Environmental Report 2012

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CEO's message

At Enel, we believe that a winning business strategy to become a leader in one's own sector must place emphasis on environmental sustainability. This is why we place initiatives and projects of high environmental value at the core of our business plan, a commitment that has not subsided in these difficult years of global economic crisis. In fact, our development prospects are moving towards progressive application of the best technological solutions, continuous development of electricity generation from renewables and provision of new energy efficiency services to our customers; all this through a program of actions that are geared to achieving our ultimate target: being carbon neutral by 2050.

In 2012, the share of zero-emission power generation in the Group's total power generation accounted for 42% thanks, above all, to the growth of wind power, which has more than balanced the decline of hydro power due to low hydraulicity in the past few years. New renewable capacity installed during the year amounted to roughly 1,000 MW, testifying the efforts that we have undertaken in this sector. These efforts will go on in the coming years, as shown by the prospects outlined in our business plan: over 80% of our new installed capacity will be emission-free, putting us on track to reach 50% of our total installed capacity by 2020, an impressive target with respect to those that the Group has set for the long term.

To boost our presence in the renewable-energy sector, we have concentrated the development and operation of new power plants in Enel Green Power, the company of the Group which has an installed capacity of 8,000 MW in 16 countries and which generated more than 25 billion kWh in 2012, giving a crucial contribution to our sustainable growth roadmap. In 2012, net renewable capacity went up, thanks to the entry into operation of wind farms in Greece, Romania, Spain, Canada, Mexico and the US, of photovoltaic plants in Italy and Greece and of hydro ones in Guatemala.

Continuously improving environmental management and performance enabled us, in 2012, to gain the ISO 14001 environmental certification for the overall Group and to maintain our position within the leading sustainability indices (Dow Jones Sustainability Index, FTSE4Good and Carbon Performance Leadership Index).

In 2012, we cut down our CO_2 emissions by 10% from their levels in 2007 (the reference year for the first Kyoto Protocol commitment period), thus surpassing the 7% reduction target announced in previous years. This result was obtained in spite of the increase in emissions that we recorded in 2012, due to low hydraulicity and greater reliance on coal. The use of coal is generalized among European utilities and driven by market conditions and commodity prices. Yet, based on our performance, we can confirm our target of slashing emissions by 15% from their 2007 levels by 2020.

Enel's generating mix and constantly improving thermal generation efficiency have come to represent a global benchmark. If our CO_2 emissions per kWh generated were taken as a standard – i.e. if the entire world produced electricity with the same performance as Enel – global emissions would fall by roughly 3.5 billion tonnes, equivalent to all the CO_2 emissions from electricity generation in the US and the EU-27 together.

In addition to CO_2, Enel has pledged to curb all of its emissions of pollutants by 2020. Today, we reiterate this pledge in the light of our performance in 2012: as compared to 2011, specific emissions of particulates and NO_x were down by roughly 9% and 5%, respectively, and SO_2 rose by 6%.

The issue of water resources is bound to become increasingly significant in the coming years. This is why Enel set the target of cutting water consumption by 10% from its 2010 levels by 2020: we are proceeding along this path, encouraged by the reduction of about 5% that we achieved in 2012 with respect to 2011. Although the water footprint of power generation is not comparable to the one of other industrial and agricultural sectors, we feel that a company like Enel should give wide visibility to its targets and performance in this area. Therefore, we decided to join the "Water Disclosure Project" initiative from 2013 on, by extending the successful activity conducted within Endesa to the overall Group.

In 2013, we will also draw up a Group-wide biodiversity conservation plan. For many years, we have been sustaining biodiversity through a broad array of initiatives, in Italy and abroad: monitoring surveys, research and enhancement projects, offsets or remediation plans, socio-environmental studies. A Group-wide plan will allow us to reach higher levels of integration, consistency and effectiveness in all of our initiatives, both already undertaken and to be undertaken in the future.

Enel can also give a major contribution to environmental sustainability, by promoting a wise and efficient use of electricity among its customers (61 million in the world). To do this, we are working on two main fronts. First, we are investing on the distribution grid in order to adequately integrate distributed generation and effectively manage power flows; indeed, Enel is a worldwide leader in smart grids, i.e. the backbones of the future smart cities and a model that we are experimenting with various pilot schemes in Spain, Italy and Latin America.

Secondly, we are focusing on final customers; during 2012, Enel intensified its efforts in deploying products and initiatives centered on energy efficiency, to which we will give strong impetus and in which we will be increasingly involved in the next few years.

Moreover, we have put in place various initiatives intended for both business and residential customers, to improve end-use energy efficiency, reduce wastage and mitigate adverse impacts on the environment. In this area, we launched innovative service offerings, such as REM (Remote Energy Monitoring), which allows business customers to track their power usage, load by load, and thus to optimize their consumption patterns without penalizing their productivity. For the segment of residential customers, Enel developed green power offerings, which come with a guarantee of origin of electricity produced from renewable sources, as well as with neutralization of CO_2 emissions from the entire invoicing process.

In 2012, Enel actively participated in global events, from Rio+20 to the Doha 2012 UN Climate Change Conference, bringing its contribution in terms of ideas and factual projects, such as "Enabling Electricity", the initiative aimed at providing sustainable electricity to millions of people who still have no access to this fundamental factor of progress.

A company like Enel – engaged day by day in supplying the energy required for economic and social well-being – must steer its environmental policy towards ambitious targets, expounding its intermediate improvement goals and maximizing the visibility of its achievements. This is the principle which guides our action today and which will guide it in future 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 adequate 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, waste waters, waste) include indicators (ratios between homogeneous or heterogeneous quantities) that make it possible to compare the results of the various components of the Group and boundaries and to track their performance over time (regardless of their volume of activities). They highlight deviations of environmental performance from the average value or targets, enabling also the evaluation of reliability and consistency of 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 the key energy & environmental performance data in the five-year period from 2008 to 2012 for the overall Group and for each country and technology.
The report has been prepared in accordance with qualitative and quantitative environmental performance disclosures required by the "Sustainability Reporting Guidelines & Electric Utility 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 sixteen editions, including the present one.
Moreover, Enel voluntarily requested Reconta Ernst & Young SpA to conduct a "limited assurance" 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 2012 refer to Enel SpA and to the companies included in its scope of consolidation in financial years 2008, 2009, 2010, 2011 and 2012 (for details about the companies, the reader is referred to the consolidated Financial Statements for the various years available at 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. 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 2012 or of each of the reported years. The flow data (resources, electricity and heat generation, emissions, waste waters, 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 which exited the Group during the year (as specified in the text from time to time).
Some deviations from the KPI guidelines and from the data reported in the

Environmental Report 2011 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	85, 86, 87, 88, 89, 90, 92, 94, 95, 96	-	85, 86, 87, 89, 90, 95, 96, 97	87, 91, 95, 96, 99, 101	46	27, 45, 46	27, 46	87, 92, 95, 96, 97	62	87, 92, 95, 97	62	62, 72	64, 65, 68, 69, 71, 72, 73	64, 66, 67, 68, 69, 70, 71, 72, 73
EUROPE														
BELGIUM	133, 135, 137	-	133, 135	-	-	-	-	133, 135	-	-	-	-	-	-
BULGARIA	139	-	137, 140	137	-	-	-	137, 139	-	137, 139	-	-	-	-
FRANCE	142	-	142	142	-	143	-	-	-	-	-	-	-	-
GREECE	146	-	146	146	148	148	-	-	-	-	-	-	-	-
ITALY	154, 155, 156, 160, 161, 163, 171, 172, 175	-	154, 155, 160, 161, 163	155, 156, 160	164	161, 164, 165	165	155, 161, 165	-	155, 161, 165	-	-	-	-
PORTUGAL	175	-	171, 175, 176	172	-	-	-	172, 175, 176	-	176	-	-	-	-
ROMANIA	180	-	180	180, 182	183	181, 182, 183	-	-	-	-	-	-	-	-
RUSSIA	187, 190, 191, 199, 200, 203	-	187, 190, 191	187	191	190	-	187, 190, 192	-	187, 190, 192	-	-	-	-
SLOVAKIA	204, 206, 216, 217, 222	206	199, 200, 203, 204	200	-	-	-	200, 203, 204, 206	-	200, 204	-	-	-	-
SPAIN	223, 226	-	216, 222, 224, 225	216, 218, 224	226	226	-	216, 217, 223	-	217, 223	-	-	-	-
NORTH AMERICA														
CANADA	236, 237	-	235, 237	-	238	238	-	235, 237	-	-	-	-	-	-
USA	241, 243	-	241, 243	-	243	243	-	241, 243	-	-	-	-	-	-
LATIN AMERICA														
ARGENTINA	250, 251, 254, 255	-	250, 254, 255	250, 251, 254	-	-	-	250, 251, 254	-	-	-	-	-	-
BRAZIL	260, 261, 263, 264, 265	-	260, 263, 264, 265	260, 261, 263	265	265	-	260, 263	-	-	-	-	-	-
CHILE	273, 274, 277, 278	-	273, 277, 278	273, 274, 277	278	278	-	273, 274, 277, 278	-	274, 277	-	-	-	-
COLOMBIA	285, 286, 289, 290	-	285, 288, 289	285, 286, 288	290	-	-	285, 289, 290	-	-	-	-	-	-
COSTA RICA	293	-	293	293	-	-	-	-	-	-	-	-	-	-
GUATEMALA	297	-	297	297	299	299	-	-	-	-	-	-	-	-
MEXICO	301	-	301	301	303	303	-	-	-	-	-	-	-	-
PANAMA	305	-	305	-	-	-	-	-	-	-	-	-	-	-
PERU	312, 314, 315, 316	-	312, 314, 315, 316	312, 313, 314	316	-	-	312, 314, 315, 316	-	-	-	-	-	-
AFRICA														
MOROCCO	319, 320, 321	-	319, 320, 321	-	321	-	-	319, 320, 321	-	-	-	-	-	-

