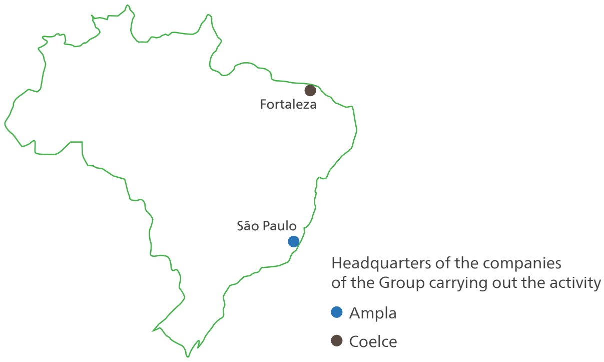
Total production: **212 t**
Total delivery to recovery operators: **11 t**



Brazil

Electricity distribution

Endesa SA



The Numbers

Substations	Capacity (MVA)	Lines (km)
245,453	14,726	191,697

General data

Municipalities served: **250**

Surface area served: **181,535 km²**

Customers connected to the grid: **6,301,582** (supplied: 6,301,469)

Resource consumption

Expendables: **717.71 t**

Electricity

Total electricity distributed: **18,799.02 million kWh**

Own consumption for grid operation: **37 million kWh**

Emissions into the atmosphere

SF_6: **25.98 kg** (577 t of CO_2 equivalent)

CO_2: **28 t**

Total greenhouse gases: **605** t of CO_2 equivalent

Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	226	7,208
MV/LV	245,227	7,518
	245,453	**14,726**

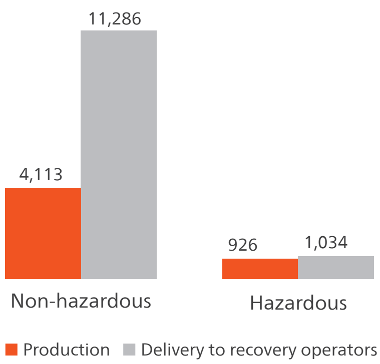
LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	8,640	-	4	**8,644**
MV	114,346	1,826	71.46	**116,243**
LV	50,047	16,582	180	**66,810**
	173,034	**18,407**	**256**	**191,697**

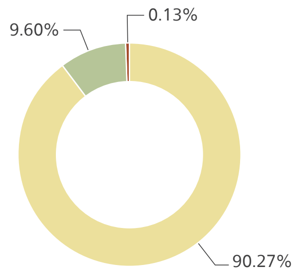
The organization has an ISO 14001-certified environmental management system in place.

Special waste

Total production: **5,039 t**

Total delivery to recovery operators: **12,320 t**





Highlights of 2013

In Brazil, Enel operates through Endesa (thermal and hydro power generation, electricity distribution and sale) and Enel Green Power (hydro and wind power generation).

EN1 EN3 The drop in hydro generation was counterbalanced by a proportional increase in generation by the combined-cycle plant of Fortaleza; therefore, overall generation was in line with the one of 2012.

Enel Green Power installed new wind farms totaling 84 MW:

> Cristal 30 MW and Curva dos Ventos (28.2 MW) in the State of Bahia;
> Modelo 2 (25.9 MW) in the State of Rio Grande do Norte.

EN8 Net specific consumption of water for industrial uses in thermal generation continued to fall (by more than 3% in 2013 vs. 2012).

EN20 Net specific emissions of NO_x referred to thermal generation decreased (-~12%) as result of a less intermittent operation of plants during the year.

EN16 In contrast, net specific emissions of CO_2 referred to thermal generation slightly increased (+5 g/kWh, i.e. +~1.5%).

EN18 CO_2 emissions displaced by electricity generation from renewables amounted to roughly 1 million tonnes.

EN19 Ozone-depleting substances (determined on the basis of gas replenishments in air conditioning systems):

HCFCs

Emission: **516.7 kg, equivalent to 25.8 kg of CFC-11**.

Halon

Emission: **985.6 kg, equivalent to 14.784 kg of CFC-11**.

R22

Emission: **681 kg, equivalent to 37.4 kg of CFC-11**.

EN23 Spill of 4.6 m^3 of oil from the Galo Blanco substation.

EN26 Environmental enhancements.

Materials and Resources

> Enel Green Power: responsible consumption campaign in the offices of all the units of Enel Green Power in Brazil.
> Endesa Ampla: setting of targets of reduction in the consumption of materials in all the environmental management systems implemented and ISO 14001-certified.
> Endesa Cien, Endesa Fortaleza: take-off of green procurement procedures by introducing environmental clauses in the contracts with suppliers.
> Endesa Cachoeira: start of a program of replacement of light bulbs in the plant with energy-efficient ones.

Water

- Ampla, Cien, Fortaleza: awareness campaigns aimed at cutting water consumption.
- Cachoeira: during the operation of the plant under partial-load conditions, priority is given to the most efficient pieces of equipment.
- Enel Green Power: environmental training & awareness in various sites and offices.

Emissions

- Ampla: inventory of emissions under the GHG Protocol and the ISO 14064 standard.
- Fortaleza: on-line monitoring of the quality of combustion and of flue gases.
- Cachoeira: improvements of breakers to avoid leakage of SF_6.

Liquid releases

- Fortaleza: monitoring and complete characterization of liquid releases from the plant.
- Cachoeira: quarterly monitoring of water quality both in the upstream basin and in the outlet canal.

Noise

- Ampla, Fortaleza: regular noise monitoring in accordance with local legislation.
- Enel Green Power: noise abatement measures in some plant machines.

Waste

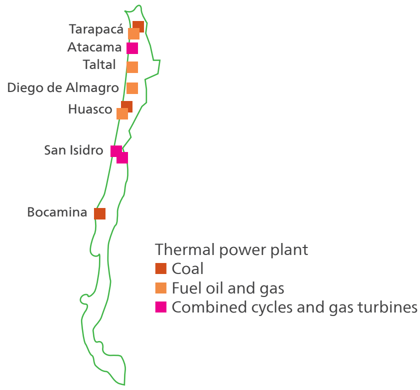
- Ampla, Cien, Fortaleza: separate waste collection and hazardous waste management.
- Enel Green Power: where possible, waste items are always recycled; waste awareness campaigns.

Other

- Cachoeira: market surveys to get an improved understanding of and purchase new products for environmental impact mitigation (e.g. oil absorbents, oil/water separators, etc.).
- Endesa: part of the vehicle fleet uses bio-ethanol as fuel.

Chile

Thermal power generation — Endesa SA



The Numbers

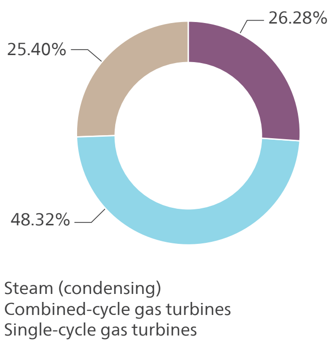
Power plants	Net capacity (MW)	Generation (million kWh)
11	2,378	9,841

Power installations

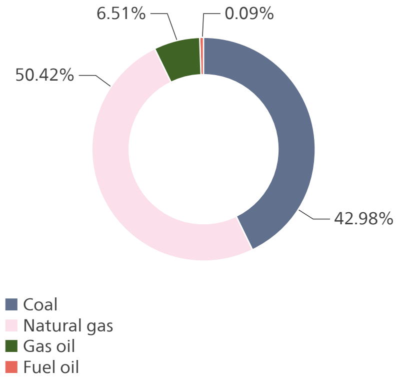
	Power plants no.	Units no.	Net maximum electrical capacity MW
Steam (condensing)	3	3	625
Combined-cycle gas turbines	3	10	1,149
Single-cycle gas turbines	5	9	604
	11	**22**	**2,378**

All the power plants (excluding the Bocamina II power plant - 350 MW) are ISO 14001-certified.

Net maximum electrical capacity
Total: 2,378 MW



Fuel consumption
Total: 1,919,340 t
of oil equivalent

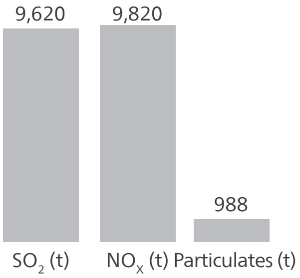


Waste waters

2,392,514 m^3

Discharged

Emissions into the atmosphere

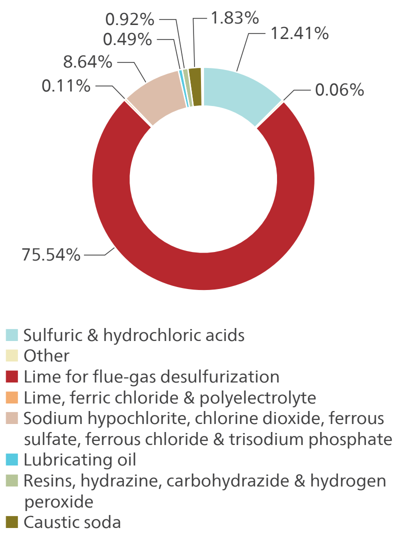


Emissions into the atmosphere

CO_2 (t)	6,033,383
from combustion	*6,030,699*
from desulfurization (computed stoichiometrically)	*2,684*

Expendables

Total: 8,076.42 t

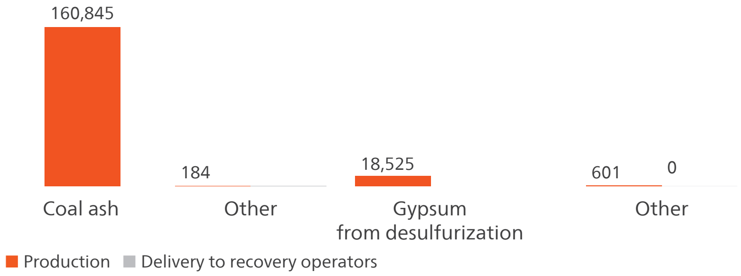


Special waste

Total production: **180,155 t**
Delivery to recovery operators: **0 t**

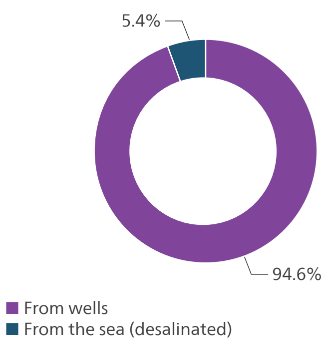
Non-hazardous
Production: 179,554 t
Delivery to recovery operators: 0 t

Hazardous
Production: 601 t
Delivery to recovery operatc



Water for industrial uses

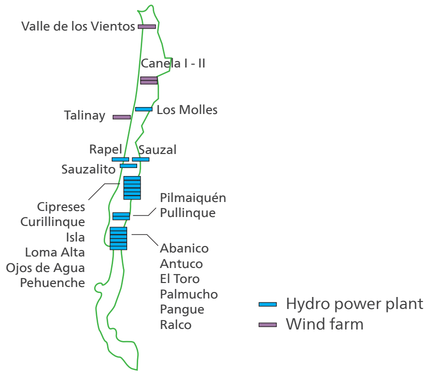
Total consumption: 6,899.27 m^3
Total abstraction from inland waters: 6,529.5 m^3



Chile

Hydro and wind power generation

Endesa SA
Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
20	3,806	10,657

Power installations

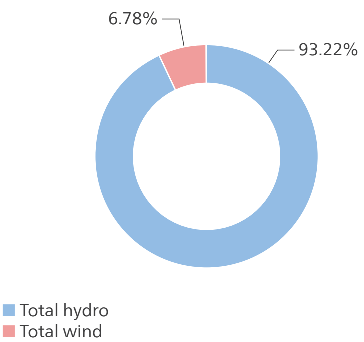
HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	10	20	854
Pondage/reservoir	6	18	2,694
	16	**38**	**3,548**

WIND	Power plants no.	Net maximum electrical capacity MW
	4	**258**

All the power plants are ISO 14001-certified.

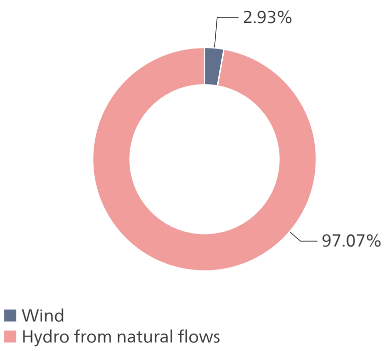
Net maximum electrical capacity

Total: 3,806 MW



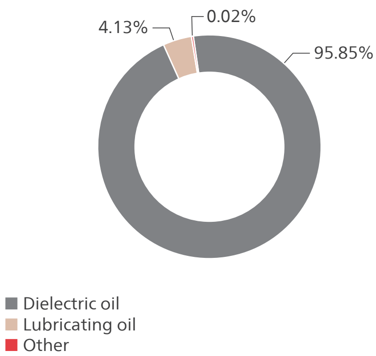
Net electricity generation

Total: 10,657 million kWh



Expendables

Total: 1,524.72 t



Equivalent yearly hours of utilization*

1,207 wind

2,916 hydro

* Yearly generation/capacity ratio.

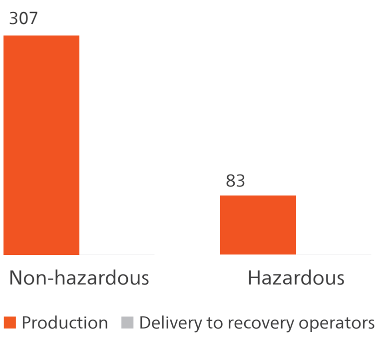
Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	6,343,000
Due to wind and solar (photovoltaic) generation	191,000
Total	**6,534,000**

Emissions from the otherwise necessary fossil-fired thermal generation.

Special waste

Total production: **390 t**
Total delivery to recovery operators: **0 t**



Chile

Electricity distribution

Endesa SA

The Numbers

Substations	Capacity (MVA)	Lines (km)
22,456	11,714	16,306

General data

Municipalities served: **33**

Surface area served: **2,118 km²**

Customers connected to the grid: **16,939,417** (supplied: 16,939,413)

Electricity

Total electricity distributed: **13,030 million kWh**

Own consumption for grid operation: **12 million kWh**

Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	61	7,568
MV/LV	22,392	4,116
MV/MV	3	30
	22,456	**11,714**

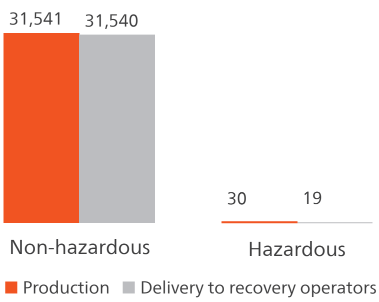
LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV (> 40 kV)	345	-	10.7	**356.1**
MV (1-30 kV)	2,739.84	1,354.043	1,018.29	**5,112.173**
LV (380 V)	3,656.119	5,153.54	2,028.521	**10,838.18**
	6,741	**6,508**	**3,057**	**16,306**

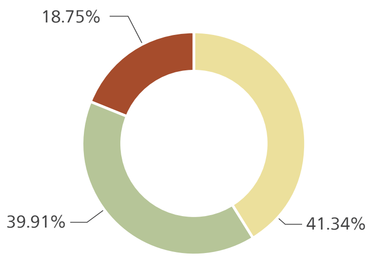
The organization has an ISO 14001-certified environmental management system in place.

Special waste

Total production: **31,571 t**

Total delivery to recovery operators: **31,559 t**





Highlights of 2013

In Chile, Enel operates through Endesa (thermal, wind and hydro power generation, electricity distribution and sale) and Enel Green Power (hydro power generation).

With respect to 2012, fossil-fired thermal generation grew by ~1 TWh (+~12%), whereas hydro generation diminished by ~1.1 TWh, thus shifting the generating mix towards thermal.

EN1 EN3 The mix of fuels changed in favor of coal (+~14 percentage points) and gas oil (+~4 percentage points) to the expense of natural gas (-~18 percentage points).
Enel Green Power commissioned new wind farms with a total capacity of 180 MW:
> Talinay (90 MW) in the province of Coquimbo;
> Valle de los Vientos (90 MW) in the province of Antofagasta.

EN1 EN3 EN5 The net heat rate of simple thermal generation remained practically steady (+0.5%).

EN8 Net specific consumption of water for industrial uses in simple thermal generation was practically unaltered.

Specific emissions responded to the higher use of coal in the following ways:

EN16 net specific emissions of CO_2 referred to thermal generation were up by 66 g/kWh (+~12%);

EN20 net specific emissions of NO_x were up by ~0.2 g/kWh (+~31%). Particulates kept the same values as in 2012 (0.1 g/kWh) thanks to the installation of bag filters in the Tarapacá plant. Net specific emissions of SO_2 decreased by ~0.3 g/kWh (-~25%); the decrease is to be ascribed, among others, to the fact that the data reported for 2013 are based on actually measured values, whereas those for 2012 are based on both measured and estimated values.

EN18 CO_2 emissions displaced by electricity generation from renewables amounted to roughly 6.5 million tonnes, in line with their 2012 value.

EN22 The sharp increase in ash produced in 2013 is due to higher generation from coal. Waste recovery was around the same value as in 2012 owing to the nearly total recovery of waste from distribution activities.

EN19 Ozone-depleting substances (determined on the basis of gas replenishments in air conditioning systems):

R22
Emission: **54 kg, equivalent to 3 kg of CFC-11**.

EN 23 Spills:

Chile	*Description*	*Impact and mitigation*
Chilectra Amount: **0.2 m³**	10 spills of dielectric oil from different substations.	Soil contamination. Actions: containment of the spilled material and collection through absorbents; removal and management of waste generated.
Cipreses hydro plant Amount: **0.005 m³**	Spill of 5 l of oil.	Impacts: the spilled material flowed through the plant discharge outlet (capacity: about 20 m^3/s) and reached the Maule river. Actions: with a view to avoiding new spills, a pump was installed to recover oil in the drainage pits of all the hydro plants located along the Maule river and an oil level sensor for the drainage pits was bought.

EN26 Environmental enhancements.

Water

> Given the local water scarcity, the thermal plant of San Isidro increased its reuse of waste waters.

Liquid releases

> San Isidro thermal plant - measures to improve the quality of liquid releases into the Aconcagua river (e.g. injection of CO_2 into the cooling tower in place of sulfuric acid and use of new wells for water withdrawal).

Emissions

> Installation of bag filters in the Tarapacá coal-fired plant, with a consequent decrease in emissions of particulates.

Noise

> At the Bocamina coal-fired plant, a number of noise mitigation measures were taken (e.g. installation of noise-absorbing panels in the turbine hall and in the boiler building and of silencers).
> Chilectra abated noise in 10 substations.

Waste

> Endesa Chile: preparation of a best-practice guide for hazardous waste management. The guide is aimed at standardizing the processes of production, handling, storage and final disposal of hazardous waste produced in all the installations of Endesa Chile and of its branches. In 2013, campaigns for recycling non-hazardous waste (paper, cardboard, glass, etc.) and hazardous waste (used oils) were also organized. These campaigns are conducted jointly with local recycling companies.

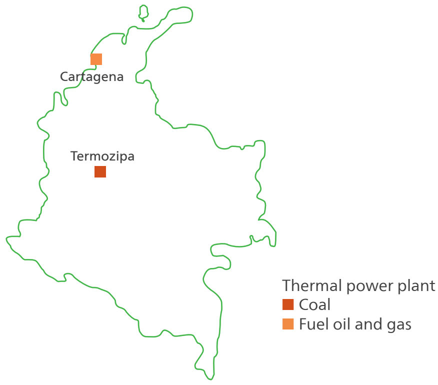
Other

> Bocamina thermal plant: installation of a grating and of a bubble diffuser to reduce the entry of sediment into the intake structures of the two units of the plant.
> Hydro plants along the Laja and Biobío rivers: creation of ecological awareness trails for visitors.

Colombia

Thermal power generation

Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
2	412	964

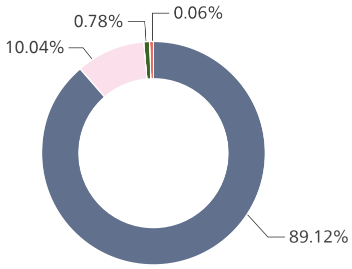
Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Steam (condensing)	**2**	**7**	**412**

The thermal power plants of Cartagena and Termozipa are both ISO 14001-certified.

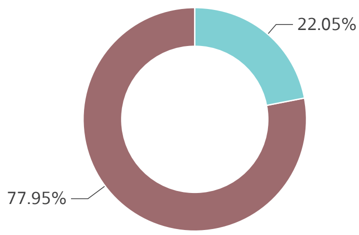
Fuel consumption

Total: 299,000 t of oil equivalent



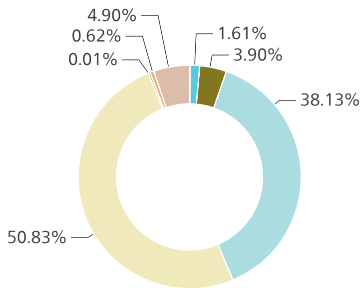
Water for industrial uses

Total consumption: 217,060 m^3
Total abstraction from inland waters: 217,060 m^3



Expendables

Total: 360.303 t



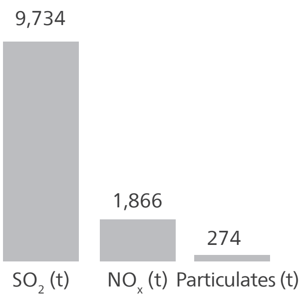
Waste waters

41,611 m^3

Discharged

Waste waters include meteoric waters that are susceptible to pollution and are therefore fed to treatment systems before being discharged or used.

Emissions into the atmosphere



CO_2 (t)	1,029,840
from combustion	*1,029,840*
Total (t of CO_2 eq)	1,029,840

Special waste

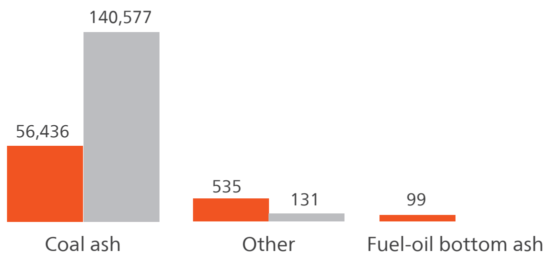
Total production: **57,104 t**

Total delivery to recovery operators: **140,718 t**

Non-hazardous

Production: 57,069 t

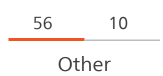
Delivery to recovery operators: 140,708 t



Hazardous

Production: 35 t

Delivery to recovery operators: 10 t

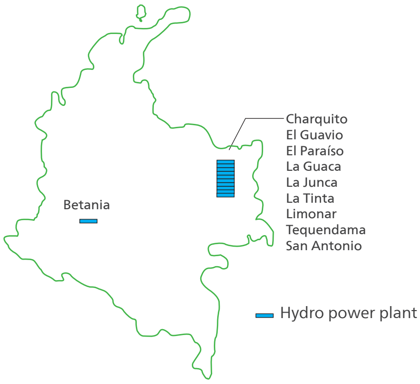


■ Production ■ Delivery to recovery operators

Colombia

Hydro power generation

Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
11	2,466	11,784

Power installations

	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	8	13	715
Pondage/reservoir	2	10	1,751
Pure/mixed pumped storage	1	0	0
	11	**23**	**2,466**

All the power plants are ISO 14001-certified.

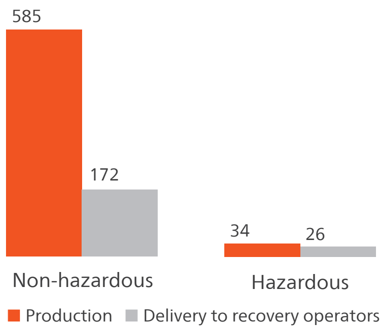
Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	12,588,840

Emissions from the otherwise necessary fossil-fired thermal generation.

Special waste

Total production: **619 t**
Total delivery to recovery operators: **198 t**



Equivalent yearly hours of utilization*

Hydro: **4,779 hours**

* Yearly generation/capacity ratio.

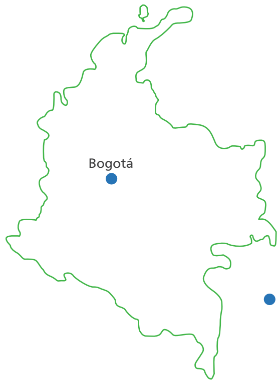
Expendables

Total: 8.56 t (lubricating oil)

Colombia

Electricity distribution

Endesa SA



● Headquarters of the company
of the Group carrying out the activity (Codensa)

The Numbers

Substations
67,843

Capacity
(MVA)
16,794

Lines
(km)
58,326

General data

Municipalities served: **102**
Surface area served: **14,494 km²**
Customers connected to the grid:
2,694,250
(supplied: 2,686,896)

Electricity

Total electricity distributed:
8,273.85 million kWh

Own consumption for grid operation:
10 million kWh

Emissions into the atmosphere

SF_6: **168 kg** (3,730 t of CO_2 equivalent)

Total greenhouse gases: **3,730** t of CO_2 equivalent

Power installations

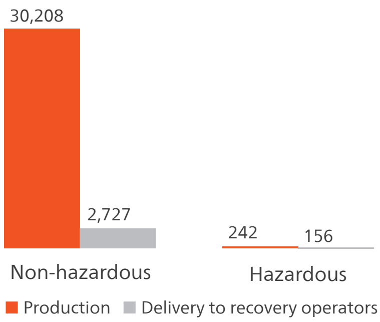
SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	55	7,742.9
MV/LV	67,727	8,710
MV/MV	61	341.1
	67,843	**16,794**

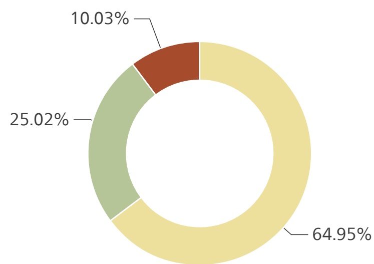
LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	1,281.59	-	-	**1,281.59**
MV	19,979.94	488	3,186.8	**23,654.34**
LV	16,620.45	14,104	2,665	**33,389.9**
	37,882	**14,592**	**5,852**	**58,326**

The organization has an ISO 14001-certified environmental management system in place.

Special waste

Total production: **30,450 t**
Total delivery to recovery operators:
2,883 t





Highlights of 2013

Fossil-fired thermal generation was up by over 300 GWh on 2012, whereas hydro generation was down by ~1 TWh.

EN1 EN3 With respect to 2012, the fuel mix changed in favor of coal (+~28 percentage points) to the expense of fuel oil (-~13 percentage points) and natural gas (-~14 percentage points).

EN1 EN3 EN5 The net heat rate of simple thermal generation continued to fall (-1.6% on 2012).

EN8 Net specific consumption of water for industrial uses in thermal generation was down by roughly 14% (from 0.26 to 0.23 l/kWh) on 2012.

EN16 Owing to the higher share of coal in the fuel mix, net specific emissions of CO_2 referred to thermal generation were up by ~124 g/kWh (+~13%).

EN20 For the same reason, net specific emissions of SO_2 rose by ~27%. The decrease in the emissions of NO_x (-~10%) and particulates (-~43%) is to be ascribed to the installation of continuous emission measurement systems; therefore, these figures are not comparable with those of 2012.

EN18 CO_2 emissions displaced by electricity generation from renewables amounted to nearly 13 million tonnes. The increase as against 2012 is justified by the increase in the reference emission factor, which more than offset the decrease of hydro generation.

EN22 Waste recovery in 2013 grew significantly, owing to recovery of ash produced in previous years and stored in the plant site.

In Colombia, Enel operates through Endesa (thermal and hydro power generation, electricity distribution and sale).

EN26

Environmental enhancements

Materials

> The company requires and ensures that all materials and resources used originate from production sites authorized by the competent environmental authority.

Water

> Continuing of the water-saving scheme in administrative offices through actions promoting reduction of consumption.

Emissions

> Continuing of the SF_6 monitoring scheme. Vehicle emission monitoring.

Noise

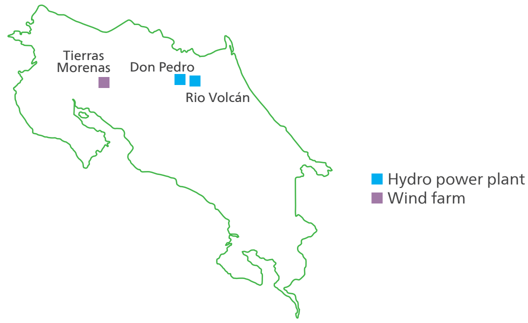
> Adequate response to complaints by customers and the general population about noise emitted by installations, by applying corrective measures as needed. In 2013, a noise barrier was installed in the substation of Ubaté.

Waste

> The company is investigating technologies to decontaminate PCB-containing equipment in the plant site, avoiding the transport of waste oils and related risks. In 2013, it initiated a project of clean-up of contaminated equipment.

Costa Rica

Hydro and wind power generation Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
3	55	167

All the power plants are ISO 14001-certified.

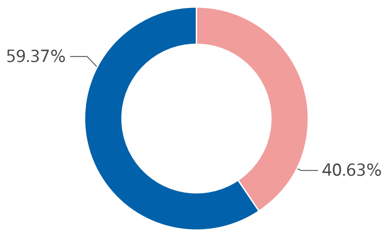
Power installations

HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Pondage/reservoir	2	2	31

WIND	Power plants no.	Net maximum electrical capacity MW
	1	24

Net electricity generation

Total: 167 million kWh



■ Hydro from natural flows
■ Wind

Equivalent yearly hours of utilization*

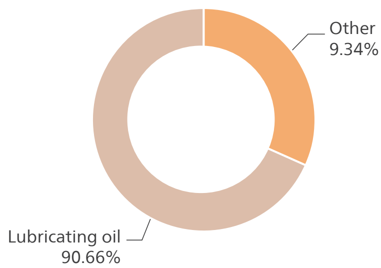
Hydro: **3,207 hours**

Wind: **2,834 hours**

* Yearly generation/capacity ratio.

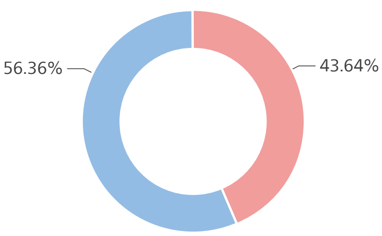
Expendables

Total: 1.049 t



Net maximum electrical capacity

Total: 55 MW



■ Total hydro
■ Total wind

Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	59,304
Due to wind generation	40,578
Total	**99,882**

Emissions from the otherwise necessary fossil-fired thermal generation.

Other data

Hydro generation

Emptied reservoirs

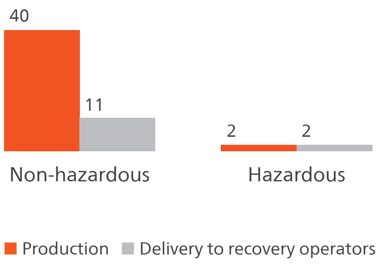
Quantity: **2**

Alluvial sediments removed by flushing them out through bottom outlets: **26,000 m³**

Alluvial sediments removed by mechanical equipment: **26,000 m³**
(of which reused locally: **25,974 m³**)

Special waste

Total production: **42 t**
Total delivery to recovery operators: **13 t**



Highlights of 2013

Total generation (hydro and wind) was down by ~11 GWh.

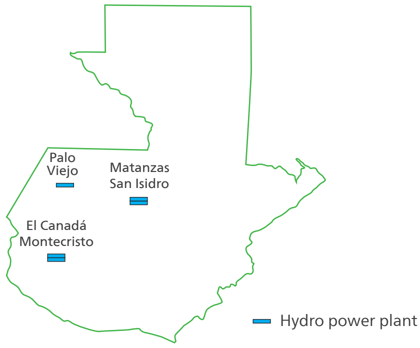
EN18 CO_2 emissions displaced by electricity generation from renewables amounted to about 100,000 tonnes (roughly 11% less than in 2012).

Enel operates in Costa Rica through Enel Green Power (hydro and wind power generation).

Guatemala

Hydro power generation

Enel Green Power SpA



The Numbers

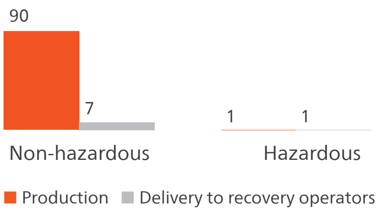
Power plants	Net capacity (MW)	Generation (million kWh)
5	164	665

Power installations

	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	1	1	3
Pondage/reservoir	4	4	161
	5	**5**	**164**

Special waste

Total production: **91 t**
Total delivery to recovery operators: **7 t**



Equivalent yearly hours of utilization*

Hydro: **4,065 hours**

* Yearly generation/capacity ratio.

Avoided CO_2 emissions (t)

Due to hydro generation from natural flows: **317,910**

Emissions from the otherwise necessary fossil-fired thermal generation.

Highlights of 2013

Total net hydro generation rose by ~85 GWh (roughly +14% on 2012).

Enel operates in Guatemala through Enel Green Power (hydro power generation).

EN18 CO_2 emissions displaced by electricity generation from renewables were equal to about 318,000 tonnes.

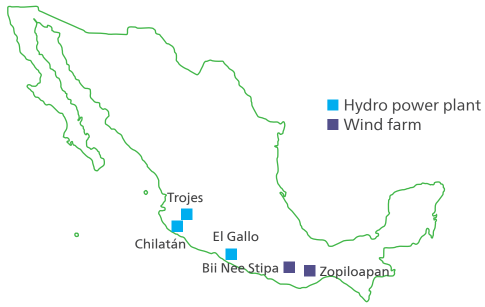
EN19 Ozone-depleting substances (determined on the basis of gas replenishments in air conditioning systems):

R22
Emission: 16.56 kg, equivalent to 0.91 kg of CFC-11.

EN22 Waste recovery was around the same levels as in 2012 (about 8%).

Mexico

Hydro and wind power generation Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
5	197	650

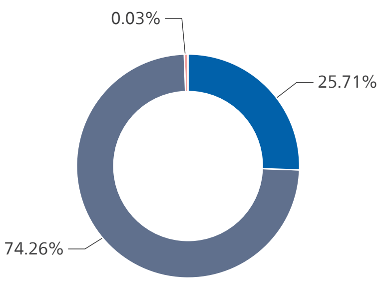
Power installations

HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Pondage/reservoir	3	3	53

	Power plants no.	Net maximum electrical capacity MW
WIND	2	144

Net electricity generation

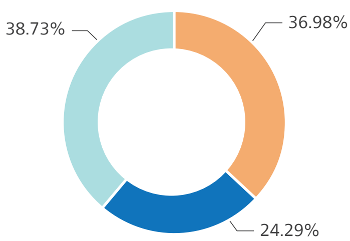
Total: 650 million kWh



Hydro from natural flows
Wind
Solar (photovoltaic)

Expendables

Total: 7.41 t



Lubricating oil
Dielectric oil
Other

Avoided CO_2 emissions (t)

Due to hydro generation from natural flows: **82.73**

Due to wind generation: **238.93**

Due to solar (photovoltaic) generation: **0.09**

Total: **321.75**

Emissions from the otherwise necessary fossil-fired thermal generation.

Equivalent yearly hours of utilization*

Wind: **3,354 hours**

Solar (photovoltaic): **1,829 hours**

Hydro: **3,186 hours**

* Yearly generation/capacity ratio.

Highlights of 2013

Total electricity generation from renewables was up by 78% on 2012, mostly driven by the sharp increase in wind power generation (+321 GWh). In contrast, hydro generation was down by roughly 17%.

Enel operates in Mexico through Enel Green Power (hydro and wind power generation in central Mexico).

EN18 CO_2 emissions displaced by electricity generation from renewables amounted to approximately 322,000 tonnes, reflecting the increase in generation.

Panama

Hydro power generation

Enel Green Power SpA

The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
1	300	1,219

Power installations

	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Pondage/reservoir	**1**	**1**	**300**

Gas oil

60 toe

Total consumption

Gas oil consumed by emergency generating sets.

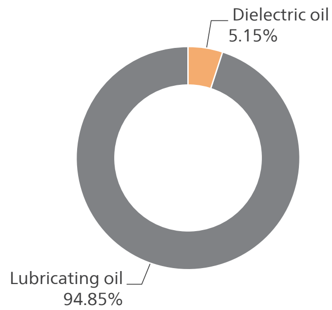
Equivalent yearly hours of utilization*

Hydro: **4,062 hours**

* Yearly generation/capacity ratio.

Expendables

Total: 6.8 t



Emissions into the atmosphere

CO_2: **176 t**

Emission produced by gas-oil combustion in emergency generating sets.

Avoided CO_2 emissions (t)

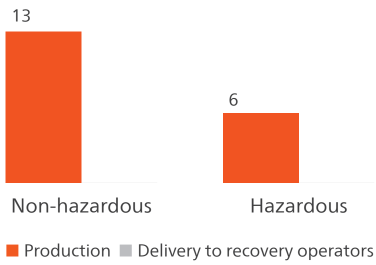
Due to hydro generation from natural flows: **847,512**

Emissions from the otherwise necessary fossil-fired thermal generation.

Special waste

Total production: **19 t**

Total delivery to recovery operators: **0 t**



Highlights of 2013

Total hydro generation was down by 27% on 2012.

Enel operates in Panama through Enel Green Power (hydro power generation).

EN18 CO_2 emissions displaced by electricity generation from renewables amounted to about 847,512 tonnes.

EN22 The low number and limited amount of waste items produced give rise to strong fluctuations in production and recovery values from one year to the other.

Peru

Thermal power generation

Endesa SA

The Numbers

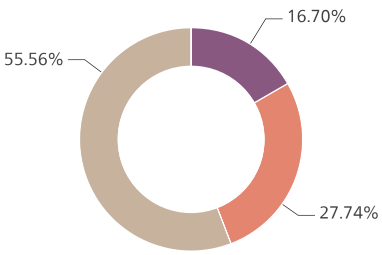
Power plants	Net capacity (MW)	Generation (million kWh)
3	1,078	4,054

Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Combined-cycle gas turbines	1	2	299
Single-cycle gas turbines	2	8	779
	3	**10**	**1,078**

Net maximum electrical capacity

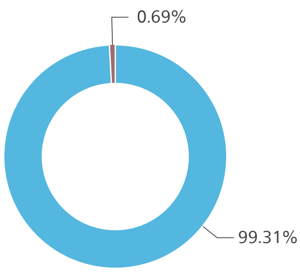
Total: 1,078 MW



Water for industrial uses

Total consumption: 3,252,210 m^3

Total abstraction from inland waters: 3,252,210 m^3



Waste waters

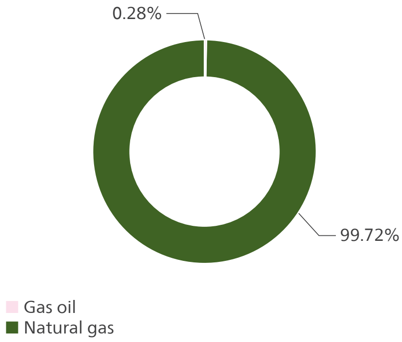
1,217,965 m^3

Discharged

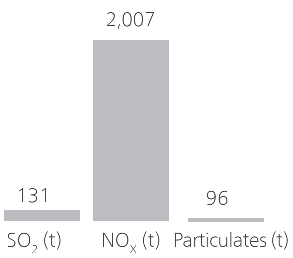
Waste waters include meteoric waters that are susceptible to pollution and are therefore fed to treatment systems before being discharged or used.

Fuel consumption

Total: 778,962 t of oil equivalent



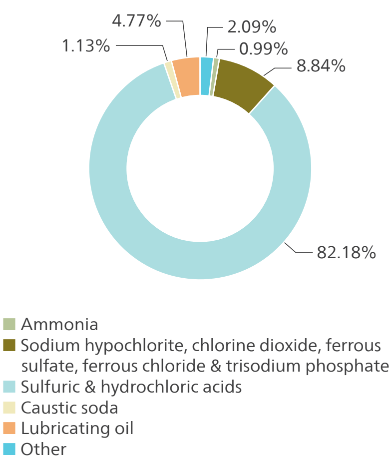
Emissions into the atmosphere



CO_2 (t)	1,570,836
from combustion	*1,570,836*

Expendables

Total: 719 t



Special waste

Total production: **443 t**

Total delivery to recovery operators: **0 t**

Non-hazardous

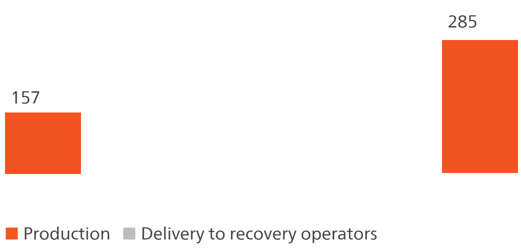
Production: 157 t

Delivery to recovery operators: 0 t

Hazardous

Production: 285 t

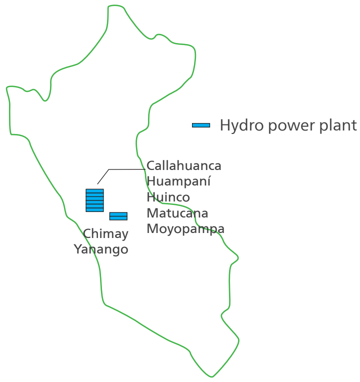
Delivery to recovery operators: 0 t



Peru

Hydro power generation

Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
7	743	4,474

Power installations

HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	5	12	349
Pondage/reservoir	2	6	394
	7	**18**	**743**

Equivalent yearly hours of utilization*

Hydro: **6,022 hours**

* Yearly generation/capacity ratio.

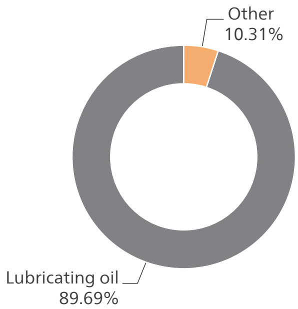
Avoided CO_2 emissions (t)

Due to hydro generation from natural flows: **1,733,577**

Emissions from the otherwise necessary fossil-fired thermal generation.

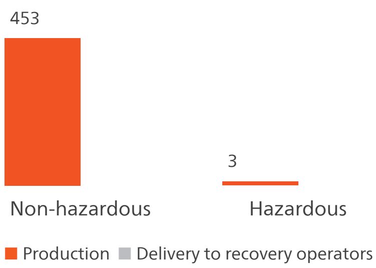
Expendables

Total: 3.8 t



Special waste

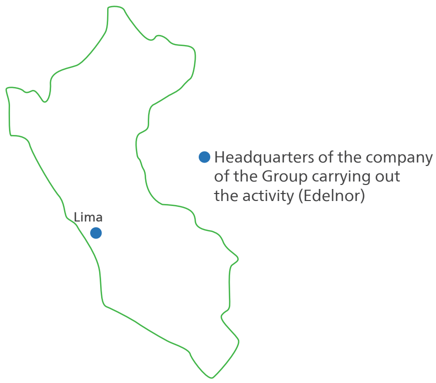
Total production: **456 t**
Total delivery to recovery operators: **0 t**



Peru

Electricity distribution

Endesa SA



The Numbers

Substations	Capacity (MVA)	Lines (km)
9,260	3,368	26,094

Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	28	1,725
MV/LV	9,229	1,617
MV/MV	3	26
	9,260	**3,368**

LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	419	-	82	**501**
MV	2,077	-	2,114	**4,191**
LV	0	10,055	11,347	**21,402**
	2,496	**10,055**	**13,543**	**26,094**

General data

Municipalities served: **57**

Surface area served: **1,517 km²**

Customers connected to the grid: **1,254,624**

(supplied: **1,254,610**)

Resource consumption

Expendables: **1.7 t**

Gas oil: **1.1 toe**

Electricity

Total electricity distributed: **6,456 million kWh**

Own consumption for grid operation: **14 million kWh**

Emissions into the atmosphere

SF_6: **1 kg** (22 t of CO_2 equivalent)

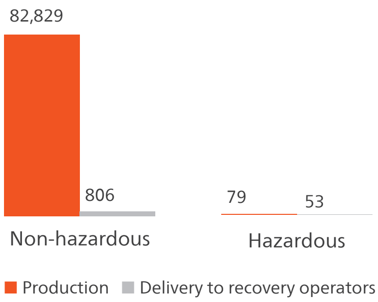
CO_2: **3 t**

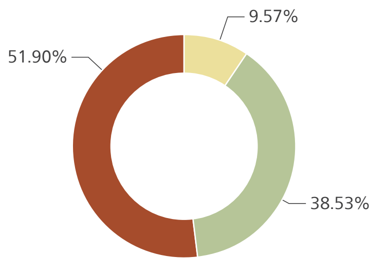
Total greenhouse gases: **25** t of CO_2 equivalent

Special waste

Total production: **82,908 t**

Total delivery to recovery operators: **859 t**





Highlights of 2013

Enel operates in Peru through Endesa (hydro and thermal power generation, electricity distribution and sale).

Overall generation fell by 703 GWh owing, above all, to lower fossil-fired thermal and hydro generation (-12% and -3% on 2012, respectively). A new unit went on line in the thermal plant of Malacas, owned by Empresa Eléctrica de Piura (EEPSA), which is part of the Endesa Group.
With an actual capacity of 187 MW, this is the first unit in commercial operation used in cold stand-by mode for the power system. This type of generating resource is normally used in tertiary frequency control.

EN1EN3 The fuel mix (including almost exclusively gas and gas oil, the latter only for plant start-up) remained practically unaltered.

EN1 EN3 EN5 The net heat rate of thermal generation, thanks to higher utilization of combined-cycle units, improved by about 10%, passing from 2,129 kcal/kWh to 1,921 kcal/kWh.

EN8 Net specific consumption of water for industrial uses in thermal generation slightly rose, passing from 0.69 to 0.8 liters/kWh.

EN16 Thanks to a better distribution of the generating output over the various thermal plants, total net specific emissions of CO_2 slightly dropped (from 422 to 387 g/kWh, i.e. -~8.3%).

EN20 Conversely, the increase of net specific emissions of macro-pollutants from thermal generation (SO_2, NO_X and particulates) was due to a higher amount of gas oil used in start-ups.

EN18 CO_2 emissions displaced by electricity generation from renewables totaled about 1.7 million tonnes.

EN23 0.28 m^3 of oil were spilled at the hydro plant of Huampaní; rehabilitation measures were promptly instituted.

EN26 Environmental enhancements.

Materials

Edelnor: in the course of 2013, the company continued to repair LV and MV power line towers instead of replacing them; this choice avoided the construction of new towers, thus sparing non-renewable resources (water, aggregates, concrete, iron); public-lighting lamp posts are recycled, thus saving on their purchase; dielectric oil is treated and regenerated.

Emissions

Edegel: in 2013, the company completed the validation of emissions avoided thanks to environmental enhancements made from 2006 to 2011 at the Ventanilla plant. The process was carried out by AENOR, a third accredited entity, which certified the reduction of 2,496,494 tonnes of CO_2. Furthermore, in 2013, Edegel (controlled by Endesa) joined the voluntary CO_2 market.

Water

> Electricity distribution (Edelnor): the company continued its program of awareness & training (via its Intranet site) on reduction of consumption of water, paper and energy.

> Santa Rosa thermal plant: reuse of waste waters for irrigation.

Waste

> Electricity distribution (Edelnor): 330 analyses of transformers were conducted to detect PCBs. No PCBs were identified.

Liquid releases

> Edelnor: prevention of pollution via quarterly monitoring of the quality of waste waters from mini-hydro plants.

> Santa Rosa thermal plant: April 2013 - approval of the environmental management plan regarding releases into the local river.

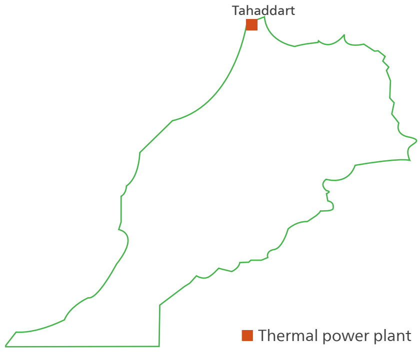
> Ventanilla thermal plant: November 2013 - approval of the environmental management plan regarding the reuse of waste waters for household uses.

Africa

Morocco

Thermal power generation

Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
1	123	852

Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Combined-cycle gas turbines	**1**	**2**	**123**

Fuel consumption

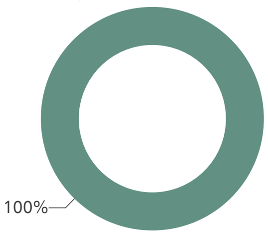
Total: **135,680 t** (of oil equivalent)

(100% natural gas)

Water for industrial uses

Total consumption: 14,164 m^3

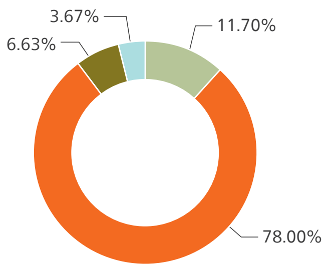
Total abstraction from inland waters: 14,164 m^3



From aqueducts

Expendables

Total: 26 t



Ammonia

Sodium hypochlorite, chlorine dioxide, ferrous sulfate, ferrous chloride & trisodium phosphate

Sulfuric & hydrochloric acids

Other

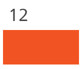
Emissions into the atmosphere

CO_2 (t)	326,400
from combustion	*326,400*
Total (t of CO_2 equivalent)	326,400

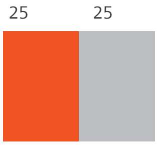
Special waste

Total production: **37 t**
Total delivery to recovery operators: **25 t**

Non-hazardous
Production: 12 t
Delivery to recovery operators: 0 t



Hazardous
Production: 25 t
Delivery to recovery operators: 25 t



■ Production ■ Delivery to recovery operators

Highlights of 2013

Enel operates in Morocco through Endesa (thermal power generation).

EN8 Water for industrial uses is only freshwater withdrawn from aqueducts; however, as the Tahaddart plant has not a completely closed cooling cycle, but a semi-open one, it also abstracts water from rivers (overall volume of recirculated water: 2.7 million m^3). The specific consumption of water for industrial uses in 2012 erroneously included the amount withdrawn from rivers and used in open-cycle cooling towers.

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Appendix to the Environmental Report 2013

Environmental management systems

2013 results

At present, ISO 14001-certified systems cover 94% of the net maximum capacity of power plants, more than 95% of the grid length and 100% of the activities of the Global Service Functions and of the Engineering and Research Division, as well as of the market activities conducted in Italy and Romania. The higher coverage with respect to 2012 reflects the new certifications gained by: the wind farms of Enel Green Power in Europe and Latin America; the combined-cycle thermal plants of Pego in Portugal and Marcinelle in Belgium; and the diesel thermal plant of Ibiza in Spain.

The details of the ISO 14001-certified and EMAS-registered activities are provided below.

ISO 14001-certified and EMAS-registered activities

Country	Technology/ business activity	List of EMAS-registered installations/sites	Net maximum capacity (MW)	List of ISO 14001-certified installations/sites	Net maximum capacity (MW)	Grid length (km)
			EUROPE			
BELGIUM	Thermal power plants			Marcinelle Energie All	406	
FRANCE	Wind power plants			Enel Green Power All	186	
	Hydro power plants			Enel Green Power All	19	
	Wind power plants			Enel Green Power All	200	
GREECE	Photovoltaic power plants			Enel Green Power All	71	
	Thermal power plants	Enel Produzione Bastardo, Fusina, Genova, La Casella, La Spezia, Leri Cavour, Montalto di Castro, Pietrafitta, Porto Corsini, Porto Marghera, Priolo Gargallo, Santa Barbara, Sulcis, Torrevaldaliga Nord	13,193	Enel Produzione Bastardo, Brindisi Sud, Fusina, Genova, La Casella, La Spezia, Leri Cavour, Montalto di Castro, Pietrafitta, Porto Corsini, Porto Empedocle, Porto Marghera, Porto Tolle, Priolo Gargallo, Rossano Calabro, Santa Barbara, Sulcis, Termini Imerese and diesel-fired plants on the Aeolian islands, Torrevaldaliga Nord	20,831	
		Enel Produzione Hydro Emilia-Toscana, Hydro Piemonte, Hydro Centro, Hydro Sud, Hydro Sardegna, Hydro Veneto	6,481	Enel Produzione Hydro Emilia-Toscana, Hydro Piemonte, Hydro Centro, Hydro Sud, Hydro Sardegna, Hydro Sicilia, Hydro Lombardia, Hydro Veneto	10,882	
		SE Hydropower		SE Hydropower	620	
			620	Enel Green Power All	1,512	
		Hydro Dolomiti Enel	627	Hydro Dolomiti Enel	627	
	Hydro power plants	San Floriano Energy All	45	San Floriano Energy All	45	
	Wind power plants			Enel Green Power All	720	
	Geothermal power plants	Enel Green Power All	723	Enel Green Power All	723	
	Photovoltaic power plants			Enel Green Power All	112	
	Power grid			Enel Distribuzione All		1,132,011
	Global Service Functions			All		
	Sales			All		
ITALY	Engineering and Innovation			All		
	Thermal power plants	Endesa Pego	244	Endesa Pego Pego	1,086	
PORTUGAL	Wind power plants			Enel Green Power All	126	

Country	Technology/ business activity	List of EMAS-registered installations/sites	Net maximum capacity (MW)	List of ISO 14001-certified installations/sites	Net maximum capacity (MW)	Grid length (km)
			EUROPE			
	Wind power plants			**Enel Green Power** All	498	
	Photovoltaic power plants			**Enel Green Power** All	36	
	Power grid			**Enel Distributie Banat** All **Enel Distributie Dobrogea** All **Enel Distributie Muntenia** All		90,906
	Sales			All		
ROMANIA	Real estate, vehicle fleet and services			All		
RUSSIA	Thermal power plants			**OGK-5** All	9,107	
	Thermal power plants			**Slovenské elektrárne AS** All	1,254	
	Nuclear power plants			**Slovenské elektrárne AS** All	1,814	
SLOVAKIA	Hydro power plants			**Slovenské elektrárne AS** All	2,329	
		Endesa Barranco de Tirajana, Besós (certified in 2013), Ceuta, Compostilla, Cristóbal Colón, Granadilla, Litoral de Almería, Melilla, Puentes (steam-condensing), Puentes (combined-cycle), San Roque, Teruel	9,306	**Endesa** Alcudia, Barranco de Tirajana, Besós, Candelaria, Ca's Tresorer, Ceuta, Compostilla, Cristóbal Colón, El Palmar, Granadilla, Ibiza, Jinámar, Las Salinas, Llanos Blancos, Litoral de Almería, Los Guinchos, Mahón, Melilla, Puentes (steam-condensing), Puentes (combined-cycle), Punta Grande, San Roque, Son Reus, Teruel	12,654	
	Thermal power plants	**Enel Green Power** UTE Biogas Garraf	6	**Enel Green Power** All	74	
	Nuclear power plants			**Endesa** All	3,680	
				Endesa All	4,629	
	Hydro power plants			**Enel Green Power** All	43	
	Wind power plants			**Enel Green Power** All	1,778	
	Photovoltaic power plants			**Enel Green Power** All	13	
	Power grid			**Endesa** Aragon, Andalusia, Balearic islands, Canary islands, Catalonia, Extremadura (including power lines under construction)		323,631
	Port terminals	**Endesa** Ferrol, Los Barrios		**Endesa** All		
SPAIN	Mining activities			**Endesa** All		

Country	Technology/ business activity	List of EMAS-registered installations/sites	Net maximum capacity (MW)	List of ISO 14001-certified installations/sites	Net maximum capacity (MW)	Grid length (km)
			EUROPE			
SPAIN	Real estate			Endesa - offices: Madrid (headquarters); Cádiz-Caracola (Cádiz); Huelva-Glorieta (Huelva); Málaga-Maestranza (Málaga); Granada-Escudo del Carmen (Granada); Almería- María Casares (Almería); Teruel (Teruel); Huesca-Miguel Servert (Huesca); Palma de Mallorca-San Juan de Dios (Palma de Mallorca); Dragonera (Mahón - Balearic islands); Las Palmas de Gran Canaria (Las Palmas de Gran Canaria); Tenerife-Hamilton-Torres del Mar (Santa Cruz de Tenerife); Barcelona- Vilanova (Barcelona); Sabadell (Barcelona); Girona-Salt (Girona); Hospitalet de Llobregat (Barcelona); Lleida- Magraners (Lleida); Tarragona (Tarragona) Enel Green Power España - offices: Madrid (headquarters) EUFER - offices: Andalusia, Barcelona, Castile, Extremadura, Galicia, Las Palmas, León, Madrid, Santander, Seville, Tenerife, Valencia		

Country	Technology/ business activity	List of EMAS-registered installations/sites	Net maximum capacity (MW)	List of ISO 14001-certified installations/sites	Net maximum capacity (MW)	Grid length (km)
			LATIN AMERICA			
ARGENTINA	Thermal power plants			**Endesa** All	3,075	
	Hydro power plants			**Endesa** All	1,328	
	Power grid			**Endesa** All		24,553
BRAZIL	Thermal power plants			**Endesa** All	314	
	Hydro power plants			**Endesa** All	662	
				Enel Green Power All	93	
	Wind power plants			**Enel Green Power** All	84	
	Power grid			**Endesa** Ampla, Coelce, Cien		105,655

Country	Technology/ business activity	List of EMAS-registered installations/sites	Net maximum capacity (MW)	List of ISO 14001-certified installations/sites	Net maximum capacity (MW)	Grid length (km)
			LATIN AMERICA			
	Thermal power plants			Endesa All (excluding Bocamina II - MW 350)	2,028	
	Hydro power plants			Endesa All	3,456	
				Enel Green Power All	92	
	Wind power plants			Endesa All	78	
				Enel Green Power All	180	
CHILE	Power grid			Endesa All		16,304
	Thermal power plants			Endesa All	412	
	Hydro power plants			Endesa All	2,466	
COLOMBIA	Power grid			Endesa All		58,326
	Hydro power plants			Enel Green Power All	31	
COSTA RICA	Wind power plants			Enel Green Power All	24	
GUATEMALA	Hydro power plants			Enel Green Power All	164	
	Hydro power plants			Enel Green Power All	53	
MEXICO	Wind power plants			Enel Green Power All	144	
PANAMA	Hydro power plants			Enel Green Power All	300	
	Thermal power plants			Endesa All	1,027	
	Hydro power plants			Endesa All	746	
PERU	Power grid			Endesa All		26,094

Country	Technology/ business activity	List of EMAS-registered installations/sites	Net maximum capacity (MW)	List of ISO 14001-certified installations/sites	Net maximum capacity (MW)	Grid length (km)
			AFRICA			
MOROCCO	Thermal power plants			Endesa All	123	


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Europe

Belgium

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.				1	1
thermal	no.				1	1
Net maximum electrical capacity	MW				406	406

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Thermal generation						
gas oil	thousand t				0.004	3.83
	thousand toe				0.004	3.86
natural gas	million m^3				233	239
	thousand toe				203	208
technologically captive use	million m^3				228	239
	thousand toe				198	208
of which in combined-cycle units	million m^3				228	239
	thousand toe				198	208
non-technologically captive use	million m^3				5.41	0.165
	thousand toe				4.71	0.141
Total	**thousand toe**				**203**	**212**
	TJ				**8,502**	**8,873**
EN8 **Water for industrial uses**						
From rivers (including second-flush rainwater)	million m^3				2.17	1.54
EN1 **Expendables**						
Ammonia	t				1.59	7.9
Sodium hypochlorite	t				3.84	2.88
Ferrous chloride	t				107	69.5
Ferric chloride	t				107	88.7
Polyectrolyte	t				4.84	9.52
Sulfuric & hydrochloric acids	t				97.5	37.7
Caustic soda	t				1.59	3.1
Lubricating oil	t				2.13	4
Other	t				60.8	46.2
Total	**t**				**387**	**269**

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	million kWh				**1,183**	**1,373**
natural gas	million kWh				1,183	1,373

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 NO_x	Thermal generation	thousand t				0.103	0.209
EN16 CO_2	Fossil-fired thermal generation (from combustion)	thousand t				484	514
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**				**484**	**514**
EN21 **Waste waters (discharged quantity)**	thermal generation	million m³				1.33	0.822
EN21 **Conventional polluting load of waste waters discharged by plants**							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg				200	123
	in some plants with an overall capacity of	MW				406	406
Total nitrogen (expressed as N)	thermal generation	kg				10,950	6,738
	in some plants with an overall capacity of	MW				406	406
COD	thermal generation	kg				35,646	21,935
	in some plants with an overall capacity of	MW				406	406
BOD	thermal generation	kg				4,396	2,705
	in some plants with an overall capacity of	MW				406	406
EN22 **Non-hazardous special waste**							
production	electricity generation	t				33.1	524
delivery to recovery operators	electricity generation	t				15.2	520
EN22 **Hazardous special waste**							
production	electricity generation	t				236	24.8
delivery to recovery operators	electricity generation	t				236	24.8
EN22 **Total special waste**							
production	electricity generation	t				269	549
delivery to recovery operators	electricity generation	t				251	545

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation	kcal/kWh				1,717	1,543		-10.1
EN8 Net specific consumption of water for industrial uses in thermal generation								
Total net specific consumption of water for industrial uses	liters/kWh				1.84	1.12		-39.1
EN8 Coverage of requirements of water for industrial uses								
From rivers (including second-flush rainwater)	% of requirements				100	100		0
Total from inland waters	% of requirements				100	100		0
EN1 EN3 Fossil fuel consumption for thermal generation								
gas oil	% of total fuel consumption				0.002	1.82		90,900
natural gas	% of total fuel consumption				100	98.2		-1.8
natural gas, technologically captive use	*% of total natural-gas consumption*				*97.7*	*99.9*		*2.3*
of which in combined-cycle units	% of total natural-gas consumption				97.7	99.9		2.3
natural gas, non-technologically captive use	*% of total natural-gas consumption*				*2.32*	*0.068*		*-97.1*
Specific emissions into the atmosphere								
EN20 NO_x (simple thermal generation)	g/kWh thermal net				0.087	0.152		74.7
EN16 CO_2 (simple thermal generation)	g/kWh thermal net				409	369		-9.8
Net specific conventional polluting load of waste waters discharged by plants (thermal generation)								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net				0.168	0.089		-47
Total nitrogen (expressed as N)	mg/kWh thermal net				9.23	4.91		-46.8
COD	mg/kWh thermal net				30	16		-46.7
BOD	mg/kWh thermal net				3.7	1.97		-46.8
EN22 **Waste recovery**								
Non-hazardous special waste								
electricity generation	% of production				46	99.2		115.7
Hazardous special waste								
electricity generation	% of production				100	100		0
Total special waste								
electricity generation	% of production				93.4	99.3		6.3

Bulgaria

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	3	3	2	2	2
thermal	no.	1	1	0	0	0
wind	no.	2	2	2	2	2
Net maximum electrical capacity	MW	796	850	42	42	42
thermal	MW	775	808	0	0	0
wind	MW	21	42	42	42	42
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	0	9	0	0	1
vehicles for both private and service use	no.	0	0	0	0	1

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Thermal generation						
fuel oil	thousand t	6.92	4.36	0	0	0
	thousand toe	6.57	4.14	0	0	0
HS	thousand t	6.92	4.36	0	0	0
	thousand toe	6.57	4.14	0	0	0
brown coal	thousand t	6,702	8,268	0	0	0
	thousand toe	1,071	1,309	0	0	0
Total	**thousand toe**	**1,077**	**1,313**	**0**	**0**	**0**
	TJ	**45,102**	**54,964**	**0**	**0**	**0**
EN4 **Primary electricity**						
Various activities	million kWh	0	0.072	0	0	0.015
EN8 **Water for industrial uses**						
From rivers (including second-flush rainwater)	million m^3	20.3	20.1	0	0	0
From wells	million m^3	0.113	0	0	0	0
Total abstraction from inland waters	**million m^3**	**20.4**	**20.1**	**0**	**0**	**0**
EN10 **From waste waters (used inside plants)**	million m^3	3.18	9.83	0	0	0
Total requirements	**million m^3**	**23.6**	**30**	**0**	**0**	**0**
for thermal generation	million m^3	23.6	30	0	0	0
EN1 **Expendables**						
Resins	t	92.8	2.4	0	0	0
Hydrazine	t	1.6	1.69	0	0	0
Ammonia	t	2.65	5.66	0	0	0

		2009	2010	2011	2012	2013
Limestone for flue-gas desulfurization	t	387,675	466,716	0	0	0
Sodium hypochlorite	t	10.2	32.4	0	0	0
Trisodium phosphate	t	2.78	3.15	0	0	0
Lime	t	762	886	0	0	0
Ferric chloride	t	119	73.2	0	0	0
Polyectrolyte	t	1.81	1.75	0	0	0
Sulfuric & hydrochloric acids	t	611	1,143	0	0	0
Caustic soda	t	248	244	0	0	0
Lubricating oil	t	142	98.7	0.29	0	0
Dielectric oil	t	0	0.55	0	0	0
Printing paper	t	0	0.165	0	0	0.001
Other	t	73.7	82.7	0	0	0
Total	**t**	**389,743**	**469,292**	**0.29**	**0**	**0.001**
for thermal generation	t	389,743	469,292	0	0	0
for wind generation	t	0	0	0.29	0	0

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	**million kWh**	**3,731**	**4,673**	**0**	**0**	**0**
fuel oil & gas oil	million kWh	22.8	14.7	0	0	0
brown coal	million kWh	3,709	4,658	0	0	0
From renewables	**million kWh**	**11.1**	**59.8**	**66.6**	**83.3**	**85.6**
wind	million kWh	11.1	59.8	66.6	83.3	85.6
Total	**million kWh**	**3,743**	**4,733**	**66.6**	**83.3**	**85.6**

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 SO_2	Thermal generation	thousand t	14.9	15.5	0	0	0
EN20 NO_X	Thermal generation	thousand t	3.87	3.86	0	0	0
EN20 Particulates	Thermal generation	thousand t	0.837	0.13	0	0	0
EN16 CO_2	Fossil-fired thermal generation (from combustion)	thousand t	5,004	5,892	0	0	0
	Fossil-fired thermal generation (from desulfurization)	thousand t	162	195	0	0	0
	Total from thermal generation	thousand t	5,166	6,086	0	0	0
	various activities	thousand t	0	0	0	0	0.009
	Total	thousand t	5,166	6,086	0	0	0.009
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		thousand t of CO_2 equivalent	5,166	6,086	0	0	0.009

	Source		2009	2010	2011	2012	2013
EN18 **Avoided CO_2 emissions**							
Due to wind power generation		thousand t	15.4	77.9	85.7	98	99.8
EN21 **Waste waters (discharged quantity)**							
	thermal generation	million m³	4.64	4.36	0	0	0
	total electricity generation	million m³	4.64	4.36	0	0	0
	Total	**million m³**	**4.64**	**4.36**	**0**	**0**	**0**
EN21 **Conventional polluting load of waste waters discharged by plants**							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	939	773	0	0	0
	in some plants with an overall capacity of	MW	775	808	0	0	0
Total nitrogen (expressed as N)	thermal generation	kg	23,417	18,652	0	0	0
	in some plants with an overall capacity of	MW	775	808	0	0	0
Total phosphorus (expressed as P)	thermal generation	kg	783	413	0	0	0
	in some plants with an overall capacity of	MW	775	808	0	0	0
COD	thermal generation	kg	1,504	1,854	0	0	0
	in some plants with an overall capacity of	MW	775	808	0	0	0
BOD	thermal generation	kg	404	583	0	0	0
	in some plants with an overall capacity of	MW	775	808	0	0	0
EN22 **Non-hazardous special waste**							
Coal bottom ash	fossil-fired thermal generation (simple and CHP)						
	production	t	106,808	120,792	0	0	0
	delivery to recovery operators	t	500	0	0	0	0
Coal flyash	fossil-fired thermal generation (simple and CHP)						
	production	t	961,275	1,087,130	0	0	0
	delivery to recovery operators	t	4,500	0	0	0	0
Gypsum from desulfurization	fossil-fired thermal generation (simple and CHP)						
	production	t	655,280	787,517	0	0	0
	delivery to recovery operators	t	1,456	219,692	0	0	0
Other							
production	electricity generation	t	28,845	27,138	28.6	0	0
delivery to recovery operators	electricity generation	t	3,542	2,578	0	0	0
Total							
production	**electricity generation**	**t**	**1,752,208**	**2,022,578**	**28.6**	**0**	**0**
delivery to recovery operators	**electricity generation**	**t**	**9,998**	**222,270**	**0**	**0**	**0**
EN22 **Hazardous special waste**							
production	electricity generation	t	134	266	0.643	0	0
delivery to recovery operators	electricity generation	t	124	140	0	0	0

	Source		2009	2010	2011	2012	2013
EN22 Total special waste							
production	electricity generation	t	1,752,343	2,022,844	29.3	0	0
delivery to recovery operators	electricity generation	t	10,122	222,410	0	0	0

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation	kcal/kWh	2,887	2,809	0	0	0	-100	0
EN8 Net specific consumption of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	6.32	6.41	0	0	0	-100	0
excluding contribution of as-is sea water	liters/kWh	6.32	6.41	0	0	0	-100	0
Total net specific consumption of water for industrial uses	liters/kWh	6.3	6.33	0	0	0	-100	0
EN8 Coverage of requirements of water for industrial uses								
from rivers (including second-flush rainwater)	% of requirements	86	67.2	0	0	0	-100	0
from wells	% of requirements	0.479	0	0	0	0	-100	0
Total from inland waters	**% of requirements**	**86.5**	**67.2**	**0**	**0**	**0**	**-100**	**0**
EN10 From waste waters (used inside plants)	% of requirements	13.5	32.8	0	0	0	-100	0
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	0.61	0.315	0	0	0	-100	0
brown coal	% of total fuel consumption	99.4	99.7	0	0	0	-100	0
HS fuel oil	% of total fuel-oil consumption	100	100	0	0	0	-100	0
Electricity generation from renewables								
wind	% of total generation	0.297	1.26	100	100	100	33,570	0
Total	**% of total generation**	**0.297**	**1.26**	**100**	**100**	**100**	**33,570**	**0**
Specific emissions into the atmosphere								
EN20 SO_2 (thermal generation, simple)	g/kWh thermal net	3.99	3.32	0	0	0	-100	0
EN20 NO_x (thermal generation, simple)	g/kWh thermal net	1.04	0.827	0	0	0	-100	0
EN20 Particulates (thermal generation, simple)	g/kWh thermal net	0.224	0.028	0	0	0	-100	0
EN16 CO_2 (thermal generation, simple)	g/kWh thermal net	1,385	1,302	0	0	0	-100	0
EN20 SO_2 (total from thermal generation)	g/kWh total net	3.98	3.28	0	0	0	-100	0
EN20 NO_x (total from thermal generation)	g/kWh total net	1.03	0.816	0	0	0	-100	0
EN20 Particulates (total from thermal generation)	g/kWh total net	0.224	0.027	0	0	0	-100	0
EN16 CO_2 (total from thermal generation)	g/kWh total net	1,380	1,286	0	0	0	-100	0

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Net specific conventional polluting load of waste waters discharged by plants (thermal generation)								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net	0.252	0.165	0	0	0	-100	0
Total nitrogen (expressed as N)	mg/kWh thermal net	6.28	3.99	0	0	0	-100	0
Total phosphorus (expressed as P)	mg/kWh thermal net	0.21	0.088	0	0	0	-100	0
COD	mg/kWh thermal net	0.403	0.397	0	0	0	-100	0
BOD	mg/kWh thermal net	0.108	0.125	0	0	0	-100	0
EN22 **Specific waste production**								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	288	259	0	0	0	-100	0
EN22 **Waste recovery**								
Coal and brown-coal ash	% of production	0.468	0	0	0	0	-100	0
bottom ash	% of production	0.468	0	0	0	0	-100	0
flyash	% of production	0.468	0	0	0	0	-100	0
Gypsum from desulfurization	% of production	0.222	27.9	0	0	0	-100	0
Other non-hazardous special waste								
electricity generation	% of production	12.3	9.5	0	0	0	-100	0
Non-hazardous special waste								
electricity generation	% of production	0.571	11	0	0	0	-100	0
Hazardous special waste								
electricity generation	% of production	92.1	52.6	0	0	0	-100	0
Total special waste								
electricity generation	% of production	0.578	11	0	0	0	-100	0

France

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	7	10	16	16	19
wind	no.	7	10	16	16	19
Net maximum electrical capacity	MW	68.1	102	166	166	186
wind	MW	68.1	102	166	166	186
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	10	9	11	10	9
special vehicles	no.	0	0	0	4	0
vehicles for both private and service use	no.	0	0	0	10	0
Gross real-estate surface area	thousand m^2	0.7	1.18	1.18	2	2.69

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Various activities	thousand toe	0.013	0.013	0.018	0.009	0.011
Grand total	thousand toe	0.013	0.013	0.018	0.009	0.011
	TJ	0.544	0.544	0.754	0.377	0.461
EN4 **Primary electricity**						
Various activities	million kWh	0.013	0.028	0.076	0.131	0.292
Water for non-industrial uses						
Real-estate & service management	million m^3	0.001	0.001	0	0	0
EN1 **Expendables**						
Lubricating oil	t	0	19.2	0	0	0
Dielectric oil	t	0	5.5	0	0	0
Printing paper	t	0.499	0.798	0.936	0.836	2.26
Total	t	0.499	25.5	0.936	0.836	2.26
for wind power generation	t	0	24.7	0	0	0

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From renewables	million kWh	65.9	149	245	364	362
wind	million kWh	65.9	149	245	364	362
Total	million kWh	65.9	149	245	364	362
Market						
Open market						
Business segment						
Green offerings						
Customers	no.	0	0	0	0	2
Power sold	million kWh	0	0	0	0	0.941
Total						
Customers	no.	0	0	0	7	24
Power sold	million kWh	0	0	0	2.09	12.7
Large customers' segment						
Green offerings						
Customers	no.	0	0	0	1	1
Power sold	million kWh	0	0	0	90.2	88.9
Time-of-use offerings						
Customers	no.	0	0	0	2	0
Power sold	million kWh	0	0	0	60.3	0
Total						
Customers	no.	0	0	0	30	42
Power sold	million kWh	0	0	0	860	835
Very large customers' segment						
Total						
Customers	no.	0	0	0	19	15
Power sold	million kWh	0	0	0	8,039	5,320
Total						
Total green offerings	million kWh	0	0	0	90.2	89.8
Total time-of-use offerings	million kWh	0	0	0	60.3	0
Overall power sold						
high-voltage	million kWh	0	0	0	3,584	3,834
medium-voltage	million kWh	0	0	0	5,317	2,334
Total	million kWh	0	0	0	8,901	6,168
Total RECs certificates canceled	no. (MWh)	0	0	0	90,180	90,720

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN16 CO_2	various activities	thousand t	0.039	0.039	0.056	0.028	0.035
	Total	thousand t	0.039	0.039	0.056	0.028	0.035
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		thousand t of CO_2 equivalent	0.039	0.039	0.056	0.028	0.035

	Source		2009	2010	2011	2012	2013
EN18 Avoided CO_2 emissions							
Due to wind power generation		thousand t	42.9	97	159	225	219
Due to generation from renewables		thousand t	42.9	97	159	225	219
EN22 Non-hazardous special waste							
production	electricity generation	t	0	0	0	0.125	0
delivery to recovery operators	electricity generation	t	0	0	0	0.125	0
EN22 Hazardous special waste							
production	electricity generation	t	0	0	4	0	0
	various activities	t	0	0.087	0.412	0.28	0.1
	Total	**t**	**0**	**0.087**	**4.41**	**0.28**	**0.1**
EN22 Total special waste							
production	electricity generation	t	0	0	4	0.125	0
	various activities	t	0	0.087	0.412	0.28	0.1
	Total	**t**	**0**	**0.087**	**4.41**	**0.405**	**0.1**
delivery to recovery operators	electricity generation	t	0	0	0	0.125	0
	Total	**t**	**0**	**0**	**0**	**0.125**	**0**

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Electricity generation from renewables								
wind	% of total generation	100	100	100	100	100	0	0
Total	**% of total generation**	**100**	**100**	**100**	**100**	**100**	**0**	**0**
EN6 Market								
Business segment								
Green power sold	% of power sold				0	7.44		-
Large customers' segment								
Green power sold	% of power sold				10.5	10.6		1
Time-of-use power sold	% of power sold				7.01	0		0
Overall power sold								
high-voltage	% of power sold				40.3	62.2		54.3
medium-voltage	% of power sold				59.7	37.8		-36.7
Total green power sold	**% of power sold**				**1.01**	**1.46**		**44.6**
Total time-of-use power sold	**% of power sold**				**0.677**	**0**		**0**
EN22 Waste recovery								
Non-hazardous special waste								
electricity generation	% of production				100	0		-100
Total special waste								
electricity generation	% of production				100	0		-100

Greece

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	13	16	20	28	50
hydro	no.	2	4	4	5	5
wind	no.	11	12	15	17	17
solar (photovoltaic)	no.	0	0	1	6	28
Net maximum electrical capacity	MW	133	143	191	248	290
hydro	MW	10	13.6	13.6	19.2	19.2
wind	MW	123	129	172	199	200
solar (photovoltaic)	MW	0	0	5	29.2	70.6
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	7	7	0	0	18
special vehicles	no.	4	4	0	0	0
vehicles for both private and service use	no.	0	0	21	12	18

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Thermal generation						
Various activities	thousand toe	0	0	0	0.014	0.069
Grand total	thousand toe	0	0	0	0.014	0.069
	TJ	0	0	0	0.586	2.89
EN4 **Primary electricity**						
Various activities	million kWh	0.467	0.467	0	0	0.35
Water for non-industrial uses						
Real-estate & service management	million m^3	0.006	0.006	0	0	0
EN1 **Expendables**						
Lubricating oil	t	0.5	1.22	3.47	2.79	3.47
Printing paper	t	1.25	0	0	0.004	0.007
Total	t	1.75	1.22	3.47	2.79	3.48
for hydro generation	t	0.5	0.76	1.4	0.66	0
for wind generation	t	0	0.462	2.07	2.13	3.47

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From renewables	**million kWh**	**262**	**310**	**349**	**476**	**575**
hydro from natural flows	million kWh	17.1	27.7	25.3	44.3	47.2
wind	million kWh	245	282	322	405	432
solar (photovoltaic)	million kWh	0	0	1.49	26.6	95.4
Total	**million kWh**	**262**	**310**	**349**	**476**	**575**

Emissions

			2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN16 CO_2	various activities	thousand t	0	0	0	0.04	0.208
	Total	**thousand t**	**0**	**0**	**0**	**0.04**	**0.208**
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		thousand t of CO_2 equivalent	0	0	0	0.04	0.208
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	16.4	26.6	24.3	39	39.2
Due to wind and solar generation		thousand t	235	271	311	380	439
Due to generation from renewables		thousand t	251	297	335	419	478
EN22 **Non-hazardous special waste**							
production	electricity generation	t	1.52	1.18	0.801	4.83	3.87
	various activities	t	0	0	0	2	0.07
	Total	**t**	**1.52**	**1.18**	**0.801**	**6.83**	**3.94**
delivery to recovery operators	electricity generation	t	0.6	0.261	0.621	0.35	3.87
	Total	**t**	**0.6**	**0.261**	**0.621**	**0.35**	**3.87**
EN22 **Hazardous special waste**							
production	electricity generation	t	11.4	0.462	8.27	6.8	10.1
	various activities	t	0	0	0	0	0.013
	Total	**t**	**11.4**	**0.462**	**8.27**	**6.8**	**10.1**
delivery to recovery operators	electricity generation	t	11.4	0	0	11.7	8
	Total	**t**	**11.4**	**0**	**0**	**11.7**	**8**
EN22 **Total special waste**							
production	electricity generation	t	13	1.64	9.07	11.6	13.9
	various activities	t	0	0	0	2	0.083
	Total	**t**	**13**	**1.64**	**9.07**	**13.6**	**14**
delivery to recovery operators	electricity generation	t	12	0.261	0.621	12.1	11.9
	Total	**t**	**12**	**0.261**	**0.621**	**12.1**	**11.9**