EN Legend

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
62, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73	-	84, 104, 105, 106, 107, 108, 111, 113	84	105	-	104, 105, 106, 108, 109, 111, 113	87, 105, 114, 115, 116, 117, 118	119, 120, 121, 125, 127, 128	-	128	62	60	-	36, 37	83, 84	39, 40, 41
-	-	134, 135	-	-	-	134, 135	134	134, 135	-	-	-	135	-	-	-	-
-	-	138, 139, 140	-	138, 140	-	138, 139, 140	138	138, 139, 140	-	-	-	-	-	-	142	-
-	-	143	-	143, 144	-	-	-	143	-	-	-	144	-	-	146	-
-	-	147	-	147, 148	-	-	-	147	-	-	-	148	-	-	-	-
-	-	158, 162, 165	-	158, 164, 165	166	158, 162, 165, 172, 173	155	159, 161, 162, 165	166	-	-	166	-	-	154, 160	-
-	-	173, 175, 176	-	173, 177, 181	-	175, 176, 179	158, 168, 173	174, 176, 177	-	-	-	177	-	-	171	-
-	-	181, 183, 189	-	183	-	-	-	181, 182, 183	184	-	-	184	-	-	180, 182	-
-	-	191, 192, 201	-	-	-	189, 190, 191, 192	187, 189, 191	189, 190, 191, 192	192	-	-	192	-	-	187	-
-	-	204, 206	-	206, 201	207	201, 204, 206	200, 201, 202, 204	202, 203, 205, 206	207	-	-	207	-	-	215	-
-	-	219, 223, 224, 226	-	219, 226	-	219, 223, 224, 226	217, 219, 221, 224	220, 221, 222, 224, 225, 226	227	-	-	227	-	-	222, 229	-
-	-	236	-	236, 238	-	236, 237, 238	236	236, 237, 238	-	-	-	-	-	-	-	-
-	-	242, 243	-	242, 243	-	-	-	242, 243	-	-	-	-	-	-	241	-
-	-	252, 254, 255	-	252, 255	255	252, 254, 255	251, 252	252, 253, 255	-	-	-	256	-	-	250, 254	-
-	-	262, 264, 265	-	262, 265	265	262, 264, 265	260, 263	262, 263, 264	265	-	-	265	-	-	260, 263, 265	-
-	-	275, 277, 279	-	275, 278, 279	279	275, 277, 279	274, 275, 278	275, 276, 278	279	-	-	279	-	-	273, 276	-
-	-	286, 289, 290	-	287, 291	291	286, 289, 291	285, 287	287, 288, 291	-	-	-	291	-	-	285, 288	-
-	-	294	-	294, 295	-	-	-	294, 295	-	-	-	295	-	-	293	-
-	-	298	-	298, 299	299	-	-	298	-	-	-	-	-	-	297	-
-	-	302	-	302, 303	-	-	-	302, 303	-	-	-	306	-	-	301	-
-	-	305	-	307	-	-	-	305, 306, 307	-	-	-	-	-	-	305	-
-	-	313, 315, 316	-	313, 316	316	313, 315, 316	313	313, 314, 315	-	-	-	316	-	-	312, 314	-
-	-	319, 320	-	-	-	319, 320	319, 320	320, 321	-	-	-	321	-	-	-	-

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

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Independent auditors' report on the limited assurance engagement of the Environmental Report of Enel Group as of December 31, 2012 (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, 2012 exclusively in relation to the indicators summarized in the *"GRI Content Index"* section. 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 inquires, 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 Energie SA, Enel Energie Muntenia SA, Enel Green Power Romania Srl, Endesa SA, Asociación Nuclear Ascó-Vandellós II A.I.E. and Endesa Latinoamerica SA, to obtain an understanding about the information, accounting

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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 Priolo Gargallo thermal and solar power plant (Italy), Salbatica II and Agighiol wind farms (Romania) and Vandellós II nuclear power plant (Spain);
- 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, 2012.

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, 2012, 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, April 24, 2013

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 a multinational group based in Italy 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 98 GW and distributes electricity and gas to 61 million customers through a grid of about 1.9 million kilometers.

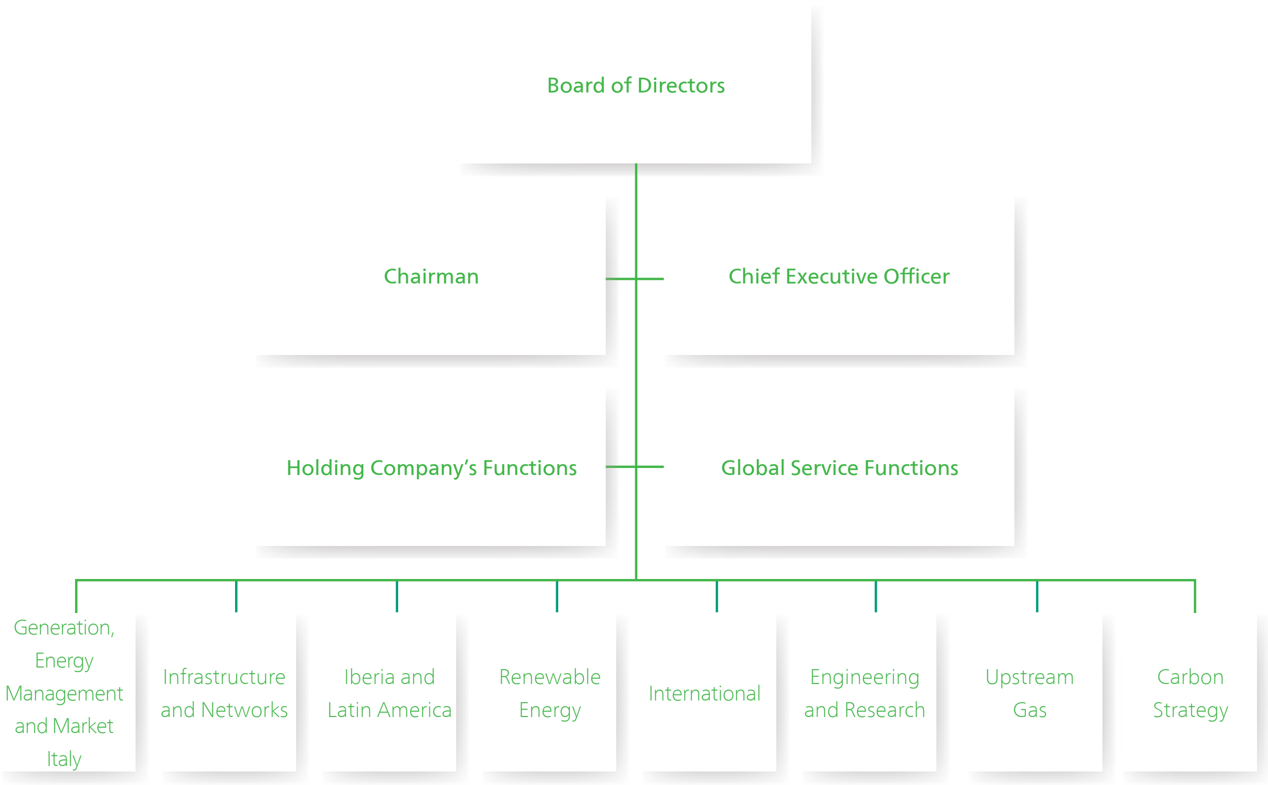
Business overview

In 2012, Enel posted revenues of around € 85 billion, a gross operating margin of roughly € 17 billion and a net ordinary income of about € 3.5 billion. The Group's workforce at December 31, 2012 was equal to about 74,000. Enel's generating mix is extremely diversified: hydro, thermal, nuclear, geothermal, wind, solar photovoltaic and other renewables. More than 42% of the electricity generated in 2012 was carbon-free.

Enel is strongly engaged in deployment of renewables, as well as in research into and development of new eco-friendly technologies. Enel Green Power, listed on the stock exchange, is the company of the Group dedicated to developing and managing electricity generation from renewables. The company manages more than 8 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, over 34 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.

Shareholders

Enel, which has been listed on the Milan stock exchange since 1999, is the Italian company with the highest number of shareholders: about 1.3 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 packages of electricity and gas products and services to its 31.2 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 around 24 GW of installed capacity and a strong presence in the electricity distribution business and in the sale of electricity and gas products to roughly 13 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 and 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 a vertically integrated operator in upstream gas and in electricity generation and sale. In the upstream gas sector, Enel manages promising natural-gas assets through Severenergia (a consortium in which it has a 19.6% stake). As regards electricity generation, Enel OGK-5 owns 9 GW of thermal capacity. In the retail sector, Enel owns 49.5% of RusEnergoSbyt, one of the largest private electricity trader of the country.

In **Latin America**, through Endesa and its subsidiaries in five countries, the Enel Group is the largest private operator, with more than 16 GW of capacity installed in thermal, hydro and other renewable plants and serves some 14 million customers. In the electricity generation sector, Endesa owns and operates 4.4 GW in Argentina, 1.0 GW in Brazil, 5.9 GW in Chile, 2.9 GW in Colombia and 1.7 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 and Brazil, as well as in Costa Rica, Guatemala, Panama, El Salvador and Mexico, Enel Green Power Latin America operates 0.9 GW of wind and hydro plants.

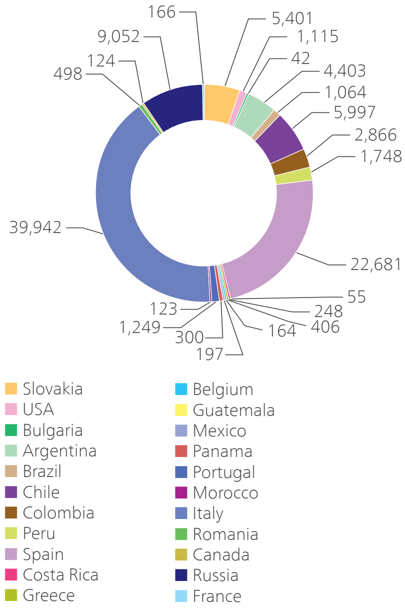
In **North America**, Enel Green Power North America owns and operates more than 1.2 GW of hydro, geothermal, wind, solar and biomass-fired plants.

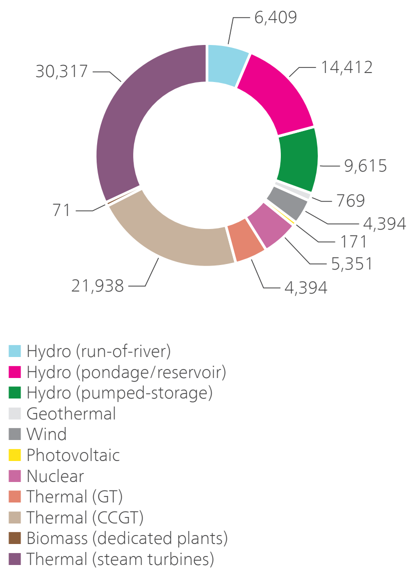
In **Africa**, Enel is present in the upstream gas sector by participating in the development of gas fields in Algeria and Egypt. Through Endesa, Enel also runs a thermal power plant in Morocco.

(Unless otherwise indicated, the data of this profile refer to December 31, 2012).

Generating mix as of Dec. 31, 2012

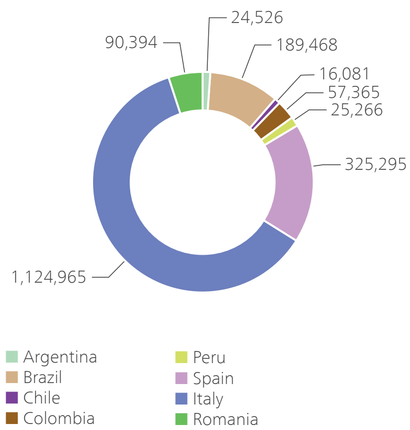
Total: 97,840 MW

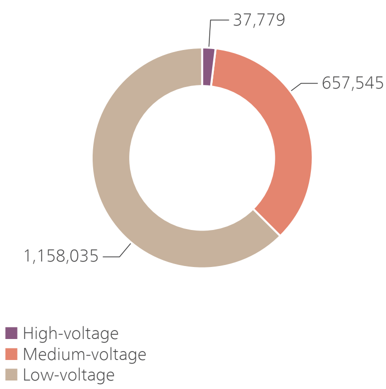




Electricity distribution grid as of Dec. 31, 2012

Total: 1,853,359 km






Environment

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 as a pre-requisite for all of its activities. Therefore, its environmental policy is based on three fundamental principles and pursues ten strategic targets.