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Electricity generation from renewables								
hydro from natural flows	% of total generation	6.54	8.94	7.26	9.31	8.21	25.5	-11.8
wind and solar (photovoltaic)	% of total generation	93.5	91.1	92.7	90.7	91.8	-1.8	1.2
Total	% of total generation	100	100	100	100	100	0	0
EN22 **Waste recovery**								
Non-hazardous special waste								
electricity generation	% of production	39.4	22.1	77.5	7.25	100	153.8	1,279.3
Hazardous special waste								
electricity generation	% of production	100	0	0	172	79.6	-20.4	-53.7
Total special waste								
electricity generation	% of production	92.9	15.9	6.85	104	85.3	-8.2	-18

Italy

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	607	603	603	622	666
thermal	no.	43	43	43	42	43
hydro	no.	502	496	483	485	504
geothermal	no.	32	33	33	33	32
wind	no.	25	25	29	32	32
solar (photovoltaic)	no.	5	6	15	30	55
Net maximum electrical capacity	MW	40,422	40,525	39,882	39,840	39,926
thermal	MW	24,855	24,833	24,825	24,621	24,664
hydro	MW	14,431	14,417	13,647	13,680	13,690
geothermal	MW	695	728	722	722	723
wind	MW	429	533	623	716	720
solar (photovoltaic)	MW	11.6	14.1	65.3	101	129
Power lines (circuit length)						
Total	km	1,099,683	1,101,518	1,112,927	1,124,965	1,132,011
high-voltage	km	56.5	56.6	0	0	0
medium-voltage	km	342,290	344,029	345,586	347,926	349,386
low-voltage	km	757,337	757,433	767,341	777,039	782,624
Mining & extracting activities						
Mining						
Mines	no.	3	3	3	3	3
brown coal	no.	3	3	3	3	3
Amount of fuels extractable since the start of activities	Mt	60	60	60	60	60
Areas occupied by excavation and other activities	ha	10	10	10	10	10
Brown-coal mines	ha	10	10	10	10	10
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	13,382	12,786	11,697	11,525	11,396
special vehicles	no.	2,218	1,832	1,645	1,595	1,550
vehicles for both private and service use	no.	1,031	1,080	1,152	1,179	1,180
Gross real-estate surface area	thousand m^2	1,460	1,360	1,800	1,880	1,850

Resources

		2009	2010	2011	2012	2013
EN1 EN3 Fossil fuels						
Thermal generation						
fuel oil	thousand t	910	419	276	344	158
	thousand toe	899	414	273	343	157
MS	*thousand t*	*249*	*97.9*	*72.5*	*48.2*	*9.11*
	thousand toe	*240*	*94.7*	*70.1*	*46.6*	*8.78*
LS	*thousand t*	*173*	*86.5*	*21.8*	*29.4*	*53.1*
	thousand toe	*169*	*84.4*	*21.2*	*28.4*	*52*
VLS	*thousand t*	*488*	*235*	*182*	*267*	*95.9*
	thousand toe	*490*	*235*	*182*	*268*	*96*
gas oil	thousand t	96.1	52.1	40.9	42.3	36.2
	thousand toe	98.4	53.1	42	43.2	36.9
natural gas	million m^3	4,216	4,114	3,737	2,594	1,693
	thousand toe	3,579	3,494	3,166	2,183	1,450
technologically captive use	*million m^3*	*3,476*	*3,557*	*3,410*	*2,232*	*1,453*
	thousand toe	*2,950*	*3,019*	*2,887*	*1,893*	*1,247*
of which in combined-cycle units	million m^3	3,357	3,478	3,364	2,209	1,444
	thousand toe	2,847	2,951	2,848	1,875	1,239
non-technologically captive use	*million m^3*	*740*	*557*	*327*	*363*	*240*
	thousand toe	*629*	*476*	*279*	*290*	*203*
coal	thousand t	11,122	10,741	12,375	13,629	13,066
	thousand toe	6,587	6,344	7,373	8,193	7,764
coke-oven gas	million m^3	0.003	0.009	0.009	0.004	0.001
	thousand toe	0.003	0.01	0.01	0.005	0.001
Total	thousand toe	11,163	10,306	10,854	10,764	9,408
	TJ	467,385	431,472	454,434	450,682	393,884
Thermal generation						
Various activities	thousand toe	27.9	27.3	26.4	26.2	23.6
Grand total	thousand toe	11,191	103,33	10,880	10,791	9,431
	TJ	468,552	432,617	455,538	451,778	394,873
EN1 EN3 Hydrogen						
Thermal generation	thousand m^3	0	3.54	1.06	3.32	0
	thousand toe	0	0.881	0.263	0.828	0
	TJ	0	36.9	11	34.7	0
EN1 EN3 Biomass and waste						
Thermal generation						
Solid biomass	t	153,842	201,406	260,439	260,698	425,450
	toe	43,983	57,825	75,814	76,042	117,901
Liquid biomass	t	336	350	423	678	699
	toe	331	298	360	602	622
RDF	t	55,235	46,136	56,106	58,398	62,617
	toe	23,027	19,377	23,839	24,527	26,850
Thermal generation						
Grand total	thousand toe	67.3	77.5	100	101	145
	TJ	2,819	3,245	4,187	4,236	6,086

		2009	2010	2011	2012	2013
EN1 EN3 Geothermal fluid						
Total fluid extracted	thousand t	46,778	47,807	50,370	47,648	48,939
net of reinjected fluids	*thousand t*	*28,462*	*27,486*	*26,878*	*27,808*	*28,244*
Used for electricity generation	thousand t	41,385	42,495	43,951	42,943	42,907
EN4 Primary electricity						
Various activities	million kWh	130	115	115	111	100
EN8 Water for industrial uses						
From rivers (including second-flush rainwater)	million m^3	7.43	5.08	5.06	3.74	3.12
From wells	million m^3	6.73	2.97	2.81	2.51	1.38
From aqueducts	million m^3	5.81	4.48	4.86	4.55	4.08
Total abstraction from inland waters	**million m^3**	**20**	**12.5**	**12.7**	**10.8**	**8.58**
From the sea (as-is)	million m^3	5.87	5.5	5.05	1.15	0.86
From the sea (desalinated)	million m^3	6.16	6.24	6.31	6.63	7
EN10 From waste waters (used inside plants)	million m^3	4.8	5.59	5.05	5.28	2.39
Total requirements	**million m^3**	**36.8**	**29.9**	**29.1**	**23.8**	**18.8**
for thermal generation	million m^3	36.7	29.8	29.1	23.8	18.8
for geothermal drilling	million m^3	0.069	0.059	0.047	0.001	0
for fuel storage & handling	million m^3	0.024	0.013	0.015	0.024	0.019
EN8 EN21 Open-cycle cooling water						
For thermal generation	million m^3	10,460	10,235	10,164	9,044	8,286
Total	**million m^3**	**10,460**	**10,235**	**10,164**	**9,044**	**8,286**
Water for non-industrial uses						
Real-estate & service management	million m^3	1.06	1.3	1.78	1.95	1.5
EN1 Expendables						
Resins	t	32.6	39.6	57.4	16.3	24.7
Carbohydrazide	t	260	18.9	25.1	24.6	13.2
Hydrogen peroxide	t	0.033	0.212	0.126	0.054	0.27
Ammonia	t	18,702	14,691	17,390	19,123	16,365
Limestone for flue-gas desulfurization	t	260,830	286,619	321,696	380,266	320,083
Magnesium oxide	t	8.58	0	0	0	0
Sodium hypochlorite	t	1,701	1,370	1,732	4,442	1,357
Ferrous sulfate	t	6.94	4.69	0	0	0
Ferrous chloride	t	41	20.2	34.7	28.4	25.4
Trisodium phosphate	t	1.64	1.8	1.91	3.44	0.41
Lime	t	7,039	8,710	8,409	9,640	9,410
Ferric chloride	t	759	742	757	716	717
Polyectrolyte	t	76.5	62.5	93.6	140	116
Sulfuric & hydrochloric acids	t	4,825	3,896	4,911	4,819	5,806
Caustic soda	t	26,778	26,056	30,653	49,764	60,776
Bentonite	t	1,359	518	937	709	1,599
Barite	t	211	216	0	60.6	27
Geothermal cement	t	3,329	2,905	2,254	2,161	6,065
Lubricating oil	t	13,492	890	538	467	67,039
Dielectric oil	t	369	147	227	168	160
Printing paper	t	1,132	1,023	938	823	722
Other	t	4,885	23,297	28,345	27,206	14,365
Total	**t**	**345,838**	**371,227**	**419,000**	**500,579**	**504,670**

		2009	2010	2011	2012	2013
for thermal generation	t	314,268	341,693	385,785	448,100	436,489
for hydro generation	t	224	209	227	167	144
for geothermal activities	t	28,665	28,185	31,924	51,339	67,164
for wind generation	t	1,341	6.5	6.49	9.42	13.4
for fuel storage & handling	t	0.533	0.266	0.407	0.415	0.21
for electricity distribution	t	207	98.8	111	135	135
EN1 **PCB survey**						
Equipment & transformers with PCBs > 500 ppm (excluding oil)	t	0	0.17	0	0	0
Oil with PCBs > 500 ppm contained in equipment & transformers	t	0	0.18	0	0	0
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding oil)	t	14,181	17,226	12,481	11,706	10,784
Oil with PCBs >50 ppm and ≤ 500 ppm contained in equipment & transformers	t	3,021	3,438	2,503	2,342	2,163

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	**million kWh**	**49,431**	**46,759**	**49,653**	**48,047**	**41,176**
fuel oil & gas oil	million kWh	3,405	1,481	948	1,290	183
natural gas	million kWh	19,254	18,759	17,449	11,587	7,343
of which in combined-cycle units	*million kWh*	*17,047*	*17,540*	*17,045*	*11,195*	*7,200*
coal	million kWh	26,772	26,520	31,256	35,171	33,650
From waste (non-biodegradable fraction)	**million kWh**	**51.9**	**30.8**	**39.4**	**47.1**	**17.8**
From hydrogen	**million kWh**	**0**	**2.17**	**0.275**	**1.5**	**0**
From renewables	**million kWh**	**29,437**	**30,809**	**26,963**	**24,493**	**29,605**
biomass	million kWh	207	266	348	344	161
simple	million kWh	207	266	348	344	161
geothermal	million kWh	5,000	5,030	5,300	5,235	5,301
hydro from natural flows	million kWh	23,725	24,784	20,479	17,761	22,754
wind	million kWh	499	723	806	1,054	1,259
solar (photovoltaic)	million kWh	5.82	5.86	29.4	98.5	129
Hydro from pumped storage	**million kWh**	**4,655**	**3,580**	**1,772**	**1,847**	**2,090**
Total	**million kWh**	**83,575**	**81,180**	**78,429**	**74,437**	**72,889**
simple	million kWh	83,575	81,180	78,429	74,437	72,889
Electricity consumption for pumping	million kWh	5,754	4,409	2,523	2,636	2,462
Fuel storage & handling						
Fuel transferred to destination	t	10,144	4,510	15,216	75,641	70,847
Heat generation	million kcal	8,700	6,769	4,550	9,888	8,331
Geothermal drilling						
Extent	m	14,824	15,498	19,062	12,090	19,441
Electricity distribution						
Electricity distributed	million kWh	241,817	932	246,355	238,163	230,015
EN4 Electricity consumption for grid operation	million kWh	318	2.45	364	393	395
Mining & extracting activities						
Areas restored since the start of activities (geomorphology, hydrogeology and landscape)						
Areas revegetated with plant, shrub and tree species	ha	0	841	843	843	843

		2009	2010	2011	2012	2013
Areas occupied by water bodies	ha	0	0	150	150	0
Areas occupied by infrastructure (roads, canals, aqueducts, power lines)	ha	0	2	2	2	2
Areas awaiting final restoration	ha	0	0	1,429	1,429	0
Market						
Open market						
Residential segment						
Green offerings						
Customers	no.	1,364,507	1,581,542	2,105,968	2,713,621	2,799,968
Power sold	million kWh	3,032	5,258	6,138	7,473	7,700
Time-of-use offerings						
Customers	no.	183,328	286,920	232,004	34,993	38,663
Power sold	million kWh	847	781	676	96	106
Total						
Customers	no.	1,603,426	2,359,385	2,779,536	3,159,837	3,795,534
Power sold	million kWh	4,099	6,418	8,102	8,702	9,683
Business segment						
Green offerings						
Customers	no.	367,527	407,884	190,630	182,621	171,778
Power sold	million kWh	3,950	5,901	3,874	3,105	2,753
Time-of-use offerings						
Customers	no.	569,160	690,034	861,974	890,197	984,001
Power sold	million kWh	16,770	17,221	17,517	15,829	15,769
Total						
Customers	no.	1,057,383	1,125,473	1,091,372	1,109,910	1,199,993
Power sold	million kWh	25,789	23,691	22,179	19,736	18,648
Large customers' segment						
Green offerings						
Customers	no.	7,925	5,612	654	72	2,473
Power sold	million kWh	986	126	94.1	65	88.3
Time-of-use offerings						
Customers	no.	38,109	46,514	46,843	42,096	26,795
Power sold	million kWh	8,068	7,397	5,583	5,740	4,873
Total						
Customers	no.	52,373	58,475	50,854	44,855	34,913
Power sold	million kWh	9,733	7,679	5,983	6,106	5,899
Very large customers' segment						
Total						
Customers	no.	133	88	33	65	19,232,372
Power sold	million kWh	14,402	6,154	5,071	7,612	3,745
Standard-offer market						
Household customers' segment						
Time-of-use offerings						
Customers	no.	178,917	7,120,327	19,716,896	19,119,434	18,760,632
Power sold	million kWh	599	17,294	44,908	42,988	35,999
Total						
Customers	no.	22,750,962	21,883,251	20,849,634	19,905,057	19,232,372
Power sold	million kWh	49,193	46,639	47,738	44,771	36,986
Non-household customers' segment						
Time-of-use offerings						
Customers	no.	3,077,277	3,844,711	3,846,194	3,782,826	3,715,397
Power sold	million kWh	15,121	18,556	20,914	20,549	17,116

		2009	2010	2011	2012	2013
Total						
Customers	no.	4,435,542	4,287,945	4,149,267	3,994,640	3,818,304
Power sold	million kWh	22,080	21,124	22,692	21,831	17,841
Total green offerings	million kWh	7,968	11,285	10,106	10,643	10,541
Total time-of-use offerings	million kWh	41,405	61,248	89,598	85,201	73,863
Overall power sold						
high-voltage	million kWh	15,148	6,520	5,449	8,128	3,863
medium-voltage	million kWh	18,645	15,318	11,696	9,334	10,046
low-voltage	million kWh	104,832	102,009	96,755	91,297	80,727
Total	**million kWh**	**138,625**	**123,847**	**113,900**	**108,758**	**94,636**
Total RECs certificates canceled	no. (MWh)	7,968,119	11,148,877	10,106,362	10,643,004	10,540,689

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	26.1	18.5	17.1	20.2	15.4
EN20 NO_x	thermal generation	thousand t	24.7	19.3	19.5	20.4	17.7
	fuel storage & handling	thousand t	0.002	0	0.001	0.002	0.001
	Total	**thousand t**	**24.7**	**19.3**	**19.5**	**20.4**	**17.7**
EN20 Particulates	thermal generation	thousand t	1.2	0.951	0.718	0.671	0.593
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	36,905	34,126	36,645	37,778	34,389
	fossil-fired thermal generation (from desulfurization)	thousand t	114	135	159	169	146
	Total from fossil-fired thermal generation	thousand t	37,019	34,261	36,804	37,947	34,535
	non-fossil-fired thermal generation (from fossil carbon)	thousand t	39.7	33.1	40.3	41.9	42.7
	Total from thermal generation	thousand t	37,059	34,294	36,845	37,989	34,577
	various activities	thousand t	82.4	81.4	77.8	77.4	70.7
	Total	**thousand t**	**37,141**	**34,376**	**36,923**	**38,066**	**34,648**
EN16 SF_6	electricity generation	kg	1,080	1,376	1,776	1,306	1,135
	electricity distribution	kg	4,023	4,102	4,156	3,704	3,572
	Total	**kg**	**5,103**	**5,478**	**5,932**	**5,010**	**4,707**
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**37,258**	**34,500**	**37,058**	**38,180**	**34,755**
EN20 H_2S	geothermal generation (fluid)	thousand t	10.2	10.4	9.17	8.96	6.37
EN16 CO_2	geothermal generation (fluid)	thousand t	1,876	1,829	1,804	1,724	1,723
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	17,694	18,062	15,079	13,929	19,025
Due to geothermal generation		thousand t	3,729	3,665	3,902	4,105	4,432
Due to wind and solar generation		thousand t	377	531	615	904	1,161

	Source		2009	2010	2011	2012	**2013**
Due to generation from biomass & biodegradable fraction of waste		thousand t	154	194	256	270	135
Due to generation from hydrogen		thousand t	0	1.58	0.202	1.18	0
Due to generation from renewables		**thousand t**	**21,954**	**22,452**	**19,853**	**19,208**	**24,753**
EN21 Waste waters (discharged quantity)	thermal generation	million m³	9.04	7.75	6.77	5.97	6
	Total electricity generation	million m³	9.04	7.75	6.77	5.97	6
	Fuel storage & handling	million m³	0.037	0.014	0.021	0.034	0.032
	Total	**million m³**	**9.08**	**7.76**	**6.79**	**6.01**	**6.04**
EN21 Conventional polluting load of waste waters discharged by plants							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	3,372	4,114	2,042	2,345	1,807
	in some plants with an overall capacity of	MW	21,539	20,021	20,011	18,473	19,780
	Total from electricity generation	kg	3,372	4,114	2,042	2,345	1,807
	Fuel storage & handling	kg	7.7	4	11.2	13.8	14.3
	Total	**kg**	**3,380**	**4,118**	**2,053**	**2,359**	**1,822**
Total nitrogen (expressed as N)	thermal generation	kg	40,525	30,797	26,194	23,340	19,560
	in some plants with an overall capacity of	MW	23,986	20,021	20,011	18,473	19,780
	Total from electricity generation	kg	40,525	30,797	26,194	23,340	19,560
	Fuel storage & handling	kg	12.6	45	26.2	35.3	27.3
	Total	**kg**	**40,538**	**30,842**	**26,220**	**23,375**	**19,587**
Total phosphorus (expressed as P)	thermal generation	kg	5,221	3,419	1,273	887	888
	in some plants with an overall capacity of	MW	19,230	18,531	18,605	15,708	18,609
	Total from electricity generation	kg	5,221	3,419	1,273	887	888
	Fuel storage & handling	kg	1.85	3	3.31	1.93	2.28
	Total	kg	5,223	3,422	1,276	888	891
COD	thermal generation	kg	245,687	212,591	164,177	135,667	115,391
	in some plants with an overall capacity of	MW	21,539	20,021	19,817	18,473	19,780
	Total from electricity generation	kg	245,687	212,591	164,177	135,667	115,391
	Fuel storage & handling	kg	132	375	315	376	477
	Total	**kg**	**245,819**	**212,966**	**164,493**	**136,043**	**115,868**
BOD	thermal generation	kg	60,861	51,988	45,414	38,511	33,716
	in some plants with an overall capacity of	MW	17,221	16,434	16,425	15,122	16,429
	Total from electricity generation	kg	60,861	51,988	45,414	38,511	33,716
	Fuel storage & handling	kg	52.9	119	98.9	132	154
	Total	**kg**	**60,914**	**52,107**	**45,512**	**38,643**	**33,870**
EN22 Non-hazardous special waste							

	Source		2009	2010	2011	2012	**2013**
Coal bottom ash	Fossil-fired thermal generation						
	production	t	31,714	34,861	59,989	92,931	65,822
	delivery to recovery operators	t	28,876	33,016	60,021	87,811	71,408
Coal flyash	Fossil-fired thermal generation						
	production	t	1,280,130	1,223,299	1,346,700	1,586,092	1,182,813
	delivery to recovery operators	t	1,067,575	1,030,514	822,574	1,325,687	1,186,905
Other non-hazardous ash	Fossil-fired thermal generation						
	production	t	2.75	0	0	0	0
Gypsum from desulfurization	Fossil-fired thermal generation						
	production	t	291,901	320,489	393,871	452,605	404,026
	delivery to recovery operators	t	294,916	307,579	390,773	358,045	388,864
Other							
production	electricity generation & geothermal drilling	t	171,146	158,616	147,094	131,330	141,747
	electricity distribution	t	15,389	15,428	20,779	19,995	16,508
	various activities	t	1,663	1,942	848	839	269
	Total	**t**	**188,197**	**175,987**	**168,722**	**152,163**	**158,524**
delivery to recovery operators	electricity generation & geothermal drilling	t	59,084	65,174	43,903	33,880	55,559
	electricity distribution	t	14,350	13,667	16,473	19,771	15,849
	various activities	t	1,660	1,791	752	753	87.5
	Total	**t**	**75,094**	**80,632**	**61,128**	**54,404**	**71,495**
Total							
production	**electricity generation & geothermal drilling**	**t**	**1,774,893**	**1,737,265**	**1,947,655**	**2,262,958**	**1,794,408**
	electricity distribution	**t**	**15,389**	**15,428**	**20,779**	**19,995**	**16,508**
	various activities	**t**	**1,663**	**1,942**	**848**	**839**	**269**
	Total	**t**	**1,791,945**	**1,754,635**	**1,969,282**	**2,283,792**	**1,811,185**
delivery to recovery operators	**electricity generation & geothermal drilling**	**t**	**1,450,451**	**1,436,283**	**1,317,272**	**1,805,422**	**1,702,736**
	electricity distribution	**t**	**14,350**	**13,667**	**16,473**	**19,771**	**15,849**
	various activities	**t**	**1,660**	**1,791**	**752**	**753**	**87.5**
	Total	**t**	**1,466,461**	**1,451,741**	**1,334,496**	**1,825,946**	**1,718,673**
EN22 **Hazardous special waste**							
Oil flyash	Fossil-fired thermal generation						
	production	t	369	383	98.7	133	17.1
Other ash	Fossil-fired thermal generation						
	production	t	0	0	30.4	15.2	0
Other							
production	electricity generation & geothermal drilling	t	35,671	39,979	21,803	30,435	38,111
	electricity distribution	t	14,314	15,601	16,664	16,158	6,711
	various activities	t	12.4	61.6	35.4	23.6	44.1
	Total	**t**	**49,997**	**55,641**	**38,503**	**46,616**	**44,866**

	Source		2009	2010	2011	2012	2013
of which with PCBs	*electricity generation & geothermal drilling*	*t*	*65.6*	*1.03*	*3.56*	*0.2*	*0*
	electricity distribution	*t*	*12*	*31*	*24*	*0*	*96*
	Total	***t***	***77.6***	***32***	***27.6***	***0.2***	***96***
delivery to recovery operators	electricity generation & geothermal drilling	t	1,809	1,415	10,957	8,645	5,904
	electricity distribution	t	10,960	10,916	9,906	8,945	6,633
	various activities	t	2.05	2.43	5.62	0.64	23.7
	Total	**t**	**12,771**	**12,334**	**20,869**	**17,591**	**12,561**
of which with PCBs	*electricity generation & geothermal drilling*	*t*	*26.2*	*0.023*	*0*	*0*	*0*
	electricity distribution	*t*	*11*	*14*	*2*	*0*	*80*
	Total	***t***	***37.2***	***14***	***2***	***0***	***80***
Total							
production	**electricity generation & geothermal drilling**	**t**	**36,039**	**40,361**	**21,932**	**30,583**	**38,128**
	electricity distribution	**t**	**14,314**	**15,601**	**16,664**	**16,158**	**6,711**
	various activities	**t**	**12.4**	**61.6**	**35.4**	**23.6**	**44.1**
	Total	**t**	**50,366**	**56,024**	**38,632**	**46,765**	**44,883**
delivery to recovery operators	**electricity generation & geothermal drilling**	**t**	**1,809**	**1,415**	**10,957**	**8,645**	**5,904**
	electricity distribution	**t**	**10,960**	**10,916**	**9,906**	**8,945**	**6,633**
	various activities	**t**	**2.05**	**2.43**	**5.62**	**0.64**	**23.7**
	Total	**t**	**12,771**	**12,334**	**20,869**	**17,591**	**12,561**
EN22 **Total special waste**							
production	electricity generation & geothermal drilling	t	1,810,933	1,777,626	1,969,587	2,293,541	1,832,536
	electricity distribution	t	29,703	31,030	37,443	36,153	23,219
	various activities	t	1,675	2,003	884	862	313
	Total	**t**	**1,842,311**	**1,810,659**	**2,007,914**	**2,330,557**	**1,856,068**
delivery to recovery operators	electricity generation & geothermal drilling	t	1,452,260	1,437,698	1,328,229	1,814,067	1,708,640
	electricity distribution	t	25,310	24,584	26,379	28,716	22,482
	various activities	t	1,662	1,793	757	754	111
	Total	**t**	**1,479,232**	**1,464,075**	**1,355,365**	**1,843,537**	**1,731,234**

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN29 **Land**								
LV cable lines								
overhead	% of entire LV grid	52.6	52.6	52.6	52.5	52.5	-0.2	0
underground	% of entire LV grid	32.7	32.7	32.9	33.7	34	4	0.9
Total	**% of entire LV grid**	**85.3**	**85.3**	**85.5**	**86.1**	**86.5**	**1.4**	**0.5**
MV cable lines								
overhead	% of entire MV grid	2.72	2.79	3.06	3.45	3.76	38.2	9
underground	% of entire MV grid	39.2	39.5	40.4	40.8	41	4.6	0.5
Total	**% of entire MV grid**	**41.9**	**42.3**	**43.4**	**44.2**	**44.8**	**6.9**	**1.4**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	71.8	71.9	72.4	73.2	73.6	2.5	0.5

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation	kcal/kWh	2,258	2,204	2,186	2,240	2,285	1.2	2
EN1EN3 Net heat rate of geothermal generation	kcal/kWh	5,344	5,459	5,356	5,318	5,248	-1.8	-1.3
EN1EN3 Net efficiency of hydro generation from pumped storage	%	80.9	81.2	70.3	70.1	70.9	4.9	1.14
EN4 Consumption of electricity for distribution grid operation	% of electricity distributed	0.131	0.263	0.148	0.165	0.172	31.3	4.2
EN8 Net specific consumption of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	0.739	0.633	0.581	0.492	0.455	-38.4	-7.5
excluding contribution of as-is sea water	liters/kWh	0.621	0.516	0.48	0.468	0.434	-30.1	-7.3
Total net specific consumption of water for industrial uses	liters/kWh	0.44	0.368	0.371	0.32	0.258	-41.4	-19.4
EN8 Coverage of requirements of water for industrial uses								
from rivers (including second-flush rainwater)	% of requirements	20.2	17	17.4	15.7	16.6	-17.8	5.7
from wells	% of requirements	18.3	9.95	9.66	10.5	7.35	-59.8	-30
from aqueducts	% of requirements	15.8	15	16.7	19.1	21.7	37.3	13.6
Total from inland waters	**% of requirements**	**54.3**	**42**	**43.7**	**45.3**	**45.6**	**-16**	**0.7**
from the sea (as-is)	% of requirements	16	18.4	17.3	4.81	4.57	-71.4	-5
from the sea (desalinated)	% of requirements	16.7	20.9	21.7	27.8	37.2	122.8	33.8
EN10 from waste waters (used inside plants)	% of requirements	13	18.7	17.3	22.1	12.7	-2.3	-42.5
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	8.05	4.02	2.52	3.19	1.67	-79.3	-47.6
orimulsion	% of total fuel consumption	0	0	0	0.022	0	0	0
gas oil	% of total fuel consumption	0.882	0.515	0.387	0.401	0.392	-55.6	-2.2
natural gas	% of total fuel consumption	32.1	33.9	29.2	20.3	15.4	-52	-24.1
coal	% of total fuel consumption	59	61.6	67.9	76.1	82.5	39.8	8.4
MS fuel oil	% of total fuel-oil consumption	26.7	22.9	25.7	13.6	5.6	-79	-58.8
LS fuel oil	% of total fuel-oil consumption	18.8	20.4	7.76	8.28	33.2	76.6	301
VLS fuel oil	% of total fuel-oil consumption	54.5	56.8	66.6	78.2	61.2	12.3	-21.7
natural gas, technologically captive use	% of total natural-gas consumption	82.4	86.4	91.2	86.7	86	4.4	-0.8
of which in combined-cycle units	*% of total natural-gas consumption*	*79.5*	*84.5*	*89.9*	*85.9*	*85.4*	*7.4*	*-0.6*
natural gas, non-technologically captive use	% of total natural-gas consumption	17.6	13.6	8.82	13.3	14	-20.5	5.3
Geothermal fluid used for electricity generation	% of geothermal fluid extracted	97.6	97.9	97.5	101	98	0.4	-3
Electricity generation from renewables								
thermal from biomass	% of total generation	0.248	0.328	0.444	0.463	0.221	-10.9	-52.3
geothermal	% of total generation	5.98	6.2	6.76	7.03	7.27	21.6	3.4

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
hydro from natural flows	% of total generation	28.4	30.5	26.1	23.9	31.2	9.9	30.5
wind and solar (photovoltaic)	% of total generation	0.604	0.897	1.07	1.55	1.91	216.2	23.2
Total	**% of total generation**	**35.2**	**38**	**34.4**	**32.9**	**40.6**	**15.3**	**23.4**
EN6 **Market**								
Residential segment								
Green power sold	% of power sold	74	81.9	75.8	85.9	79.5	7.4	-7.5
Time-of-use power sold	% of power sold	20.7	12.2	8.34	1.1	1.1	-94.7	0
Business segment								
Green power sold	% of power sold	15.3	24.9	17.5	15.7	14.8	-3.3	-5.7
Time-of-use power sold	% of power sold	65	72.7	79	80.2	84.6	30.2	5.5
Large customers' segment								
Green power sold	% of power sold	10.1	1.64	1.57	1.07	1.5	-85.1	40.2
Time-of-use power sold	% of power sold	82.9	96.3	93.3	94	82.6	-0.4	-12.1
Household customers' segment								
Time-of-use power sold	% of power sold	1.22	37.1	94.1	96	97.3	7,875.4	1.4
Non-household customers' segment								
Time-of-use power sold	% of power sold	68.5	87.8	92.2	94.1	95.9	40	1.9
Overall power sold								
high-voltage	% of power sold	10.9	5.27	4.78	7.47	4.08	-62.6	-45.4
medium-voltage	% of power sold	13.5	12.4	10.3	8.58	10.6	-21.5	23.5
low-voltage	% of power sold	75.6	82.4	84.9	83.9	85.3	12.8	1.7
Total green power sold	**% of power sold**	**5.75**	**9.11**	**8.87**	**9.79**	**11.1**	**93**	**13.4**
Total time-of-use power sold	**% of power sold**	**29.9**	**49.5**	**78.7**	**78.3**	**78**	**160.9**	**-0.4**
Specific emissions into the atmosphere								
EN20 SO_2 (simple thermal generation)	g/kWh thermal net	0.525	0.394	0.341	0.417	0.373	-29	-10.6
EN20 NO_x (simple thermal generation)	g/kWh thermal net	0.498	0.41	0.389	0.42	0.427	-14.3	1.7
EN20 Particulates (simple thermal generation)	g/kWh thermal net	0.024	0.02	0.014	0.014	0.014	-41.7	0
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	746	729	736	784	836	12.1	6.6
EN20 SO_2 (total from thermal generation, simple)	g/kWh total net	0.312	0.228	0.218	0.271	0.212	-32.1	-21.8
EN20 NO_x (total from thermal generation, simple)	g/kWh total net	0.296	0.237	0.248	0.274	0.242	-18.2	-11.7
EN20 Particulates (total from thermal generation, simple)	g/kWh total net	0.014	0.012	0.009	0.009	0.008	-42.9	-11.1
EN16 CO_2 (total from thermal generation, simple)	g/kWh total net	443	422	470	510	474	7	-7.1
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	1.07	1.16	1.27	1.06	0.99	-7.5	-6.6
EN20 H_2S (geothermal fluid)	g/kWh geothermal net	2.04	2.06	1.73	1.71	1.2	-41.2	-29.8
EN20 CO_2 (geothermal fluid)	g/kWh geothermal net	375	364	340	329	325	-13.3	-1.2
Net specific conventional polluting load of waste waters discharged by plants (thermal generation)								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net	0.095	0.149	0.079	0.11	0.105	10.5	-4.5
Total nitrogen (expressed as N)	mg/kWh thermal net	0.822	1.11	1.01	1.09	1.14	38.7	4.6
Total phosphorus (expressed as P)	mg/kWh thermal net	0.167	0.146	0.056	0.049	0.063	-62.3	28.6

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
COD	mg/kWh thermal net	6.92	7.69	6.33	6.35	6.72	-2.9	5.8
BOD	mg/kWh thermal net	1.9	2.17	2	2.1	2.38	25.3	13.3
EN22 Specific waste production								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	49	47.4	45	47.7	37.1	-24.3	-22.2
Oil flyash (thermal generation)	g/kWh net from fuel oil & gas oil	0.108	0.259	0.104	0.103	0.093	-13.9	-9.7
Oil bottom ash (thermal generation)	g/kWh net from fuel oil & gas oil	0.108	0.259	0.104	0.103	0.093	-13.9	-9.7
EN22 Waste recovery								
Coal and brown-coal ash	% of production	83.6	84.5	62.7	84.2	101	20.8	20
bottom ash	% of production	91.1	94.7	100	94.5	108	18.6	14.3
flyash	% of production	83.4	84.2	61.1	83.6	100	19.9	19.6
Gypsum from desulfurization	% of production	101	96	99.2	79.1	96.2	-4.8	21.6
Other non-hazardous special waste								
electricity generation & geothermal drilling	% of production	34.5	41.1	29.8	25.8	39.2	13.6	51.9
electricity distribution	% of production	93.3	88.6	79.3	98.9	96	2.9	-2.9
fuel storage & handling	% of production	95.9	100	100	100	91.3	-4.8	-8.7
Total	**% of production**	**39.9**	**45.8**	**36.2**	**35.8**	**45.1**	**13**	**26**
Total non-hazardous special waste								
electricity generation & geothermal drilling	% of production	81.7	82.7	67.6	79.8	94.9	16.2	18.9
electricity distribution	% of production	93.3	88.6	79.3	98.9	96	2.9	-2.9
fuel storage & handling	% of production	95.9	100	100	100	91.3	-4.8	-8.7
Total	**% of production**	**81.8**	**82.7**	**67.8**	**80**	**94.9**	**16**	**18.6**
Other hazardous special waste								
electricity generation & geothermal drilling	% of production	5.07	3.54	50.3	28.4	15.5	205.7	-45.4
electricity distribution	% of production	76.6	70	59.4	55.4	98.8	29	78.3
fuel storage & handling	% of production	0	3.28	12.8	0	43	0	-
Total	**% of production**	**25.5**	**22.2**	**54.2**	**37.7**	**28**	**9.8**	**-25.7**
Total hazardous special waste								
electricity generation & geothermal drilling	% of production	5.02	3.51	50	28.3	15.5	208.8	-45.2
electricity distribution	% of production	76.6	70	59.4	55.4	98.8	29	78.3
fuel storage & handling	% of production	0	3.28	12.8	0	43	0	-
Total	**% of production**	**25.4**	**22**	**54**	**37.6**	**28**	**10.2**	**-25.5**
Total special waste								
electricity generation & geothermal drilling	% of production	80.2	80.9	67.4	79.1	93.2	16.2	17.8
electricity distribution	% of production	85.2	79.2	70.5	79.4	96.8	13.6	21.9
fuel storage & handling	% of production	85.6	86.4	96.4	100	66.8	-22	-33.2
Total	**% of production**	**80.3**	**80.9**	**67.5**	**79.1**	**93.3**	**16.2**	**18**
Mining & extracting activities								
Yield of the site (open-pit mine)	million m^3 of moved soil/ million t of extracted mineral	0	0.017	0.031	0.027	0	0	0

Portugal

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	11	11	13	15	16
thermal	no.	1	1	2	2	2
wind	no.	10	10	11	13	14
Net maximum electrical capacity	MW	295	299	760	1,192	1,192
thermal	MW	221	224	644	1,066	1,066
wind	MW	74.5	74.5	116	126	126
Combined heat & power installations						
Power plants	no.	5	5	14	13	13
thermal	no.	5	5	14	13	13
Net maximum electrical capacity	MW	25.7	44.4	69.9	57.2	37.4
thermal	MW	25.7	44.4	69.9	57.2	37.4
Useful thermal capacity	10^6 kcal/h	27.9	27.9	78.6	78.6	66.7
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	0	0	0	16	16
Gross real-estate surface area	thousand m^2	0	0	0	1.04	1.04

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Thermal generation						
fuel oil	thousand t	4.41	3.04	2.39	2.15	1.51
	thousand toe	4.25	3.1	2.44	2.11	1.48
LS	thousand t	4.41	3.04	2.39	2.15	1.51
	thousand toe	4.25	3.1	2.44	2.11	1.48
gas oil	thousand t	0.002	0.002	0.008	0.006	0.005
	thousand toe	0.002	0.002	0.003	0.007	0.005
natural gas	million m^3	0	0	272	263	23.5
	thousand toe	0	0	251	239	21.4
technologically captive use	*million m^3*	*0*	*0*	*272*	*263*	*23.5*
	thousand toe	*0*	*0*	*251*	*239*	*21.4*
of which in combined-cycle units	million m^3	0	0	272	263	23.5
	thousand toe	0	0	251	239	21.4
coal	thousand t	461	265	356	542	469
	thousand toe	274	157	211	317	274

		2009	2010	2011	2012	2013
Total	**thousand toe**	**278**	**161**	**464**	**558**	**297**
	TJ	**11,637**	**6,720**	**19,447**	**23,368**	**12,425**
Thermal generation combined with heat generation						
fuel oil	thousand t	4.99	4.49	27.4	21.6	0
	thousand toe	4.91	4.42	27	21.3	0
LS	thousand t	4.99	4.49	27.4	21.6	0
	thousand toe	4.91	4.42	27	21.3	0
gas oil	thousand t	0.003	0.15	0.137	0.104	0
	thousand toe	0.004	0.136	0.069	0.094	0
natural gas	million m^3	31.9	29.7	65.1	63.7	66
	thousand toe	29.2	26.8	58.8	57.7	59.8
technologically captive use	*million m^3*	*14.6*	*16.7*	*39.2*	*37.9*	*40.1*
	thousand toe	13.6	15	35.5	34.3	36.3
of which in combined-cycle units	million m^3	0	0	0	0	40.1
	thousand toe	0	0	0	0	36.3
non-technologically captive use	*million m^3*	*17.3*	*13*	*25.9*	*25.9*	*25.9*
	thousand toe	*15.7*	*11.8*	*23.4*	*23.4*	*23.4*
Total	**thousand toe**	**34.2**	**31.3**	**85.9**	**79**	**59.8**
Various activities	thousand toe	0	0	0	0.03	0.034
Grand total	**thousand toe**	**312**	**192**	**550**	**637**	**357**
	TJ	**13,067**	**8,031**	**23,043**	**26,679**	**14,928**
EN4 **Primary electricity**						
Various activities	million kWh	0	0	0	0.118	0.142
EN8 **Water for industrial uses**						
From rivers (including second-flush rainwater)	million m^3	4.73	3.64	4.21	6.16	4.52
From wells	million m^3	0.001	0.001	0.001	0.001	0
Total abstraction from inland waters	**million m^3**	**4.73**	**3.64**	**4.22**	**6.16**	**4.52**
Total requirements	**million m^3**	**4.73**	**3.64**	**4.22**	**6.16**	**4.52**
for thermal generation	**million m^3**	**4.73**	**3.64**	**4.22**	**6.16**	**4.52**
Water for non-industrial uses						
Real-estate & service management	million m^3	0	0	0	0.001	0.001
EN1 **Expendables**						
Resins	t	0	0	7.31	7	4,629
Hydrazine	t	1.1	0.854	0.373	0.521	0.075
Carbohydrazide	t	0	0	0.1	0	0.342
Ammonia	t	958	466	597	948	770
Limestone for flue-gas desulfurization	t	8,740	4,831	6,503	10,097	9,808
Sodium hypochlorite	t	26.2	13.7	22.4	35	23
Trisodium phosphate	t	0.075	0.227	0	0	0
Lime	t	87.4	1.65	110	101	77.9
Ferric chloride	t	2.28	2.57	3.7	11.9	9.72
Polyectrolyte	t	22.8	0.778	1.56	1.56	33.8
Sulfuric & hydrochloric acids	t	113	47.5	52.5	66.6	60.5
Caustic soda	t	152	38.9	42	75.6	57.6
Lubricating oil	t	51.1	21.1	284	192	13.8
Dielectric oil	t	0.286	0.743	0.503	1.31	37.6
Printing paper	t	0	0	0	1.04	0.748
Other	t	0	0	0.642	0.104	0.077
Total	**t**	**10,154**	**5,424**	**7,626**	**11,538**	**15,522**
for thermal generation	t	10,116	5,412	7,346	11,352	15,520

		2009	2010	2011	2012	2013
for thermal generation combined with heat generation (CHP)	t	36.8	12.4	279	185	0
for wind generation	t	0.576	0.043	0.668	0.106	0.607

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	million kWh	1,300	815	1,880	3,154	1,500
natural gas	*million kWh*	*0*	*0*	*785*	*1,542*	*132*
of which in combined-cycle units	million kWh	0	0	785	1,542	132
coal	million kWh	1,195	658	883	1,360	1,177
combined with heat generation	million kwh	105	156	212	251	191
fuel oil & gas oil	*million kWh*	*31.1*	*35.8*	*70.1*	*73.7*	*0*
natural gas	*million kWh*	*73.7*	*121*	*142*	*178*	*191*
From renewables	million kWh	188	153	247	303	346
wind	million kWh	188	153	247	303	346
Total	million kWh	1,488	968	2,127	3,457	1,846
simple	million kWh	1,383	811	1,915	3,205	1,655
combined with heat generation	million kWh	105	156	212	251	191
Useful heat output (combined with power generation)						
In thermal power plants	million kcal	111,781	74,047	289,551	276,651	316,550
Fossil fuels	million kcal	111,781	74,047	289,551	276,651	316,550
Total	million kcal	111,781	74,047	289,551	276,651	316,550
	million kWh	130	86.1	337	322	368

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	0.511	0.262	0.424	0.657	0.591
	thermal generation combined with heat generation	thousand t	0	0	0	0.188	0.014
	Total	thousand t	0.511	0.262	0.424	0.845	0.605
EN20 NO_x	thermal generation	thousand t	0.843	0.466	0.77	1.02	0.785
	thermal generation combined with heat generation	thousand t	0	0	0	0.731	0.012
	Total	thousand t	0.843	0.466	0.77	1.76	0.797
EN20 Particulates	thermal generation	thousand t	0.035	0.012	0.012	0.013	0.018
	Total	thousand t	0.035	0.012	0.012	0.013	0.018

	Source		2009	2010	2011	2012	2013
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	1,068	628	1,425	1,803	1,124
	fossil-fired thermal generation (from desulfurization)	thousand t	9.63	2.12	2.86	4.45	3.85
	Total Fossil-fired thermal generation	thousand t	1,077	630	1,428	1,807	1,128
	fossil-fired thermal generation - CHP (from combustion)	thousand t	81.6	76.1	237	208	31.6
	various activities	thousand t	0	0	0	0.093	0.105
	Total	**thousand t**	**1,159**	**706**	**1,665**	**2,015**	**1,159**
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**1,159**	**706**	**1,665**	**2,015**	**1,159**
EN18 **Avoided CO_2 emissions**							
Due to wind power generation		thousand t	170	147	211	189	298
Due to generation from renewables		thousand t	170	147	211	189	298
EN21 **Waste waters (discharged quantity)**							
	thermal generation	million m^3	3.57	0.276	0.216	0.34	0.326
	Total from electricity generation	million m^3	3.57	0.276	0.216	0.34	0.326
	Total	**million m^3**	**3.57**	**0.276**	**0.216**	**0.34**	**0.326**
EN21 **Conventional polluting load of waste waters discharged by plants**							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	0	54.1	1.01	2.72	3.43
	in some plants with an overall capacity of	MW	0	224	224	224	224
	Total from electricity generation	kg	0	54.1	1.01	2.72	3.43
Total nitrogen (expressed as N)	thermal generation	kg	0	1,242	1,197	1,882	1,610
	in some plants with an overall capacity of	MW	0	224	224	224	224
	Total from electricity generation	kg	0	1,242	1,197	1,882	1,610
	Total	**kg**	**0**	**1,242**	**1,197**	**1,882**	**1,610**
Total phosphorus (expressed as P)	thermal generation	kg	0	226	333	513	198
	in some plants with an overall capacity of	MW	0	224	224	224	224
	Total from electricity generation	kg	0	226	333	513	198
	Total	**kg**	**0**	**226**	**333**	**513**	**198**
COD	thermal generation	kg	0	18,478	8,562	28,000	25,322
	in some plants with an overall capacity of	MW	0	224	224	224	224
	Total from electricity generation	kg	0	18,478	8,562	28,000	25,322
	Total	**kg**	**0**	**18,478**	**8,562**	**28,000**	**25,322**
BOD	thermal generation	kg	0	5,941	960	5,206	3,545
	in some plants with an overall capacity of	MW	0	224	224	224	224
	Total from electricity generation	kg	0	5,941	960	5,206	3,545
	Total	**kg**	**0**	**5,941**	**960**	**5,206**	**3,545**

	Source		2009	2010	2011	2012	2013
EN22 Non-hazardous special waste							
Coal bottom ash	fossil-fired thermal generation (simple and CHP)						
	production	t	3,834	2,167	2,691	3,335	2,697
	delivery to recovery operators	t	70.8	11,197	2,300	31.9	1,653
Coal flyash	thermal generation combined with heat generation						
	production	t	61,123	25,034	29,160	50,074	39,881
	delivery to recovery operators	t	44,777	22,814	20,570	28,826	26,992
Gypsum from desulfurization	thermal generation combined with heat generation						
	production	t	16,395	10,515	11,393	18,222	15,694
	delivery to recovery operators	t	14,436	5,262	13,559	17,589	9,003
Other							
production	electricity generation	t	149	920	1,173	1,139	868
	Total	**t**	**149**	**920**	**1,173**	**1,139**	**868**
delivery to recovery operators	electricity generation	t	3.03	91.4	18.4	21.6	35.2
	Total	**t**	**3.03**	**91.4**	**18.4**	**21.6**	**35.2**
Total							
production	**electricity generation**	**t**	**81,501**	**38,636**	**44,418**	**72,770**	**59,141**
	Total	**t**	**81,501**	**38,636**	**44,418**	**72,770**	**59,141**
delivery to recovery operators	**electricity generation**	**t**	**59,287**	**39,365**	**36,447**	**46,468**	**37,683**
	Total	**t**	**59,287**	**39,365**	**36,447**	**46,468**	**37,683**
EN22 Hazardous special waste							
Oil flyash	thermal generation combined with heat generation						
	production	t	0	0	1.51	0.116	8.71
	delivery to recovery operators	t	0	0	0.18	0.08	0
Other ash	thermal generation combined with heat generation						
	production	t	7.98	8.6	0	1.39	0
	delivery to recovery operators	t	0	8.6	0	0	0
Other							
production	electricity generation	t	11.2	176	723	516	67.9
	various activities	t	0	0	0	0	0.006
	Total	**t**	**11.2**	**176**	**723**	**516**	**68**
delivery to recovery operators	electricity generation	t	18.6	183	716	479	44.5
	Total	**t**	**18.6**	**183**	**716**	**479**	**44.5**
Total							
production	**electricity generation**	**t**	**19.2**	**185**	**725**	**518**	**76.7**
	various activities	**t**	**0**	**0**	**0**	**0**	**0.006**
	Total	**t**	**19.2**	**185**	**725**	**518**	**76.7**
delivery to recovery operators	**electricity generation**	**t**	**18.6**	**191**	**717**	**479**	**44.5**
	Total	**t**	**18.6**	**191**	**717**	**479**	**44.5**

	Source		2009	2010	2011	2012	2013
EN22 Total special waste							
production	electricity generation	t	81,520	38,821	45,142	73,288	59,217
	various activities	t	0	0	0	0	0.006
	Total	t	**81,520**	**38,821**	**45,142**	**73,288**	**59,217**
delivery to recovery operators	electricity generation	t	59,305	39,556	37,164	46,947	37,728
	Total	t	**59,305**	**39,556**	**37,164**	**46,947**	**37,728**

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation	kcal/kWh	2,325	2,439	2,785	1,923	2,267	-2.5	17.9
EN1EN3 Net specific energy input of thermal power generation (CHP)	kcal/kWh	1,454	1,291	1,566	1,379	1,069	-26.5	-22.5
EN8 Net specific consumption of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	3.96	5.54	2.53	2.12	3.45	-12.9	62.7
excluding contribution of as-is sea water	liters/kWh	3.96	5.54	2.53	2.12	3.45	-12.9	62.7
Total net specific consumption of water for industrial uses	liters/kWh	2.93	3.46	1.71	1.63	2.04	-30.4	25.2
EN8 Coverage of requirements of water for industrial uses								
From rivers (including second-flush rainwater)	% of requirements	100	100	100	100	100	0	0
From wells	% of requirements	0.021	0.027	0.024	0.016	0	-100	0
Total from inland waters	**% of requirements**	**100**	**100**	**100**	**100**	**100**	**0**	**0**
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	2.93	3.92	5.34	3.67	0.416	-85.8	-88.7
gas oil	% of total fuel consumption	0.002	0.072	0.013	0.016	0.001	-50	-93.8
natural gas	% of total fuel consumption	9.37	14	56.2	46.6	22.8	143.3	-51.1
coal	% of total fuel consumption	87.7	82.1	38.4	49.7	76.8	-12.4	54.5
LS fuel oil	% of total fuel-oil consumption	100	100	100	100	100	0	0
natural gas, technologically captive use	% of total natural-gas consumption	46.4	55.9	92.4	92.1	71.1	53.2	-22.8
of which in combined-cycle units	*% of total natural-gas consumption*	*0*	*0*	*81*	*80.6*	*71.1*	*0*	*-11.8*
natural gas, non-technologically captive use	% of total natural-gas consumption	53.6	44.1	7.55	7.87	28.9	-46.1	267.2
Electricity generation from renewables								
wind and solar (photovoltaic)	% of total generation	12.6	15.8	11.6	8.77	18.8	49.2	114.4
Total	**% of total generation**	**12.6**	**15.8**	**11.6**	**8.77**	**18.8**	**49.2**	**114.4**
Specific emissions into the atmosphere								
EN20 SO_2 (simple thermal generation)	g/kWh thermal net	0.428	0.398	0.254	0.226	0.452	5.6	100
EN20 NO_x (simple thermal generation)	g/kWh thermal net	0.705	0.708	0.462	0.353	0.6	-14.9	70
EN20 Particulates (simple thermal generation)	g/kWh thermal net	0.029	0.018	0.007	0.004	0.014	-51.7	250

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	901	957	856	623	862	-4.3	38.4
EN20 SO_2 (thermal generation - CHP)	g/kWh thermal net	0	0	0	0.328	0.025	0	-92.4
EN20 NO_x (thermal generation - CHP)	g/kWh thermal net	0	0	0	1.28	0.021	0	-98.4
EN16 CO_2 (thermal generation - CHP)	g/kWh thermal net	347	314	432	362	56.5	-83.7	-84.4
EN20 SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	0.316	0.249	0.172	0.224	0.273	-13.6	21.9
EN20 NO_x (total from thermal generation - simple and CHP)	g/kWh total net	0.521	0.442	0.313	0.464	0.36	-30.9	-22.4
EN20 Particulates (total from thermal generation - simple and CHP)	g/kWh total net	0.022	0.011	0.005	0.003	0.008	-63.6	166.7
EN16 CO_2 (total from thermal generation - simple and CHP)	g/kWh total net	716	670	676	533	524	-26.8	-1.7
Net specific conventional polluting load of waste waters discharged by plants (thermal generation)								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net	0	0.082	0.001	0.002	0.003	0	50
Total nitrogen (expressed as N)	mg/kWh thermal net	0	1.89	1.36	1.38	1.37	0	-0.7
Total phosphorus (expressed as P)	mg/kWh thermal net	0	0.344	0.377	0.377	0.168	0	-55.4
COD	mg/kWh thermal net	0	28.1	9.7	20.6	21.5	0	4.4
BOD	mg/kWh thermal net	0	9.03	1.09	3.83	3.01	0	-21.4
EN22 **Specific waste production**								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	54.3	41.3	36.1	39.3	36.2	-33.3	-7.9
EN22 **Waste recovery**								
Coal and brown-coal ash	% of production	69	125	71.8	54	67.3	-2.5	24.6
bottom ash	% of production	1.85	517	85.4	0.956	61.3	3,213.5	6,312.1
Flyash	% of production	73.3	91.1	70.5	57.6	67.7	-7.6	17.5
Gypsum from desulfurization	% of production	88.1	50	119	96.5	57.4	-34.8	-40.5
Other non-hazardous special waste								
electricity generation	% of production	2.03	9.94	1.57	1.9	4.06	100	113.7
Total	% of production	2.03	9.94	1.57	1.9	4.06	100	113.7
Total non-hazardous special waste								
electricity generation	% of production	72.7	102	82.1	63.9	63.7	-12.4	-0.3
Total	% of production	72.7	102	82.1	63.9	63.7	-12.4	-0.3
Oil flyash	% of production	0	0	11.9	69	0	0	0
Other hazardous special waste								
electricity generation	% of production	165	104	99	92.8	65.4	-60.4	-29.5
Total	% of production	165	104	99	92.8	65.4	-60.4	-29.5
Total hazardous special waste								
electricity generation	% of production	96.7	103	98.9	92.5	58	-40	-37.3
Total	% of production	96.7	103	98.9	92.5	58	-40	-37.3
Total special waste								
electricity generation	% of production	72.7	102	82.3	64.1	63.7	-12.4	-0.6
Total	% of production	72.7	102	82.3	64.1	63.7	-12.4	-0.6

Romania

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	0	1	4	7	11
wind	no.	0	1	4	7	7
solar (photovoltaic)	no.	0	0	0	0	4
Net maximum electrical capacity	MW	0	64	269	498	534
Net maximum electrical capacity (wind)	MW	0	64	269	498	498
Net maximum electrical capacity (solar)	MW	0	0	0	0	35.7
Power lines (circuit length)						
Total	km	91,550	89,240	89,944	90,394	90,906
high-voltage	km	6,023	6,583	6,584	6,586	6,586
medium-voltage	km	37,761	34,439	34,665	34,956	34,923
low-voltage	km	47,766	48,218	48,695	48,852	49,397
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	1,162	1,161	1,142	1,108	1,131
special vehicles	no.	79	101	159	162	169
vehicles for both private and service use	no.	61	62	95	89	99
Gross real-estate surface area	thousand m²	93.5	91.8	92.2	95.2	92.3

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Various activities	thousand toe	1.94	2.31	2.91	2.61	2.34
Grand total	thousand toe	1.94	2.31	2.91	2.61	2.34
	TJ	81.3	96.5	122	109	97.9
EN4 **Primary electricity**						
Various activities	million kWh	10.9	5.37	10.8	20.4	22.1
Water for non-industrial uses						
Real-estate & service management	million m³	0.15	0.16	0.147	0.391	0.381
EN1 **Expendables**						
Lubricating oil	t	0.83	1.8	1.24	3.58	9.1
Dielectric oil	t	91.9	94.6	115	77.4	76.8
Printing paper	t	74.2	100	123	109	86.1
Total	t	167	197	239	190	172
for wind generation	t	0	0	0	3	8.7
for electricity distribution	t	92.7	96.4	116	77.9	77.2

		2009	2010	2011	2012	2013
EN1 PCB survey						
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding oil)	t	36	3.83	23.5	53.3	0
Oil with PCBs >50 ppm and ≤ 500 ppm contained in equipment & transformers	t	3.09	0.202	11.3	26.5	0

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From renewables	**million kWh**	**0**	**3.97**	**132**	**589**	**1,080**
wind	million kWh	0	3.97	132	589	1,073
solar (photovoltaic)	million kWh	0	0	0	0	7.19
Total	**million kWh**	**0**	**3.97**	**132**	**589**	**1,080**
Electricity distribution						
Electricity distributed	million kWh	13,224	13,827	14,263	14,606	13,996
EN4 Electricity consumption for grid operation	million kWh	23.7	21.3	23.8	20.7	19.9
Market						
Open market						
Residential segment						
Total						
Customers	no.	0	0	0	1	1
Power sold	million kWh	0	0	0	0.118	0.07
Business segment						
Green offerings						
Customers	no.	0	0	0	16	487
Power sold	million kWh	0	0	0	4.96	42.4
Time-of-use offerings						
Customers	no.	39	41	47	81	2,780
Power sold	million kWh	11.3	6.41	7.42	10.4	59
Total						
Customers	no.	1,589	4,053	9,835	11,300	22,628
Power sold	million kWh	466	563	565	628	831
Large customers' segment						
Green offerings						
Customers	no.	0	0	0	4	9
Power sold	million kWh	0	0	0	9.1	16.3
Time-of-use offerings						
Customers	no.	6	4	8	9	21
Power sold	million kWh	20	22.1	32.7	26.9	87
Total						
Customers	no.	172	146	192	230	215
Power sold	million kWh	557	361	520	560	591
Very large customers' segment						
Total						
Customers	no.	0	0	0	0	1
Power sold	million kWh	0	0	0	0	122

		2009	2010	2011	2012	2013
Standard-offer market						
Household customers' segment						
Time-of-use offerings						
Customers	no.	9,065	6,263	6,063	6,009	5,904
Power sold	million kWh	18.1	17.9	18.7	19.5	17.2
Total						
Customers	no.	2,384,698	2,430,676	2,455,147	2,475,110	2,491,275
Power sold	million kWh	3,889	4,017	4,126	4,370	4,231
Non-household customers' segment						
Time-of-use offerings						
Customers	no.	14,310	11,216	10,421	10,160	5,920
Power sold	million kWh	3,124	1,656	1,567	1,403	1,078
Total						
Customers	no.	171,946	170,470	169,426	166,538	149,872
Power sold	million kWh	4,687	4,085	3,573	3,600	2,979
Total green offerings	**million kWh**	**0**	**0**	**0**	**14.1**	**58.8**
Total time-of-use offerings	**million kWh**	**3,174**	**1,703**	**1,626**	**1,460**	**1,241**
Overall power sold						
high-voltage	million kWh	369	294	300	263	378
medium-voltage	million kWh	2,153	1,630	1,395	1,450	1,290
low-voltage	million kWh	7,077	7,102	7,090	7,445	7,086
Total	**million kWh**	**9,599**	**9,026**	**8,785**	**9,158**	**8,754**

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN16 CO_2	various activities	thousand t	5.62	6.71	8.38	7.65	6.95
EN16 SF_6	electricity distribution	kg	122	14.5	26.6	41.4	13.2
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**8.41**	**7.05**	**8.98**	**8.59**	**7.26**
EN18 **Avoided CO_2 emissions**							
Due to wind and solar generation		thousand t	0	3.03	101	593	1,061
Due to generation from renewables		thousand t	0	3.03	101	593	1,061
EN22 **Non-hazardous special waste**							
Other							
production	electricity generation	t	0	0	0	1.9	8.15
	electricity distribution	t	2,112	3,330	4,389	4,301	4,525
	Total	**t**	**2,112**	**3,330**	**4,389**	**4,303**	**4,533**
delivery to recovery operators	electricity generation	t	0	0	0	1.1	6.7
	electricity distribution	t	812	2,150	2,969	2,599	2,460
	Total	**t**	**812**	**2,150**	**2,969**	**2,600**	**2,467**
EN22 **Hazardous special waste**							
production	electricity generation	t	0	0	0	1	5.8
	electricity distribution	t	93.9	73.6	120	61.3	110

	Source		2009	2010	2011	2012	2013
	various activities	t	0	0	0	0	0.001
	Total	**t**	**93.9**	**73.6**	**120**	**62.3**	**116**
of which with PCBs	*electricity distribution*	*t*	*0*	*0*	*0*	*0*	*10.4*
	Total	***t***	***0***	***0***	***0***	***0***	***10.4***
delivery to recovery operators	electricity generation	t	0	0	0	1	5.8
	electricity distribution	t	50.7	78.8	116	53	60.8
	Total	**t**	**50.7**	**78.8**	**116**	**54**	**66.6**
of which with PCBs	*electricity distribution*	*t*	*0*	*0*	*0*	*0*	*10.4*
	Total	***t***	***0***	***0***	***0***	***0***	***10.4***
EN22 **Total special waste**							
production	electricity generation	t	0	0	0	2.9	14
	electricity distribution	t	2,206	3,404	4,509	4,363	4,635
	various activities	t	0	0	0	0	0.001
	Total	**t**	**2,206**	**3,404**	**4,509**	**4,366**	**4,649**
delivery to recovery operators	electricity generation	t	0	0	0	2.1	12.5
	electricity distribution	t	862	2,229	3,085	2,652	2,521

Indicators

		2009	2010	2011	2012	**2013**	% ('13-'09)/'09	% ('13-'12)/'12
EN29 **Land**								
LV cable lines								
overhead	% of entire LV grid	24.1	25.7	27.6	28	28.4	17.8	1.4
underground	% of entire LV grid	41.6	41.3	41.3	41.4	40.9	-1.7	-1.2
Total	**% of entire LV grid**	**65.6**	**67.1**	**68.9**	**69.4**	**69.2**	**5.5**	**-0.3**
MV cable lines								
overhead	% of entire MV grid	0.098	0.086	0.175	0.367	0.381	288.8	3.8
underground	% of entire MV grid	36.9	34.2	34.7	35.3	35.9	-2.7	1.7
Total	**% of entire MV grid**	**37**	**34.3**	**34.9**	**35.6**	**36.3**	**-1.9**	**2**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	49.8	49.7	51	51.6	51.9	4.2	0.6
Resource conservation and quality								
EN4 Consumption of electricity for distribution grid operation	% of electricity distributed	0.179	0.154	0.167	0.142	0.142	-20.7	0
Electricity generation from renewables								
wind and solar (photovoltaic)	% of total generation	0	100	100	100	100	0	0
Total	**% of total generation**	**0**	**100**	**100**	**100**	**100**	**0**	**0**
EN6 **Market**								
Business segment								
Green power sold	% of power sold	0	0	0	0.79	5.11	0	546.8
Time-of-use power sold	% of power sold	2.43	1.14	1.31	1.66	7.1	192.2	327.7
Large customers' segment								
Green power sold	% of power sold	0	0	0	1.63	2.77	0	69.9
Time-of-use power sold	% of power sold	3.59	6.13	6.28	4.81	14.7	309.5	205.6

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Household customers' segment								
Time-of-use power sold	% of power sold	0.466	0.445	0.453	0.447	0.406	-12.9	-9.2
Non-household customers' segment								
Time-of-use power sold	% of power sold	66.7	40.5	43.9	39	36.2	-45.7	-7.2
Overall power sold								
high-voltage	% of power sold	3.85	3.26	3.42	2.87	4.32	12.2	50.5
medium-voltage	% of power sold	22.4	18.1	15.9	15.8	14.7	-34.4	-7
low-voltage	% of power sold	73.7	78.7	80.7	81.3	80.9	9.8	-0.5
Total green power sold	**% of power sold**	**0**	**0**	**0**	**0.154**	**0.671**	**0**	**335.7**
Total time-of-use power sold	**% of power sold**	**33.1**	**18.9**	**18.5**	**15.9**	**14.2**	**-57.1**	**-10.7**
Specific emissions into the atmosphere								
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.494	0.05	0.068	0.092	0.027	-94.5	-70.7
EN22 **Waste recovery**								
Total non-hazardous special waste								
electricity generation	% of production				57.9	82.2		42
electricity distribution	% of production	38.4	64.6	67.7	60.4	54.4	41.7	-9.9
Total	**% of production**	**38.4**	**64.6**	**67.7**	**60.4**	**54.4**	**41.7**	**-9.9**
Total hazardous special waste								
electricity generation	% of production				100	100		0
electricity distribution	% of production	54	107	96.7	86.4	55.2	2.2	-36.1
Total	**% of production**	**54**	**107**	**96.7**	**86.6**	**57.4**	**6.3**	**-33.7**
Total special waste								
electricity generation	% of production				72.4	89.6		23.8
electricity distribution	% of production	39.1	65.5	68.4	60.8	54.4	39.1	-10.5
Total	**% of production**	**39.1**	**65.5**	**68.4**	**60.8**	**54.5**	**39.4**	**-10.4**

Russia

Status data

		2009	2010	2011	2012	2013
Combined heat & power installations						
Power plants	no.	4	4	4	4	4
thermal	no.	4	4	4	4	4
Net maximum electrical capacity	MW	8,198	8,198	9,027	9,052	9,107
Useful thermal capacity	10^6 kcal/h	2,406	2,406	2,612	2,582	2,382
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	0	14	6	22	19

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Thermal generation combined with heat generation						
fuel oil	thousand t	59.7	50	33.6	52.2	29.8
	thousand toe	56.4	48.4	32.9	50.2	27.9
MS	thousand t	59.7	50	33.6	52.2	29.8
	thousand toe	56.4	48.4	32.9	50.2	27.9
natural gas	million m^3	6,143	6,716	7,421	7,030	6,608
	thousand toe	4,976	5,449	5,642	5,678	5,335
technologically captive use	*million m^3*	*51*	*88.4*	*330*	*996*	*943*
	thousand toe	*42.5*	*73.1*	*269*	*808*	*764*
of which in combined-cycle units	million m^3	51	88.4	330	996	943
	thousand toe	42.5	73.1	269	808	764
non-technologically captive use	*million m^3*	*6,092*	*6,628*	*7,091*	*6,033*	*5,664*
	thousand toe	*4,933*	*5,376*	*5,373*	*4,870*	*4,571*
coal	thousand t	11,630	13,654	12,572	13,026	12,371
	thousand toe	4,852	5,325	5,059	5,139	4,890
Total	**thousand toe**	**9,884**	**10,823**	**10,733**	**10,867**	**10,253**
Various activities	thousand toe	0.205	0.059	0.053	0.159	0.093
Grand total	**thousand toe**	**9,884**	**10,823**	**10,733**	**10,867**	**10,253**
	TJ	**413,834**	**453,141**	**449,386**	**454,970**	**429,288**
EN4 **Primary electricity**						
Various activities	million kWh	0	0	0.805	0.802	0.754
EN8 **Water for industrial uses**						
From rivers (including second-flush rainwater)	million m^3	35	27.9	25.4	29.5	29.7
From wells	million m^3	2.94	3.11	3.09	1.14	1.8
Total abstraction from inland waters	**million m^3**	**38**	**31**	**28.5**	**30.7**	**31.5**

		2009	2010	2011	2012	2013
EN10 From waste waters (used inside plants)	million m^3	8.48	7.67	6.92	6.06	5.75
Total requirements	**million m^3**	**46.4**	**38.7**	**35.4**	**36.7**	**37.3**
for thermal generation combined with heat generation (CHP)	million m^3	46.4	38.7	35.4	36.7	37.3
EN8 EN21 Open-cycle cooling water						
For thermal generation (simple and CHP)	million m^3	6,463	7,735	7,377	6,005	5,589
Total	**million m^3**	**6,463**	**7,735**	**7,377**	**6,005**	**5,589**
Water for non-industrial uses						
Real-estate & service management	million m^3	0.269	0	0.002	0.002	0.002
EN1 Expendables						
Resins	t	345	173	111	142	107
Hydrazine	t	1.7	1.53	1.74	0.877	1.15
Carbohydrazide	t	0	0	0	2.58	1.56
Ammonia	t	11	8.4	9.33	5.71	13.3
Sodium hypochlorite	t	0	2.93	5.82	7.1	7.2
Ferrous sulfate	t	200	253	256	307	293
Trisodium phosphate	t	11.6	8.51	8.97	7.83	5.05
Lime	t	735	611	562	606	697
Sulfuric & hydrochloric acids	t	2,704	2,276	2,577	2,846	2,846
Caustic soda	t	1,632	1,553	1,660	1,925	2,099
Lubricating oil	t	452	342	376	313	389
Dielectric oil	t	162	166	90.9	43.6	64.4
Printing paper	t	4.16	15	4.29	4.49	6.74
Other	t	1,849	1,708	1,802	1,517	1,406
Total	**t**	**8,107**	**7,119**	**7,465**	**7,728**	**7,936**
for thermal generation combined with heat generation (CHP)	t	8,103	7,104	7,461	7,723	7,930

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	million kWh	39,112	42,835	42,433	44,511	41,901
natural gas	million kWh	19,066	20,844	22,410	23,597	22,062
coal	million kWh	20,046	21,991	20,023	20,913	19,839
Total	**million kWh**	**39,112**	**42,835**	**42,433**	**44,511**	**41,901**
Useful heat output (combined with power generation)						
In thermal power plants	million kcal	6,766,684	6,519,608	6,776,922	6,624,966	6,459,134
	million kWh	7,870	7,582	7,882	7,705	7,512
Market						
Open market						
Residential segment						
Customers	no.	4,615	0	0	0	0
Power sold	million kWh	20.8	0	0	0	0
Total						
Customers	no.	100,338	95,206	88,052	73,760	129,534
Power sold	million kWh	223	239	269	270	232

		2009	2010	2011	2012	2013
Time-of-use offerings						
Customers	no.	18	0	0	0	0
Power sold	million kWh	4.35	0	0	0	0
Business segment						
Total						
Customers	no.	4,484	4,728	4,507	4,894	10,066
Power sold	million kWh	3,325	306	277	319	652
Large customers' segment						
Total						
Customers	no.	0	99	127	179	368
Power sold	million kWh	0	921	1,412	1,010	3,429
Very large customers' segment						
Total						
Customers	no.	1	31	34	39	75
Power sold	million kWh	16,069	19,616	20,694	24,217	44,838
Overall power sold						
high-voltage	million kWh	17,749	19,405	20,834	23,677	44,575
medium-voltage	million kWh	1,405	1,345	1,431	1,743	3,546
low-voltage	million kWh	462	332	387	397	1,029
Total	**million kWh**	**19,617**	**21,082**	**22,653**	**25,817**	**49,150**

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 SO_2	thermal generation combined with heat generation	thousand t	124	147	124	147	135
EN20 NO_x	thermal generation combined with heat generation	thousand t	93.5	120	104	94	91
EN20 Particulates	thermal generation combined with heat generation	thousand t	120	148	103	96.2	109
EN16 CO_2	fossil-fired thermal generation - CHP (from combustion)	thousand t	31,202	33,988	32,408	33,602	31,501
	various activities	thousand t	0	0.181	0.157	0.472	0.277
	Total	**thousand t**	**31,202**	**33,988**	**32,408**	**33,602**	**31,501**
EN16 SF_6	electricity generation	kg	47.2	18.7	26.3	15	67
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**31,203**	**33,989**	**32,408**	**33,603**	**31,502**
EN21 **Waste waters (discharged quantity)**	thermal generation combined with heat generation	million m³	34.6	34.2	25.4	28.3	23.9

	Source		2009	2010	2011	2012	2013
EN21 Conventional polluting load of waste waters discharged by plants							
Metals and compounds (expressed as metal equivalents)	thermal generation combined with heat generation	kg	53,085	42,430	46,111	64,873	85,838
	in some plants with an overall capacity of	MW	6,979	6,979	5,135	5,145	5,191
Total nitrogen (expressed as N)	thermal generation combined with heat generation	kg	0	0	34.1	95.2	99.7
	in some plants with an overall capacity of	MW	0	0	2,277	2,297	2,297
BOD	thermal generation combined with heat generation	kg	694	0	102	0	690
	in some plants with an overall capacity of	MW	2,252	0	2,277	0	2,297
EN22 Non-hazardous special waste							
Coal bottom ash	fossil-fired thermal generation (simple and CHP)						
	production	t	214,636	274,951	242,506	247,489	233,516
Coal flyash	thermal generation combined with heat generation						
	production	t	4,078,082	5,076,426	4,607,616	4,949,779	4,436,800
	delivery to recovery operators	t	93,584	135,463	174,029	225,646	192,774
Other							
production	electricity generation	t	19,455	19,432	20,654	20,290	19,297
	various activities	t	3,660	0	0	0	0
	Total	**t**	**23,115**	**19,432**	**20,654**	**20,290**	**19,297**
delivery to recovery operators	electricity generation	t	5,338	3,759	6,942	6,148	5,114
Total							
production	electricity generation	t	4,312,173	5,370,809	4,870,777	5,217,558	4,689,613
	various activities	t	3,660	0	0	0	0
	Total	**t**	**4,315,833**	**5,370,809**	**4,870,777**	**5,217,558**	**4,689,613**
delivery to recovery operators	electricity generation	t	98,922	139,222	180,971	231,794	197,888
EN22 Hazardous special waste							
production	electricity generation	t	399	462	1,796	2,659	3,808
	various activities	t	134	0	0	0	0.09
	Total	**t**	**533**	**462**	**1,796**	**2,659**	**3,808**
delivery to recovery operators	electricity generation	t	364	223	148	3,617	77.2
	Total	**t**	**364**	**223**	**148**	**3,617**	**77.2**
EN22 Total special waste							
production	electricity generation	t	4,312,572	5,371,272	4,872,573	5,220,217	4,693,421
	various activities	t	3,795	0	0	0	0.09
	Total	**t**	**4,316,367**	**5,371,272**	**4,872,573**	**5,220,217**	**4,693,421**
delivery to recovery operators	electricity generation	t	99,285	139,444	181,119	235,411	197,965
	Total	**t**	**99,285**	**139,444**	**181,119**	**235,411**	**197,965**

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation (CHP)	kcal/kWh	2,104	2,147	2,133	2,081	2,075	-1.4	-0.3
EN8 Net specific consumption of water for industrial uses in thermal generation (CHP)	liters/kWh	0.988	0.767	0.704	0.704	0.754	-23.7	7.1
Total net specific consumption of water for industrial uses	liters/kWh	0.988	0.767	0.704	0.704	0.754	-23.7	7.1
EN8 Coverage of requirements of water for industrial uses								
from rivers (including second-flush rainwater)	% of requirements	75.4	72.1	71.7	80.4	79.8	5.8	-0.7
from wells	% of requirements	6.33	8.04	8.74	3.1	4.82	-23.9	55.5
Total from inland waters	**% of requirements**	**81.7**	**80.2**	**80.5**	**83.5**	**84.6**	**3.5**	**1.3**
EN10 from waste waters (used inside plants)	% of requirements	18.3	19.8	19.5	16.5	15.4	-15.8	-6.7
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	0.571	0.448	0.307	0.462	0.272	-52.4	-41.1
natural gas	% of total fuel consumption	50.3	50.4	52.6	52.2	52	3.4	-0.4
coal	% of total fuel consumption	49.1	49.2	47.1	47.3	47.7	-2.9	0.8
MS fuel oil	% of total fuel-oil consumption	100	100	100	100	100	0	0
natural gas, technologically captive use	% of total natural-gas consumption	0.855	1.34	4.76	14.2	14.3	1,572.5	0.7
of which in combined-cycle units	*% of total natural-gas consumption*	*0.855*	*1.34*	*4.76*	*14.2*	*14.3*	*1,572.5*	*0.7*
natural gas, non-technologically captive use	% of total natural-gas consumption	99.1	98.7	95.2	85.8	85.7	-13.5	-0.1
EN6 **Market**								
Residential segment								
Time-of-use power sold	% of power sold	9.35	0	0	0	0	-100	0
Business segment								
Time-of-use power sold	% of power sold	0.131	0	0	0	0	-100	0
Overall power sold								
high-voltage	% of power sold	90.5	92	92	91.7	90.7	0.2	-1.1
medium-voltage	% of power sold	7.16	6.38	6.32	6.75	7.22	0.8	7
low-voltage	% of power sold	2.36	1.57	1.71	1.54	2.09	-11.4	35.7
Total time-of-use power sold	**% of power sold**	**0.128**	**0**	**0**	**0**	**0**	**-100**	**0**
Specific emissions into the atmosphere								
EN20 SO_2 (thermal generation - CHP)	g/kWh thermal net	2.63	2.92	2.46	2.81	2.74	4.2	-2.5
EN20 NO_x (thermal generation - CHP)	g/kWh thermal net	1.99	2.38	2.06	1.8	1.84	-7.5	2.2
EN20 Particulates (thermal generation - CHP)	g/kWh thermal net	2.54	2.93	2.05	1.84	2.21	-13	20.1
EN16 CO_2 (thermal generation - CHP)	g/kWh thermal net	664	674	644	644	637	-4.1	-1.1
EN20 SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	2.63	2.92	2.46	2.81	2.74	4.2	-2.5
EN20 NO_x (total from thermal generation - simple and CHP)	g/kWh total net	1.99	2.38	2.06	1.8	1.84	-7.5	2.2

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN20 Particulates (total from thermal generation - simple and CHP)	g/kWh total net	2.54	2.93	2.05	1.84	2.21	-13	20.1
EN16 CO_2 (total from thermal generation - simple and CHP)	g/kWh total net	664	674	644	644	637	-4.1	-1.1
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	1.1	0.267	0.348	0.136	0.536	-51.3	294.1
Net specific conventional polluting load of waste waters discharged by plants (thermal generation - CHP)								
Metals and compounds (expressed as metal equivalents)	mg/kWh	1.33	0.985	1.4	1.85	2.64	98.5	42.7
Total nitrogen (expressed as N)	mg/kWh	0	0	0.004	0.011	0.012	0	9.1
BOD	mg/kWh	0.093	0	0.011	0	0.083	-10.8	-
EN22 **Waste recovery**								
Coal and brown-coal ash	% of production	2.18	2.53	3.59	4.34	4.13	89.4	-4.8
flyash	% of production	2.3	2.67	3.78	4.56	4.35	89.1	-4.6
Other non-hazardous special waste								
electricity generation	% of production	27.4	19.3	33.6	30.3	26.5	-3.3	-12.5
Total non-hazardous special waste								
electricity generation	% of production	2.29	2.59	3.72	4.44	4.22	84.3	-5
Other hazardous special waste								
electricity generation	% of production	91.2	48.1	8.24	136	2.03	-97.8	-98.5
Total special waste								
electricity generation	% of production	2.3	2.6	3.72	4.51	4.22	83.5	-6.4