Principles

> Safeguarding the environment.

> Improving and promoting the environmental features of products and services.

> Creating corporate value.

Strategic targets

> Application of internationally recognized environmental management systems, based on continuous improvement, to the entire organization and definition of environmental indices to monitor the environmental performance of the overall Group.

> Optimized integration of installations and buildings into the landscape, while conserving biodiversity.

> Mitigation of environmental impacts by applying the best available technologies and the best practices in construction, operation and decommissioning of installations.

> Leadership in renewables and low-emission electricity generation.

> Efficient use of energy, water and raw materials.

> Optimized management of waste and waste waters.

> Development of innovative technologies for the environment.

> Communication of Enel’s environmental management efforts and performance to citizens, institutions and other stakeholders.

> Environmental awareness, training & education of employees.

> Promotion of environmentally sustainable practices among suppliers, contractors and customers.

The Chief Executive Officer
and General Manager
Fulvio Conti

Strategic targets

Enel translates the principles enshrined in its environmental policy into a number of initiatives, which are aimed at achieving its strategic targets.

Application of internationally recognized environmental management systems to the entire organization

> Extension of certification to sites that are not yet certified
> Yearly maintenance of already acquired ISO 14001 certifications and EMAS registrations

Optimized integration of installations and buildings into the landscape, while conserving biodiversity

> Biodiversity conservation projects (conservation of protected species habitats, relocation 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

Mitigation of environmental impacts by applying the best available technologies and the best practices in construction, operation and decommissioning of installations

> 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

Leadership in renewables and low-emission electricity generation

> 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

Efficient use of energy, water and raw materials

> 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

Optimized management of waste and waste waters

> Reduction of waste production
> Decrease of the polluting load of waste waters
> Increased recovery of waste and waste waters (also by better sorting)
> Qualification of waste disposal operators
> Use of information systems for waste traceability

Development of innovative technologies for the environment

> 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

Communication of Enel's environmental management efforts and performance to citizens, institutions and other stakeholders

> 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

Environmental awareness, training & education of employees

> Periodical courses on environmental themes
> Posting of thematic insights on the Intranet site

Promotion of environmentally sustainable practices among suppliers, contractors and customers

> 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, waste waters, etc.)

Quantitative targets by 2020

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 total specific emissions of CO_2, in 2012 Enel curbed them by 10% from their levels in 2007 (the year immediately before the first Kyoto Protocol commitment period), thus surpassing the previously announced 7% reduction target. This result enabled Enel to confirm its target of decreasing these emissions by 15% by 2020 on 2007. These targets are in line with current initiatives and programs, which include installing emission abatement systems in thermal plants, building new combined-cycle 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.

Organizational structure of the Enel Group

One Company

After major international acquisitions in the past few years, which led Enel to operate in 40 countries, the year 2012 marked not only its 50th anniversary but also a process of deep internal reorganization.

During the year, Enel went on with its One-Company project (launched in July 2011) with a view to favoring the integration of the different souls of the Group, by defining a common language, homogeneous decision-making processes and a clear allocation of roles and responsibilities so as to avoid duplications and overlaps.

By making its main processes leaner, Enel will become faster, more effective and more capable of responding to an increasingly challenging competitive environment.

At present, the Group's organizational model is as follows:

> Holding Company's Functions: responsible for directing and controlling strategic activities for the overall Group;
> Global Service Functions: responsible for providing services to the Group, maximizing synergies and economies of scale;
> Business Lines: responsible for managing business activities within the scope of their responsibilities.

The aim of the new operating model is to enhance organizational effectiveness, by reorganizing processes, seeking Group-wide synergies and eliminating redundant or non-beneficial activities.

The Holding Company's Functions have the task of directing and controlling the strategic activities of the Group in accordance with the guidelines defined in the "One Company Handbook", with local legislation and regulations and with governance rules.

Environmental organization

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

1

formulating environmental policies and strategic environmental targets for the Group

2

monitoring the management of environmental compliance and the achievement of targets

3

issuing guidelines for environmental management systems, managing the Group's environmental reporting activity and preparing the Environmental Report

4

fostering the dissemination of the best practices and of the culture of environmental performance improvement

5

contributing to the Group's strategic guidelines and planning process in the environmental domain

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.

> **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 464 full-time equivalents (FTEs). This figure includes support personnel, i.e. personnel members at Holding Company, divisional and regional levels who provide environmental services to multiple operational units.

Organizational structure (FTEs)

10	Regulatory, Environment and Innovation function
47	Renewable Energy Division
105	Generation, Energy Management and Market Italy Division
137	Iberia and Latin America Division
80	Infrastructure and Networks Division
14	Engineering and Research Division
66	International Division
1	Upstream Gas Division
4	Global Service functions
464	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.

Overview

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.

2012 Results

EN6 EN7 At present, ISO 14001-certified systems cover more than 93% of the net maximum capacity of power plants, 95% of the grid length and 100% of activities of real-estate (about 1,000 buildings) and service management, as well as market activities in Italy and Romania. The higher coverage reflects new certifications of installations belonging to Enel Green Power in Europe and Latin America and of the thermal plant of Porto Empedocle in Italy.

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and its partner

CISQ/RINA

hereby certify that the organisation

ENEL S.P.A.

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

in the following operative units

GENERATION AND ENERGY MANAGEMENT DIVISION
IBERIA AND LATAM DIVISION
INTERNATIONAL DIVISION
RENEWABLE AND ENERGIES DIVISION
INFRASTRUCTURE AND NETWORK DIVISION
ENGINEERING AND RESARCH DIVISION
GLOBAL ICT – GLOBAL PROCUREMENT – GLOBAL BUSINESS SERVICES
MARKET DIVISION
E TUTTI I CERTIFICATI COME DA ALLEGATI AL PRESENTE CERTIFICATO /
AND ALL CERTIFICATES LISTED IN THE ANNEXES TO THIS CERTIFICATE

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

has implemented and maintains a

Environmental Management System

which fulfills the requirements of the following standard

ISO 14001:2004

Registration Number: **IT-82367**

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

René Wasmer
President of IQNET

Gianrenzo Prati
President of CISQ

IQNet partners*:

AENOR *Spain* AFAQ AFNOR *France* AIB-Vinçotte International *Belgium* ANCE *Mexico* APCER *Portugal* CISQ *Italy* CQC *China* CQM *China* CQS *Czech Republic* Cro Cert *Croatia* DQS *Germany* DS *Denmark* ELOT *Greece* FCAV *Brazil* FONDONORMA *Venezuela* HKQAA *Hong Kong China* ICONTEC *Colombia* IMNC *Mexico* Inspecta Certification *Finland* IRAM *Argentina* JQA *Japan* KFQ *Korea* MSZT *Hungary* Nemko AS *Norway* NSAI *Ireland* PCBC *Poland* QMI *Canada* Quality Austria *Austria* RR *Russia* SAI Global *Australia* SII *Israel* SIQ *Slovenia* SIRIM QAS International *Malaysia* SQS *Switzerland* SRAC *Romania* TEST St Petersburg *Russia* YUQS *Serbia*

IQNet is represented in the USA by: AFAQ AFNOR, AIB-Vinçotte International, CISQ, DQS, NSAI Inc., QMI and SAI Global

*The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com

The following are the ISO 14001-certified or EMAS-registered activities.

ISO 14001-certified and EMAS-registered activities

ISO 14001

Electricity generation

90,555
MW net maximum capacity certified

93%
coverage

Electricity distribution

1,765,480
km grid length certified

95%
coverage

EMAS

Electricity generation

29,898
MW net maximum capacity registered

42%
coverage (EU)

Europe

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 certified (km)
France	Wind power plants			All (certified in 2012)	**166**	
Greece	Hydro power plants			All (certified in 2012)	**19**	
	Wind power plants			All (certified in 2012)	**199**	
	Photovoltaic power plants			All (certified in 2012)	**29**	
Italy	Thermal power plants	Bastardo, Fusina, Genova, La Casella, La Spezia, Leri Cavour, Montalto di Castro, Pietrafitta, Porto Corsini, Porto Marghera, Priolo Gargallo, Santa Barbara, Sulcis, Torrevaldaliga Nord	**13,250**	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, Torrevaldaliga Nord	**20,859**	
	Hydro power plants	Business Units: Bologna, Cuneo, Montorio, Sardegna, Vittorio Veneto	**6,358**	Business Units: Bologna, Cuneo, Montorio, Sardegna, Sicilia, Sondrio, Vittorio Veneto	**10,854**	
		Bolzano (=SE Hydropower)	**617**	Bolzano (= SE Hydropower)	**617**	
		Enel Green Power		All	**1,513**	
		Business Unit: Trento (Hydro Dolomiti Energia)	**624**	Business Unit: Trento (Hydro Dolomiti Energia)	**624**	
		San Floriano Energy	**45**	All	**45**	
	Wind power plants	Enel Green Power		All	**716**	
	Geothermal power plants	All	**722**	All	**722**	
	Power grid			All		**1,124,966**
	Real estate, vehicle fleet and services (Procurement, ICT, Enel University)			All		
	Market			All		
	Engineering and Innovation			All		
Portugal	Thermal power plants	Endesa: Pego	**221**	Endesa: Pego	**221**	
	Wind power plants	Enel Green Power		All (certified in 2012)	**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 certified (km)
Romania	Wind power plants	Enel Green Power		All (certified in 2012)	**498**	
	Power grid			All		**90,394**
	Market			All		
	Real estate, vehicle fleet and services			All		
Russia	Thermal power plants			All	**9,052**	
Slovakia	Thermal power plants			All	**1,249**	
	Nuclear power plants			All	**1,816**	
	Hydro power plants			All	**2,329**	
Spain	Thermal power plants	Endesa: Barranco de Tirajana, Ceuta, Cristóbal Colón, Litoral de Almería, Melilla, Puentes (steam-condensing), Puentes (combined-cycle), San Roque, Teruel	**8,055** (the power plants of Compostilla – 1,100 MW – and of Llanos Blancos – 14 MW – were registered in 2012)	Endesa: Alcudia, Barranco de Tirajana, Besós, Candelaria, Cas 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	**12,604**	
		Enel Green Power España: All	**6**	Enel Green Power España: All	**6**	
	Nuclear power plants			All	**3,526**	
	Hydro power plants			All	**4,629**	
	Wind power plants	Enel Green Power España		All	**1,568**	
	Power grid			Aragon, Andalusia, Balearic Islands, Canary Islands, Catalonia, Extremadura		**321,227**
	Port terminals	Ferrol, Los Barrios		Carboneras, Ferrol, Los Barrios		
	Mining sites			Andorra, Puertollano		
	Real estate			Endesa - offices: Madrid Enel Green Power España - offices: Madrid Eufer - offices: Andalusia, Barcelona, Castile, Extremadura, Galicia, Las Palmas, León, Madrid, Santander, Seville, Tenerife, Valencia		