Slovakia

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	30	34	34	36	36
hydro	no.	30	34	34	34	34
solar (photovoltaic)	no.	0	0	0	2	2
Net maximum electrical capacity	MW	1,590	2,329	2,329	2,330	2,330
hydro	MW	1,590	2,329	2,329	2,329	2,329
solar (photovoltaic)	MW	0	0	0	1.9	1.9
Combined heat & power installations						
Power plants	no.	4	4	4	4	4
thermal	no.	2	2	2	2	2
nuclear	no.	2	2	2	2	2
Net maximum electrical capacity	MW	3,012	3,070	3,072	3,070	3,068
thermal	MW	1,250	1,254	1,254	1,254	1,254
nuclear	MW	1,762	1,816	1,818	1,816	1,814
Useful thermal capacity	million kcal/h	887	887	887	887	887
thermal	million kcal/h	423	423	423	423	423
nuclear	million kcal/h	464	464	464	464	464
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	395	422	399	542	354
special vehicles	no.	208	159	102	58	56

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Thermal generation combined with heat generation						
fuel oil	thousand t	5.42	8.42	7.23	8.68	5.46
	thousand toe	5.35	8.37	7.03	7.73	4.82
LS	*thousand t*	*5.42*	*8.42*	*7.23*	*8.68*	*5.46*
	thousand toe	*5.35*	*8.37*	*7.03*	*7.73*	*4.82*
natural gas	million m^3	3.89	5.87	3.24	4.47	3.96
	thousand toe	3.19	4.83	2.37	3.42	2.89
non-technologically captive use	*million m^3*	*3.89*	*5.87*	*3.24*	*4.47*	*3.96*
	thousand toe	*3.19*	*4.83*	*2.37*	*3.42*	*2.89*
coal	thousand t	363	279	249	265	170
	thousand toe	221	169	149	146	102

		2009	2010	2011	2012	2013
brown coal	thousand t	2,308	2,273	2,424	2,292	2,200
	thousand toe	571	575	600	501	538
Total	**thousand toe**	**801**	**757**	**758**	**659**	**647**
Various activities	thousand toe	1.72	1.88	2.04	1.71	1.57
Grand total	**thousand toe**	**802**	**759**	**760**	**660**	**649**
	TJ	**33,595**	**31,777**	**31,823**	**27,652**	**27,166**
EN1 EN3 **Biomass and waste**						
Thermal generation combined with heat generation						
Solid biomass	t	8,311	22,286	27,186	39,111	72,355
	toe	2,190	6,055	7,524	13,195	20,001
Grand total	**thousand toe**	**2.19**	**6.06**	**7.52**	**13.2**	**20**
	TJ	**91.7**	**254**	**315**	**552**	**837**
EN1 EN3 **Nuclear fuel**						
Nuclear generation (CHP)						
Uranium	t	36	37.4	38.5	35.5	33.4
	thousand toe	3,727	3,782	3,972	3,997	4,058
EN4 **Primary electricity**						
Various activities	million kWh	1.41	1.94	1.77	1.64	1.09
EN8 EN10 **Water for industrial uses**						
From rivers (including second-flush rainwater)	million m^3	55	54.1	55.7	52.9	51.5
Total abstraction from inland waters	**million m^3**	**55**	**54.1**	**55.7**	**52.9**	**51.5**
EN10 From waste waters (used inside plants)	million m^3	0.432	0.57	0.637	0.594	0.516
Total requirements	**million m^3**	**55.4**	**54.7**	**56.3**	**53.5**	**52**
for thermal generation (CHP)	million m^3	15	13.7	12.5	8.93	7.91
for nuclear generation (CHP)	million m^3	40.4	41	43.7	44.5	44.1
EN8 EN21 **Open-cycle cooling water**						
For thermal generation (simple and CHP)	million m^3	0.428	0.636	0	76.7	58.3
Water for non-industrial uses						
Real-estate & service management	million m^3	0.419	0.44	0.432	0.003	0.003
EN1 **Expendables**						
Resins	t	2.5	26.5	26.5	26.5	11
Hydrazine	t	15.3	15.5	15.6	14.9	17.5
Ammonia	t	835	416	261	158	21.3
Limestone for flue-gas desulfurization	t	85,377	72,619	88,768	103,932	94,752
Sodium hypochlorite	t	23.8	6.11	5.9	5.81	5.71
Chlorine dioxide	t	0.514	0.875	0.709	0.835	1.04
Trisodium phosphate	t	7.92	8.07	5.8	9.16	8.7
Lime	t	18,545	14,681	13,018	7,468	6,058
Ferric chloride	t	105	108	96.4	113	96.9
Polyectrolyte	t	0	36.9	33.6	36.9	35.4
Sulfuric & hydrochloric acids	t	1,530	1,430	1,406	1,733	1,564
Caustic soda	t	439	288	234	189	159
Lubricating oil	t	125	105	195	147	178
Dielectric oil	t	4.46	2.92	5	2.16	11.5
Printing paper	t	54	61.2	71.5	41.8	52.7
Other	t	0	0	0.2	19.5	14
Total	t	107,065	89,804	104,143	113,898	102,987

		2009	2010	2011	2012	2013
for thermal generation (CHP)	t	100,593	83,517	97,212	108,007	96,683
for nuclear generation (CHP)	t	6,361	6,145	6,776	5,769	6,085
for hydro generation	t	57	81.4	83.6	79.4	167

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	**million kWh**	**2,400**	**2,235**	**2,259**	**2,176**	**1,901**
combined with heat generation	million kWh	2,400	2,235	2,259	2,176	1,901
fuel oil & gas oil	million kWh	15.5	23.8	20.4	39	15.1
natural gas	million kWh	10.6	13.9	7.84	11.1	8.9
coal	million kWh	734	558	493	533	346
brown coal	million kWh	1,640	1,639	1,738	1,593	1,531
From renewables	**million kWh**	**1,830**	**4,813**	**3,455**	**3,888**	**4,506**
biomass	million kWh	7.31	20.2	23.1	26	57
hydro from natural flows	million kWh	1,823	4,793	3,432	3,860	4,447
solar (photovoltaic)	million kWh	0	0	0	2.09	1.94
Hydro from pumped storage	**million kWh**	**235**	**386**	**360**	**244**	**312**
Nuclear (simple)	**million kWh**	**13,055**	**13,534**	**14,340**	**14,411**	**14,624**
combined with heat generation	million kWh	13,055	13,534	14,340	14,411	14,624
Total	**million kWh**	**17,521**	**20,968**	**20,414**	**20,720**	**21,343**
simple	million kWh	2,058	5,179	3,791	4,107	4,761
combined with heat generation	million kWh	15,463	15,789	16,622	16,613	16,582
Electricity consumption for pumping	**million kWh**	**321**	**528**	**494**	**345**	**437**
Useful heat output (combined with power generation)						
In thermal power plants	million kcal	359,842	382,203	351,819	313,643	377,682
fossil fuels	*million kcal*	*359,842*	*382,203*	*346,589*	*292,039*	*352,201*
biomass	*million kcal*	*0*	*0*	*5,230*	*21,604*	*25,481*
In nuclear power plants	million kcal	541,146	596,857	527,923	504,474	504,078
Total	**million kcal**	**900,988**	**979,060**	**879,742**	**818,117**	**881,760**
	million kWh	**1,048**	**1,139**	**1,023**	**951**	**1,025**

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 SO_2	thermal generation combined with heat generation	thousand t	32.9	36.9	40.2	34	31.4
EN20 NO_x	thermal generation combined with heat generation	thousand t	5.21	4.53	4.85	4.09	3.44
EN20 Particulates	thermal generation combined with heat generation	thousand t	0.543	0.379	0.451	0.34	0.311

	Source		2009	2010	2011	2012	2013
EN16 CO_2	fossil-fired thermal generation - CHP (from combustion)	thousand t	3,362	2,973	2,933	2,845	2,643
	non-fossil- fired thermal generation (from desulfurization)	thousand t	37.6	35	39.4	45.6	41.7
	Total from thermal generation combined with heat generation	thousand t	3,400	3,008	2,972	2,890	2,685
	various activities	thousand t	2.88	2.64	3.24	5.62	4.28
	Total	**thousand t**	**3,403**	**3,011**	**2,975**	**2,896**	**2,689**
EN16 SF_6	electricity generation	kg	198	83	222	60.6	57.7
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**3,407**	**3,012**	**2,980**	**2,897**	**2,690**
EN18 Avoided CO_2 emissions							
Due to hydro generation from natural flows		thousand t	2,129	5,040	3,608	3,779	3,662
Due to solar (photovoltaic) generation		thousand t	0	0	0	2.05	1.6
Due to generation from biomass		thousand t	8.54	21.3	24.3	25.5	46.9
Due to generation from renewables		thousand t	2,138	5,062	3,633	3,807	3,710
Due to nuclear generation (simple and CHP)		thousand t	15,983	14,962	15,725	14,683	12,523
EN20 Radioactive emissions into the atmosphere							
Noble gases	nuclear generation (CHP)	TBq	6.56	8.51	10.5	7.72	5.95
Iodine 131	nuclear generation (CHP)	MBq	0.556	0.608	0.979	0.662	0.727
Aerosols β and γ	nuclear generation (CHP)	MBq	20.8	18.7	16	28.5	15.6
Aerosol α	nuclear generation (CHP)	kBq	22.6	6.49	3.58	1.52	1.82
Strontium 89 and 90	nuclear generation (CHP)	kBq	91.5	74.7	64.7	55	70.4
EN21 Waste waters (discharged quantity)							
	thermal generation combined with heat generation	million m^3	5.91	5.49	5.4	3.39	3.28
	nuclear generation (CHP)	million m^3	8.22	9.06	9.28	9.3	8.75
	Total from electricity generation	**million m^3**	**14.1**	**14.6**	**14.7**	**12.7**	**12**
EN21 Conventional polluting load of waste waters discharged by plants							
Metals and compounds (expressed as metal equivalents)	nuclear generation (CHP)	kg	158	366	257	567	651
	on an overall capacity of	MW	1,762	1,816	1,818	1,816	1,814
Total nitrogen (expressed as N)	nuclear generation (CHP)	kg	34,566	32,130	33,275	34,847	39,592
	on an overall capacity of	MW	1,762	1,816	1,818	1,816	1,814

	Source		2009	2010	2011	2012	2013
Total phosphorus (expressed as P)	nuclear generation (CHP)	kg	2,213	2,491	2,721	2,257	1,555
	on an overall capacity of	MW	1,762	1,816	1,818	1,816	1,814
COD	thermal generation combined with heat generation	kg	71,867	75,484	94,625	802,330	661,867
	in some plants with an overall capacity of	MW	1,234	1,254	1,234	1,234	1,234
	nuclear generation (CHP)	kg	111,648	140,870	134,170	168,912	179,154
	on an overall capacity of	MW	1,762	1,816	1,818	1,816	1,814
	Total	**kg**	**183,515**	**216,354**	**228,795**	**971,242**	**841,021**
BOD	thermal generation combined with heat generation	kg	12,405	11,696	16,622	186,090	134,739
	in some plants with an overall capacity of	MW	1,234	1,254	1,234	1,234	1,234
	nuclear generation (CHP)	kg	17,605	16,021	21,474	24,469	25,459
	on an overall capacity of	MW	1,762	1,816	1,818	1,816	1,814
	Total	**kg**	**30,009**	**27,717**	**38,096**	**210,559**	**160,198**
EN21 **Radionuclides in waste waters discharged by plants**							
Tritium	nuclear generation (CHP)	GBq	21,621	19,359	20,960	21,358	21,632
Corrosion and fission products	nuclear generation (CHP)	GBq	0.032	0.035	0.038	0.042	0.041
EN22 **Non-hazardous special waste**							
Coal bottom ash	fossil-fired thermal generation (simple and CHP)						
	production	t	108,238	56,970	90,714	97,655	80,526
	delivery to recovery operators	t	59,087	45,187	70,193	18,509	20,294
Coal flyash	thermal generation combined with heat generation						
	production	t	316,529	355,049	455,721	477,927	434,622
	delivery to recovery operators	t	165,057	164,358	382,097	226,861	239,666
Gypsum from desulfurization	thermal generation combined with heat generation						
	production	t	7,673	8,212	174,526	173,519	121,548
	delivery to recovery operators	t	7,673	8,212	75,148	86,604	80,192
Other							
production	electricity generation	t	386,088	332,789	117,573	108,376	82,461
	various activities	t	149	35.9	13.8	66.9	11.9
	Total	**t**	**386,237**	**332,825**	**117,587**	**108,443**	**82,473**
delivery to recovery operators	**Total**	**t**	**15,358**	**19,979**	**15,360**	**12,707**	**12,153**

	Source		2009	2010	2011	2012	2013
Total							
production	electricity generation	t	818,528	753,020	838,534	857,477	719,157
	various activities	t	149	35.9	13.8	66.9	11.9
	Total	t	818,677	753,056	838,548	857,544	719,169
delivery to recovery operators	Total	t	247,174	237,735	542,798	344,680	352,305
EN22 **Hazardous special waste**							
production	electricity generation	t	1,017	490	506	790	1,647
	various activities	t	1,017	0.023	0.03	0.022	0.011
	Total	**t**	**2,035**	**490**	**506**	**790**	**1,647**
of which with PCBs	*various activities*	*t*	*400*	*0*	*0*	*0*	*0*
	Total	***t***	***400***	***0***	***0***	***0***	***0***
delivery to recovery operators	electricity generation	t	584	377	331	426	265
	Total	**t**	**584**	**377**	**331**	**426**	**265**
Total							
production	electricity generation	t	1,017	490	506	790	1,647
	various activities	t	1,017	0.023	0.03	0.022	0.011
	Total	t	2,035	490	506	790	1,647
delivery to recovery operators	electricity generation	t	584	377	331	426	265
	Total	t	584	377	331	426	265
EN22 **Total special waste**							
production	electricity generation	t	819,545	753,510	839,039	858,267	720,804
	various activities	t	1,166	35.9	13.9	66.9	12
	Total	**t**	**820,711**	**753,546**	**839,053**	**858,334**	**720,816**
delivery to recovery operators	electricity generation	t	247,758	238,112	543,129	345,106	352,570
	Total	**t**	**247,758**	**238,112**	**543,129**	**345,106**	**352,570**
EN22 **Radioactive waste**							
Low-, intermediate- and high-level radioactive waste stored inside plants	nuclear generation (CHP)						
	liquid	m^3	2,585	2,508	2,207	2,005	1,827
	solid	t	310	307	278	285	296
Low- and intermediate-level: production	nuclear generation (CHP)						
	liquid	m^3	90.2	76.2	56.6	34.4	39.2
	solid	t	31.7	29.3	31	31.4	29.9
High-level: production	nuclear generation (CHP)						
	solid	t	1.01	1.92	1.51	0.175	0.348

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation (CHP)	kcal/kWh	2,841	2,827	2,844	2,618	2,784	-2	6.3
EN1EN3 Net efficiency of hydro generation from pumped storage	%	73.3	73	72.8	70.9	71.5	-2.5	0.8
EN8 Net specific consumption of water for industrial uses in thermal generation (CHP)	liters/kWh	5.31	5.08	4.66	3.48	3.3	-37.9	-5.2
EN8 Net specific consumption of water for industrial uses in nuclear generation (CHP)	liters/kWh	2.95	2.88	2.93	2.97	2.9	-1.7	-2.4

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Total net specific consumption of water for industrial uses	liters/kWh	2.98	2.48	2.63	2.47	2.32	-22.1	-6.1
EN8 Coverage of requirements of water for industrial uses								
From rivers (including second-flush rainwater)	% of requirements	99.2	99	98.9	98.9	99	-0.2	0.1
Total from inland waters	**% of requirements**	**99.2**	**99**	**98.9**	**98.9**	**99**	**-0.2**	**0.1**
EN10 from waste waters (used inside plants)	% of requirements	0.78	1.04	1.13	1.11	0.993	27.3	-10.5
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	0.668	1.11	0.927	1.17	0.744	11.4	-36.4
natural gas	% of total fuel consumption	0.398	0.637	0.312	0.518	0.446	12.1	-13.9
coal	% of total fuel consumption	27.7	22.3	19.7	22.2	15.7	-43.3	-29.3
brown coal	% of total fuel consumption	71.3	76	79.1	76.1	83.1	16.5	9.2
LS fuel oil	% of total fuel-oil consumption	100	100	100	100	100	0	0
natural gas, non-technologically captive	% of total natural-gas consumption	100	100	100	100	100	0	0
Electricity generation from renewables								
thermal from biomass and biodegradable fraction of waste	% of total generation	0.042	0.096	0.113	0.126	0.267	535.7	111.9
hydro from natural flows	% of total generation	10.4	22.9	16.8	18.6	20.8	100	11.8
wind and solar (photovoltaic)	% of total generation	0	0	0	0.01	0.009	0	-10
Total	**% of total generation**	**10.4**	**23**	**16.9**	**18.8**	**21.1**	**102.9**	**12.2**
Specific emissions into the atmosphere								
EN20 SO_2 (thermal generation - CHP)	g/kWh thermal net	11.6	13.7	14.9	13.2	13.1	12.9	-0.8
EN20 NO_x (thermal generation - CHP)	g/kWh thermal net	1.84	1.68	1.8	1.6	1.44	-21.7	-10
EN20 Particulates (thermal generation - CHP)	g/kWh thermal net	0.192	0.14	0.168	0.132	0.13	-32.3	-1.5
EN16 CO_2 (thermal generation - CHP)	g/kWh thermal net	1,203	1,114	1,104	1,126	1,120	-6.9	-0.5
EN20 SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	1.77	1.67	1.88	1.57	1.4	-20.9	-10.8
EN20 NO_x (total from thermal generation - simple and CHP)	g/kWh total net	0.28	0.205	0.226	0.189	0.154	-45	-18.5
EN20 Particulates (total from thermal generation - simple and CHP)	g/kWh total net	0.029	0.017	0.021	0.016	0.014	-51.7	-12.5
EN16 CO_2 (total from thermal generation - simple and CHP)	g/kWh total net	183	136	139	133	120	-34.4	-9.8
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.553	0.229	0.616	0.172	0.167	-69.8	-2.9
EN20 Specific radioactive emissions into the atmosphere								
Nuclear generation (CHP)								
Noble gases	kBq/kWh	0	1	1	1	0	0	0
Aerosols β and γ	mBq/kWh	2	1	1	2	1	-50	-50
Aerosol α	μBq/kWh	2	0	0	0	0	-100	0
Strontium 89 and 90	μBq/kWh	7	5	4	4	5	-28.6	25
Net specific conventional polluting load of waste waters discharged by plants (thermal generation - CHP)								
COD	mg/kWh	25.4	28	35.2	313	276	986.6	-11.8
BOD	mg/kWh	4.39	4.33	6.18	72.5	56.2	1,180.2	-22.5

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN21 Net specific conventional polluting load of waste waters discharged by plants (nuclear generation - CHP)								
Metals and compounds (expressed as metal equivalents)	mg/kWh	0.012	0.026	0.017	0.038	0.043	258.3	13.2
Total nitrogen (expressed as N)	mg/kWh	2.53	2.26	2.23	2.32	2.6	2.8	12.1
Total phosphorus (expressed as P)	mg/kWh	0.162	0.175	0.182	0.15	0.102	-37	-32
COD	mg/kWh	8.16	9.9	8.97	11.3	11.8	44.6	4.4
BOD	mg/kWh	1.29	1.13	1.44	1.63	1.67	29.5	2.5
EN21 Net specific polluting load of radionuclides in waste waters (nuclear generation - CHP)								
Nuclear generation (CHP)								
Tritium	kBq/kWh	1.58	1.36	1.4	1.42	1.42	-10.1	0
EN22 Specific waste production radioactive								
Low- and intermediate-level								
liquid	mm^3/kWh net	6.59	5.36	3.78	2.29	2.58	-60.8	12.7
solid	mg/kWh net	2.32	2.06	2.07	2.09	1.97	-15.1	-5.7
High-level								
solid	mg/kWh net	0.074	0.135	0.101	0.012	0.023	-68.9	91.7
EN22 Low-, intermediate- and high-level radioactive waste stored inside plants								
liquid	% in volume of production since the start of operation	57.8	53.6	46.6	42	37.9	-34.4	-9.8
solid	% in weight of production since the start of operation	32.8	30.8	27	26.9	27.3	-16.8	1.5
EN22 Waste recovery								
Coal and brown-coal ash	% of production	52.8	50.9	82.8	42.6	50.5	-4.4	18.5
bottom ash	*% of production*	*54.6*	*79.3*	*77.4*	*19*	*25.2*	*-53.8*	*32.6*
flyash	*% of production*	*52.1*	*46.3*	*83.8*	*47.5*	*55.1*	*5.8*	*16*
Gypsum from desulfurization	% of production	100	100	43.1	49.9	66	-34	32.3
Other non-hazardous special waste								
electricity generation	% of production	3.98	6	13.1	11.7	14.7	269.3	25.6
Total non-hazardous special waste								
electricity generation	% of production	30.2	31.6	64.7	40.2	49	62.3	21.9
Total hazardous special waste								
electricity generation	% of production	57.4	76.9	65.4	53.9	16.1	-72	-70.1
Total special waste								
electricity generation	% of production	30.2	31.6	64.7	40.2	48.9	61.9	21.6

Spain

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	215	248	254	253	257
thermal	no.	32	32	33	32	32
nuclear	no.	5	5	5	5	5
hydro	no.	102	144	140	137	137
wind	no.	75	65	74	77	80
solar (photovoltaic)	no.	1	2	2	2	3
Net maximum electrical capacity	MW	21,744	23,441	23,120	22,662	22,825
thermal	MW	12,441	13,934	13,372	12,816	12,883
nuclear	MW	3,522	3,514	3,527	3,535	3,556
hydro	MW	4,688	4,700	4,684	4,729	4,722
wind	MW	1,080	1,279	1,524	1,568	1,652
solar (photovoltaic)	MW	12.3	13.3	13.4	13.4	13.4
Combined heat & power installations						
Power plants	no.	8	8	1	1	1
thermal	no.	8	8	1	1	1
Net maximum electrical capacity	MW	26.3	26.3	21.4	19.7	14
Useful thermal capacity	million kcal/h	13.5	2.6	30	30	136
Power lines (circuit length)						
Total	km	313,158	317,275	321,462	325,295	323,631
high-voltage	km	21,352	18,880	19,022	19,541	19,566
medium-voltage	km	117,238	118,668	118,799	119,634	117,542
low-voltage	km	174,568	179,727	183,641	186,120	186,523
Gas pipelines						
Total	km	3,440	0	0	0	0
high-pressure	km	1,007	0	0	0	0
medium-pressure	km	1,596	0	0	0	0
low-pressure	km	837	0	0	0	0
Mining & extracting activities						
Mining						
Mines	no.	5	5	4	5	5
coal	no.	5	4	3	4	5
brown coal	no.	0	1	1	1	0
Amount of fuels extractable since the start of activities	Mt	0	339	342	343	344
brown coal	Mt					
Areas occupied by excavation and other activities	ha	5,341	4,438	4,500	4,425	4,362
Coal mines	ha	5,341	4,438	3,756	1,148	1,165
Brown-coal mines	ha	0	0	744	3,277	3,197

		2009	2010	2011	2012	2013
EN29 Service & real-estate management						
Vehicle fleet						
service vehicles	no.	1,229	1,375	1,712	1,724	1,724
special vehicles	no.	10	65	140	133	120
vehicles for both private and service use	no.	152	0	579	715	706
Gross real-estate surface area	**thousand m²**	**281**	**1,093**	**217**	**202**	**192**

Resources

		2009	2010	2011	2012	2013
EN1 EN3 Fossil fuels						
Thermal generation						
fuel oil	thousand t	1,660	1,620	1,480	1,505	1,364
	thousand toe	1,627	1,572	1,405	1,462	1,321
LS	*thousand t*	*1,660*	*1,610*	*1,473*	*1,502*	*1,362*
	thousand toe	*1,626*	*1,563*	*1,399*	*1,459*	*1,318*
VLS	*thousand t*	*0.242*	*9.47*	*6.38*	*3.05*	*2.28*
	thousand toe	*0.236*	*9.39*	*6.2*	*2.97*	*2,22*
gas oil	thousand t	1,063	1,020	909	813	760
	thousand toe	1,079	1,060	926	808	757
natural gas	million m³	1,229	753	1,071	775	544
	thousand toe	1,097	697	997	711	497
technologically captive use	*million m³*	*1,143*	*725*	*1,061*	*751*	*483*
	thousand toe	*1,017*	*671*	*987*	*690*	*443*
of which in combined-cycle units	million m³	1,143	725	1,061	721	398
	thousand toe	1,017	671	987	664	366
non-technologically captive use	*million m³*	*86.3*	*28.3*	*10.5*	*24.4*	*60.2*
	thousand toe	*80.2*	*26.2*	*9.59*	*21.8*	*54.4*
coal	thousand t	7,830	5,647	9,955	11,701	8,559
	thousand toe	4,245	3,036	5,270	6,028	4,485
brown coal	thousand t	1,213	780	2,698	2,047	1,623
	thousand toe	370	247	856	639	517
Total	**thousand toe**	**8,416**	**6,612**	**9,455**	**9,648**	**7,577**
	TJ	**352,363**	**276,845**	**395,861**	**403,935**	**317,223**
Thermal generation combined with heat generation						
fuel oil	thousand t	19.3	0	0	0	0
	thousand toe	20.3	0	0	0	0
LS	*thousand t*	*19.3*	*0*	*0*	*0*	*0*
	thousand toe	*20.3*	*0*	*0*	*0*	*0*
natural gas	million m³	6.19	26.3	33.1	33.4	34.7
	thousand toe	9.9	24.1	26.9	30.3	26.4
technologically captive use	*million m³*	*0*	*0*	*33.1*	*26.9*	*26.8*
	thousand toe	*0*	*0*	*26.9*	*24.4*	*24.1*
of which in combined-cycle units	million m³	0	0	29	24.1	26.8
	thousand toe	0	0	26.6	21.8	24.1
non-technologically captive use	*million m³*	*6.19*	*26.3*	*0*	*6.54*	*7.89*
	thousand toe	*9.9*	*24.1*	*0*	*5.93*	*2.35*
Total	**thousand toe**	**30.2**	**24.1**	**26.9**	**30.3**	**26.4**

		2009	2010	2011	2012	2013
Various activities	thousand toe	24.8	11.4	11.1	9.36	4.44
Grand total	**thousand toe**	**8,471**	**6,648**	**9,493**	**9,688**	**7,608**
	TJ	**354,664**	**278,333**	**397,453**	**405,597**	**318,610**
EN1 EN3 Biomass and waste						
Thermal generation						
Solid biomass	t	69,774	66,260	91,240	92,639	91,520
	toe	26,733	25,386	36,208	36,685	35,327
Biogas	thousand m^3	33,104	37,442	38,266	18,948	33,923
	toe	13,197	14,846	15,134	6,188	10,959
Thermal generation combined with heat generation						
Grand total	**thousand toe**	**39.9**	**40.2**	**51.3**	**42.9**	**35.8**
	TJ	**1,672**	**1,684**	**2,150**	**1,795**	**1,638**
EN1 EN3 Nuclear fuel						
Nuclear generation						
Uranium	t	79.7	36.4	90.4	99.5	73.9
	thousand toe	6,191	6,040	6,857	7,349	6,579
EN4 Primary electricity						
Various activities	million kWh	20.4	51.5	54.4	44.1	44.1
EN8 Water for industrial uses						
From rivers (including second-flush rainwater)	million m^3	32.8	20.6	44.8	46.2	53.4
From wells	million m^3	1.84	2.82	1.96	1.99	2.28
From aqueducts	million m^3	1.12	0.493	0.414	0.795	0.603
Total abstraction from inland waters	**million m^3**	**35.8**	**23.9**	**47.2**	**48.9**	**56.2**
From the sea (as-is)	million m^3	2.73	2.62	2.56	0.003	0.002
From the sea (desalinated)	million m^3	2.55	2.87	3.43	2.81	2.79
EN10 From waste waters (used inside plants)	million m^3	0.008	0.028	0.015	0.006	0.009
Total requirements	**million m^3**	**41.1**	**29.4**	**53.2**	**51.8**	**59**
for thermal generation	million m^3	36.5	25.1	49.2	47.5	39.8
for thermal generation combined with heat generation (CHP)	million m^3	0	0	0	0.186	0.337
for nuclear generation	million m^3	1.47	1.4	1.81	1.93	16.9
for fuel storage & handling	million m^3	0.026	0.029	0.028	0.018	0.043
for mining & extracting activities	million m^3	3.09	2.92	2.11	2.18	1.93
EN8 EN21 Open-cycle cooling water						
For thermal generation (simple and CHP)	million m^3	3,574	3,405	3,356	3,420	3,111
For nuclear generation	million m^3	2,435	2,988	2,417	2,563	2,537
Total	**million m^3**	**6,009**	**6,392**	**5,773**	**5,982**	**5,648**
Water for non-industrial uses						
Real-estate & service management	million m^3	2.74	0.046	0.204	0.281	0.085
EN1 Expendables						
Resins	t	18.9	22.3	28	23.4	16.5
Hydrazine	t	43.7	19.5	20.1	22.4	21
Carbohydrazide	t	36.2	12.8	3.9	21.4	9.76
Hydrogen peroxide	t	0.198	0.537	0.971	1.01	2.28
Ammonia	t	47.4	67.7	85.1	118	79.9
Limestone for flue-gas desulfurization	t	354,569	197,218	691,037	545,256	379,571
Magnesium oxide	t	318	279	235	181	212
Sodium hypochlorite	t	858	830	1,541	919	478
Chlorine dioxide	t	0	0	0	284	153

		2009	2010	2011	2012	2013
Ferrous sulfate	t	0	0.1	0	1.5	1.15
Trisodium phosphate	t	6.09	6.96	10	12.2	6.43
Lime	t	6,202	445	500	614	349
Ferric chloride	t	240	294	411	484	430
Polyectrolyte	t	18	8.85	13.7	20.6	21.8
Sulfuric & hydrochloric acids	t	2,035	1,156	2,334	2,064	1,699
Caustic soda	t	995	629	966	1,057	843
Lubricating oil	t	3,288	5,398	5,556	5,090	4,983
Dielectric oil	t	164	321	286	24,703	227
Printing paper	t	17.6	14.9	59.9	69.5	55.1
Other	t	5,670	17,560	14,589	3,435	2,957
Total	**t**	**374,527**	**224,284**	**717,677**	**584,377**	**392,116**
for thermal generation	t	367,401	219,315	713,104	554,787	387,684
for thermal generation combined with heat generation (CHP)	t	30	15.3	0	24.8	0
for nuclear generation	t	1,047	1,108	1,403	1,713	1,200
for hydro generation	t	98.6	158	200	170	104
for wind generation	t	52.1	19.6	14	49.5	0
for fuel storage & handling	t	711	169	186	208	362
for electricity distribution	t	103	201	146	24,589	165
EN1 **PCB survey**						
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding oil)	t	997	46	1.33	1.66	1.71
Oil with PCBs > 500 ppm contained in equipment & transformers	t	309	4.92	0.34	0.51	0.73
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding oil)	t	6,100	7,447	6,645	7,229	7,365
Oil with PCBs > 50 ppm and ≤ 500 ppm contained in equipment & transformers	t	1,307	2,791	2,062	2,760	2,498

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	**million kWh**	**37,446**	**29,182**	**42,251**	**42,247**	**32,953**
fuel oil & gas oil	*million kWh*	*11,291*	*11,597*	*11,143*	*9,918*	*9,047*
natural gas	*million kWh*	*6,569*	*3,904*	*4,945*	*3,842*	*2,409*
of which in combined-cycle units	million kWh	6,292	3,815	4,446	3,647	1,887
coal	*million kWh*	*17,704*	*12,523*	*22,484*	*25,720*	*19,323*
brown coal	*million kWh*	*1,783*	*983*	*3,563*	*2,687*	*2,123*
combined with heat generation	million kwh	98.9	175	117	80	49.3
fuel oil & gas oil	*million kWh*	*72.8*	*0*	*0*	*0*	*0*
natural gas	*million kWh*	*26.1*	*175*	*117*	*80*	*49.3*
From renewables	**million kWh**	**10,268**	**10,520**	**8,455**	**8,291**	**12,597**
biomass	million kWh	127	84.8	94.6	113	114
hydro from natural flows	million kWh	7,995	8,212	5,479	4,693	8,406
wind	million kWh	2,123	2,202	2,857	3,459	4,051
solar (photovoltaic)	million kWh	21.9	21.1	25.3	26.2	26.7
Hydro from pumped storage	**million kWh**	**998**	**1,162**	**833**	**767**	**1,251**

		2009	2010	2011	2012	2013
Nuclear (simple)	million kWh	22,630	27,620	25,177	26,967	25,967
Total	million kWh	71,341	68,483	76,716	78,272	72,768
simple	million kWh	71,242	68,308	76,600	78,192	72,719
combined with heat generation	million kWh	98.9	175	117	80	49.3
Electricity consumption for pumping	million kWh	1,409	1,592	1,295	1,398	1,407
Useful heat output (combined with power generation)						
In thermal power plants	million kcal	77,442	9,124	169,192	126,273	143,013
Fossil fuels	million kcal	77,442	9,124	169,192	126,273	143,013
	million kWh	90.1	10.6	197	147	166
Electricity distribution						
Electricity distributed	million kWh	104,938	103,943	101,789	101,408	98,456
EN4 Electricity consumption for grid operation	million kWh	14.6	0	0.818	0.888	3.98
Natural-gas distribution						
Natural gas distributed	million m^3	442	0	0	0	0
Mining & extracting activities						
Mining						
Fuel extracted in the year	million t	1.9	1.84	1.01	0.926	0.804
Areas restored in the year (geomorphology, hydrogeology and landscape)						
Areas revegetated with plant, shrub and tree species	ha	23.1	0	283	268	122
Areas occupied by water bodies	ha	234	0	74	8	8.56
Areas occupied by infrastructure (roads, canals, aqueducts, power lines)	ha	0	0	0	45	0
Areas restored since the start of activities (geomorphology, hydrogeology and landscape)						
Areas revegetated with plant, shrub and tree species	ha	2,287	2,063	2,502	2,709	2,808
Areas of high landscape-cultural value	ha	132	132	139	139	139
Areas occupied by water bodies	ha	509	509	892	957	1,012
Areas occupied by infrastructure (roads, canals, aqueducts, power lines)	ha	97.9	90.1	93	138	138
Areas awaiting final restoration	ha	271	207	121	109	96.6

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	64.2	45.3	78.8	79.4	66.1
EN20 NO_x	thermal generation	thousand t	111	76.8	105	110	85.7
EN20 Particulates	thermal generation	thousand t	3.02	1.74	2.97	3.28	2.63
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	29,778	23,141	34,228	35,851	27,951
	fossil-fired thermal generation (from desulfurization)	thousand t	125	69.5	239	195	138
	Total from thermal generation	thousand t	29,903	23,210	34,467	36,046	28,089
	Total fossil-fired thermal generation - CHP (from combustion)	thousand t	85.7	29	72.4	89.6	68.4
	various activities	thousand t	74.7	51.8	26.3	30.2	13.7
	Total	**thousand t**	**30,063**	**23,291**	**34,566**	**36,166**	**28,171**

	Source		2009	2010	2011	2012	2013
EN16 SF_6	electricity generation	kg	47.7	111	99.8	594	205
	electricity distribution	kg	196	139	158	402	284
	Total	**kg**	**244**	**249**	**258**	**995**	**488**
EN16 CH_4	gas distribution, mining & extracting activities	thousand t	1.57	1.52	0.837	0.744	0.646
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**30,108**	**23,335**	**34,593**	**36,207**	**28,199**
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	6,380	6,552	4,472	4,001	7,151
Due to wind and solar power generation		thousand t	1,712	1,773	2,352	2,971	3,469
Due to generation from biomass		thousand t	102	67.6	77.2	96.2	96.8
Due to generation from renewables		thousand t	8,193	8,393	6,901	7,068	10,717
Due to nuclear generation (simple and CHP)		thousand t	18,058	22,035	20,549	22,991	22,092
EN20 **Radioactive emissions into the atmosphere**							
Noble gases	nuclear generation	TBq	24	15.2	40.7	72.6	40.2
Iodine 131	nuclear generation	MBq	258	88.8	31.3	106	32.5
Aerosols β and γ	nuclear generation	MBq	18,401	6,567	5,976	2,534	132
Aerosol α	nuclear generation	kBq	63.7	31.4	39.2	28.8	33.9
Strontium 89 and 90	nuclear generation	kBq	8,482	2,896	1,838	869	176
EN21 **Waste waters (discharged quantity)**							
	thermal generation	million m^3	28.8	23	24.2	32.6	40.9
	nuclear generation	million m^3	158	158	190	1.74	1.62
	Total from electricity generation	million m^3	187	181	215	34.3	42.5
	Fuel storage & handling	million m^3	0	0.013	0.027	0.042	0.122
	Total	**million m^3**	**187**	**181**	**215**	**34.4**	**42.7**
EN21 **Conventional polluting load of waste waters discharged by plants**							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	58,684	68,367	2,823	4,273	25,207
	in some plants with an overall capacity of	MW	4,622	4,344	5,118	4,785	7,743
	nuclear generation	kg	70.3	104	15.2	249	230
	on an overall capacity of	MW	3,522	3,514	3,527	3,535	3,556
	Total from electricity generation	kg	58,754	68,471	2,838	4,521	25,436
	Fuel storage & handling	kg	0	0	11.1	21.3	64.6
	Total	**kg**	**58,754**	**68,471**	**2,849**	**4,542**	**25,501**
Total nitrogen (expressed as N)	thermal generation	kg	221,409	284,571	38,248	520,851	14,983
	in some plants with an overall capacity of	MW	1,588	5,265	4,574	5,309	6,699
	nuclear generation	kg	17,612	5,888	10,664	10,293	9,088
	on an overall capacity of	MW	3,522	3,514	3,527	3,535	3,556
	Total electricity generation	kg	239,021	290,459	48,912	531,144	24,070
	Fuel storage & handling	kg	0	0	31.3	72.9	553
	Total	**kg**	**239,021**	**290,459**	**48,943**	**531,217**	**24,623**

	Source		2009	2010	2011	2012	2013
Total phosphorus (expressed as P)	thermal generation	kg	10,028	19,028	10,008	38,228	8,543
	in some plants with an overall capacity of	MW	488	3,593	5,570	7,010	5,711
	nuclear generation	kg	118	1,189	1,152	1,085	712
	on an overall capacity of	MW	3,522	3,514	3,527	3,535	3,556
	Total electricity generation	kg	10,146	20,217	11,160	39,313	9,255
	Fuel storage & handling	kg	0	0	19.7	81.9	131
	Total	**kg**	**10,146**	**20,217**	**11,179**	**39,395**	**9,386**
COD	thermal generation	kg	77,778	16,365	7,061	4,406	8,646
	in some plants with an overall capacity of	MW	2,705	4,094	1,792	2,073	2,490
	nuclear generation	kg	2,714	24,125	29,400	25,773	37,227
	on an overall capacity of	MW	3,522	3,514	3,527	3,535	3,556
	Total electricity generation	kg	80,492	40,491	36,461	30,179	45,873
	Fuel storage & handling	kg	265	0	7,376	13,903	34,791
	Total	**kg**	**80,757**	**40,491**	**43,837**	**44,082**	**80,664**
BOD	thermal generation	kg	4,912	2,783	750,856	100,851	2,217
	in some plants with an overall capacity of	MW	1,096	2,076	1,646	1,784	1,738
	nuclear generation	kg	1,792	4,623	7,986	4,624	4,369
	on an overall capacity of	MW	3,522	3,514	3,527	3,535	3,556
	Total electricity generation	kg	6,704	7,406	758,842	105,474	6,586
	Fuel storage & handling	kg	114	0	2,482	3,839	10,766
	Total	**kg**	**6,818**	**7,406**	**761,324**	**109,313**	**17,352**
EN21 **Radionuclides in waste waters discharged by plants**							
Tritium	nuclear generation	GBq	57,746	71,013	78,993	112,192	48,943
Corrosion and fission products	nuclear generation	GBq	21.7	9.82	19	22.8	18.1
EN22 **Non-hazardous special waste**							
Coal bottom ash	fossil-fired thermal generation (simple and CHP)						
production		t	133,769	77,428	243,908	211,560	171,326
delivery to recovery operators		t	8,556	7,376	100,688	71,903	24,034
Coal flyash	thermal generation combined with heat generation						
production		t	1,050,321	601,802	1,773,881	1,778,064	1,186,897
delivery to recovery operators		t	860,169	438,567	808,927	511,699	527,715
Oil bottom ash	thermal generation combined with heat generation						
production		t	0	1.84	0	0	0
delivery to recovery operators		t	0	1.84	0	0	0
Other non-hazardous ash	thermal generation combined with heat generation						
production		t	3,508	6,352	6,310	6,235	6,319
delivery to recovery operators		t	0	0	6,310	0	6,319