North Africa

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 certified (km)
Morocco	Thermal power plant			All	**123**	

Latin America

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 certified (km)
Argentina	Thermal power plants			All	**3,075**	
	Hydro power plants			All	**1,328**	
	Power grid			All		**24,526**
Brazil	Thermal power plants			All	**317**	
	Hydro power plants			All	**748**	
	Power grid			Ampla, Cien, Coelce		**105,655**
Chile	Thermal power plants			All (excluding Bocamina II - 350 MW)	**2,021**	
	Hydro power plants			All	**3,548**	
	Wind power plants			All	**78**	
	Power grid			All		**16,081**
Colombia	Thermal power plants			All	**411**	
	Hydro power plants			All	**2,455**	
	Power grid			All		**57,365**
Costa Rica	Hydro power plants			All	**31**	
	Wind power plants			All	**24**	
Guatemala	Hydro power plants			All (certified in 2012)	**164**	
Mexico	Hydro power plants			All (certified in 2012)	**53**	
	Wind power plants			All (certified in 2012)	**144**	
Panama	Hydro power plants			All	**300**	
Peru	Thermal power plants			All	**1,009**	
	Hydro power plants			All	**739**	
	Power grid			All		**25,266**

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. In 2012, Enel consolidated its efforts in this field by widening the range of products and services classified as green. This result was obtained 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. 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	0.80
Oil-insulated MV/LV transformers and autotransformers	2.34
Resin-insulated MV/LV transformers and autotransformers	0.20
Ammonia	7.53
Data storage devices (magnetic disks and back-up libraries)	1.69
Personal computers (desktops, notebooks, PDAs)	0.09
Stationery, printed material, paper or paperboard, toner cartridges, IT materials and accessories	0.04
Office furnishings	3.32
Promotional items and gadgets	0.57
Demolition of non-industrial installations and buildings	2.15
Construction and renovation of industrial buildings	0.10
Renovations and non-routine maintenance of non-industrial installations and buildings	3.87
Construction and maintenance of canals and hydraulic structures	13.63
Application and removal of insulating materials	5.83
Industrial painting	0.97
Routine maintenance of non-industrial buildings	2.08
Non-specialist mechanical maintenance	0.05
Industrial cleaning	34.75
Non-industrial cleaning	2.27
Management of company canteens and coffee bars, provision of meal vouchers	119.83
Handling and transport of goods/materials and porterage	4.11
Handling, transport and disposal of non-hazardous waste	15.45
Handling, transport and disposal of hazardous waste	12.77
Total	**234.44**

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 2012 with respect to the previous two years.

Contracts awarded/orders placed (million €)

Year	Total contracts/ orders	Total green contracts/ orders	% green contracts/ total contracts
2010	6,914	766	11.0%
2011	2,774	623	22.5%
2012	**2,723**	**816**	**30.0%**

Green procurement also helps progressively increase the percentage of use of recycled materials through their purchase in the market (see EN1 Expendables, on pages 97-98).

Stakeholders

Relations with institutions

In managing its relations with institutions in 2012, Enel continued to take an approach based on completeness and transparency of information and aimed at improving their level of technical knowledge.
Relations with institutional counterparts took place at different levels – local, national, European and international – in an integrated way.

At local level, Enel renewed its dialogue with authorities, seeking to reconcile the requirements of industrial presence with those of land and landscape protection and respect for local communities. This interaction was continuous, especially during critical stages, such as those associated with the granting or renewal of authorizations.

At national level, Enel strengthened the relations that it had established in previous years with parliamentary and governmental representatives, widening and diversifying its network of contacts. In Italy, Enel started relations of direct cooperation with new political counterparts, i.e. the key players of the technocratic Government's legislative activity and of the parliamentary process. Interaction at both governmental and parliamentary level allowed Enel not only to express its positions on and interests in various issues (national energy strategy, sustainable mobility, concessions for hydro power generation), but also to make available its wealth of knowledge on energy and environmental themes. Among the initiatives taken in 2012, it is worth recalling a seminar on energy and the electricity market, organized jointly with the Enel Foundation at the Chamber of Deputies and intended for parliamentary assistants.
During the sessions, Enel gave an overview of the national energy system, describing the operation and rules of the electricity market, as well as the international reference scenario.
On the institutional communication front, Enel organized conferences on corporate strategic themes (carbon capture & storage, gas extraction, electric cars and energy mix prospects), actively participated in working groups and events organized by national and EU-wide think tanks and, through its own lecturers, in educational events on energy themes which took place in leading universities.

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 in the B20 Business Summit held in Los Cabos (Mexico), by co-chairing the Green Growth Task Force and contributing to the drafting of the relevant position paper to be submitted to the G20 Summit. Furthermore, Enel contributed to forging a public-private partnership (Green Growth Action Alliance), which was launched in Los Cabos, together with Mexican President Calderón, to encourage green investments. Enel also participated in the Rio+20 UN Conference on Sustainable Development and in the Doha UN Climate Change Conference, where it organized a side event on new market mechanisms jointly with the International Emissions Trading Association (IETA). Moreover, Enel interacts with non-governmental organizations and multilateral development banks and participates in an active and structured way in the major associations of the sector and in global fora of consultation over energy and environmental matters.

Main legislative and regulatory developments in the environmental domain

On July 4, 2012, the European Parliament and the Council adopted Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances (known as Seveso III), with a view to: aligning the list of the substances indicated in the directive with the changes made to CLP-Regulation (EC) 1272/2008 on classification, labeling and packaging of hazardous substances and mixtures; strengthening provisions on public access to safety information, participation in the decision-making process and access to justice in accordance with the Aarhus Convention; and introducing stricter standards for inspection of establishments from June 2015 on.

As part of the implementation of the Industrial Emissions Directive (IED - 2010/75/EU), the European Commission adopted two decisions. The first (February 10, 2012) concerns guidance for the drawing-up and implementation of Transitional National Plans (TNPs) by Member States: the plants falling under the plan may gradually align their emissions with the limit values specified in the directive from January 1, 2016 to June 30, 2020. The second decision (May 7, 2012) defines the start-up and shut-down periods required for assessing compliance with emission limit values.

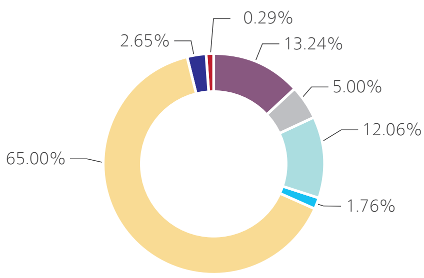
In 2012, the European Integrated Pollution Prevention and Control Bureau (EIPPCB - Seville) continued its revision of the Best Available Techniques Reference Document (BRef) on large combustion plants (LCPs). The LCP BRef is a sector-specific guidance document setting out the performance requirements, based on the best available and economically viable techniques, to be met by plants under the IED Directive.

In 2012, within the framework of its Roadmap to a Resource Efficient Europe, the European Commission drafted a Blueprint to Safeguard Europe's Water Resources, proposing solutions to harmonize and integrate the current legislation on water resource conservation and management and guide the relevant political choices of the European Union until 2050.

Always in 2012, the European Commission also adopted a proposal for a new directive amending Directive 2011/92/EU on the environmental impact assessment (EIA) of certain public and private projects. Moreover, the Commission proposed the revision of Regulation (EC) 842/2006 on certain fluorinated greenhouse gases, with the goal of lowering the current levels of emission of these gases by two thirds by 2030. Finally, in the course of 2013, the Commission put forward a proposal for a Council directive laying down basic safety standards for protection against dangers arising from exposure to ionizing radiation.

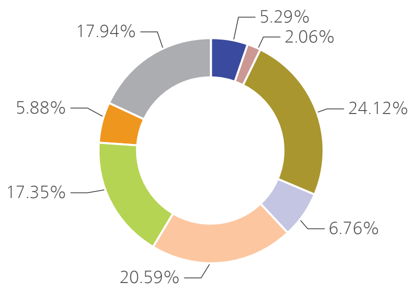
EN28 Environmental criticalities

Environmental criticalities
as of Dec. 31, 2012
(by business or line of activity)
Total: 340



- Thermal generation (including fuel oil storage & handling)
- Geothermal generation (CHP)
- Hydro generation
- Geothermal generation
- Wind generation
- Electricity distribution
- Real-estate management

Environmental criticalities
as of Dec. 31, 2012
(by environmental domain)
Total: 340



- Air and climate
- Waste waters
- Waste
- Soil, groundwater and surface waters
- Noise and vibrations
- Biodiversity and landscape
- Radiation (including electric and magnetic fields)
- Pertaining to multiple domains

(1) For a comprehensive description of relations with local communities, the reader is referred to http://www.enel.com/en-GB/sustainability/environment/, as well as to the Group's Sustainability Report.

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 2012, the number of environmental criticalities was equal to 340. Their increase with respect to previous years is due to improvements in the ways in which they are identified in all the countries where Enel operates and to the extension of the monitoring activity to construction sites.

The following is a description of the criticalities, grouped by type, and of the measures taken.

Public opposition to construction of some hydro power plants in Chile (Hidroaysén dam project) and Colombia (Quimbo dam project). Local indigenous communities' opposition to planned offsets in Chile (Ralco hydro power plant).
Relations with stakeholders [1]

Press campaigns and articles against the presence of some thermal power plants (Brindisi, Livorno and Piombino) 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

Detection of high iron and manganese values in the piezometers installed at the boundaries of the Porto Empedocle power plant site (Italy).
Submission of the site characterization plan to the competent authorities

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

Impact of the presence and operation of hydro power plants (Paraíso, Guavio, Betania and San Antonio) on land and local fauna (Colombia).
Biodiversity monitoring and conservation

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

Noise produced by power grid transformers in Italy, Argentina (Alberdi, Falcón and Villa Crespo substations), Colombia and Spain (substations in Andalusia and Catalonia), Romania (Salaj substation), by transformers in the San Floriano hydro power plant in Italy, by two steam units of Endesa's Costanera power plant in Argentina, by the thermal power plant of Bocamina in Chile and by wind farms in France (Coulonges).
Noise monitoring plans, abatement measures and replacement/retrofit of components

Notices or administrative measures issued by the competent bodies concerning: operation of thermal power plants in Italy (Torrevaldaliga Nord, Piombino), Russia (Reftinskaya, Sredneuralskaya, Konakovskaya), Spain (Cristóbal, Colón, Foix), Argentina (Costanera) and Chile (Bocamina); operation of hydro power plants in Spain (UPH Ebro-Pyrineos, UPH Noroeste), in Colombia (Paraíso, Guavio, Betania, San Antonio) and Italy (San Floriano and Turrite Cava dam), of wind farms in Spain (Careon, Peña Armada, Couto de San Sebastián, Peña Forcada), of the electricity distribution grid in Romania (station of Militari), Spain (Andalusia) 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 where Enel was sued or prosecuted and those which arose from third parties' appeals seeking the quashing of administrative judgments in favor of Enel ("passive litigations").

As of December 31, 2012, Enel had 710 pending judicial proceedings (about 82% related to its electricity distribution grid), of which 634 pending from previous years. In 2012, 64 proceedings were closed. The increase in the litigations is chiefly due to those concerning electromagnetic fields in Italy, given the fact that the Italian population is particularly concerned about this aspect.

The following table summarizes the most significant litigations.

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

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

Waste
Alleged irregular waste management in thermal generation in Italy (Brindisi, Augusta - Syracuse, Mercure - Cosenza, Bari, Piombino Business Unit) and in electricity distribution in Spain (Gran Tarajal substation).

Releases into water bodies
Exceedance of limits of releases into water bodies in thermal generation in Italy (Brindisi, Porto Tolle - Rovigo, Porto Marghera - Venice, Torrevaldaliga Nord - Rome) and in Argentina.

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.

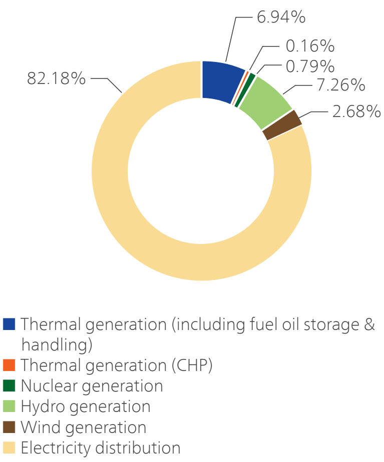
Damage from fires
Damage from fires caused by electricity distribution in Spain (Catalonia and Canary Islands).

Damage to the environment
Alleged damage from pollution in hydro generation in Colombia (Muña basin).

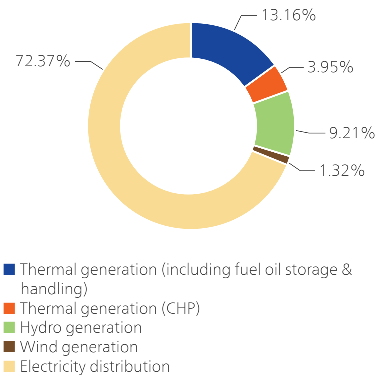
Damage to flora and fish fauna
Alleged damage to flora and fish fauna associated with the management of minimum in-stream flows, sediment flushing-out and removal in hydro generation in Italy (Hydro Veneto Business Unit), Brazil (Cachoeira Dourada) and Colombia (Tominé basin and Betania power plant).

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

Environmental litigations pending as of Dec. 31, 2012 and initiated before 2012 (by business activity)
Total: 634



Environmental litigations initiated in 2012 (by business activity)
Total: 76



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 2012. 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.

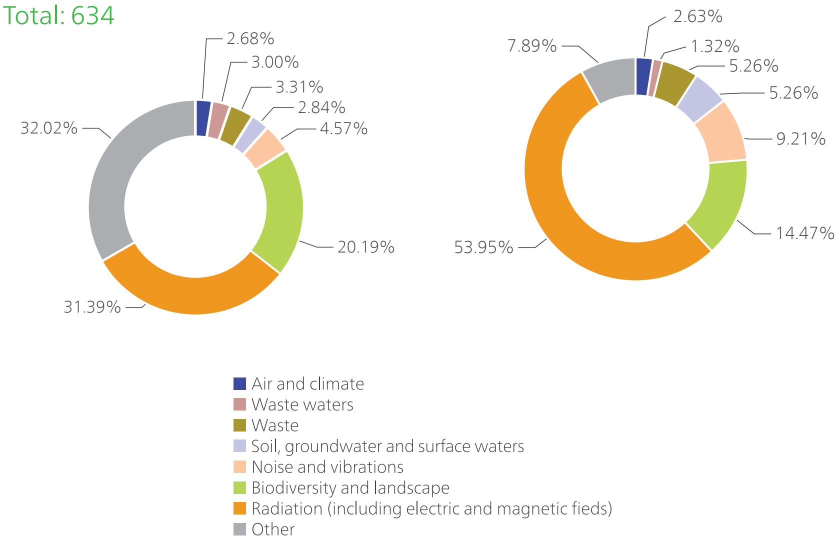
In 2012, the monetary value of environmental penalties was equal to approximately € 747,000.

The increase on 2011 is mainly due to:

> compensation for damage to fish farms caused by waste waters from the condenser of the Sredneuralskaya plant in Russia;
> fine for damage to fish fauna (Konakovskaya plant in Russia).

Environmental litigations pending as of Dec. 31, 2012 and initiated before 2012 (by environmental domain)
Total: 634

Environmental litigations initiated in 2012 (by environmental domain)
Total: 76



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 [(1)] 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.

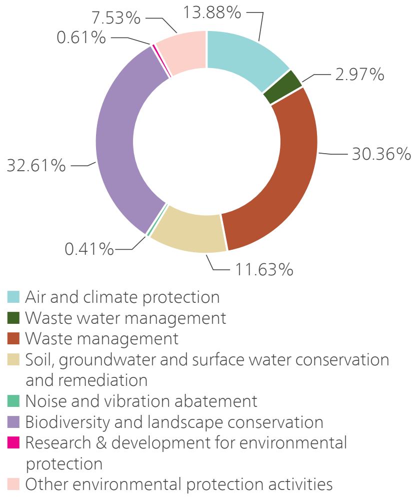
(1) The values of "current expenditure for waste disposal, emission abatement and environmental restoration" in the three-year period, published in the Sustainability Report, do not consider environmental liability insurance policies and depreciation charges for environmental protection investments for 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 2012

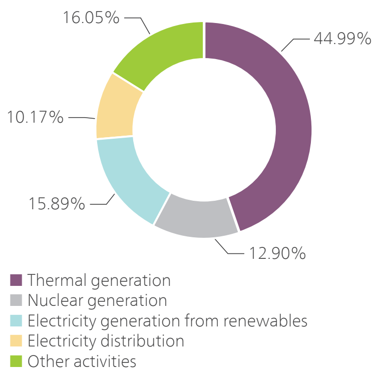
Business/line of activity (€ million)	Investments	Current expenditure	Total	%
Thermal generation	242	252	494	45.0
Nuclear generation	8	134	142	12.9
Electricity generation from renewables	122	53	175	15.9
Electricity distribution	78	34	112	10.2
Environmental support activities [(2)]	74	102	176	16.0
Total	524	576	1,100	100.0
Emission certificates	-	*182*	*182*	
Total	**524**	**758**	**1,282**	

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

Overall environmental investments in 2012
(by environmental protection activity)
Total: € 524 million



Financial resources allocated to environmental protection as of Dec. 31, 2012
(by business or line of activity)
Total: € 1,099 million



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

€242 million
Thermal generation

€8 million
Nuclear generation

€122 million
Electricity generation from renewables

€78 million
Electricity distribution

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

- management of hazardous and radioactive waste;
- replacement of magneto-thermal circuit breakers (containing SF_6 and oil) with vacuum circuit breakers;
- management of waste waters;
- improvement of the cooling system of the Almaraz plant (Spain): replacement of various mini-cooling towers to lower the temperature of the water returned to the basin.

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 2012 is almost entirely attributable to electricity generation (74%).
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 waste waters 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 waste waters;
> maintenance of flue-gas desulfurization and environmental monitoring systems;
> maintenance of crystallizers and waste water treatment systems;
> 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 waste waters and by-products);
> analysis and characterization of waste and waste waters;
> maintenance of waste water treatment systems;
> groundwater quality monitoring;
> noise monitoring surveys;
> awareness, training & education

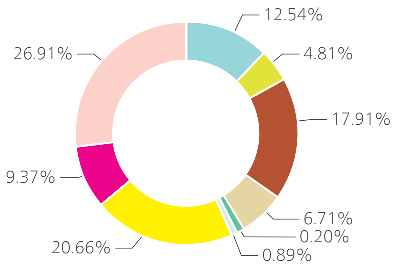
Electricity distribution

> water- and leak-proofing and clean-up of oil spills;
> analysis of waste waters;
> 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;
> noise monitoring surveys;
> 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.

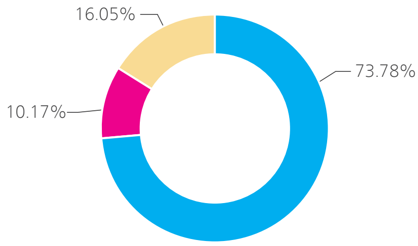
Current environmental expenditure in 2012, excluding extra fuel costs [1]
(by environmental protection activity)
Total: € 543 million



- 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
- Protection from radiation
- Research & development for environmental protection
- Other environmental protection activities

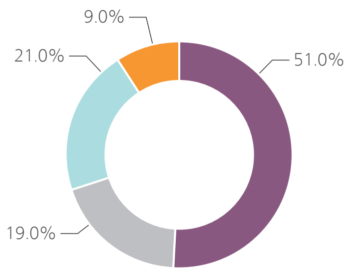
(1) "Extra fuel costs" are the extra costs incurred to purchase fuels with a lower environmental impact.

Current environmental expenditure in 2012, excluding extra fuel costs
(by business or line of activity)
Total: € 543 million



- Electricity generation
- Electricity distribution
- Support activities

Financial resources allocated to research and innovation as of Dec. 31, 2012
Total: € 127 million



- Conventional generation
- Electricity generation from renewables
- Power grid
- End uses

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	2012	%
Conventional generation	(million €)	65.0	51.0
Electricity generation from renewables	(million €)	24.0	19.0
Power grid	(million €)	27.0	21.0
End uses	(million €)	11.0	9.0
Total	**(million €)**	**127.0**	**100.0**

Other items of expenditure accrued in financial year 2012 (not explicitly allocated to environmental protection and thus separately recorded) include the purchase of green certificates (about € 488 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 [3], under which 61 companies are committed to achieving a carbon-neutral European electricity industry by 2050.

With respect to 1990, the base year of the Kyoto Protocol, the Group's specific CO_2 emissions were down by 32%. In 2012, in spite of a slight increase in these emissions, Enel curbed them by 10% from their levels in 2007, surpassing its previously announced 7% reduction target. Thanks to this result, Enel confirmed its target of slashing emissions by 15% by 2020 from their levels in 2007, the year immediately before the first Kyoto Protocol commitment period.

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 the Group stands among the worldwide leaders.

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 37 million tonnes of CO_2 equivalent emissions in 2012.

(3) http://www.eurelectric.org/media/50109/iep_roadmap_version_fin-2009-030-1071-01-e.pdf (page 5): in March 2009, 61 CEOs from 27 European countries signed a declaration which stated: "The power sector, as a significant emitter of greenhouse gases, needs to achieve a carbon-neutral power supply by the middle of this century."

Enel's CDM and JI projects (about 100, excluding those resulting from participation in funds) are located in Asia, Africa and Latin America and span a wide array of technologies: renewables (hydro, wind and geothermal), industrial gases, 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/index.html).

Enel is now supporting the first CDM project ever implemented in Haiti. The project is aimed at manufacturing and distributing efficient cook stoves. Thanks to this project, thousands of Haitian families will benefit from a more efficient household appliance technology at an affordable cost. The dissemination of this technology will not only lower greenhouse-gas emissions, but also improve the economic and health conditions of the population (fuel savings and reduction of flue gases in homes).

Enel is also 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.