	Source		2009	2010	2011	2012	**2013**
Gypsum from desulfurization	thermal generation combined with heat generation						
production		t	727,750	436,838	1,399,006	1,162,566	793,464
delivery to recovery operators		t	9,549	36,661	54,099	55,683	31,890
Other							
production	electricity generation	t	203,426	19,457	25,940	22,590	64,227
	electricity distribution	t	115,842	79,110	67,996	36,046	37,342
	various activities	t	1,619	1,059	363	1,477	27,549
	Total	**t**	**320,887**	**99,626**	**94,299**	**60,113**	**129,118**
delivery to recovery operators	electricity generation	t	2,062	18,554	12,833	7,073	34,956
	electricity distribution	t	7,355	21,613	67,996	32,070	28,973
	various activities	t	1,360	878	363	1,382	27,355
	Total	**t**	**10,777**	**41,045**	**81,192**	**40,525**	**91,284**
Total							
production	**electricity generation**	**t**	**2,118,774**	**1,141,878**	**3,449,045**	**3,181,015**	**2,222,232**
	electricity distribution	**t**	**115,842**	**79,110**	**67,996**	**36,046**	**37,342**
	various activities	**t**	**1,619**	**1,059**	**363**	**1,477**	**27,549**
	Total	**t**	**2,236,235**	**1,222,047**	**3,517,403**	**3,218,538**	**2,287,123**
delivery to recovery operators	**electricity generation**	**t**	**880,335**	**501,160**	**982,856**	**646,357**	**624,914**
	electricity distribution	**t**	**7,355**	**21,613**	**67,996**	**32,070**	**28,973**
	various activities	**t**	**1,360**	**878**	**363**	**1,382**	**27,355**
	Total	**t**	**889,051**	**523,651**	**1,051,215**	**679,809**	**681,242**
EN22 **Hazardous special waste**							
Oil flyash	thermal generation combined with heat generation						
production		t	753	909	1,225	1,129	1,118
delivery to recovery operators		t	753	909	1,012	0	0
Other ash	thermal generation combined with heat generation						
production		t	0.19	0.3	0.6	0	0
delivery to recovery operators		t	0.19	0	0	0	0
Other							
production	electricity generation	t	9,124	6,164	9,027	9,497	11,799
	electricity distribution	t	4,865	5,593	4,891	2,970	4,211
	various activities	t	317	110	136	74.9	69.1
	Total	**t**	**14,306**	**11,867**	**14,054**	**12,542**	**16,079**
	of which with PCBs electricity generation	*t*	*7*	*2.28*	*1.89*	*0.25*	*2.24*
	electricity distribution	*t*	*17.9*	*18.9*	*473*	*6.01*	*0.4*
	various activities	*t*	*2.2*	*1.07*	*2.74*	*1.66*	*3.75*
	Total	***t***	***27.1***	***22.3***	***478***	***7.92***	***6.39***
delivery to recovery operators	electricity generation	t	2,776	6,026	8,040	3,598	3,595
	electricity distribution	t	4,382	5,331	4,891	2,532	2,520
	various activities	t	310	13.5	124	16.3	25.3
	Total	**t**	**7,469**	**11,371**	**13,054**	**6,147**	**6,140**
	of which with PCBs electricity generation	*t*	*7*	*2.28*	*1.03*	*0.353*	*2.24*
	electricity distribution	*t*	*17.9*	*0*	*473*	*20.7*	*0.4*
	various activities	*t*	*0*	*0.574*	*2.74*	*1.44*	*2.7*
	Total	***t***	***24.9***	***2.86***	***477***	***22.5***	***5.34***

	Source		2009	2010	2011	2012	2013
Total							
production	electricity generation	t	9,878	7,073	10,253	10,627	12,917
	electricity distribution	t	4,865	5,593	4,891	2,970	4,211
	various activities	t	317	110	136	74.9	69.1
	Total	t	15,060	12,776	15,280	13,671	17,197
delivery to recovery operators	electricity generation	t	3,530	6,935	9,052	3,598	3,595
	electricity distribution	t	4,382	5,331	4,891	2,532	2,520
	various activities	t	310	13.5	124	16.3	25.3
	Total	t	8,223	12,279	14,066	6,147	6,140
EN22 Total special waste							
production	electricity generation	t	2,128,652	1,148,951	3,459,298	3,191,642	2,235,148
	electricity distribution	t	120,707	84,704	72,887	39,015	41,553
	various activities	t	1,936	1,169	499	1,552	27,618
	Total	**t**	**2,251,295**	**1,234,823**	**3,532,683**	**3,232,209**	**2,304,320**
delivery to recovery operators	electricity generation	t	883,866	508,095	991,908	649,955	628,509
	electricity distribution	t	11,738	26,944	72,887	34,602	31,492
	various activities	t	1,670	892	487	1,399	27,380
	Total	**t**	**897,273**	**535,930**	**1,065,281**	**685,955**	**687,382**
EN22 Radioactive waste							
Low-, intermediate- and high-level radioactive waste stored inside plants	nuclear generation						
	liquid	m^3	58.5	32.1	33.8	34.8	37
	solid	m^3	2,953	1,528	1,449	1,529	1,503
Low- and intermediate-level: production	nuclear generation						
	liquid	m^3	0	0	0	0.56	9.6
	solid	m^3	220	238	289	482	197
	of which fraction not storable in off-site surface or subsurface sites	*m^3*	*0*	*33.4*	*32.3*	*45.1*	*40.8*
High-level: production	nuclear generation						
	solid	m^3	22.1	4.62	8.81	23.9	0
	solid	t	0	10.2	10.2	56.2	64.5

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN29 Land								
LV cable lines								
overhead	% of entire LV grid	21.7	38.1	44.6	44.4	44.8	106.5	0.9
underground	% of entire LV grid	46.2	47.3	47.8	48.3	48	3.9	-0.6
Total	**% of entire LV grid**	**67.9**	**85.4**	**92.3**	**92.7**	**92.8**	**36.7**	**0.1**
MV cable lines								
overhead	% of entire MV grid	1.11	1.11	0	0	0	-100	0
underground	% of entire MV grid	31.6	32.4	33	33.6	34	7.6	1.2
Total	**% of entire MV grid**	**32.7**	**33.6**	**33**	**33.6**	**34**	**4**	**1.2**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	50.4	61.1	65.2	65.6	66.1	31.2	0.8

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation	kcal/kWh	2,253	2,280	2,244	2,288	2,303	2.2	0.7
EN1EN3 Net specific energy input of thermal power generation (CHP)	kcal/kWh	1,598	1,298	859	1,337	1,226	-23.3	-8.3
EN1EN3 Net efficiency of hydro generation from pumped storage	%	70.8	73	64.3	54.8	88.9	25.6	62.2
EN4 Consumption of electricity for distribution grid operation	% of electricity distributed	0.014	0	0.001	0.001	0.004	-71.4	300
EN8 Net specific consumption of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	0.974	0.861	1.17	1.12	1.21	24.2	8
excluding contribution of as-is sea water	liters/kWh	0.901	0.771	1.11	1.12	1.21	34.3	8
EN8 Net specific consumption of water for industrial uses in thermal generation (CHP)	liters/kWh	0	0	0	0.82	1.56	0	90.2
EN8 Net specific consumption of water for industrial uses in nuclear generation	liters/kWh	0.065	0.051	0.072	0.072	0.652	903.1	805.6
Total net specific consumption of water for industrial uses	liters/kWh	0.532	0.387	0.664	0.632	0.783	47.2	23.9
EN8 Coverage of requirements of water for industrial uses								
From rivers (including second-flush rainwater)	% of requirements	77.1	69.5	83.9	88.8	90.3	17.1	1.7
From wells	% of requirements	0.163	0.184	0.111	0.097	0.662	306.1	582.5
From aqueducts	% of requirements	2.38	1.6	0.739	1.41	0.986	-58.6	-30.1
Total from inland waters	**% of requirements**	**79.6**	**71.3**	**84.8**	**90.3**	**92**	**15.6**	**1.9**
From the sea (as-is)	% of requirements	6.64	8.91	4.81	0.006	0.003	-100	-50
From the sea (desalinated)	% of requirements	6.2	9.77	6.45	5.44	4.72	-23.9	-13.2
EN10 from waste waters (used inside plants)	% of requirements	0.019	0.095	0.028	0.012	0.015	-21.1	25
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	19.5	23.7	14.8	15.1	17.4	-10.8	15.2
gas oil	% of total fuel consumption	12.8	16	9.77	8.35	9.96	-22.2	19.3
natural gas	% of total fuel consumption	13.1	10.9	10.8	7.67	6.88	-47.5	-10.3
coal	% of total fuel consumption	50.3	45.7	55.6	62.3	59	17.3	-5.3
brown coal	% of total fuel consumption	4.38	3.73	9.03	6.6	6.8	55.3	3
LS fuel oil	% of total fuel-oil consumption	100	99.4	99.6	99.8	99.8	-0.2	0
VLS fuel oil	% of total fuel-oil consumption	0.014	0.597	0.441	0.203	0.168	1,100	-17.2
natural gas, technologically captive use	% of total natural-gas consumption	91.9	93	99.1	96.3	89.2	-2.9	-7.4
of which in combined-cycle units	*% of total natural-gas consumption*	*91.9*	*93*	*99*	*92.4*	*74.5*	*-18.9*	*-19.4*
natural gas, non-technologically captive use	% of total natural-gas consumption	8.14	6.97	0.937	3.74	10.8	32.7	188.8
Electricity generation from renewables								
thermal from biomass	% of total generation	0.179	0.124	0.123	0.144	0.156	-12.8	8.3
hydro from natural flows	% of total generation	11.2	12	7.14	6	11.6	3.6	93.3
wind and solar (photovoltaic)	% of total generation	3.01	3.25	3.76	4.45	5.6	86	25.8
Total	**% of total generation**	**14.4**	**15.4**	**11**	**10.6**	**17.3**	**20.1**	**63.2**

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Specific emissions into the atmosphere								
EN20 SO_2 (simple thermal generation)	g/kWh thermal net	1.71	1.56	1.87	1.88	2	17	6.4
EN20 NO_x (simple thermal generation)	g/kWh thermal net	2.97	2.64	2.48	2.61	2.59	-12.8	-0.8
EN20 Particulates (simple thermal generation)	g/kWh thermal net	0.081	0.06	0.07	0.077	0.08	-1.2	3.9
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	798	798	816	853	851	6.6	-0.2
EN20 NO_x (thermal generation - CHP)	g/kWh thermal net	0	0	0	0	0.26	-	-
EN16 CO_2 (thermal generation - CHP)	g/kWh thermal net	453	156	231	395	317	-30	-19.7
EN20 SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	0.899	0.661	1.03	1.01	0.907	0.9	-10.2
EN20 NO_x (total from thermal generation - simple and CHP)	g/kWh total net	1.56	1.12	1.36	1.41	1.18	-24.4	-16.3
EN20 Particulates (total from thermal generation - simple and CHP)	g/kWh total net	0.042	0.025	0.039	0.042	0.036	-14.3	-14.3
EN16 CO_2 (total from thermal generation - simple and CHP)	g/kWh total net	420	339	449	461	386	-8.1	-16.3
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.051	0.271	0.144	0.38	0.178	249	-53.2
EN20 **Specific radioactive emissions into the atmosphere**								
Nuclear generation								
Noble gases	kBq/kWh	1	1	2	3	2	100	-33.3
Iodine 131	kBq/kWh	11	3	1	4	1	-90.9	-75
Aerosols β and γ	mBq/kWh	813	238	237	94	5	-99.4	-94.7
Aerosol α	µBq/kWh	3	1	2	1	1	-66.7	0
Strontium 89 and 90	µBq/kWh	375	105	73	32	7	-98.1	-78.1
Net specific conventional polluting load of waste waters discharged by plants (thermal generation)								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net	4.18	6.19	0.151	0.25	1.25	-70.1	400
Total nitrogen (expressed as N)	mg/kWh thermal net	34.7	26.3	2.63	31.2	0.938	-97.3	-97
Total phosphorus (expressed as P)	mg/kWh thermal net	7.73	1.8	0.463	1.78	0.601	-92.2	-66.2
COD	mg/kWh thermal net	9.62	2.2	2.14	1.32	2.52	-73.8	90.9
BOD	mg/kWh thermal net	1.82	1.09	207	31.4	1.84	1.1	-94.1
EN21 **Net specific conventional polluting load of waste waters discharged by plants (nuclear generation)**								
Metals and compounds (expressed as metal equivalents)	mg/kWh	0.003	0.004	0.001	0.009	0.009	200	0
Total nitrogen (expressed as N)	mg/kWh	0.778	0.213	0.424	0.382	0.35	-55	-8.4
Total phosphorus (expressed as P)	mg/kWh	0.005	0.043	0.046	0.04	0.027	440	-32.5
COD	mg/kWh	0.12	0.873	1.17	0.956	1.43	1,091.7	49.6
BOD	mg/kWh	0.079	0.167	0.317	0.171	0.168	112.7	-1.8
EN21 **Net specific polluting load of radionuclides in waste waters (nuclear generation - CHP)**								
Nuclear generation								
Tritium	kBq/kWh	2.55	2.57	3.14	4.16	1.89	-25.9	-54.6
EN22 **Specific waste production**								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	60.8	50.3	77.5	70	63.3	4.1	-9.6

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Oil flyash (thermal generation)	g/kWh net from fuel oil & gas oil	0.067	0.078	0.11	0.114	0.124	85.1	8.8
Oil bottom ash (thermal generation)	g/kWh net from fuel oil & gas oil	0.067	0.079	0.11	0.114	0.124	85.1	8.8
EN22 **Specific production of radioactive waste**								
Low- and intermediate-level								
liquid	mm^3/kWh net	0	0	0	0.021	0.37	0	1,661.9
	mm^3/kWh	9.7	8.62	11.5	17.9	7.6	-21.6	-57.5
High-level								
solid	mg/kWh net	0	0.37	0.406	2.08	2.48	0	19.2
	mm^3/kWh	0.975	0.167	0.35	0.887	0	-100	0
EN22 **Low-, intermediate- and high-level radioactive waste stored inside plants**								
liquid	% in volume of production since the start of operation	89.7	57.1	54.9	56.1	57.6	-35.8	2.7
	% in volume of production since the start of operation	69.9	27.1	25.1	25.9	25.3	-63.8	-2.3
EN22 **Waste recovery**								
Coal and brown-coal ash	% of production	73.4	65.7	45.1	29.3	40.6	-44.7	38.6
bottom ash	*% of production*	*6.4*	*9.53*	*41.3*	*34*	*14*	*118.8*	*-58.8*
flyash	*% of production*	*81.9*	*72.9*	*45.6*	*28.8*	*44.5*	*-45.7*	*54.5*
Gypsum from desulfurization	% of production	1.31	8.39	3.87	4.79	4.02	206.9	-16.1
Other non-hazardous special waste								
electricity generation	% of production	1.01	95.4	49.5	31.3	54.4	5,286.1	73.8
electricity distribution	% of production	6.35	27.3	100	89	77.6	1,122	-12.8
fuel storage & handling	% of production	0	67.1	100	85.5	98.7	0	15.4
Total	**% of production**	**3.36**	**41.2**	**86.1**	**67.4**	**70.7**	**2,004.2**	**4.9**
Total non-hazardous special waste								
electricity generation	% of production	41.5	43.9	28.5	20.3	28.1	-32.3	38.4
electricity distribution	% of production	6.35	27.3	100	89	77.6	1,122	-12.8
fuel storage & handling	% of production	0	67.1	100	85.5	98.7	0	15.4
Total	**% of production**	**39.8**	**42.9**	**29.9**	**21.1**	**29.8**	**-25.1**	**41.2**
Oil flyash	% of production	100	100	82.6	0	0	-100	0
Other hazardous special waste								
electricity generation	% of production	30.4	97.8	89.1	37.9	30.5	0.3	-19.5
electricity distribution	% of production	90.1	95.3	100	85.3	59.8	-33.6	-29.9
fuel storage & handling	% of production	0	72.8	99.3	73.4	53.3	0	-27.4
Total	**% of production**	**52.2**	**95.8**	**92.9**	**49**	**38.2**	**-26.8**	**-22**
Total hazardous special waste								
electricity generation	% of production	35.7	98.1	88.3	33.9	27.8	-22.1	-18
electricity distribution	% of production	90.1	95.3	100	85.3	59.8	-33.6	-29.9
fuel storage & handling	% of production	0	72.8	99.3	73.4	53.3	0	-27.4
Total	**% of production**	**54.6**	**96.1**	**92.1**	**45**	**35.7**	**-34.6**	**-20.7**
Total special waste								
electricity generation	% of production	41.5	44.2	28.7	20.4	28.1	-32.3	37.7
electricity distribution	% of production	9.72	31.8	100	88.7	75.8	679.8	-14.5
fuel storage & handling	% of production	0	67.5	100	85.4	98.3	0	15.1
Total	**% of production**	**39.9**	**43.4**	**30.2**	**21.2**	**29.8**	**-25.3**	**40.6**

North America

Canada

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	1	1	1	2	2
wind	no.	1	1	1	2	2
Net maximum electrical capacity	MW	27	27	27	103	103
Combined heat & power installations						
Power plants	no.	1	1	1	1	0
thermal	no.	1	1	1	1	0
Net maximum electrical capacity	MW	21.4	21.4	21.4	21.4	0
Useful thermal capacity	million kcal/h	5.78	5.68	5.68	5.68	0

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Biomass and waste**						
Thermal generation combined with heat generation						
Solid biomass	t	402,877	402,568	354,242	322,340	0
	toe	89,720	89,651	78,230	71,185	0
	TJ	3,756	3,754	3,275	2,980	0
EN8 **Water for industrial uses**						
From aqueducts	million m^3	0.621	0.765	0.706	0.68	0
for thermal generation combined with heat generation (CHP)	million m^3	0.621	0.765	0.706	0.68	0
EN1 **Expendables**						
Sodium hypochlorite	t	10.1	10.2	9.95	8.43	0
Sulfuric & hydrochloric acids	t	5.1	0	0	6.8	0
Lubricating oil	t	2.23	2.38	3.2	3.6	0.001
Dielectric oil	t	0	0.171	14.3	0.171	0.33
Total	t	17.5	12.7	27.5	19	0.331
for thermal generation combined with heat generation (CHP)	t	17.5	12.5	13.1	18.8	0
for wind generation	t	0	0.171	14.3	0.172	0.331

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From renewables	million kWh	251	281	285	394	313
biomass	million kWh	149	182	175	175	0
combined with heat generation	million kWh	149	182	175	175	0
wind	million kWh	102	99	110	219	313
Total	million kWh	251	281	285	394	313
simple	million kWh	102	99	110	219	313
combined with heat generation	million kWh	149	182	175	175	0
Useful heat output (combined with power generation)						
In thermal power plants	million kcal	23,042	32,524	29,117	32,620	0
	million kWh	26.8	37.8	33.9	37.9	0

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 SO_2	thermal generation combined with heat generation	thousand t	0.002	0	0.011	0	0
	Total	thousand t	0.002	0	0.011	0	0
EN20 NO_x	thermal generation combined with heat generation	thousand t	0.087	0.076	0.145	0.129	0
	Total	thousand t	0.087	0.076	0.145	0.129	0
EN20 Particulates	thermal generation combined with heat generation	thousand t	0.04	0.032	0.016	0.068	0
	Total	thousand t	0.04	0.032	0.016	0.068	0
EN16 CO_2	various activities	thousand t	0	0	0	0.01	0
	Total	thousand t	0	0	0	0.01	0
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		thousand t of CO_2 equivalent	0	0	0	0.01	0
EN18 **Avoided CO_2 emissions**							
Due to wind generation		thousand t	72.9	70.7	78.5	142	203
Due to generation from biomass		thousand t	107	130	125	114	0
Due to generation from renewables		thousand t	179	200	203	256	203
EN21 **Waste waters (discharged quantity)**							
	thermal generation combined with heat generation	million m^3	0.116	0.105	0.063	0	0
EN21 **Conventional polluting load of waste waters discharged by plants**							
Total nitrogen (expressed as N)	thermal generation combined with heat generation	kg	0	0	0	276	0
	in some plants with an overall capacity of	MW	0	0	0	21.4	0

	Source		2009	2010	2011	2012	2013
Total phosphorus (expressed as P)	thermal generation combined with heat generation	kg	0	0	75	21.5	0
	in some plants with an overall capacity of	MW	0	0	21.4	21.4	0
COD	thermal generation combined with heat generation	kg	439	4,331	0	244	0
	in some plants with an overall capacity of	MW	21.4	21.4	0	21.4	0
BOD	thermal generation combined with heat generation	kg	1,109	4,178	0	1,378	0
	in some plants with an overall capacity of	MW	21.4	21.4	0	21.4	0
EN22 Non-hazardous special waste							
Biomass ash bottom ash	fossil-fired thermal generation (simple and CHP)						
production		t	14,129	10,100	7,070	3,966	0
delivery to recovery operators		t	14,129	10,100	7,070	3,966	0
Biomass ash flyash	thermal generation combined with heat generation						
production		t	24,023	22,592	18,635	16,422	0
delivery to recovery operators		t	24,023	22,592	18,635	16,422	0
Other							
production	electricity generation	t	0	191	181	285	2.6
delivery to recovery operators	electricity generation	t	0	50.7	55.5	263	1.85
Total							
production	**electricity generation**	**t**	**38,152**	**32,882**	**25,886**	**20,673**	**2.6**
delivery to recovery operators	**electricity generation**	**t**	**38,152**	**32,742**	**25,760**	**20,651**	**1.85**
EN22 Hazardous special waste							
production	electricity generation	t	0.408	3.57	3.17	2.93	0
delivery to recovery operators	electricity generation	t	0.408	2.55	2.14	2.93	0
Total							
production	**electricity generation**	**t**	**0.408**	**3.57**	**3.17**	**2.93**	**0**
delivery to recovery operators	**electricity generation**	**t**	**0.408**	**2.55**	**2.14**	**2.93**	**0**
EN22 Total special waste							
production	electricity generation	t	38,153	32,886	25,889	20,676	2.6
delivery to recovery operators	electricity generation	t	38,153	32,745	25,763	20,654	1.85

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation (CHP)	kcal/kWh	5,093	4,084	3,751	3,345	0	-100	0
EN8 Net specific consumption of water for industrial uses in thermal generation (CHP)	liters/kWh	3.53	3.49	3.39	3.2	0	-100	0
Total net specific consumption of water for industrial uses	liters/kWh	2.23	2.4	2.22	1.58	0	-100	0
EN8 Coverage of requirements of water for industrial uses								
From aqueducts	% of requirements	100	100	100	100	0	-100	0
Electricity generation from renewables								
thermal from biomass and biodegradable fraction of waste	% of total generation	59.4	64.7	61.4	44.4	0	-100	0
wind	% of total generation	40.6	35.3	38.6	55.6	100	146.3	79.9
Total	% of total generation	100	100	100	100	100	0	0
Specific emissions into the atmosphere								
EN20 SO_2 (thermal generation - CHP)	g/kWh thermal net	0.011	0	0.053	0	0	-100	0
EN20 NO_x (thermal generation - CHP)	g/kWh thermal net	0.494	0.346	0.695	0.606	0	-100	0
EN20 Particulates (thermal generation - CHP)	g/kWh thermal net	0.227	0.146	0.077	0.32	0	-100	0
EN20 SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	0.007	0	0.035	0	0	-100	0
EN20 NO_x (total from thermal generation - simple and CHP)	g/kWh total net	0.313	0.239	0.455	0.299	0	-100	0
EN20 Particulates (total from thermal generation - simple and CHP)	g/kWh total net	0.144	0.1	0.05	0.158	0	-100	0
Net specific conventional polluting load of waste waters discharged by plants (thermal generation - CHP)								
Total nitrogen (expressed as N)	mg/kWh	0	0	0	1.3	0	0	0
Total phosphorus (expressed as P)	mg/kWh	0	0	0.36	0.101	0	0	0
COD	mg/kWh	2.49	19.7	0	1.15	0	-100	0
BOD	mg/kWh	6.3	19	0	6.47	0	-100	0
EN22 **Waste recovery**								
Biomass ash	% of production	100	100	100	100	0	-100	0
bottom ash	*% of production*	*100*	*100*	*100*	*100*	*0*	*-100*	*0*
flyash	*% of production*	*100*	*100*	*100*	*100*	*0*	*-100*	*0*
Other non-hazardous special waste								
electricity generation	% of production		26.5	30.6	92.1	71.2		-22.7
Total non-hazardous special waste								
electricity generation	% of production	100	99.6	99.5	99.9	71.2	-28.8	-28.7
Other hazardous special waste								
electricity generation	% of production	100	71.4	67.5	100	0	-100	-100
Total special waste								
electricity generation	% of production	100	99.6	99.5	99.9	71.2	-28.8	-28.7

United States

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	88	88	89	91	96
hydro	no.	65	65	65	66	67
geothermal	no.	2	2	2	2	3
wind	no.	21	21	21	22	24
solar (photovoltaic)	no.	0	0	1	1	2
Net maximum electrical capacity	MW	740	740	962	1,115	1,580
hydro	MW	314	314	313	313	318
geothermal	MW	46.5	46.5	46.5	46.5	71.5
wind	MW	379	379	578	728	1,162
solar (photovoltaic)	MW	0	0	24	26.4	28.8
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	0	0	0	104	111
special vehicles	no.	0	0	0	123	188
Gross real-estate surface area	thousand m^2	0	0	0	4.9	4.9

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Various activities	thousand toe	0	0	0	0	0.111
	TJ	0	0	0	0	4.65
EN1 EN3 **Geothermal fluid**						
Total fluid extracted	thousand t	29,597	45,473	43,922	44,048	42,454
Used for electricity generation	thousand t	29,597	45,473	43,922	44,048	42,454
EN8 **Water for industrial uses**						
From wells	million m^3	0.136	0	0	0	0.001
From aqueducts	million m^3	0.006	0	0	0	0
Total abstraction from inland waters (for geothermal drilling)	million m^3	0.142	0	0	0	0.001
EN1 **Expendables**						
Sulfuric & hydrochloric acids	t	22	0	0	0	0
Caustic soda	t	0.4	0	0	0	0
Bentonite	t	380	0	0	0	0

		2009	2010	2011	2012	2013
Barite	t	260	0	0	0	0
Geothermal cement	t	1,230	0	0	0	0
Lubricating oil	t	8.01	8.91	7.32	350	358
Dielectric oil	t	0	0.05	0.903	0.903	214
Printing paper	t	0	0	0	0	0.808
Other	t	0.115	2.59	0.022	144	0.297
Total	**t**	**1,901**	**11.6**	**8.24**	**495**	**573**
for hydro generation	t	7.47	10.6	8.24	10.6	6.74
for geothermal activities	t	1,892	0	0	0	0
for wind generation	t	0.653	1	0	484	566

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From renewables	million kWh	2,172	2,366	2,637	3,506	4,913
geothermal	million kWh	150	248	268	257	280
hydro from natural flows	million kWh	997	919	1,069	933	1,060
wind	million kWh	1,025	1,198	1,299	2,273	3,529
solar (photovoltaic)	million kWh	0	0	0	42.4	44.6
Geothermal drilling						
Extent	m	12,992	0	152	0	0

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN16 CO_2	various activities	thousand t	0	0	0	0.074	0.998
EN16 SF_6	electricity generation	kg	1.46	1.45	0	0.9	0
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**0.033**	**0.033**	**0**	**0.095**	**0.998**
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	877	809	941	667	706
Due to geothermal generation		thousand t	132	218	236	184	187
Due to wind and solar generation		thousand t	902	1,054	1,143	1,654	2,382
Due to generation from renewables		thousand t	1,911	2,082	2,320	2,505	3,276
EN22 **Non-hazardous special waste**							
production	electricity generation & geothermal drilling	t	5.01	442	552	1,168	5,500
delivery to recovery operators	electricity generation & geothermal drilling	t	5.01	442	550	543	5,416

	Source		2009	2010	2011	2012	2013
EN22 Hazardous special waste							
production	electricity generation & geothermal drilling	t	17.8	47.4	15.8	1,265	1,415
	of which with PCBs						
	electricity generation & geothermal drilling	t	0	0	0	122	0
delivery to recovery operators	electricity generation & geothermal drilling	t	18.2	44.2	10.2	144	719
	of which with PCBs						
	electricity generation & geothermal drilling	t	0	0	0	122	0
EN22 Total special waste							
production	electricity generation & geothermal drilling	t	22.9	490	568	2,433	6,915
delivery to recovery operators	electricity generation & geothermal drilling	t	23.2	487	560	687	6,135

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Resource conservation and quality								
EN1EN3 Net heat rate of geothermal generation	kcal/kWh	28,651	25,928	23,589	24,356	21,541	-24.8	-11.6
Total net specific consumption of water for industrial uses	liters/kWh	0.065	0	0	0	0	-100	0
EN8 Coverage of requirements of water for industrial uses								
From wells	% of requirements	95.8	0	0	0	100	4.4	-
From aqueducts	% of requirements	4.23	0	0	0	0	-100	0
Total from inland waters	**% of requirements**	**100**	**0**	**0**	**0**	**100**	**0**	**-**
EN1 EN3 Fossil fuel consumption for thermal generation								
Geothermal steam for electricity generation	% of total geothermal fluid extracted	100	100	100	100	100	0	0
Electricity generation from renewables								
geothermal	% of total generation	6.9	10.5	10.2	7.33	5.71	-17.2	-22.1
hydro from natural flows	% of total generation	45.9	38.9	40.5	26.6	21.6	-52.9	-18.8
wind and solar (photovoltaic)	% of total generation	47.2	50.6	49.3	66.1	72.7	54	10
Specific emissions into the atmosphere								
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.298	0.228	0	0.049	0	-100	0
EN22 Waste recovery								
Non-hazardous special waste								
electricity generation & geothermal drilling	% of production	100	100	99.6	46.4	98.5	-1.5	112.3
Hazardous special waste								
electricity generation & geothermal drilling	% of production	102	93.4	64.5	11.4	50.8	-50.2	345.6
Total special waste								
electricity generation & geothermal drilling	% of production	102	99.3	98.6	28.2	88.7	-13	214.5

Latin America

Argentina

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	7	7	7	7	7
thermal	no.	5	5	5	5	5
hydro	no.	2	2	2	2	2
Net maximum electrical capacity	MW	4,403	4,403	4,403	4,403	4,403
thermal	MW	3,075	3,075	3,075	3,075	3,075
hydro	MW	1,328	1,328	1,328	1,328	1,328
Power lines (circuit-length)						
Total	km	24,256	24,417	24,470	24,526	24,553
high-voltage	km	1,162	1,162	1,139	1,146	1,115
medium-voltage	km	7,223	7,318	7,346	7,373	7,417
low-voltage	km	15,871	15,937	15,985	16,007	16,021
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	0	0	12	106	106
vehicles for both private and service use	no.	0	0	42	0	0
Gross real-estate surface area	thousand m^2	0	0	33.5	33.5	33.5

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Thermal generation						
fuel oil	thousand t	333	466	514	522	548
	thousand toe	328	458	500	516	542
LS	*thousand t*	*333*	*466*	*514*	*522*	*548*
	thousand toe	*328*	*458*	*500*	*516*	*542*
gas oil	thousand t	131	339	332	183	386
	thousand toe	133	346	339	187	394
natural gas	million m^3	2,208	2,044	2,157	1,997	1,976
	thousand toe	1,851	1,783	1,883	1,673	1,655
technologically captive use	*million m^3*	*1,771*	*1,696*	*1,685*	*1,724*	*1,678*
	thousand toe	*1,486*	*1,492*	*1,488*	*1,444*	*1,407*
of which in combined-cycle units	million m^3	1,753	1,696	1,681	1,715	1,663
	thousand toe	1,470	1,492	1,484	1,437	1,394
non-technologically captive use	*million m^3*	*437*	*348*	*472*	*274*	*297*
	thousand toe	*366*	*291*	*395*	*229*	*249*
Total	thousand toe	2,313	2,588	2,722	2,376	2,592
	TJ	96,834	108,350	113,948	99,499	108,510

		2009	2010	2011	2012	2013
Various activities	thousand toe	0	0	0.118	0.161	0.183
Grand total	**thousand toe**	**2,313**	**2,588**	**2,722**	**2,377**	**2,592**
	TJ	**96,834**	**108,350**	**113,953**	**99,506**	**108,517**
EN1 EN3 **Biomass and waste**						
Thermal generation						
Liquid biomass	t	0	0	0	1,031	0
	toe	0	0	0	928	0
Grand total	**thousand toe**	**0**	**0**	**0**	**0.928**	**0**
	TJ	**0**	**0**	**0**	**38.9**	**0**
EN4 **Primary electricity**						
Various activities	million kWh	0	0	3.81	3.58	3.42
EN8 **Water for industrial uses**						
From aqueducts	million m^3	2.68	2.83	2.66	2.75	2.88
Total abstraction from inland waters	**million m^3**	**2.68**	**2.83**	**2.66**	**2.75**	**2.88**
EN8 EN21 **Open-cycle cooling water**						
For thermal generation	million m^3	1,348	1,519	1,556	1,340	1,462
Water for non-industrial uses						
Real-estate & service management	million m^3	0	0	0.032	0.016	0.02
EN1 **Expendables**						
Resins	t	7.5	11.8	35.9	3.94	84.5
Hydrazine	t	13.4	16	15.5	15.8	17.3
Ammonia	t	4.18	5.71	6.26	7.89	7.78
Sodium hypochlorite	t	2,781	1,823	2,842	2,597	3,015
Trisodium phosphate	t	3.5	2.57	3.63	2.39	3.49
Ferric chloride	t	2.54	4.04	5.01	4.39	5.68
Sulfuric & hydrochloric acids	t	1,886	2,015	2,085	1,958	2,188
Caustic soda	t	1,428	1,500	1,617	1,667	2,043
Lubricating oil	t	50.2	51.6	136	91.9	91.8
Dielectric oil	t	14.3	19.6	14.8	8.83	14
Printing paper	t	0	0	0.046	0.034	0.041
Other	t	0.52	0.418	0.619	0.62	0.659
Total	**t**	**6,191**	**5,450**	**6,762**	**6,358**	**7,472**
for thermal generation	t	6,187	5,447	6,759	6,354	7,469
for hydro generation	t	0.818	0	0.5	1.56	0.349
for electricity distribution	t	3	2.5	2.5	1.83	2.47
EN1 **PCB survey**						
Equipment & transformers with PCBs > 500 ppm (excluding oil)	t	31.5	0	0	0	0
Oil with PCBs > 500 ppm contained in equipment & transformers	t	31.5	0	0	0	0

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	million kWh	12,024	13,016	13,556	12,421	13,426
fuel oil & gas oil	million kWh	1,926	3,558	4,435	2,967	4,193
natural gas	million kWh	10,098	9,458	9,121	9,454	9,233
of which in combined-cycle units	million kWh	8,695	8,468	8,431	8,609	8,281
From renewables	million kWh	3,782	2,975	2,404	2,801	2,317
hydro from natural flows	million kWh	3,782	2,975	2,404	2,801	2,317
Total	million kWh	15,806	15,991	15,960	15,222	15,743
Electricity distribution						
Electricity distributed	million kWh	17,899	16,759	14,280	14,758	14,953
EN4 Electricity consumption for grid operation	million kWh	24.4	26.4	27.7	29	25.3

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	3.72	5.39	7.36	4.81	3.82
	Total	thousand t	3.72	5.39	7.36	4.81	3.82
EN20 NO_x	thermal generation	thousand t	7.16	11.4	14	11.3	14.3
	Total	thousand t	7.16	11.4	14	11.3	14.3
EN20 Particulates	thermal generation	thousand t	0.161	0.264	0.329	0.19	0.304
	Total	thousand t	0.161	0.264	0.329	0.19	0.304
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	5,817	6,590	6,950	6,171	6,834
	Total from fossil-fired thermal generation	thousand t	5,817	6,590	6,950	6,171	6,834
	Total from thermal generation	thousand t	5,817	6,590	6,950	6,171	6,834
	various activities	thousand t	0	0	0.345	1.28	1.19
	Total	thousand t	5,817	6,590	6,951	6,172	6,836
EN16 SF_6	electricity generation	kg	0	0	0	0.6	0
	electricity distribution	kg	117	45.5	66.3	140	367
	Total	kg	117	45.5	66.3	141	367
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		thousand t of CO_2 equivalent	5,820	6,591	6,952	6,176	6,844
EN18 Avoided CO_2 emissions							
Due to hydro generation from natural flows		thousand t	1,830	1,507	1,233	1,391	1,179
Due to generation from renewables		thousand t	1,830	1,507	1,233	1,391	1,179
EN21 Waste waters (discharged quantity)							
	thermal generation	million m^3	0.923	1.09	1.17	1.63	1.67
	Total electricity generation	million m^3	0.923	1.09	1.17	1.63	1.67

	Source		2009	2010	2011	2012	**2013**
EN21 Conventional polluting load of waste waters discharged by plants							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	169	229	175	135	206
	in some plants with an overall capacity of	MW	870	870	798	798	798
Total nitrogen (expressed as N)	thermal generation	kg	536	726	954	310	412
	in some plants with an overall capacity of	MW	870	870	798	798	798
Total phosphorus (expressed as P)	thermal generation	kg	117	118	284	229	284
	in some plants with an overall capacity of	MW	870	870	798	798	798
COD	thermal generation	kg	9,000	44,550	38,635	74,428	30,877
	in some plants with an overall capacity of	MW	870	3,194	3,122	3,122	3,122
BOD	thermal generation	kg	1,815	2,457	3,518	11,895	5,862
	in some plants with an overall capacity of	MW	870	870	798	798	798
EN22 Non-hazardous special waste							
production	electricity generation	t	834	1,552	34,037	69,489	17,720
	electricity distribution	t	213	146	406	265	218
	various activities	t	0	0	6.25	0	0
	Total	**t**	**1,048**	**1,699**	**34,449**	**69,754**	**17,939**
delivery to recovery operators	electricity generation	t	2.15	2.33	641	1.06	0
	electricity distribution	t	103	106	406	0	218
	Total	**t**	**105**	**109**	**1,047**	**1.06**	**218**
Total							
production	**electricity generation**	**t**	**834**	**1,552**	**34,037**	**69,489**	**17,720**
	electricity distribution	**t**	**213**	**146**	**406**	**265**	**218**
	various activities	**t**	**0**	**0**	**6.25**	**0**	**0**
	Total	**t**	**1,048**	**1,699**	**34,449**	**69,754**	**17,939**
delivery to recovery operators	**electricity generation**	**t**	**2.15**	**2.33**	**641**	**1.06**	**0**
	electricity distribution	**t**	**103**	**106**	**406**	**0**	**218**
	Total	**t**	**105**	**109**	**1,047**	**1.06**	**218**
EN22 Hazardous special waste							
Oil flyash	thermal generation						
	production	t	0	0	0	26.4	53.3
Other							
production	electricity generation	t	300	329	1,019	721	271
	electricity distribution	t	220	63.6	244	181	685
	Total	**t**	**520**	**393**	**1,263**	**901**	**956**
	of which with PCBs						
	electricity distribution	*t*	*31.5*	*31.5*	*31.5*	*31.5*	*31.5*
	Total	***t***	***31.5***	***31.5***	***31.5***	***31.5***	***31.5***
delivery to recovery operators	electricity generation	t	43.6	43.2	260	15.6	0
	electricity distribution	t	75	20.7	213	0	654
	Total	**t**	**119**	**63.9**	**473**	**15.6**	**654**