As to policies of adaptation to climate change, extreme weather events may have significant impacts on the level and quality of electricity supply in the short and medium term. In 2013, Enel will extend the climate change vulnerability mapping of its installations, initiated last year in its Iberia and Latin America Division, to the overall Group.

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 greenhouse-gas 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 8,000 MW of installed capacity in 16 countries and over 25 billion of kWh generated in 2012, 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 2012, the company's net maximum renewable capacity was up by over 900 MW thanks to the commissioning of wind farms in Greece, Romania, Spain, Canada, Mexico and the United States, of photovoltaic plants in Italy and Greece and of hydro plants in Guatemala. 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, Slovenské elektrárne in Slovakia.

Today, the net maximum capacity of Enel's RES-E plants all over the world is equal to about 36,000 MW, accounting for about 37% of the overall capacity of Enel's generating mix. With this mix, Enel generated a total of over 84 billion kWh from RES in 2012, displacing about 60 million tonnes of CO_2 emissions into the atmosphere.

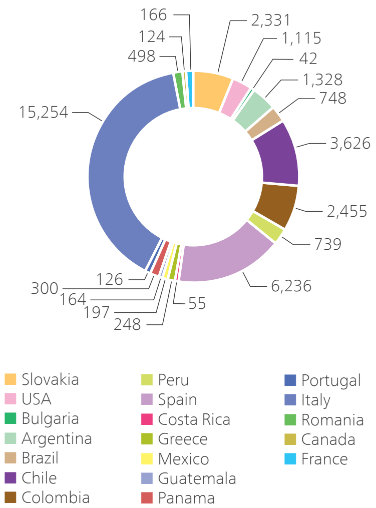
The strategy that the Group pursues in the sector of renewables places particular emphasis on:

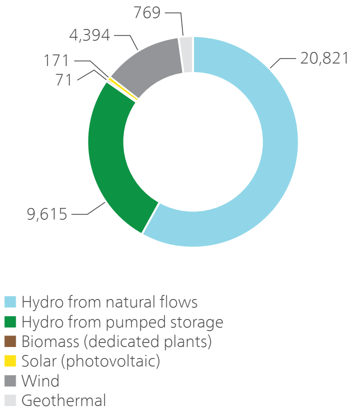
> technological diversification – although the Group excels in historical technologies, e.g. hydro and geothermal, it is investing on the most recent technologies, harnessing wind, solar and biomass resources in the various countries where it is present;

> 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 of 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.

Renewable-energy generating mix
as of Dec. 31, 2012
Total: 35,840 MW





EN5 EN6 EN7 Energy efficiency

The following table shows some 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
France	Travel management	Promotion of audio-videoconferencing and corporate chat systems instead of travel or of trains instead of cars.
Italy	Power distribution grid	New low-loss transformers, new substations and renovation/upgrade of LV/MV lines. Estimated savings: 352,200 GJ.
	Services	Introduction of 37 electric vehicles into Enel's fleet. In 2012, the vehicles covered approximately 50,000 km, with a reduction of gas oil consumption (vs. the one of a Fiat Panda) by about 2,500 l (~100 GJ). Continuing of the plan of replacement of service vehicles with Euro 5 and low-consumption models.
		Project of optimization and rationalization of physical archive space (Latium, Apulia and Calabria); storage space requirements were reduced by about 200 m^2.
	Hydro power generation	Total renovation of the Lappago, Molini di Tures and Sarentino plants (belonging to the company SE Hydropower): increased energy efficiency and acquisition of green certificates.
Romania	Power distribution grid	Modernization of grids and optimization of operations. Total savings: 44,722 GJ.
	Light-saving campaign	Replacement of more than 3,670 incandescent light bulbs with low-consumption ones in the village of Valea Ciorii (province of Ialomița). Energy savings: 136 GJ. More than 735 household customers will save a total of about € 16,520 on their electricity bills.
Russia	Thermal power generation	Retrofit of turbine 4 in the plant of Konakovskaya (KGRES). Revamping of the electric motors of cooling water pumps and installation of a variable-frequency drive for feedwater pumps. Total primary energy savings: 34,465 GJ.
		In the Nevinnomysskaya plant, 6,130 GJ of primary energy were saved thanks to: i) improvement of the efficiency of 150-MW units equipped with exhaust gas recirculation systems, by excluding gas recirculation at loads > 90-100 MW rather than at 130 MW; ii) use of a single forced-draft fan and of a single induced-draft fan (instead of two) when the load is < 60%; iii) treatment of boiler water with hydrazine; iv) repair and restoration of boiler refractory material; v) putting autotransformer 1 in stand-by mode.
Slovakia	Nuclear power generation	Increased efficiency of units 3 and 4 in the plant of Bohunice. After more than 25 years of operation, the main components of the plant (turbines, generators, transformers, condensers, steam separators and cooling towers) were revamped. The heat rate of the plant passed from 11,353 GJ/MWh in 2010 to 10,477 GJ/MWh in 2012. The program, started in 2010, yielded 6,970,682 GJ of energy savings in 2012.
	Photovoltaic power generation	Saving of electricity for own consumption (27,641 GJ) thanks to generation by the photovoltaic facilities of Mochovce, Vojany and of the Terry chalet.
	Thermal power generation	The use of biomass in place of indigenous brown coal in the plant of Vojany (26,917 t with a calorific value of 11.82 MJ/kg) and in the one of Nováky (12,194 t with a calorific value of 10.74 MJ/kg) saved 318,159 and 130,964 GJ, respectively.
	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	CCGT plant of San Roque: energy-saving program upon outages (2,215.5 GJ saved in 2012).
		Replacement of high-consumption lamps in the plants of Punta Grande and Litoral de Almería. Total primary energy savings: 86.226 GJ.
	Power distribution grid	Distribución Cataluña Oriental: reduction of grid losses thanks to grid reconfiguration. Energy savings: 86.04 GJ.
		Distribución Andalucía Oriental: reduction of grid losses thanks to construction of new installations and grid reconfiguration. Savings: 2,160 GJ.

Country	Type of project	Description
		NORTH AMERICA
North America	Travel management	Minimization of travel for duty by using ICT tools (audio-videoconferencing and live meetings).
		Implementation of a new travel management system to optimize travel for duty.
		LATIN AMERICA
Argentina	Thermal power generation	Introduction of VACE (*variación del consumo específico* - indirect method) and STEP (station thermal efficiency performance - direct method) systems to control deviations from nominal efficiency during maintenance and operation.
Brazil	End-use energy efficiency	In 2012, Ampla: i) installed solar water heating systems and retrofitted lighting and cooling/heating systems in 7 hospitals and 1 nursery school; ii) revamped electrical installations in the homes of 5,366 customers; and iii) supplied more efficient refrigerators to 10,143 customers. Energy savings: 88,134.59 GJ.
	Environmental awareness & training	Building of employees' awareness of environmental management system guidelines, wise energy use and pollution control in their activities.
	Travel management	Minimization of travel for meetings by intensifying the use of audio-videoconferencing systems.
Chile	Hydro power generation	Program of clean-up of trashracks and removal of the resulting material in 5 plant sites (Cachapoal, Rapel, Maule, Laja, Bío Bío). Energy savings per plant: 18,100 GJ; total energy savings: 90,500 GJ; these savings were obtained by increasing the net useful head, thus improving plant efficiency.
Peru	Thermal and hydro power generation	In 2012, CDM projects to increase the capacity of the Callahuanca hydro plant by 7.5 MW and to convert the Ventanilla thermal plant to combined cycle resulted into savings of 157,320 GJ and 3,131,640 GJ, respectively.
	Power distribution grid	To decrease peak demand by industrial customers, Edelnor developed a special rate plan (*Bloques de potencia*): by concentrating usage in statistical off-peak days, customers may get a reduction on the fixed rate of their electricity bills. Edelnor also installed meters equipped with LV reactive power compensators at the premises of its residential and commercial customers, thereby decreasing losses and increasing voltage at their points of connection. Savings: 1,753.2 GJ.

In 2012, policies of efficiency improvement decreased energy consumption for simple and CHP thermal generation by a total of 3,775 TJ.

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 5,351 MW (5.5% of its overall electrical capacity). In 2012, Enel generated about 40 TWh in nuclear plants (14% of its total generation), displacing over 38 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 oxide) 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, with 7 plants). Enel's participation in the Flamanville 3 project in France ended on December 4, 2012, when Enel notified

EDF of its withdrawal from the project and thus from the strategic cooperation agreement that the two companies had signed in 2007. Also the knowledge transfer agreement of which Enel has benefited in the past few years is ending.
Enel pursues other international initiatives: in Romania, where Enel participates in the ownership of a project for a consortium which is looking forward to winning the contract for completing units 3 and 4 of the Canadian-technology Cernavodă plant; and in Russia where, after the end of the cooperation relationship under the Kaliningrad plant financing agreement, Enel kept 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 conducted 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 conditions is clearly expressed in its Nuclear Policy, approved by its Board of Directors. The Nuclear Safety Oversight (NSO) unit of the Nuclear Technical Area (NTA) ensures the governance of this policy, as it is in charge of continuously monitoring and maximizing the safety 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.
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 Radioprotection, Nuclear Operation & Maintenance and Best Practice Sharing unit of the NTA carries out structured actions of monitoring, analysis and coordination of radioprotection for 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.

In the light of 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 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, a continuous improvement approach is taken, 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 operational excellence.

Stress tests on Enel's nuclear plants

As indicated by the European Commission, stress tests are aimed at determining the safety and 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 and 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 resulting into the publication of the respective national reports in April. In December 2012, the European Council approved the European Commission's final report with proposals for future actions. After the assessment of stress tests and the peer review process, the nuclear safety authorities of each Member State issued national action plans.

Enel conducted a thorough analysis of the Fukushima incident, studying the various stages of the seismic event (and of the subsequent tsunami), as well as the deficiencies in terms of regulation, plant design and operation, as well as emergency response, so as to derive lessons learned to be applied to stress tests on its nuclear plants. The two Site and Plant Safety Analysis (ASI) and Nuclear Engineering (INN) units (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 they will assist them in implementing the planned ones.

Management of radioactive waste

Both in 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 in 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 stored into 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. A study on a centralized, above-ground, temporary storage facility (where high-level waste is expected to remain for 60 years) is under way; the site selection process was completed in 2011 and, in December of the same year, the Government chose the area of the municipality of Villar de Cañas; the facility, to be built in the next five years, will make it possible to defer decisions about the delivery of spent fuel to a final geological storage site or about its reprocessing.

In addition to the centralized storage facility, it was decided to build a temporary storage facility adjoining each plant, so as to continue to temporarily store the fuel on site when approaching the level of saturation of the fuel pools. An on-site temporary dry storage facility has been in operation near the Trillo plant site since 2002; a similar facility was built in the Ascó plant site and will be ready to accommodate the fuel in March 2013. As regards the plants of Almaraz, Vandellós and Cofrentes (Enel has no holding in the latter plant), the fuel pool is estimated to reach saturation beyond 2020; therefore, no on-site temporary storage facility will be needed.