	Source		2009	2010	2011	2012	2013
Total							
production	electricity generation	t	300	329	1,019	747	324
	electricity distribution	t	220	63.6	244	181	685
	Total	t	520	393	1,263	928	1,010
delivery to recovery operators	electricity generation	t	43.6	43.2	260	15.6	0
	electricity distribution	t	75	20.7	213	0	654
	Total	t	119	63.9	473	15.6	654
EN22 **Total special waste**							
production	electricity generation	t	1,135	1,882	35,056	70,236	18,045
	electricity distribution	t	433	210	650	446	904
	various activities	t	0	0	6.25	0	0
	Total	t	1,568	2,091	35,712	70,682	18,948
delivery to recovery operators	electricity generation	t	45.8	45.5	901	16.6	0
	electricity distribution	t	178	127	618	0	872
	Total	t	224	172	1,520	16.6	872

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN29 **Land**								
LV cable lines								
overhead	% of entire LV grid	45.5	45.5	45.3	45.3	62.2	36.7	37.3
underground	% of entire LV grid	37.6	37.8	37.7	37.7	37.8	0.5	0.3
Total cable lines	% of entire LV grid	83.2	83.2	83.1	83.1	100	20.2	20.3
MV cable lines								
overhead	% of entire MV grid	1.69	1.68	1.66	1.66	45.1	2,568.6	2,616.9
underground	% of entire MV grid	54.5	54.7	54.8	54.8	54.9	0.7	0.2
Total cable lines	% of entire MV grid	56.2	56.3	56.5	56.5	100	77.9	77
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	73.7	73.7	73.6	73.7	97.8	32.7	32.7
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation	kcal/kWh	1,924	1,988	2,008	1,913	1,930	0.3	0.9
EN4 Electricity consumption for distribution grid operation	% of electricity distributed	0.136	0.157	0.194	0.197	0.169	24.3	-14.2
EN8 Net specific consumption of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	0.223	0.217	0.196	0.221	0.215	-3.6	-2.7
excluding contribution of as-is sea water	liters/kWh	0.223	0.217	0.196	0.221	0.215	-3.6	-2.7
Total net specific consumption of water for industrial uses	liters/kWh	0.169	0.177	0.166	0.18	0.183	8.3	1.7
EN8 Coverage of requirements of water for industrial uses								
from aqueducts	% of requirements	100	100	100	100	100	0	0
Total from inland waters	% of requirements	100	100	100	100	100	0	0

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	14.2	17.7	18.4	21.7	20.9	47.2	-3.7
gas oil	% of total fuel consumption	5.77	13.4	12.5	7.88	15.2	163.4	92.9
natural gas	% of total fuel consumption	80	68.9	69.2	70.4	63.9	-20.1	-9.2
LS fuel oil	% of total fuel-oil consumption	100	100	100	100	100	0	0
natural gas, technologically captive use	% of total natural-gas consumption	80.2	83.7	79	86.3	85	6	-1.5
of which in combined-cycle units	*% of total natural-gas consumption*	*79.4*	*83.7*	*78.8*	*85.9*	*84.2*	*6*	*-2*
natural gas, non-technologically captive use	% of total natural-gas consumption	19.8	16.3	21	13.7	15	-24.2	9.5
Electricity generation from renewables								
hydro from natural flows	% of total generation	23.9	18.6	15.1	18.4	14.7	-38.5	-20.1
Total	**% of total generation**	**23.9**	**18.6**	**15.1**	**18.4**	**14.7**	**-38.5**	**-20.1**
Specific emissions into the atmosphere								
EN20 SO_2 (simple thermal generation)	g/kWh thermal net	0.309	0.414	0.543	0.387	0.285	-7.8	-26.4
EN20 NO_x (simple thermal generation)	g/kWh thermal net	0.596	0.879	1.04	0.913	1.07	79.5	17.2
EN20 Particulates (simple thermal generation)	g/kWh thermal net	0.013	0.02	0.024	0.015	0.023	76.9	53.3
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	484	506	513	497	509	5.2	2.4
EN20 SO_2 (total from simple thermal generation)	g/kWh total net	0.235	0.337	0.461	0.316	0.243	3.4	-23.1
EN20 NO_x (total from simple thermal generation)	g/kWh total net	0.453	0.715	0.879	0.745	0.91	100.9	22.1
EN20 Particulates (total from simple thermal generation)	g/kWh total net	0.01	0.017	0.021	0.012	0.019	90	58.3
EN16 CO_2 (total from simple thermal generation)	g/kWh total net	368	412	435	405	434	17.9	7.2
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.729	0.344	0.497	1.15	3	311.5	160.9
Net specific conventional polluting load of waste waters discharged by plants								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net	0.044	0.045	0.034	0.035	0.043	-2.3	22.9
Total nitrogen (expressed as N)	mg/kWh thermal net	0.139	0.143	0.185	0.079	0.085	-38.8	7.6
Total phosphorus (expressed as P)	mg/kWh thermal net	0.03	0.023	0.055	0.059	0.058	93.3	-1.7
COD	mg/kWh thermal net	2.34	3.41	2.85	6.04	2.31	-1.3	-61.8
BOD	mg/kWh thermal net	0.471	0.485	0.684	3.04	1.21	156.9	-60.2
EN22 Specific waste production								
Oil flyash (thermal generation)	g/kWh net from fuel oil & gas oil	0	0	0	0.009	0.013	0	44.4
Oil bottom ash (thermal generation)	g/kWh net from fuel oil & gas oil	0	0	0	0.009	0.013	0	44.4
EN22 Waste recovery								
Non-hazardous special waste								
electricity generation	% of production	0.257	0.15	1.88	0.002	0	-100	0
electricity distribution	% of production	48.3	72.6	100	0	100	107	-
Total	**% of production**	**10**	**6.39**	**3.04**	**0.002**	**1.22**	**-87.8**	**60,900**

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Total non-hazardous special waste								
electricity generation	% of production	0.257	0.15	1.88	0.002	0	-100	0
electricity distribution	% of production	48.3	72.6	100	0	100	107	-
Total	**% of production**	**10**	**6.39**	**3.04**	**0.002**	**1.22**	**-87.8**	**60,900**
Hazardous special waste								
electricity generation	% of production	14.5	13.1	25.5	2.16	0	-100	0
electricity distribution	% of production	34.1	32.6	87.1	0	95.4	179.8	-
Total	**% of production**	**22.8**	**16.3**	**37.4**	**1.73**	**68.4**	**200**	**3,853.8**
Total hazardous special waste								
electricity generation	% of production	14.5	13.1	25.5	2.09	0	-100	0
electricity distribution	% of production	34.1	32.6	87.1	0	95.4	179.8	-
Total	**% of production**	**22.8**	**16.3**	**37.4**	**1.68**	**64.8**	**184.2**	**3,757.1**
Total special waste								
electricity generation	% of production	4.03	2.42	2.57	0.024	0	-100	0
electricity distribution	% of production	41.1	60.5	95.2	0	96.5	134.8	-
Total	**% of production**	**14.3**	**8.25**	**4.26**	**0.024**	**4.6**	**-67.8**	**19,066.7**

Brazil

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	22	22	22	22	28
thermal	no.	1	1	1	1	1
hydro	no.	21	21	21	21	24
wind	no.	0	0	0	0	3
Net maximum electrical capacity	MW	1,064	1,050	1,066	1,064	1,153
thermal	MW	313	307	317	317	314
hydro	MW	752	743	749	748	755
wind	MW	0	0	0	0	84
Power lines (circuit-length)						
Total	km	176,404	180,389	184,688	189,468	191,697
high-voltage	km	8,081	8,120	8,273	8,397	8,644
medium-voltage	km	106,881	109,810	112,841	115,253	116,243
low-voltage	km	61,443	62,458	63,575	65,818	66,810
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	0	0	584	467	492
special vehicles	no.	0	0	0	2	2
vehicles for both private and service use	no.	0	0	0	425	381
Gross real-estate surface area	thousand m²	0	0	38,462	38,462	38,462

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Thermal generation						
gas oil	thousand t	0.001	0	0	0	0
	thousand toe	0.001	0	0	0	0
natural gas	million m³	108	344	218	293	539
	thousand toe	91.1	293	187	252	457
technologically captive use	*million m³*	*108*	*344*	*218*	*293*	*539*
	thousand toe	*91.1*	*293*	*187*	*252*	*457*
of which in combined-cycle units	million m³	108	344	218	293	539
	thousand toe	91.1	293	187	252	457
Total	thousand toe	91.1	293	187	252	457
	TJ	3,814	12,280	7,839	10,551	19,146
Various activities	thousand toe	0.001	0.002	1.35	1.66	0.709
Grand total	thousand toe	91.1	293	189	254	458
	TJ	3,814	12,280	7,895	10,620	19,175

		2009	2010	2011	2012	2013
EN4 Primary electricity						
Various activities	million kWh	0	0	21.6	27	27.2
EN8 Water for industrial uses						
From rivers (including second-flush rainwater)	million m^3	0.665	2.21	1.28	1.88	3.23
Water for non-industrial uses						
Real-estate & service management	million m^3	0	0	0.098	0.092	0.092
EN1 Expendables						
Resins	t	3.8	0	3.8	0.25	3.8
Hydrazine	t	0.232	0.237	0.108	0.2	0.123
Carbohydrazide	t	0.05	0.237	0.06	0.01	0
Ammonia	t	0.17	0.172	0.023	0.01	0.046
Sodium hypochlorite	t	16.1	40.8	21.4	29.2	38.2
Ferrous sulfate	t	0	11.2	8.04	16.6	26.3
Trisodium phosphate	t	0.292	0.547	0.236	0.19	0.433
Polyelectrolyte	t	0.26	1.01	0.669	1.15	1.4
Sulfuric & hydrochloric acids	t	17	21.5	18.4	33.1	52.1
Caustic soda	t	23.3	25.6	18.9	26.3	57.7
Lubricating oil	t	20.8	20.5	23.2	14.1	5.77
Dielectric oil	t	217	526	320	833	843
Printing paper	t	0	0	47.1	73.7	37.3
Other	t	2	41	22.6	33	47.5
Total	**t**	**301**	**689**	**485**	**1,061**	**1,113**
for thermal generation	t	61.5	141	93.3	140	228
for hydro generation	t	24	21.6	31.4	14.1	130
for electricity distribution	t	216	526	313	833	718
EN1 PCB survey						
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding oil)	t	0	48.5	340	67.5	0.08
Oil with PCBs >50 ppm and ≤ 500 ppm contained in equipment & transformers	t	0	7.16	13.2	24	0.22

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	**million kWh**	**500**	**1,665**	**1,033**	**1,454**	**2,588**
fuel oil & gas oil	million kWh	0.002	0	0	0.002	0.002
natural gas	million kWh	500	1,665	1,033	1,454	2,588
of which in combined-cycle units	*million kWh*	*500*	*1,665*	*1,033*	*1,454*	*2,588*
From renewables	**million kWh**	**3,369**	**3,950**	**3,658**	**4,234**	**2,905**
hydro from natural flows	million kWh	3,369	3,950	3,658	4,234	2,905
Total	**million kWh**	**3,869**	**5,615**	**4,691**	**5,688**	**5,493**
Electricity distribution						
Electricity distributed	million kWh	17,254	18,777	16,797	18,000	18,799
EN4 Electricity consumption for grid operation	million kWh	11	34.6	34.6	36	37

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 NO_x	thermal generation	thousand t	0.192	0.19	0.233	0.396	0.622
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	177	563	358	491	886
	various activities	thousand t	0	0.013	3.27	23.2	2.19
	Total	**thousand t**	**177**	**563**	**361**	**514**	**888**
EN16 SF_6	electricity generation	kg	4	6	0	1.1	4.4
	electricity distribution	kg	94.8	97.5	33.7	58.4	26
	Total	**kg**	**98.8**	**104**	**33.7**	**59.5**	**30.4**
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**179**	**565**	**362**	**515**	**888**
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	1,193	1,336	1,266	1,428	994
EN21 **Waste waters (discharged quantity)**							
	thermal generation	million m^3	0.175	0.415	0.253	0.37	0.689
EN21 **Conventional polluting load of waste waters discharged by plants**							
Total nitrogen (expressed as N)	thermal generation	kg	75.3	373	179	333	620
	in some plants with an overall capacity of	MW	322	322	322	322	322
COD	thermal generation	kg	68.8	43,763	20,660	272,582	51,417
	in some plants with an overall capacity of	MW	322	322	322	322	322
BOD	thermal generation	kg	55.3	24,230	9,607	150,099	29,816
	in some plants with an overall capacity of	MW	322	322	322	322	322
EN22 **Non-hazardous special waste**							
production	electricity generation	t	196	645	566	696	1,199
	electricity distribution	t	2,052	5,852	10,660	8,482	4,113
	various activities	t	0	0	0	2.6	0.08
	Total	**t**	**2,248**	**6,497**	**11,226**	**9,181**	**5,312**
delivery to recovery operators	electricity generation	t	114	6.32	49.3	694	1,193
	electricity distribution	t	2,700	5,629	5,252	11,837	11,286
	Total	**t**	**2,814**	**5,636**	**5,301**	**12,531**	**12,479**

	Source		2009	2010	2011	2012	2013
EN22 Hazardous special waste							
production	electricity generation	t	9.21	20.5	37.5	24	211
	electricity distribution	t	619	1,111	150	19,680	926
	various activities	t	0	0	456	2.32	237
	Total	**t**	**629**	**1,132**	**643**	**19,706**	**1,374**
	of which with PCBs						
	various activities	t	0	0	0	0.88	110
	Total	**t**	**0**	**0**	**0**	**0.88**	**110**
delivery to recovery operators	electricity generation	t	11.3	0.43	19.4	30.4	15.6
	electricity distribution	t	143	1,111	280	19,774	1,034
	Total	**t**	**155**	**1,112**	**299**	**19,805**	**1,049**
EN22 Total special waste							
production	electricity generation	t	205	665	603	720	1,410
	electricity distribution	t	2,671	6,964	10,810	28,162	5,039
	various activities	t	0	0	456	4.92	237
	Total	**t**	**2,877**	**7,629**	**11,869**	**28,887**	**6,686**
delivery to recovery operators	electricity generation	t	125	6.75	68.7	725	1,208
	electricity distribution	t	2,844	6,741	5,532	31,611	12,320
	Total	**t**	**2,969**	**6,747**	**5,600**	**32,335**	**13,528**

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN29 Land								
LV cable lines								
overhead	% of entire LV grid	15.3	15.2	15	40	24.8	62.1	-38
underground	% of entire LV grid	0.093	0.049	0.03	0.265	0.27	190.3	1.9
Total cable lines	**% of entire LV grid**	**15.4**	**15.2**	**15**	**40.3**	**25.1**	**63**	**-37.7**
MV cable lines								
overhead	% of entire MV grid	0.951	0.941	0.05	1.47	1.57	65.1	6.8
underground	% of entire MV grid	0.055	0.056	0.005	0.047	0.061	10.9	29.8
Total cable lines	**% of entire MV grid**	**1.01**	**0.997**	**0.055**	**1.52**	**1.63**	**61.4**	**7.2**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	6	5.91	5.19	14.9	9.74	62.3	-34.6
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation	kcal/kWh	1,823	1,762	1,812	1,733	1,767	-3.1	2
EN4 Electricity consumption for distribution grid operation	% of electricity distributed	0.064	0.184	0.206	0.2	0.197	207.8	-1.5
EN8 Net specific consumption of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	1.33	1.33	1.24	1.29	1.25	-6	-3.1
excluding contribution of as-is sea water	liters/kWh	1.33	1.33	1.24	1.29	1.25	-6	-3.1

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Total net specific consumption of water for industrial uses	liters/kWh	0.172	0.394	0.272	0.33	0.588	241.9	78.2
EN8 Coverage of requirements of water for industrial uses								
From rivers (including second-flush rainwater)	% of requirements	100	100	100	100	100	0	0
EN1 EN3 Fossil fuel consumption for thermal generation								
gas oil	% of total fuel consumption	0.001	0	0	0	0	-100	0
natural gas	% of total fuel consumption	100	100	100	100	100	0	0
natural gas, technologically captive use	% of total natural-gas consumption	100	100	100	100	100	0	0
of which in combined-cycle units	*% of total natural-gas consumption*	*100*	*100*	*100*	*100*	*100*	*0*	*0*
Electricity generation from renewables								
hydro from natural flows	% of total generation	87.1	70.3	78	74.4	52.9	-39.3	-28.9
Specific emissions into the atmosphere								
EN20 NO_x (simple thermal generation)	g/kWh thermal net	0.384	0.114	0.225	0.272	0.24	-37.5	-11.8
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	354	338	346	337	342	-3.4	1.5
EN20 NO_x (total from simple thermal generation)	g/kWh total net	0.05	0.034	0.05	0.07	0.113	126	61.4
EN16 CO_2 (total from simple thermal generation)	g/kWh total net	45.7	100	76.3	86.2	161	252.3	86.8
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	3.05	1.89	1.08	1.51	1.45	-52.5	-4
Net specific conventional polluting load of waste waters discharged by plants								
Total nitrogen (expressed as N)	mg/kWh thermal net	0.151	0.218	0.172	0.228	0.234	55	2.6
COD	mg/kWh thermal net	0.138	25.6	19.8	186	19.4	13,958	-89.6
BOD	mg/kWh thermal net	0.111	14.2	9.21	103	11.2	9,990.1	-89.1
EN22 **Waste recovery**								
Non-hazardous special waste								
electricity generation	% of production	58.1	0.98	8.72	99.7	99.5	71.3	-0.2
electricity distribution	% of production	132	96.2	49.3	140	274	107.6	95.7
Total	% of production	125	86.7	47.2	136	235	88	72.8
Hazardous special waste								
electricity generation	% of production	123	2.1	51.7	126	7.39	-94	-94.1
electricity distribution	% of production	23.1	100	187	100	112	384.8	12
Total	% of production	24.6	98.2	46.6	100	76.4	210.6	-23.6
Total special waste								
electricity generation	% of production	61	1.01	11.4	101	85.7	40.5	-15.1
electricity distribution	% of production	106	96.8	51.2	112	244	130.2	117.9
Total	% of production	103	88.4	47.2	112	202	96.1	80.4

Chile

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	30	30	30	31	31
thermal	no.	10	10	10	11	11
hydro	no.	18	18	18	18	16
wind	no.	2	2	2	2	4
Net maximum electrical capacity	MW	5,461	5,679	5,647	5,997	6,185
thermal	MW	1,850	2,067	2,021	2,371	2,378
hydro	MW	3,534	3,535	3,548	3,548	3,548
wind	MW	77.2	77	78	78.2	258
Power lines (circuit-length)						
Total	km	15,155	15,155	15,824	16,081	16,306
high-voltage	km	355	355	355	356	356
medium-voltage	km	4,828	4,828	4,993	5,070	5,112
low-voltage	km	9,972	9,972	10,476	10,655	10,838
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	0	8	324	319	259
special vehicles	no.	0	2	2	9	7
vehicles for both private and service use	no.	0	3	9	90	82
Gross real-estate surface area	thousand m^2	0	0.388	51.1	50.6	23.6

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Thermal generation						
fuel oil	thousand t	11.2	0.09	0.696	3.31	1.77
	thousand toe	10.9	0.089	0.691	0.744	1.75
MS	*thousand t*	*0.004*	*0*	*0*	*0*	*0*
	thousand toe	*0.004*	*0*	*0*	*0*	*0*
LS	*thousand t*	*9.69*	*0*	*0*	*0*	*0*
	thousand toe	*9.4*	*0*	*0*	*0*	*0*
VLS	*thousand t*	*1.51*	*0.09*	*0.696*	*3.31*	*1.77*
	thousand toe	*1.5*	*0.089*	*0.691*	*0.744*	*1.75*
gas oil	thousand t	650	196	62.5	35.8	122
	thousand toe	674	199	60.7	38.4	125
natural gas	million m^3	366	1,192	1,320	1,386	1,174
	thousand toe	360	1,015	1,126	1,181	968

		2009	2010	2011	2012	2013
technologically captive use	*million m³*	*366*	*1,192*	*1,320*	*1,386*	*1,174*
	thousand toe	*360*	*1,015*	*1,126*	*1,181*	*968*
of which in combined-cycle units	million m³	288	1,098	1,240	1,127	1,089
	thousand toe	297	935	1,054	943	888
non-technologically captive use	*million m³*	*0*	*0*	*0.079*	*0*	*0*
	thousand toe	*0*	*0.042*	*0.09*	*0*	*0*
coal	thousand t	756	476	718	823	1,398
	thousand toe	434	287	429	492	825
Total	**thousand toe**	**1,479**	**1,501**	**1,616**	**1,712**	**1,919**
	TJ	**61,935**	**62,863**	**67,672**	**71,669**	**80,359**
Various activities	thousand toe	0.002	0.027	0.529	0.792	0.799
Grand total	**thousand toe**	**1,479**	**1,501**	**1,617**	**1,713**	**1,920**
	TJ	**61,935**	**62,864**	**67,694**	**71,703**	**80,392**
EN4 **Primary electricity**						
Various activities	million kWh	0	0.142	17.5	15	16.7
EN8 **Water for industrial uses**						
From wells	million m³	2.64	6.29	6.45	5.89	6.53
From aqueducts	million m³	3.84	0	0	0	0
Total abstraction from inland waters	**million m³**	**6.48**	**6.29**	**6.45**	**5.89**	**6.53**
From the sea (desalinated)	million m³	0.587	0.598	0.543	0.261	0.37
EN10 From waste waters (used inside plants)	million m³	0	0	0.14	0	0
Total requirements	**million m³**	**7.07**	**6.89**	**7.14**	**6.15**	**6.9**
EN8 EN21 **Open-cycle cooling water**						
For thermal generation	million m³	557	408	520	440	671
Water for non-industrial uses						
Real-estate & service management	million m³	0	0.717	0.132	0.063	0.1
EN1 **Expendables**						
Resins	t	0.208	0	0	0	66
Hydrazine	t	3.31	7.65	8.13	7.98	8.44
Ammonia	t	0.827	0.474	0.328	0.165	0.22
Limestone for flue-gas desulphurization	t	0	0	0	0	6,101
Sodium hypochlorite	t	301	227	198	206	468
Ferrous sulfate	t	65.1	10.5	47.9	56.3	228
Trisodium phosphate	t	1.65	1.15	1.35	1.14	1.14
Lime	t	3.64	1.86	1.53	0.067	0.602
Ferric chloride	t	10.4	9.19	6.96	5.13	8.29
Polyelectrolyte	t	0.678	0.636	0.395	0.199	0.228
Sulfuric & hydrochloric acids	t	596	858	966	899	1,002
Caustic soda	t	253	110	108	90.9	148
Lubricating oil	t	27.7	69	30.9	28.6	221
Dielectric oil	t	357	11.9	60	43.6	1,345
Printing paper	t	0	0.412	2.35	0.417	0.072
Other	t	7.23	24.5	19.6	15.6	7.94
Total	**t**	**1,626**	**1,333**	**1,452**	**1,356**	**9,607**
for thermal generation	t	1,260	1,279	1,369	1,292	8,076
for hydro generation	t	365	47.4	50.9	38.9	1,523
for wind generation	t	0.465	3.77	0.612	0.199	1.55
for electricity distribution	t	0	2.18	29	24.7	5.8

			2009	2010	2011	2012	2013
EN1 PCB survey							
Equipment & transformers with PCBs > 500 ppm (excluding oil)	t		0.06	0	0.06	0.06	0.13
Oil with PCBs > 500 ppm contained in equipment & transformers	t		0	0.06	0	0	0
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding oil)	t		5.79	3.72	0	0	0
Oil with PCBs > 50 ppm and ≤ 500 ppm contained in equipment & transformers	t		5.21	1.48	0	0	0

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	million kWh	7,297	8,146	8,674	8,820	9,841
fuel oil & gas oil	million kWh	3,282	1,034	224	103	672
natural gas	million kWh	2,189	5,890	6,630	6,381	5,569
of which in combined-cycle units	*million kWh*	*2,016*	*5,603*	*6,386*	*5,842*	*5,040*
coal	million kWh	1,826	1,221	1,820	2,337	3,601
From renewables	million kWh	15,332	13,227	12,476	11,786	10,657
hydro from natural flows	million kWh	15,275	13,084	12,344	11,632	10,345
wind	million kWh	57	143	132	153	312
Hydro from pumped storage	million kWh	2.26	0	0	0	0
Total	million kWh	22,632	21,373	21,150	20,606	20,498
Electricity distribution						
Electricity distributed	million kWh	12,585	13,098	11,958	12,485	13,030
EN4 Electricity consumption for grid operation	million kWh	12	7.86	11.6	12	12

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	10.9	7.36	9.85	11.5	9.62
EN20 NO_x	thermal generation	thousand t	8.45	6.57	6.93	6.7	9.82
EN20 Particulates	thermal generation	thousand t	1.14	1.32	1.58	0.98	0.988
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	4,663	4,128	4,599	4,819	6,031
	fossil-fired thermal generation (from desulfurization)	thousand t	0	0	0	0	2.68
	various activities	thousand t	0	0.144	1.6	2.46	2.5
	Total	thousand t	4,663	4,128	4,600	4,822	6,036
EN16 SF_6	electricity generation	kg	0	10.5	0	0.38	0
	electricity distribution	kg	6.7	113	13	14.5	0
	Total	kg	6.7	124	13	14.8	0

	Source		2009	2010	2011	2012	2013
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		thousand t of CO_2 equivalent	4,663	4,131	4,601	4,822	6,036
EN18 Avoided CO_2 emissions							
Due to hydro generation from natural flows		thousand t	9,761	6,631	6,544	6,355	6,343
Due to wind generation		thousand t	36.4	72.4	69.9	83.8	191
Due to generation from renewables		thousand t	9,798	6,704	6,614	6,439	6,534
EN21 Waste waters (discharged quantity)	thermal generation	million m³	1.49	2.71	2.6	2	2.38
EN21 Conventional polluting load of waste waters discharged by plants							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	2,968	8,123	0	0	0
	in some plants with an overall capacity of	MW	128	128	0	0	0
Total nitrogen (expressed as N)	thermal generation	kg	266	0	0	0	0
	in some plants with an overall capacity of	MW	399	0	0	0	0
Total phosphorus (expressed as P)	thermal generation	kg	476	0	56	17.3	25.5
	in some plants with an overall capacity of	MW	399	0	390	781	390
BOD	thermal generation	kg	6,085	0	0	0	0
	in some plants with an overall capacity of	MW	399	0	0	0	0
EN22 Non-hazardous special waste							
Coal bottom ash	thermal generation						
	production	t	14,550	5,688	13,584	13,896	11,945
Coal flyash	thermal generation						
	production	t	66,665	44,120	69,668	78,548	148,899
Gypsum from desulfuration	thermal generation						
	production	t	0	0	0	0	18,525
Other							
production	electricity generation	t	935	1,271	1,275	1,291	491
	electricity distribution	t	36,098	3,618	36,615	17,834	31,541
	various activities	t	0	0	0.443	0	0
	Total	t	37,033	4,889	37,890	19,125	32,032
delivery to recovery operators	electricity generation	t	56.5	84.3	25.7	4.05	0
	electricity distribution	t	12,415	848	36,762	17,509	31,540
	Total	t	12,472	933	36,788	17,513	31,540
Total							
production	**electricity generation**	**t**	**82,150**	**51,079**	**84,527**	**93,735**	**179,861**
	electricity distribution	**t**	**36,098**	**3,618**	**36,615**	**17,834**	**31,541**
	various activities	**t**	**0**	**0**	**0.443**	**0**	**0**
	Total	**t**	**118,248**	**54,697**	**121,142**	**111,569**	**211,401**
delivery to recovery operators	**electricity generation**	**t**	**56.5**	**84.3**	**25.7**	**4.05**	**0**
	electricity distribution	**t**	**12,415**	**848**	**36,762**	**17,509**	**31,540**
	Total	**t**	**12,472**	**933**	**36,788**	**17,513**	**31,540**

	Source		2009	2010	2011	2012	2013
EN22 Hazardous special waste							
production	electricity generation	t	400	426	386	404	684
	electricity distribution	t	138	26.1	27.5	22.7	29.6
	various activities	t	0	0.02	1.04	0.659	3.55
	Total	**t**	**538**	**452**	**415**	**427**	**717**
	of which with PCBs						
	electricity generation	*t*	*11.9*	*0*	*1.38*	*0*	*0*
	Total	***t***	***11.9***	***0***	***1.38***	***0***	***0***
delivery to recovery operators	electricity generation	t	16.3	305	91.3	0.813	0
	electricity distribution	t	6.71	0	26.2	22.7	18.8
	Total	**t**	**23**	**305**	**118**	**23.5**	**18.8**
	of which with PCBs						
	electricity generation	*t*	*0.24*	*0*	*0*	*0*	*0*
	Total	***t***	***0.24***	***0***	***0***	***0***	***0***
EN22 Total special waste							
production	electricity generation	t	82,550	51,505	84,914	94,139	180,544
	electricity distribution	t	36,236	3,644	36,642	17,856	31,570
	various activities	t	0	0.02	1.48	0.659	3.55
	Total	**t**	**118,785**	**55,150**	**121,557**	**111,996**	**212,118**
delivery to recovery operators	electricity generation	t	72.8	389	117	4.86	0
	electricity distribution	t	12,422	848	36,788	17,532	31,559
	Total	**t**	**12,495**	**1,237**	**36,905**	**17,537**	**31,559**

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN29 Land								
LV cable lines								
overhead	% of entire LV grid	43	39	43.9	46.1	47.6	10.7	3.3
underground	% of entire LV grid	18	17.6	18	18.3	18.7	3.9	2.2
Total cable lines	**% of entire LV grid**	**61**	**56.5**	**61.9**	**64.3**	**66.3**	**8.7**	**3.1**
MV cable lines								
overhead	% of entire MV grid	19.1	21.9	24	25.3	26.5	38.7	4.7
underground	% of entire MV grid	20.1	18.5	18.9	19.5	19.9	-1	2.1
Total cable lines	**% of entire MV grid**	**39.2**	**40.3**	**43**	**44.8**	**46.4**	**18.4**	**3.6**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	52.7	50.1	54.6	56.8	58.7	11.4	3.3
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation	kcal/kWh	2,027	1,843	1,863	1,941	1,950	-3.8	0.5
EN4 Electricity consumption for distribution grid operation	% of electricity distributed	0.095	0.06	0.097	0.096	0.092	-3.2	-4.2
EN8 Net specific consumption of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	0.968	0.845	0.823	0.697	0.701	-27.6	0.6
excluding contribution of as-is sea water	liters/kWh	0.968	0.845	0.823	0.697	0.701	-27.6	0.6
Total net specific consumption of water for industrial uses	liters/kWh	0.312	0.322	0.337	0.298	0.337	8	13.1

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN8 Coverage of requirements of water for industrial uses								
from wells	% of requirements	37.3	91.3	90.4	95.8	94.6	153.6	-1.3
from aqueducts	% of requirements	54.4	0	0	0	0	-100	-
Total from inland waters	**% of requirements**	**91.7**	**91.3**	**90.4**	**95.8**	**94.6**	**3.2**	**-1.3**
from the sea (desalinated)	% of requirements	8.31	8.69	7.61	4.25	5.36	-35.5	26.1
EN10 from waste waters (used inside plants)	% of requirements	0	0	1.96	0	0	-	-
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	0.737	0.006	0.043	0.043	0.091	-87.7	111.6
gas oil	% of total fuel consumption	45.6	13.2	3.75	2.25	6.51	-85.7	189.3
natural gas	% of total fuel consumption	24.4	67.6	69.7	69	50.4	106.6	-27
coal	% of total fuel consumption	29.3	19.1	26.5	28.7	43	46.8	49.8
MS fuel oil	% of total fuel-oil consumption	0.037	0	0	0	0	-100	-
LS fuel oil	% of total fuel-oil consumption	86.2	0	0	0	0	-100	-
VLS fuel oil	% of total fuel-oil consumption	13.7	100	100	100	100	629.9	0
natural gas, technologically captive use	% of total natural-gas consumption	100	100	100	100	100	0	0
of which in combined-cycle units	*% of total natural-gas consumption*	*82.3*	*92*	*93.6*	*79.9*	*91.8*	*11.5*	*14.9*
natural gas, non-technologically captive use	% of total natural-gas consumption	0	0.004	0.008	0	0	-	-
Electricity generation from renewables								
hydro from natural flows	% of total generation	67.5	61.2	58.4	56.5	50.5	-25.2	-10.6
wind	% of total generation	0.252	0.669	0.624	0.745	1.52	503.2	104
Total	**% of total generation**	**67.7**	**61.9**	**59**	**57.2**	**52**	**-23.2**	**-9.1**
Specific emissions into the atmosphere								
EN20 SO_2 (simple thermal generation)	g/kWh thermal net	1.49	0.904	1.14	1.31	0.977	-34.4	-25.4
EN20 NO_x (simple thermal generation)	g/kWh thermal net	1.16	0.807	0.799	0.76	0.997	-14.1	31.2
EN20 Particulates (simple thermal generation)	g/kWh thermal net	0.156	0.162	0.182	0.111	0.1	-35.9	-9.9
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	639	507	530	546	613	-4.1	12.3
EN20 SO_2 (Total from thermal generation, simple and CHP)	g/kWh total net	0.481	0.344	0.466	0.56	0.469	-2.5	-16.3
EN20 NO_x (total from simple thermal generation)	g/kWh total net	0.373	0.307	0.328	0.325	0.479	28.4	47.4
EN20 Particulates (total from simple thermal generation)	g/kWh total net	0.05	0.062	0.075	0.048	0.048	-4	0
EN16 CO_2 (total from simple thermal generation)	g/kWh total net	206	193	217	234	294	42.7	25.6
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.037	0.155	0.197	0.26	0	-100	0
Net specific conventional polluting load of waste waters discharged by plants								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net	3.23	40	0	0	0	-100	-
Total nitrogen (expressed as N)	mg/kWh thermal net	0.148	0	0	0	0	-100	-
Total phosphorus (expressed as P)	mg/kWh thermal net	0.265	0	0.054	0.057	0.058	-78.1	1.8
BOD	mg/kWh thermal net	3.38	0	0	0	0	-100	-

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN22 Specific waste production								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	44.5	40.8	45.7	39.6	44.7	0.4	12.9
EN22 Waste recovery								
Non-hazardous special waste								
electricity generation	% of production	6.04	6.63	2.02	0.314	0	-100	0
electricity distribution	% of production	34.4	23.4	100	98.2	100	190.7	1.8
Total	% of production	33.7	19.1	97.1	91.6	98.5	192.3	7.5
Hazardous special waste								
electricity generation	% of production	4.08	71.6	23.6	0.201	0	-100	0
electricity distribution	% of production	4.88	0	95.2	100	63.5	1,201.2	-36.5
Total	% of production	4.28	67.4	28.3	5.51	2.62	-38.8	-52.5
Total special waste								
electricity generation	% of production	0.088	0.756	0.138	0.005	0	-100	0
electricity distribution	% of production	34.3	23.3	100	98.2	100	191.5	1.8
Total	% of production	10.5	2.24	30.4	15.7	14.9	41.9	-5.1

Colombia

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	11	12	12	13	13
thermal	no.	2	2	2	2	2
hydro	no.	9	10	10	11	11
Net maximum electrical capacity	MW	2,847	2,866	2,866	2,866	2,878
thermal	MW	411	411	411	411	412
hydro	MW	2,436	2,455	2,455	2,455	2,466
Power lines (circuit-length)						
Total	km	42,322	51,988	53,341	57,365	58,326
high-voltage	km	1,240	1,275	1,281	1,282	1,282
medium-voltage	km	18,881	22,692	23,000	23,270	23,654
low-voltage	km	22,201	28,021	29,060	32,813	33,390
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	0	0	0	0	29
Gross real-estate surface area	thousand m^2	0	0	12.2	16	16.9

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Thermal generation						
fuel oil	thousand t	7.33	28.8	34.4	46	31.3
	thousand toe	7.39	30	33	44.2	30
MS	*thousand t*	*7.33*	*21.2*	*34.4*	*46*	*1.97*
	thousand toe	*7.39*	*22.1*	*33*	*44.2*	*1.89*
LS	*thousand t*	*0*	*7.6*	*0*	*0*	*29.3*
	thousand toe	*0*	*7.91*	*0*	*0*	*28.1*
gas oil	thousand t	2.81	2.26	2.74	1.97	2.25
	thousand toe	3.08	2.3	2.81	2.04	2.33
natural gas	million m^3	76.2	73.6	43.3	28.7	0.198
	thousand toe	60.9	58.7	34.6	26.6	0.18
non-technologically captive use	*million m^3*	*76.2*	*73.6*	*43.3*	*28.7*	*0.198*
	thousand toe	*60.9*	*58.7*	*34.6*	*26.6*	*0.18*
coal	thousand t	428	406	135	201	459
	thousand toe	260	236	78,2	117	266
Total	thousand toe	332	327	149	190	299
	TJ	13,884	13,683	6,219	7,940	12,516

		2009	2010	2011	2012	2013
Various activities	thousand toe	0	0	0	0	0.02
Grand total	**thousand toe**	**332**	**327**	**149**	**190**	**299**
	TJ	**13,884**	**13,683**	**6,219**	**7,940**	**12,517**
EN4 **Primary electricity**						
Various activities	million kWh	0	0	1.3	1.25	2.18
EN8 **Water for industrial uses**						
From rivers (including second-flush rainwater)	million m^3	0.338	0.14	0.096	0.078	0.169
From aqueducts	million m^3	0.097	0.116	0.075	0.079	0.048
Total abstraction from inland waters	**million m^3**	**0.435**	**0.256**	**0.171**	**0.157**	**0.217**
EN8 EN21 **Open-cycle cooling water**						
For thermal generation	million m^3	210	205	128	146	190
Water for non-industrial uses						
Real-estate & service management	million m^3	0	0	0.752	0.005	0.016
EN1 **Expendables**						
Hydrazine	t	2.89	4.69	4.4	4.69	5.79
Sodium hypochlorite	t	10	7.11	14.2	14	14
Trisodium phosphate	t	0.034	0.05	0	0.034	0.034
Sulfuric & hydrochloric acids	t	103	120	108	115	137
Caustic soda	t	158	172	170	166	183
Lubricating oil	t	19.3	12.7	17.8	19.5	10.8
Dielectric oil	t	1.18	25	23	5.49	5.51
Printing paper	t	0	0	0	9.3	5.71
Other	t	10.6	12.5	30.7	16.4	17.7
Total	**t**	**306**	**355**	**368**	**350**	**380**
for thermal generation	t	299	321	330	323	360
for hydro generation	t	6.8	8.32	15.2	13	8.56
for electricity distribution	t	0	25	23	5.46	5.46
EN1 **PCB survey**						
Equipment & transformers with PCBs > 500 ppm (excluding oil)	t	33	35.6	35.6	36.5	36.3
Oil with PCBs > 500 ppm contained in equipment & transformers	t	0	0.74	0.74	0.94	0
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding oil)	t	54.5	36	36	37.8	36.4
Oil with PCBs >50 ppm and ≤ 500 ppm contained in equipment & transformers	t	46	1.2	1.21	0.001	0.801

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	million kWh	973	1,030	470	602	964
fuel oil & gas oil	million kWh	31.7	87.7	154	131	91.5
natural gas	million kWh	202	158	52.1	72	0.504
coal	million kWh	740	784	264	398	872
From renewables	million kWh	11,701	10,253	11,620	12,692	11,784
hydro from natural flows	million kWh	11,701	10,253	11,620	12,692	11,784
Total	million kWh	12,674	11,283	12,090	13,294	12,748
Electricity consumption for pumping	million kWh	96.6	99.2	0	96.5	118
Electricity distribution						
Electricity distributed	million kWh	4,418	12,141	8,041	8,193	8,274
EN4 Electricity consumption for grid operation	million kWh	7	9.37	128	11.7	10

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	8.51	9.19	3.48	4.8	9.73
EN20 NO_x	thermal generation	thousand t	2.39	5.23	2.02	1.3	1.87
EN20 Particulates	thermal generation	thousand t	1.69	1.93	0.613	0.302	0.274
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	1,124	944	425	568	1,030
	various activities	thousand t	0	0	0	0	0.059
	Total	thousand t	1,124	944	425	568	1,030
EN16 SF_6	electricity generation	kg	0	12.5	605	269	370
	electricity distribution	kg	83	115	182	181	168
	Total	kg	83	127	787	451	538
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		thousand t of CO_2 equivalent	1,126	947	443	579	1,042
EN18 Avoided CO_2 emissions							
Due to hydro generation from natural flows		thousand t	13,513	9,394	10,496	11,989	12,589
EN21 Waste waters (discharged quantity)	thermal generation	million m^3	0.087	0.049	0.03	0.028	0.042
EN21 Conventional polluting load of waste waters discharged by plants							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	0	0	6.21	6.82	0
	in some plants with an overall capacity of	MW	0	0	208	208	0
Total nitrogen (expressed as N)	thermal generation	kg	2.62	762	510	317	0
	in some plants with an overall capacity of	MW	208	208	208	208	0
Total phosphorus (expressed as P)	thermal generation	kg	0.04	11.8	158	25.3	0
	in some plants with an overall capacity of	MW	208	208	208	208	0

	Source		2009	2010	2011	2012	**2013**
COD	thermal generation	kg	1,622	9,860	1,634	8,559	0
	in some plants with an overall capacity of	MW	444	236	444	444	0
BOD	thermal generation	kg	885	30,973	139	885	0
	in some plants with an overall capacity of	MW	444	444	444	444	0
EN22 Non-hazardous special waste							
Coal bottom ash	thermal generation						
	production	t	53,055	57,352	17,703	25,025	56,436
	delivery to recovery operators	t	0	0	46,506	25,025	140,557
Oil bottom ash	thermal generation						
	production	t	0	0	0	0	99
Other							
production	electricity generation	t	277	1,512	1,412	1,382	1,120
	electricity distribution	t	34,279	50,594	73,786	56,517	30,208
	Total	t	34,556	52,106	75,198	57,899	31,328
delivery to recovery operators	electricity generation	t	59,3	383	591	363	303
	electricity distribution	t	4,396	1,597	3,360	3,156	2,727
	Total	t	4,456	1,980	3,951	3,518	3,030
Total							
production	**electricity generation**	**t**	**53,333**	**58,864**	**19,114**	**26,407**	**57,655**
	electricity distribution	**t**	**34,279**	**50,594**	**73,786**	**56,517**	**30,208**
	Total	**t**	**87,612**	**109,458**	**92,900**	**82,924**	**87,863**
delivery to recovery operators	**electricity generation**	**t**	**59.3**	**383**	**47,097**	**25,387**	**140,860**
	electricity distribution	**t**	**4,396**	**1,597**	**3,360**	**3,156**	**2,727**
	Total	**t**	**4,456**	**1,980**	**50,457**	**28,543**	**143,587**
EN22 Hazardous special waste							
Oil flyash	thermal generation						
	production	t	0	0.506	2.26	0	0
Other							
production	electricity generation	t	84.3	86.2	53.1	99.4	69.1
	electricity distribution	t	220	233	303	208	242
	various activities	t	0	0	0.03	0	0
	Total	**t**	**304**	**319**	**356**	**308**	**311**
	of which with PCBs						
	electricity generation	*t*	*48.4*	*0.068*	*0*	*0*	*0*
	electricity distribution	*t*	*0*	*0*	*0*	*43.3*	*39.5*
	Total	***t***	***48.4***	***0.068***	***0***	***43.3***	***39.5***
delivery to recovery operators	electricity generation	t	26.7	43.3	26.4	33.5	35.8
	electricity distribution	t	216	123	192	127	156
	Total	**t**	**243**	**166**	**219**	**160**	**192**
	of which with PCBs						
	electricity generation	*t*	*19.3*	*0*	*0*	*0*	*0*
	Total	***t***	***19.3***	***0***	***0***	***0***	***0***
Total							
production	**electricity generation**	**t**	**84.3**	**86.7**	**55.4**	**99.4**	**69.1**
	electricity distribution	**t**	**220**	**233**	**303**	**208**	**242**
	various activities	**t**	**0**	**0**	**0.03**	**0**	**0**
	Total	**t**	**304**	**320**	**358**	**308**	**311**

	Source		2009	2010	2011	2012	2013
delivery to recovery operators	electricity generation	t	26.7	43.3	26.4	33.5	35.8
	electricity distribution	t	216	123	192	127	156
	Total	t	**243**	**166**	**219**	**160**	**192**
EN22 Total special waste							
production	electricity generation	t	53,417	58,951	19,169	26,506	57,724
	electricity distribution	t	34,499	50,827	74,089	56,726	30,450
	various activities	t	0	0	0.03	0	0
	Total	t	**87,916**	**109,778**	**93,259**	**83,231**	**88,174**
delivery to recovery operators	electricity generation	t	86	426	47,123	25,421	140,896
	electricity distribution	t	4,613	1,720	3,552	3,282	2,883
	Total	t	**4,699**	**2,146**	**50,676**	**28,703**	**143,779**

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN29 Land								
LV cable lines								
overhead	% of entire LV grid	3.31	3.3	3	40.9	42.2	1,174.9	3.2
underground	% of entire LV grid	3.11	3.36	4	9.15	7.98	156.6	-12.8
Total cable lines	**% of entire LV grid**	**6.42**	**6.66**	**7**	**50**	**50.2**	**681.9**	**0.4**
MV cable lines								
overhead	% of entire MV grid	0.879	0.876	1	2.2	2.06	134.4	-6.4
underground	% of entire MV grid	14.8	15.1	15	15.7	13.5	-8.8	-14
Total cable lines	**% of entire MV grid**	**15.7**	**16**	**16**	**17.9**	**15.5**	**-1.3**	**-13.4**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	10.4	10.6	10.7	35.9	35.1	237.5	-2.2
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation	kcal/kWh	3,407	3,172	3,160	3,152	3,101	-9	-1.6
EN4 Electricity consumption for distribution grid operation	% of electricity distributed	0.158	0.077	1.59	0.143	0.121	-23.4	-15.4
EN8 Net specific consumption of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	0.447	0.249	0.364	0.261	0.225	-49.7	-13.8
excluding contribution of as-is sea water	liters/kWh	0.447	0.249	0.364	0.261	0.225	-49.7	-13.8
Total net specific consumption of water for industrial uses	liters/kWh	0.034	0.023	0.014	0.012	0.017	-50	41.7
EN8 Coverage of requirements of water for industrial uses								
From rivers (including second-flush rainwater)	% of requirements	77.7	54.7	56.1	49.7	77.9	0.3	56.7
from aqueducts	% of requirements	22.3	45.3	43.9	50.3	22.1	-0.9	-56.1
Total from inland waters	**% of requirements**	**100**	**100**	**100**	**100**	**100**	**0**	**0**
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	2.23	9.17	22.2	23.3	10	348.4	-57.1
gas oil	% of total fuel consumption	0.928	0.705	1.89	1.07	0.78	-15.9	-27.1
natural gas	% of total fuel consumption	18.4	18	23.3	14	0.06	-99.7	-99.6
coal	% of total fuel consumption	78.5	72.2	52.6	61.6	89.1	13.5	44.6

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
MS fuel oil	% of total fuel-oil consumption	100	73.6	100	100	6.3	-93.7	-93.7
LS fuel oil	% of total fuel-oil consumption	0	26.4	0	0	93.7	-	-
natural gas, non-technologically captive use	% of total natural-gas consumption	100	100	100	100	100	0	0
Electricity generation from renewables								
hydro from natural flows	% of total generation	92.3	90.9	96.1	95.5	92.4	0.1	-3.2
Specific emissions into the atmosphere								
EN20 SO_2 (simple thermal generation)	g/kWh thermal net	8.74	8.92	7.4	7.98	10.1	15.6	26.6
EN20 NO_x (simple thermal generation)	g/kWh thermal net	2.46	5.07	4.3	2.15	1.94	-21.1	-9.8
EN20 Particulates (simple thermal generation)	g/kWh thermal net	1.73	1.87	1.3	0.502	0.284	-83.6	-43.4
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	1,155	916	903	945	1,068	-7.5	13
EN20 SO_2 (total from simple thermal generation)	g/kWh total net	0.671	0.814	0.288	0.361	0.764	13.9	111.6
EN20 NO_x (total from simple thermal generation)	g/kWh total net	0.189	0.463	0.167	0.097	0.146	-22.8	50.5
EN20 Particulates (total from simple thermal generation)	g/kWh total net	0.133	0.171	0.051	0.023	0.021	-84.2	-8.7
EN16 CO_2 (total from simple thermal generation)	g/kWh total net	88.7	83.7	35.1	42.7	80.8	-8.9	89.2
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.297	0.46	2.76	1.58	1.88	533	19
Net specific conventional polluting load of waste waters discharged by plants								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net	0	0	0.031	0.034	0	-	0
Total nitrogen (expressed as N)	mg/kWh thermal net	0.012	3.18	2.57	1.59	0	-100	0
Total phosphorus (expressed as P)	mg/kWh thermal net	0	0.049	0.795	0.127	0	-	0
COD	mg/kWh thermal net	1.67	12.5	3.54	14.4	0	-100	0
BOD	mg/kWh thermal net	0.909	30	0.3	1.49	0	-100	0
EN22 **Specific waste production**								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	71.7	73.1	67.1	62.8	64.7	-9.8	3
Oil flyash (thermal generation)	g/kWh net from fuel oil & gas oil	0	0.006	0.015	0	0	0	0
Oil bottom ash (thermal generation)	g/kWh net from fuel oil & gas oil	0	0.006	0.015	0	1.08	0	-
EN22 **Waste recovery**								
Coal and brown-coal ash	% of production	0	0	263	100	249	0	149
bottom	% of production	0	0	263	100	249	0	149
Other non-hazardous special waste								
electricity generation	% of production	21.4	25.3	41.9	26.2	27	26.2	3.1
electricity distribution	% of production	12.8	3.16	4.55	5.58	9.03	-29.5	61.8
Total	% of production	12.9	3.8	5.25	6.08	9.67	-25	59
Total non-hazardous special waste								
electricity generation	% of production	0.111	0.651	246	96.1	244	219,719.8	153.9
electricity distribution	% of production	12.8	3.16	4.55	5.58	9.03	-29.5	61.8
Total	% of production	5.09	1.81	54.3	34.4	163	3,102.4	373.8

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Other hazardous special waste								
electricity generation	% of production	31.7	50.2	49.7	33.7	51.8	63.4	53.7
electricity distribution	% of production	98.3	52.8	63.5	60.7	64.4	-34.5	6.1
Total	**% of production**	**79.9**	**52.1**	**61.5**	**52**	**61.6**	**-22.9**	**18.5**
Total special waste								
electricity generation	% of production	0.161	0.723	246	95.9	244	151,452.8	154.4
electricity distribution	% of production	13.4	3.38	4.8	5.79	9.47	-29.3	63.6
Total	**% of production**	**5.35**	**1.96**	**54.3**	**34.5**	**163**	**2,946.7**	**372.5**

Costa Rica

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	3	3	3	3	3
hydro	no.	2	2	2	2	2
wind	no.	1	1	1	1	1
Net maximum electrical capacity	MW	55	55	55	55	55
hydro	MW	31	31	31	31	31
wind	MW	24	24	24	24	24
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	0	20	12	12	0
special vehicles	no.	0	1	1	1	1
Gross real-estate surface area	thousand m^2	0	0.8	0.8	0.8	0.8

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Various activities	thousand toe	0	0	0.034	0.042	0.044
	TJ	0	0	1.42	1.76	1.84
EN4 **Primary electricity**						
Various activities	million kWh	0	0.277	0.014	30.2	30.2
Water for non-industrial uses						
Real-estate & service management	million m^3	0	0	0	0.088	0.089
EN1 **Expendables**						
Lubricating oil	t	0.229	1.38	1.96	0.51	0.951
Other	t	0	0	1.07	1.1	0.098
Total	t	0.229	1.38	3.03	1.61	1.05
for hydro generation	t	0.119	0.922	2.05	1.52	0.585
for wind generation	t	0.11	0.46	0.983	0.091	0.464

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From renewables	million kWh	191	199	170	189	167
hydro from natural flows	million kWh	116	142	114	115	99.4
wind	million kWh	75.1	57.1	56.6	73.7	68

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN16 CO_2	various activities	thousand t	0	0	0.105	0.13	0.134
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	71.2	79	63.1	68.5	59.3
Due to wind generation		thousand t	46	31.7	31.4	44	40.6
Due to generation from renewables		thousand t	117	111	94.6	112	99.9
EN22 **Non-hazardous special waste**							
	production						
	electricity generation	t	108	114	1,325	28.3	40.1
	various activities	t	0	0.01	0.1	0.1	0.1
	Total	t	108	114	1,325	28.4	40.2
	delivery to recovery operators						
	electricity generation	t	4.48	3.61	1,229	8.31	11.1
	Total	t	4.48	3.61	1,229	8.31	11.1
EN22 **Hazardous special waste**							
	production						
	electricity generation	t	0.664	0.001	6.84	1.39	1.95
	delivery to recovery operators						
	electricity generation	t	0.664	0.001	6.84	1.36	1.54
EN22 **Total special waste**							
production	electricity generation	t	109	114	1,331	29.7	42
	various activities	t	0	0.01	0.1	0.1	0.1
	Total	t	109	114	1,332	29.8	42.1
delivery to recovery operators	electricity generation	t	5.15	3.62	1,236	9.67	12.7

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Electricity generation from renewables								
hydro from natural flows	% of total generation	60.7	71.3	66.7	60.9	59.4	-2.1	-2.5
wind	% of total generation	39.3	28.7	33.3	39.1	40.6	3.3	3.8
EN22 **Waste recovery**								
Non-hazardous special waste								
electricity generation	% of production	4.15	3.18	92.8	29.3	27.7	567.5	-5.5
Hazardous special waste								
electricity generation	% of production	100	100	100	97.9	79	-21	-19.3
Total special waste								
electricity generation	% of production	4.73	3.18	92.8	32.5	30.1	536.4	-7.4

Guatemala

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	4	4	4	5	5
hydro	no.	4	4	4	5	5
Net maximum electrical capacity	MW	76.5	76.5	76.5	164	164
hydro	MW	76.5	76.5	76.5	164	164
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	0	0	10	22	0
special vehicles	no.	0	0	3	7	0
vehicles for both private and service use	no.	0	8	8	9	0
Gross real-estate surface area	thousand m^2	0	0.7	0.7	0.7	0

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Real-estate management	thousand toe	0.001	0.014	0.051	0.043	0
	TJ	0.042	0.586	2.14	1.8	0
EN4 **Primary electricity**						
Real-estate management	million kWh	0	0.047	3.71	4.51	4.48
Water for non-industrial uses						
Real-estate management	million m^3	0	0	0.001	0.001	0.001
EN1 **Expendables**						
Lubricating oil	t	1.1	0.677	0.361	1.47	0
Dielectric oil	t	0	8.5	0.02	0.01	0
Printing paper	t	0	2.48	3.05	3.57	0
Total	t	1.1	11.7	3.43	5.05	0
for hydro generation	t	1.1	9.18	0.381	1.48	0

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
Hydro generation	million kWh	287	354	356	582	665

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN16 CO_2	real-estate management	thousand t	0	0.022	0.136	0.138	0.065
EN18 **Avoided CO_2 emissions**							
Due to hydro generation		thousand t	176	197	198	278	318
EN22 **Non-hazardous special waste**							
production	electricity generation	t	48.2	342	175	89.6	89.6
	real-estate management	t	0	0.014	0.016	0	0
	Total	**t**	**48.2**	**342**	**175**	**89.6**	**89.6**
delivery to recovery operators	electricity generation	t	25.2	24.1	17.6	7.43	6.79
	Total	**t**	**25.2**	**24.1**	**17.6**	**7.43**	**6.79**
EN22 **Hazardous special waste**							
production	electricity generation	t	0.895	0.071	0.128	0.031	0.579
delivery to recovery operators	electricity generation	t	0	0.02	0.04	0.031	0.579
EN22 **Total special waste**							
production	electricity generation	t	49.1	342	175	89.6	90.2
	real-estate management	t	0	0.014	0.016	0	0
	Total	**t**	**49.1**	**342**	**175**	**89.6**	**90.2**
delivery to recovery operators	electricity generation	t	25.2	24.1	17.6	7.46	7.37
	Total	**t**	**25.2**	**24.1**	**17.6**	**7.46**	**7.37**

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Electricity generation from renewables								
hydro from natural flows	% of total generation	100	100	100	100	100	0	0
EN22 **Waste recovery**								
Non-hazardous special waste								
electricity generation	% of production	52.4	7.05	10.1	8.29	7.58	-85.5	-8.6
Hazardous special waste								
electricity generation	% of production	0	28.2	31.3	100	100	-	0
Total special waste								
electricity generation	% of production	51.5	7.05	10.1	8.32	8.18	-84.1	-1.7

Mexico

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	3	3	3	4	6
hydro	no.	3	3	3	3	3
wind	no.	0	0	0	1	2
solar (photovoltaic)	MW	0	0	0	0	1
Net maximum electrical capacity	**MW**	**52.4**	**52.5**	**52.5**	**197**	**197**
hydro	MW	52.4	52.5	52.5	52.5	52.5
wind	MW	0	0	0	144	144
solar (photovoltaic)	MW	0	0	0	0	0.1
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	0	0	24	20	28
vehicles for both private and service use	no.	0	0	5	0	0
Gross real-estate surface area	**thousand m^2**	**0**	**0**	**0.592**	**0.015**	**16**

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Real-estate management	thousand toe	na	na	0.08	0.034	0.072
	TJ	na	na	3.35	1.42	3.01
EN4 **Primary electricity**						
Real-estate management	million kWh	na	na	0.481	53	75.1
Water for non-industrial uses						
Real-estate management	million m^3	na	na	na	na	0.003
EN1 **Expendables**						
Lubricating oil	t	0.541	1.01	1.09	3.5	2.74
Dielectric oil	t	0	0	0	3.5	1.8
Printing paper	t	na	na	0.269	0.15	0.499
Other	t	0.006	0	0	0	2.87
Total	**t**	**0.547**	**1.01**	**1.36**	**7.15**	**7.91**
for hydro generation	t	0.547	1.01	1.09	6	3.48
for wind generation	t	na	na	na	1	3.93

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From renewables	million kWh	**178**	**277**	**231**	**364**	**650**
hydro from natural flows	million kWh	178	277	231	203	167
wind	million kWh	0	0	0	162	483
solar (photovoltaic)	million kWh	0	0	0	0	0.18

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN16 CO_2	various activities	thousand t	0	0	0.234	0.104	0.214
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	109	154	128	101	82.7
Due to wind and solar generation		thousand t				80.4	239
Due to generation from renewables		thousand t	109	154	128	181	322
EN22 **Non-hazardous special waste**							
production	electricity generation	t	0	1.22	1.75	na	na
	Total	**t**	**0**	**1.22**	**1.75**	**na**	**na**
delivery to recovery operators	electricity generation	t	0.002	1.19	1.91	na	na
	Total	**t**	**0.002**	**1.19**	**1.91**	**na**	**na**
EN22 **Hazardous special waste**							
production	electricity generation	t	0	0.931	0.078	na	na
	various activities	t	0	0	0.001	na	0.31
	Total	**t**	**0**	**0.931**	**0.079**	**na**	**na**
delivery to recovery operators	electricity generation	t	0	0.158	0	na	na
	Total	**t**	**0**	**0.158**	**0**	**na**	**na**
EN22 **Total special waste**							
production	electricity generation	t	0	2.15	1.83	na	na
	various activities	t	0	0	0.001	na	0.31
	Total	**t**	**0**	**2.15**	**1.83**	**na**	**na**
delivery to recovery operators	electricity generation	t	0.002	1.35	1.91	na	na
	Total	**t**	**0.002**	**1.35**	**1.91**	**na**	**na**

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Electricity generation from renewables								
hydro from natural flows	% of total generation	100	100	100	55.6	25.7	-74.3	-53.8
wind and solar (photovoltaic)	% of total generation	0	0	0	44.4	74.3	-	67.3
Total	**% of total generation**	**100**	**100**	**100**	**100**	**100**	**0**	**0**
EN22 **Waste recovery**								
Non-hazardous special waste								
electricity generation	% of production		97.5	109	na	na	na	na
Hazardous special waste								
electricity generation	% of production		17	0	na	na	na	na
Total special waste								
electricity generation	% of production		62.7	105	na	na	na	na

Panama

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants (hydro)	no.	1	1	1	1	1
Net maximum electrical capacity (hydro)	MW	300	300	300	300	300
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	0	47	46	46	0

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Real-estate management	thousand toe	na	0.109	0.121	0.121	na
	TJ	na	4.56	5.07	5.07	na
Water for non-industrial uses						
Real-estate management	million m^3	na	0.01	0.013	0.013	na
EN1 **Expendables**						
Lubricating oil	t	4.07	3.87	3.26	3.26	6.44
Dielectric oil	t	0	0	2.64	2.64	0.35
Other	t	0	0	8.32	10.5	0
Total	t	**4.07**	**3.87**	**14.2**	**16.4**	**6.79**

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From renewables (hydro from natural flows)	million kWh	1,792	1,793	1,543	1,666	1,219

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN16 CO_2	real-estate management	thousand t	0	0.336	0.37	0.465	0.176
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	1,098	996	857	1,136	848
EN22 **Non-hazardous special waste**							
	production						
	electricity generation	t	10.4	47.3	53.1	20.6	12.9
	real-estate management	t	0	0.754	0.645	1.69	0
	Total	**t**	**10.4**	**48**	**53.7**	**22.3**	**12.9**
	delivery to recovery operators						
	electricity generation	t	8.75	31.7	32.6	20.6	0
EN22 **Hazardous special waste**							
production	electricity generation	t	0	4.81	4.4	2.35	5.6
	real-estate management	t	0	4.14	4.25	1.8	0
	Total	**t**	**0**	**8.95**	**8.65**	**4.15**	**5.6**
delivery to recovery operators	electricity generation	t	0	4.81	4.4	2.35	0
	Total	**t**	**0**	**4.81**	**4.4**	**2.35**	**0**
EN22 **Total special waste**							
production	electricity generation	t	10.4	52.1	57.5	23	18.5
	real-estate management	t	0	4.89	4.89	3.49	0
	Total	**t**	**10.4**	**57**	**62.4**	**26.5**	**18.5**
delivery to recovery operators	electricity generation	t	8.75	36.5	37	23	0
	Total	**t**	**8.75**	**36.5**	**37**	**23**	**0**

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Electricity generation from renewables								
hydro from natural flows	% of total generation	100	100	100	100	100	0	0
EN22 **Waste recovery**								
Non-hazardous special waste								
electricity generation	% of production	84.1	67	61.4	100	0	-100	0
Hazardous special waste								
electricity generation	% of production		100	100	100	0		0
Total special waste								
electricity generation	% of production	84.1	70.1	64.4	100	0	-100	0

Peru

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants	no.	10	10	10	10	10
thermal	no.	3	3	3	3	3
hydro	no.	7	7	7	7	7
Net maximum electrical capacity	MW	1,774	1,775	1,774	1,748	1,821
thermal	MW	1,037	1,037	1,035	1,009	1,078
hydro	MW	737	739	739	739	743
Power lines (circuit-length)						
Total	km	22,741	23,378	24,144	25,266	26,094
high-voltage	km	436	449	464	471	501
medium-voltage	km	3,597	3,694	3,854	4,064	4,191
low-voltage	km	18,708	19,234	19,826	20,731	21,402
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	0	0	28	20	15
special vehicles	no.	0	0	2	2	1
Gross real-estate surface area	thousand m²	0	0	106	17.8	17.7

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Thermal generation						
gas oil	thousand t	4.81	0.417	0.712	9.66	2.11
	thousand toe	4.73	0.461	0.733	10.7	2.16
natural gas	million m³	942	1,106	1,219	1,099	919
	thousand toe	822	961	1,060	976	777
technologically captive use	*million m³*	*942*	*1,085*	*1,196*	*1,083*	*911*
	thousand toe	*822*	*942*	*1,040*	*962*	*770*
of which in combined-cycle units	million m³	609	596	595	504	540
	thousand toe	534	520	519	460	471
non-technologically captive use	*million m³*	*0*	*21*	*22.7*	*15.8*	*8.31*
	thousand toe	*0*	*18.3*	*19.8*	*13.7*	*7.2*
Total	thousand toe	827	961	1,061	986	779
	TJ	34,614	40,236	44,416	41,290	32,614
Real-estate & service management	thousand toe	0	0	0.04	0.034	0.02
Grand total	thousand toe	827	961	1,061	986	779
	TJ	34,614	40,236	44,418	41,292	32,614

		2009	2010	2011	2012	2013
EN1 EN3 Biomass and waste						
Thermal generation						
Liquid biomass	t	0	0	0	0	0.209
	toe	0	0	0	0	0.212
EN4 Primary electricity						
Real-estate & service management	million kWh	na	na	4.08	3.91	3.58
EN8 Water for industrial uses						
From wells	million m^3	3.3	2.98	3.36	3.12	3.23
From aqueducts	million m^3	0.072	0.041	0.05	0.089	0.022
Total abstraction from inland waters	**million m^3**	**3.38**	**3.02**	**3.41**	**3.2**	**3.25**
Total consumption	**million m^3**	**3.38**	**3.02**	**3.41**	**3.2**	**3.25**
for thermal generation	million m^3	3.38	3.02	3.41	3.2	3.25
Water for non-industrial uses						
Real-estate & service management	million m^3	na	na	0.011	0.017	0.018
EN1 Expendables						
Hydrazine	t	0.22	0.23	0.12	0.035	0
Ammonia	t	6.37	7.09	6.37	7.3	7.13
Sodium hypochlorite	t	90.6	82.9	83.8	85.9	63.5
Sulfuric & hydrochloric acids	t	665	588	685	591	591
Caustic soda	t	10.5	3.57	5.93	7.49	8.12
Lubricating oil	t	17	191	18.3	20	37.8
Dielectric oil	t	1.33	2.5	3.5	2.67	1.71
Printing paper	t	na	na	0.009	21.8	14.3
Other	t	21.4	17.1	14.1	17.3	15.5
Total	**t**	**812**	**892**	**817**	**754**	**739**
for thermal generation	t	804	878	810	723	719
for hydro generation	t	7.21	9.27	2.72	5.96	3.85
for electricity distribution	t	1.33	4.5	3.5	2.67	1.71

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels	**million kWh**	**4,164**	**4,728**	**5,225**	**4,632**	**4,054**
fuel oil & gas oil	million kWh	15.9	2.17	2.86	25.9	231
natural gas	million kWh	4,148	4,726	5,223	4,606	3,823
of which in combined-cycle units	*million kWh*	*3,179*	*3,040*	*2,153*	*2,805*	*2,774*
From renewables	**million kWh**	**4,564**	**4,405**	**4,615**	**4,599**	**4,474**
hydro from natural flows	million kWh	4,564	4,405	4,615	4,599	4,474
Total	**million kWh**	**8,728**	**9,133**	**9,840**	**9,231**	**8,528**
Electricity distribution						
Electricity distributed	million kWh	5,716	6,126	6,017	6,289	6,456
EN4 Electricity consumption for grid operation	million kWh	10	9.76	9.91	11	14.1

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	0.096	0.073	0.016	0.095	0.131
EN20 NO_x	thermal generation	thousand t	2.48	2.18	1.93	1.57	2.01
EN20 Particulates	thermal generation	thousand t	0.087	0.104	0.042	0.032	0.096
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	1,671	1,959	2,125	1,953	1,571
	real-estate management and services	thousand t	0	0.086	0.102	0.099	0.058
EN16 SF_6	electricity distribution	kg	5.5	51.5	23	5	1
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		thousand t of CO_2 equivalent	1,671	1,960	2,125	1,953	1,571
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	1,832	1,825	1,876	1,939	1,734
EN21 **Waste waters (discharged quantity)**	thermal generation	million m³	0.039	0.083	1.56	1.39	1.22
EN22 **Non-hazardous special waste**							
production	electricity generation	t	798	731	734	836	610
	electricity distribution	t	2,489	35,305	44,971	76,157	82,829
	real-estate management and services	t	0	0	0	0.08	4.61
	Total	**t**	**3,287**	**36,036**	**45,704**	**76,993**	**83,444**
delivery to recovery operators	electricity generation	t	0.762	21	18.4	0	0
	electricity distribution	t	555	1,364	633	1,028	806
	Total	**t**	**556**	**1,385**	**652**	**1,028**	**806**
EN22 **Hazardous special waste**							
	production						
	electricity generation	t	217	377	359	183	289
	electricity distribution	t	17.8	25.1	15.3	57.7	79.4
	real-estate management and services	t	0	0	4.58	0.499	499
	Total	**t**	**235**	**402**	**379**	**241**	**867**
	of which with PCBs						
	real-estate management and services	*t*	*0*	*0*	*1.23*	*0*	*0*
	Total	***t***	***0***	***0***	***1.23***	***0***	***0***
	delivery to recovery operators						
	electricity generation	t	76.5	1.86	260	0	0

	Source		2009	2010	2011	2012	2013
	electricity distribution	t	2.91	5.21	0	28.6	53.1
	Total	**t**	**79.4**	**7.07**	**260**	**28.6**	**53.1**
EN22 Total special waste							
production	electricity generation	t	1,015	1,108	1,093	1,019	899
	electricity distribution	t	2,507	35,330	44,986	76,215	82,908
	real-estate management and services	t	0	0	4.58	0.579	503
	Total	**t**	**3,522**	**36,438**	**46,084**	**77,234**	**84,311**
delivery to recovery operators	electricity generation	t	77.3	22.9	278	0	0
	electricity distribution	t	558	1,369	633	1,056	859
	Total	**t**	**635**	**1,392**	**912**	**1,056**	**859**

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN29 Land								
LV cable lines								
overhead	% of entire LV grid	42.6	43.2	44.2	46.1	47	10.3	2
underground	% of entire LV grid	57.4	56.8	55.8	53.9	53	-7.7	-1.7
Total cable lines	**% of entire LV grid**	**100**	**100**	**100**	**100**	**100**	**0**	**0**
MV cable lines								
overhead	% of entire MV grid	1.86	1.81	0	0	0	-100	-
underground	% of entire MV grid	47.5	47.1	48.7	49.2	50.4	6.1	2.4
Total cable lines	**% of entire MV grid**	**49.4**	**48.9**	**48.7**	**49.2**	**50.4**	**2**	**2.4**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	90.2	90.2	90	90.2	90.4	0.2	0.2
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation	kcal/kWh	1,986	2,033	2,030	2,129	1,921	-3.3	-9.8
EN4 Electricity consumption for distribution grid operation	% of electricity distributed	0.175	0.159	0.165	0.175	0.219	25.1	25.1
EN8 Net specific consumption of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	0.811	0.638	0.653	0.692	0.802	-1.1	15.9
excluding contribution of as-is sea water	liters/kWh	0.811	0.638	0.653	0.692	0.802	-1.1	15.9
Total net specific consumption of water for industrial uses	liters/kWh	0.387	0.33	0.347	0.347	0.381	-1.6	9.8
EN8 Coverage of requirements of water for industrial uses								
from wells	% of requirements	97.9	98.6	98.5	97.2	99.3	1.4	2.2
from aqueducts	% of requirements	2.13	1.36	1.47	2.78	0.677	-68.2	-75.6
Total from inland waters	**% of requirements**	**100**	**100**	**100**	**100**	**100**	**0**	**0**
EN1 EN3 Fossil fuel consumption for thermal generation								
gas oil	% of total fuel consumption	0.572	0.048	0.069	1.08	0.278	-51.4	-74.3
natural gas	% of total fuel consumption	99.4	100	99.9	98.9	99.7	0.3	0.8

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
natural gas, technologically captive use	% of total natural-gas consumption	100	98.1	98.1	98.6	99.1	-0.9	0.5
of which in combined-cycle units	*% of total natural-gas consumption*	*64.9*	*54.1*	*49*	*47.2*	*60.6*	*-6.6*	*28.4*
natural gas, non-technologically captive use	% of total natural-gas consumption	0	1.9	1.87	1.4	0.927	-	-33.8
Electricity generation from renewables								
hydro from natural flows	% of total generation	52.3	48.2	46.9	49.8	52.5	0.4	5.4
Specific emissions into the atmosphere								
EN20 SO_2 (simple thermal generation)	g/kWh thermal net	0.023	0.015	0.003	0.021	0.032	39.1	52.4
EN20 NO_x (simple thermal generation)	g/kWh thermal net	0.597	0.461	0.369	0.34	0.495	-17.1	45.6
EN20 Particulates (simple thermal generation)	g/kWh thermal net	0.021	0.022	0.008	0.007	0.024	14.3	242.9
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	401	414	407	422	387	-3.5	-8.3
EN20 SO_2 (total from simple thermal generation)	g/kWh total net	0.011	0.008	0.002	0.01	0.015	36.4	50
EN20 NO_x (total from simple thermal generation)	g/kWh total net	0.285	0.239	0.196	0.17	0.235	-17.5	38.2
EN20 Particulates (total from simple thermal generation)	g/kWh total net	0.01	0.011	0.004	0.003	0.011	10	266.7
EN16 CO_2 (total from simple thermal generation)	g/kWh total net	191	214	216	212	184	-3.7	-13.2
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.297	2.39	1.45	0.289	0.056	-81.1	-80.6
EN22 Waste recovery								
Non-hazardous special waste								
electricity generation	% of production	0.095	2.88	2.51	0	0	-100	-
electricity distribution	% of production	22.3	3.86	1.41	1.35	0.973	-95.6	-27.9
Hazardous special waste								
electricity generation	% of production	35.3	0.492	72.3	0	0	-100	-
electricity distribution	% of production	16.4	20.8	0	49.5	66.9	307.9	35.2
Total special waste								
electricity generation	% of production	7.62	2.07	25.5	0	0	-100	-
electricity distribution	% of production	22.3	3.87	1.41	1.39	1.04	-95.3	-25.2
Total	**% of production**	**18**	**3.82**	**1.98**	**1.37**	**1.02**	**-94.3**	**-25.5**

Africa

Morocco

Status data

		2009	2010	2011	2012	2013
Power-generating installations						
Power plants (thermal)	no.		1	1	1	1
Net maximum electrical capacity (thermal)	MW		123	123	123	123

Resources

		2009	2010	2011	2012	2013
EN1 EN3 **Fossil fuels**						
Thermal generation						
natural gas	million m^3		119	123	157	148
	thousand toe		107	110	140	136
	TJ		4,465	4,585	5,859	5,681
EN8 **Water for industrial uses**						
From aqueducts	million m^3		0.019	0.019	0.013	0.014
Total abstraction from inland waters	**million m^3**		**0.019**	**0.019**	**0.013**	**0.014**
From the sea (as-is)	million m^3		0.194	0.194	2.69	0
Total consumption	**million m^3**		**0.213**	**0.213**	**2.7**	**0.014**
EN8 EN21 **Open-cycle cooling water**						
For thermal generation	million m^3		0	0	0	2.71
EN1 **Expendables**						
Resins	t		0.016	0	0	0
Hydrazine	t		0.096	0.006	0.064	0
Ammonia	t		0.64	0.96	1.28	1.7
Sodium hypochlorite	t		41.9	17.3	2.37	0.94
Trisodium phosphate	t		0.064	0	0	0
Sulfuric & hydrochloric acids	t		2.24	1.6	3.71	3
Caustic soda	t		2.24	2.56	0	0
Other	t		7.68	11.5	5.29	20
Total	**t**		**54.9**	**33.9**	**12.7**	**25.6**

Processes and products

		2009	2010	2011	2012	2013
Electricity generation (net)						
From fossil fuels (natural gas)	million kWh		689	745	906	852

Emissions

	Source		2009	2010	2011	2012	2013
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t		0.191	0.191	0.244	0.003
EN20 NO_x	thermal generation	thousand t		0.034	0.034	0.247	0.097
EN16 CO_2	thermal generation	thousand t		267	274	361	326
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		thousand t of CO_2 equivalent		267	274	361	326
EN21 **Waste waters (discharged quantity)**	thermal generation	million m³		0.007	0.016	1.95	0
EN21 **Conventional polluting load of waste waters discharged by plants**							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg		4,187	4,999	na	1.14
	in some plants with an overall capacity of	MW		123	123	na	123
EN22 **Non-hazardous special waste**							
production	electricity generation	t		16	26.2	0	12
delivery to recovery operators	electricity generation	t		0	6.53	0	0
EN22 **Hazardous special waste**							
production	electricity generation	t		0.506	3.77	0	25
delivery to recovery operators	electricity generation	t		0	3.77	0	25
EN22 **Total special waste**							
production	electricity generation	t		16.5	30	0	37
delivery to recovery operators	electricity generation	t		0	10.3	0	25

Indicators

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
Resource conservation and quality								
EN1EN3 Net specific energy input of thermal power generation	kcal/kWh		1,547	1,469	1,545	1,592		3
EN8 Net specific consumption of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh		0.309	0.286	2.98	0.016		-99.5
excluding contribution of as-is sea water	liters/kWh		0.028	0.025	0.014	0.016		14.3
Total net specific consumption of water for industrial uses	liters/kWh		0.309	0.286	2.98	0.016		-99.5
EN8 Coverage of requirements of water for industrial uses								
from aqueducts	% of requirements		8.92	8.92	0.481	100		20,690
Total from inland waters	**% of requirements**		**8.92**	**8.92**	**0.481**	**100**		**20,690**
from the sea (as-is)	% of requirements		91.1	91.1	99.5	0		0

		2009	2010	2011	2012	2013	% ('13-'09)/'09	% ('13-'12)/'12
EN1 EN3 Fossil fuel consumption for thermal generation								
natural gas	% of total fuel consumption		100	100	100	100		0
natural gas, technologically captive use	% of total natural-gas consumption		100	100	100	100		0
of which in combined-cycle units	*% of total natural-gas consumption*		*100*	*100*	*100*	*100*		*0*
Specific emissions into the atmosphere								
EN20 SO_2 (simple thermal generation)	g/kWh thermal net		0.277	0.256	0.269	0.004		-98.5
EN20 NO_x (simple thermal generation)	g/kWh thermal net		0.049	0.046	0.273	0.114		-58.2
EN16 CO_2 (simple thermal generation)	g/kWh thermal net		387	367	398	383		-3.8
Net specific conventional polluting load of waste waters discharged by plants								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net		1.94	6.71	na	0.001		-
EN22 **Waste recovery**								
Non-hazardous special waste								
electricity generation	% of production		0	24.9	na	0		-
Hazardous special waste								
electricity generation	% of production		0	100	na	100		-
Total special waste								
electricity generation	% of production		0	34.4	na	67.6		-

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