In the light of the Fukushima events, the Spanish nuclear safety council (CSN) required improvement measures to ensure the integrity and cooling of fuel pools upon major incidents. This requirement is not expected to affect current spent-fuel storage plans.

Anyway, all the activities of waste management are based on quality criteria and standards, in line with the best practices of the sector, which safeguard the environment, the population and 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, in particular 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 2012, Enel kept the vice chair of the Sustainable Nuclear Energy Technology Platform (SNE-TP) Governing Board, actively participating in its international activities.

To know more about the activities carried out in 2012 in the nuclear sector, the reader is referred to the sections of the Report concerning 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, in order to progressively increase production (started in 2012); and search for new medium-long term opportunities for procuring gas for local markets (Russia, Italy and Latin America), via pipelines (Algeria) or supplies of liquefied natural gas (LNG).

The year 2012 was particularly significant for the Upstream Gas Division. The most advanced projects in which Enel is involved are as follows:

Algeria:

in 2012, together with its partners (Sonatrach and Petroceltic), Enel issued a Declararation of Commerciality for the Ain Tsila natural-gas field. Always in Algeria, together with its partners (Repsol, GDFSuez and Sonatrach), Enel found a new gas field (South East Illizi).

Russian Federation – SeverEnergia project (joint venture including Enel, Eni, Gazpromneft and Novatek):

the joint venture completed the construction of two gas treatment trains to obtain an overall production of about 1.7 billion m^3 in 2012 (Enel's share: about 300 million m^3) and of about 220,000 tonnes of condensates (Enel's share: about 43,000 tonnes). In parallel, Enel continued its drilling activities in the gas field area (7 drill rigs).

In 2012, Enel appointed the new HSE manager of the partnership and organized an HSE Management System audit in Siberia and an HSE workshop in Rome, attended by representatives of all of its partners; the events resulted into a plan of continuous improvement involving, among others, the ISO 14001 pre-certification of SeverEnergia (with support from the partners) and the revision of the risk register, with particular emphasis on environmental impacts.

Italy:
in the area of the Abbadesse 1 well (province of Ravenna, Emilia Romagna), Enel (also in conjunction with third parties) began the monitoring of the status of conservation of the site and of the surrounding environment.
In 2012, under the San Marco project for identification of potential gas fields in the municipalities of Bagnacavallo, Cotignola, Ravenna, Russi, Faenza and Lugo (Emilia Romagna), Enel made preparations to collect geoseismic data and drill the Rossetta well at the end of 2013. The project is among those subject to the Environmental Impact Assessment (EIA). Geoseismic exploration and data collection have already been authorized, whereas the authorization for well drilling is being finalized. Under Enel's procedures, the contractor in charge of geoseismic surveys (ISO 14001-certified) underwent a Health, Safety and Environment (HSE) audit in the pre-mobilization stage of the project. The HSE audit demonstrated the contractor's compliance with the Italian legislation and with the best practices of the industry. In particular, Enel ensured that:

> the planning and organization of the activity included the analysis and monitoring of the impacted environmental matrices and an extensive application of the Best Available Techniques (BATs);
> the waste management activity was based on a controlled process of identification, classification, transport and disposal, as well as on improvement targets;
> the emergency plans included potential environmental incidents (e.g. spills, leakage of polluting substances, groundwater contamination and on-site emergency drills).

For projects abroad in which Enel does not participate as operator, Enel checks whether the projects are compliant with local legislation and whether operator's management procedures and practices are effective and aligned with international best practices.
In particular:

Algeria - South East Illizi project (joint venture including Repsol, GDF, Enel and Sonatrach):
in 2012, Repsol (operator) supervised the drilling of two wells (called TIHS and TESO) by the contractor (Saipem). Prior to drilling, in accordance with local legislation, Repsol: i) carried out an environmental screening of the entire lot and an Environmental Impact Assessment on the specific site to be drilled; and ii) put in place an environmental monitoring plan to be applied at the end of operations and after restoration of the site to its previous conditions. Based on its environmental management system, the operator took additional initiatives, in which Enel's HSE representative was directly involved:

> Drilling Well On Paper (DWOP): workshop attended by the operator and all the contractors to conduct a comprehensive analysis of operational risks and environmental impacts, potentially jeopardizing the outcome of operations, and to define additional protective measures;
> HSE audit in the TESO drilling site.

With regard to waste management in the area of the two wells, solid material is separately collected, compacted and delivered in appropriate containers to disposal operators. Liquid waste from internal services and waters from the wells are channeled into sealed underground collection tanks for subsequent on-site treatment by authorized operators.

Research & innovation

Innovation is of paramount importance to the Enel Group, which has always paid the utmost attention to technological breakthroughs, gives their potential to make the ways in which energy is produced and distributed progressively more reliable, more environmentally benign and more competitive.
CO_2 emission reduction scenarios show that achieving targets in the medium and long term (2030-2050) calls for a new model, founded on strong growth and integration of renewables, energy efficiency, new end uses of electricity (including electric mobility) and deployment of flexible, efficient and low-CO_2 technologies for conventional electricity generation.
The following paragraphs outline the results of the activities that Enel conducted in line with its Technology Map, i.e. the main tool used to shape innovation strategies and to pinpoint key technologies on which to invest in the future, ushering in the evolution of and changes in energy policies and scenarios. The results are described by business or line of activity: Conventional Generation, Renewables, Grid, Efficiency and End Uses.
In 2012, the Enel Group invested approximately € 127 million on Research & Development, implementing 136 innovation projects (up by roughly 31% on 2011).

Conventional generation

Efficiency of power plants and abatement of pollutants

Enhancing the efficiency and flexibility of Enel's thermal plants is imperative to improve their generating and environmental performance. In this area, the main ongoing project is **ENCIO** (European Network for "Advanced USC" Component Integration and Optimization), whose goal is to further develop clean-coal technologies, by experimenting advanced ultra-supercritical (A-USC) technologies (steam at 700°C), and thus to attain conversion efficiencies of above 50%. Higher efficiency will reduce CO_2 emissions into the atmosphere and consumption of fossil resources. The project, started in 2011, is being implemented and tests are scheduled to take off at the end of 2013.

Enel also pursues sustainable development by continuously improving its environmental profile. This is why, over the years, it has acquired skills and know-how in prediction, monitoring and assessment of environmental impacts. In Brindisi, Enel has fine-tuned models and measuring methods to characterize all environmental matrices. In this way, Enel ensures that all of its activities respond to its priority sustainability requirements.

Moreover, environmental research is intended to track and predict scientific developments in order to be proactive and identify possible improvement actions. Thanks to its environmental skills and know-how, Enel can assess its impacts on environmental 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's Research is a technical-scientific point of reference for all the aspects related to characterization and recovery of by-products from thermal generation. Projects in this field are aimed at identifying and extending potential markets, with a view to optimizing the management of these products. The design of innovative items based on by-products from thermal generation may create alternatives of higher added value. Additionally, through local coordination actions, Enel is promoting the concept of the short supply chain in the management of by-products, thereby saving on emissions associated with their transport and generating benefits for local communities.

Carbon capture & storage (CCS)

Enel is rebalancing and refocusing its activities in this area to capitalize on results achieved at the pilot scale.

The main activities carried out in 2012 in the area of post-combustion capture strengthened the technological know-how that Enel had developed in its pilot carbon capture facility of Brindisi (completed in 2010 to treat 10,000 Nm^3/h of flue gases and separate 2.5 tonne/h of CO_2), acquiring specific experience in design and operation of carbon capture facilities and comparatively testing sorbents and processes, today still under development.

In January 2012, jointly with Mitsubishi Heavy Industries Ltd (MHI), Enel initiated a set of tests on new solvents; the first stage of the testing was completed successfully. To minimize energy consumption associated with carbon capture and compression, Enel began investigating phase-changing sorbents (European Octavius project) and solid sorbents. Tests are in progress to characterize a novel solid sorbent developed by Ricerca sul Sistema Energetico (RSE).

In Spain, Enel completed the start-up of a 300-kWth pilot facility for amine-based post-combustion carbon capture in its **Compostilla** plant; the initial operation of the facility yielded promising results. As part of the "*Menos CO_2*" project, improvements were obtained in terms of control of the pilot facility and reduction of its energy consumption during its 36 weeks of operation. Tests on new sorbents were also started and in part completed in synergy with those conducted in Brindisi. Also the preliminary results of the calcium looping technology, experimented at the **La Pereda** carbon capture pilot installation (1.5 MWth), were very encouraging. This technology exploits the carbonatation reaction of a calcium oxide sorbent to separate carbon dioxide from burnt gases.

As to CCS with combustion in oxygen at atmospheric pressure, Enel completed tests on the pilot facility of Compostilla in Spain and began the analysis of results.

Enel also went on with its characterization and preliminary selection of sites suitable for permanent geological storage of CO_2. In 2012, it completed 4 characterization wells in the **Duero** site and 1 in the **Andorra-Monegrillo** one. In parallel, Enel concluded the study of an off-shore storage site in the Adriatic Sea, in Italy.

As regards research into biological (algal-based) capture of CO_2, stage-1 tests were completed, while stage-2 ones (optimization of CO_2 fixation) are under way in the pilot facility for CO_2 capture by microalgae installed in the site of the **Litoral Microalgae** plant (Andalusia). This activity was supported by laboratory and small pilot-scale work conducted at the research center of Brindisi.

Diagnostics and advanced automation

Enel's Research continued its development of advanced sensing, diagnostics and automation applications to enhance power plant reliability, security/safety and efficiency and to minimize injuries in construction sites and during plant maintenance and operation. In 2012, Enel began the configuration of safety/security systems in the construction site of its **Brindisi coal storage dome**.

Enel also completed its assessment of IT security risks in three real power plants and carried out preliminary lab studies to test the vulnerability of their Diagnostic Control System (DCS) architecture.

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 develop more and more effective and efficient technologies are intense. This is why Enel is committed to all the main technologies for electricity generation from renewables available to date and to identify other ones for tapping still unused resources.

The chief activities carried out in 2012 were focused on power generation by solar thermodynamic, photovoltaic, wind, geothermal, biomass-fired, hydro, sea or ocean energy and hybrid installations.

CSP - solar thermodynamics

Enel completed the commissioning of its "**Archimedes**" 5-MWe concentrating solar power (CSP) plant in Priolo Gargallo (Syracuse). The plant – built in 2010 to integrate the local combined-cycle gas-turbine plant – uses a mixture of molten salts (sodium and potassium nitrates) as heat transfer fluid and thermal energy storage.

During 2012, a system was developed to test salts at low melting temperature (80-140°C) and innovative components, in order to verify the energy performance of the technology and the reliability of the key components of the plant and to optimize its operation.

Another solar thermodynamic plant (30 MW), based on the Archimedes technology, is planned to be built. The new project (**ARCHETYPE**), coordinated by Enel Green Power and funded under the EU's Seventh Framework Programme (FP7), will scale up the Archimedes technology to industrial levels, by combining CSP with biomass back-up and seawater desalination.

As regards small-scale installations, Enel's laboratory of Catania completed the experimental characterization of an innovative thermodynamic facility using solar radiation to generate:

> electricity via a free-piston Stirling engine generator,
> heat for domestic water production.

Photovoltaics

In 2012, Enel's **solar laboratory of Catania** carried out the indoor and outdoor characterization of some commercial and pre-commercial photovoltaic (PV) technologies, as well as the validation of systems to assess performance, reliability and actual potential of large-scale applications under different operating conditions.

An additional "**Diamond**" solar PV facility is being installed in the Valle Giulia site of the University of Rome "La Sapienza" School of Architecture. The new facility combines PV panels with storage systems in a futuristic geodesic dome.

Wind

Enel continued its fine-tuning of models for predicting wind power generation in the short-medium term (up to 72 hours). Use is made of: i) physical models based on computational fluid dynamics (CFD) for new plants without historical generation data; and ii) statistical models based on artificial neural networks (ANN) for plants with historical generation data.

Geothermal energy

In the first half of 2012, a 500-kW pilot installation using a supercritical cycle for medium-enthalpy (130-160°C) geothermal sources (improving generating efficiency over current commercial technologies) passed its first test. Enel also developed and tested new ways (e.g. new tube coatings for dry cooling towers) to increase the efficiency of geothermal plants and lower their operation & maintenance costs.

Biomass

Enel is evaluating small-scale generation technologies and optimizing co-firing in existing plants. It is also conducting studies to assess the possible integration of the geothermal source with biomass.

Hydro

In 2012, Enel developed design solutions to optimize hydro power generation, by recovering energy from the release of the minimum in-stream flow via mini-turbines. In Italy, projects of this kind were implemented near the Trezzo d'Adda and Borgo Mozzano plants.

Sea or ocean energy

Enel carried out a first stage of analysis and selection of the most interesting sites, in terms of availability of natural resources, in Europe and Latin America (Chile). It also completed the analysis of technologies under development and embarked on a technological cooperation project in view of developing and testing a system to generate electricity from waves with a nominal capacity of about 100 kW.

Hybridization

During 2012, Enel concentrated its efforts on the integration of multiple technologies. In Stillwater (US), two plants have been operating simultaneously since March 2012: a 26-MW PV plant and a 33-MW geothermal plant. In August, with this project, Enel Green Power won the second edition of the GEA Honors Awards (organized by the US Geothermal Energy Association).

In the same site, Enel launched a project of hybridization of geothermal and solar thermal technologies; the project is based on the construction of a demonstration system aimed at increasing the capacity of an existing geothermal plant by 2 MW by pre-heating the geothermal fluid through the use of solar energy.

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.

The following are some of Enel's key ongoing projects and the main results achieved in 2012.

Smart grid

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; MV storage system; optimized electric-vehicle (EV) recharging station; experimentation of Enel's "Smart Info" device (user terminal to receive consumption/generation data from one's own smart meter) on a large sample of customers (8,000) to enable demand response applications.

Enel also went on with its **Address** project, which will allow customers to actively participate in the energy market. The project is moving into its final stage: field testing of active demand programs and validation of models proposed in previous stages. The project will end in the first half of 2013 with an international event for the presentation of results, to be held in Rome. Moreover, in December 2012, the "Advanced (Active Demand Value ANd Consumer Experience Discovery)" project kicked off. The project, of which Enel Distribuzione SpA is the coordinator, is intended to work out a plan of action for implementing active demand in Europe with the involvement of 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 Distribuzione 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.

Navicelli, implemented by Enel's Research, is a project for smart managing the electricity, heating & cooling resources of an industrial district. The project, which began in 2010, is heading towards its final stage, i.e. the creation of two demonstrators. The first is the smart- user prototype of the Navicelli site, a virtual power plant combining systems generating electricity from renewables with a CHP system whose thermal output serves local users. The second demonstrator is a reactive-power compensation system, consisting of a battery of high-power (1 MVA) lithium-ion accumulators to be integrated into the 3-MW PV park of Toscana Energia.

Energy storage

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, electricity can be stored when it is more advantageous – or when renewables are abundant – and used when needed.

In Italy, as part of its Isernia project, Enel installed a lithium ion storage system (1 MVA – 500 kWh) in an MV/LV substation in partnership with Siemens. This multifunctional storage system, integrated with an EV recharging station, will be used to test the ancillary services of the distribution grid, as a resource for voltage control, peak shaving and black start on a limited portion of the MV grid, etc. Additionally, a storage device (1 MVA – 1 MWh) will be placed into a switching substation in the province of Forlì-Cesena, as part of the European Grid4EU project for voltage and power-flow control, in order to accommodate distributed generation by increasing the hosting capacity of the grid.

Always in Italy, new storage devices will be tested in pilot installations on smart grids. In particular, applications are being developed for the MV grid on the island of Ventotene and for three HV/MV substations in the regions of Apulia, Calabria and Sicily.

Endesa applies energy storage technologies in its **Málaga Smartcity** (lithium-iron-phosphate ion batteries) and **STORE** (lithium ion battery on the Gran Canaria island, flywheel battery in La Gomera and ultracapacitors in La Palma) projects.

Enel also initiated procedures for procuring a storage system, which 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 and, 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 Livorno, 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 to 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.

Efficiency and end uses

To help 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.

In 2012, Enel launched its **Info+** project. Under the project, Enel's **Smart Info** device will be tested for the first time on a large sample of household customers (roughly 8,000). Customers equipped with **Smart Info** will be able to view their electricity consumption/generation data (recorded by a smart meter), thus becoming more aware of their usage patterns and of the need for taking on more energy-efficient behaviors.

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.

Always in the area of energy efficiency, Enel Energia and Enel's Research teams launched the "**ComeConsumo**" (how do I use electricity?) project on a sample of customers, who can view their real-time and historical electricity usage data on an indoor display and on a dedicated website. In 2012, Enel assessed the usage patterns of the sample to determine the potential of this tool.

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

Enel's Research is also engaged in the European **ENCOURAGE** project, which is intended to develop technologies that optimize energy usage in service-sector buildings, focusing on monitoring and 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).

Distributed generation

In February 2012, a prototype of the **Triangle-based Omnipurpose Building (TOB)** was installed in the site of Enel's Research in Pisa. The system 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 training & education, refrigerators for drug storage in outpatients' clinics, systems of water purification and mobile phone recharging, PCs with Internet connection.

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.

In 2012, an alternating-current 43-kW fast recharge infrastructure was added to the already installed box stations (home garage recharge) and pole stations (public recharge), both based on the smart-meter technology. The new station was successfully tested with the new Renault Zoe, the first car that uses the inverter providing traction to the car as a battery charger, thus permitting to fully recharge the car in less than 30 minutes.

At the end of 2012, the recharging stations installed in Italy and in Spain were 1,000 and about 200, respectively. All are remotely operated by the Electric Mobility Management (EMM) system, which supervises all the stations and monitors all the recharge processes in real time, providing end users with basic and value-added services.

In Italy, Enel extended its Memorandum of Understanding on electric mobility (e-mobility) with the Emilia Romagna Region; the main cities of the region now equipped with recharging infrastructures are 8 (out of 9). The infrastructures are interoperable, even if they are connected to grids of different distributors. In the above-mentioned cities, whoever owns an EV will be able to recharge it by using a single card and a single electricity contract.

Interoperability is also a key feature of the Memorandum of Understanding signed between Enel, Roma Capitale and Acea to develop e-mobility in Rome's metropolitan area.

In Perugia, Enel set up a public EV recharging network, a pilot scheme that Enel submitted to *Autorità per l'Energia Elettrica e il Gas* (AEEG - the Italian electricity and gas regulator) for testing and assessing the various EV recharging service options.

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 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.

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 some countries of Latin America (Brazil, Chile), where interest in sustainable mobility is growing, Enel is promoting technologies already successfully proven in Europe. Finally, in Colombia, Enel supports Codensa in a sustainable mass transit project.

Smart cities

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. Wise energy use, optimized electricity distribution on smart grids, electricity generation from renewables, sustainable transport, efficient public lighting and new services for citizens contribute to creating an efficient and integrated urban ecosystem.

The first pilot schemes that are under way in Italy are located in **Genoa** and **Bari**. Enel Distribuzione 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 new services, including e-mobility and active involvement of citizens by raising their awareness of electricity consumption.

In **Bari** and **Cosenza**, Enel Distribuzione – together with 8 other partners, including large companies – is implementing **Res Novae**, a project co-funded by the Ministry of Education, University and Research. The project, whose goal is to create a sustainable and people-friendly urban environment, covers various activities: energy distribution infrastructures based on smart grids; functionality to monitor, control and manage energy flows in buildings in an optimum way; technological solutions to enable active participation of citizens in the electricity market (active demand); installation of an urban command center, which will provide public administrations, citizens and other interested parties with key energy and non-energy data about the urban environment, in view of pursuing adequate energy planning policies based on real data.

Enel Distribuzione 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 and industrial partners, such as *Electricité Réseau Distribution France* (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 Distribuzione 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 2012, it completed the installation of systems making part of the European **Málaga Smartcity** project and set in motion the **Barcelona Smartcity** 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** was officially inaugurated in November. This is the first smart city in Latin America. Technology, innovation and sustainability are the keywords underlying this project, under which Enel is converting the municipality of Armação dos Búzios (Rio de Janeiro) into a model of sustainable energy management. The first activities in 2012 concerned the installation of 217 smart meters in the homes of Ampla's customers, of 60 Archilede LED systems equipped with remote control along the main roads and of 2 EV recharging stations. 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. Ampla's customers who recycle waste can get discounts and bonuses on their electricity bills.

In 2012, *Cidade Inteligente Búzios* received some prestigious international awards, which recognized its value in terms of environmental sustainability and social responsibility. In July, 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 the "Project of the Year" award (in the small smart-city category) to Búzios thanks to its capability of combining cutting-edge technologies, customer base involvement and environmental protection.

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 Smartcity** 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).

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 of which is worth 1 tonne of oil equivalent) give proof of reduction of energy consumption. In this context, with a view to maximizing efforts to reach the above-mentioned targets, Enel Distribuzione launched a special offering via a dedicated web portal. The offering is intended for all parties who/which wish to implement (and incur the costs of) energy efficiency projects (mainly in the residential sector) supported under the scheme. Interested parties must provide Enel Distribuzione with their identification data, technical data about the project and documents certifying: adequate implementation of the project; its compliance with the technical specifications laid down by the relevant regulator for the presentation of projects by Enel Distribuzione in view of gaining white certificates. If the submitted projects are approved, Enel Distribuzione will make an initial single payment to the project owner, based on the tariff applicable throughout the useful lifetime of the project, net of the costs incurred for development, management and promotion of the project. Therefore, any party, even if it/he/she is not eligible for the white certificates scheme, may obtain an economic benefit commensurate with the energy savings generated by the project.
During 2013, the initiative will be mostly focused on the support of projects in the industrial and transport sector.

Enel Energia

Also in 2012, the Market Division intensified efforts for deploying sustainable-development and energy-efficiency products and services. Various initiatives were put in place to encourage both business and residential customers to adopt energy-efficient practices and reduce energy wastage and adverse environmental impacts. As regards business customers, Enel Energia makes available a broad range of rate plans, both all-green (e.g. "*Energia Pura*") or with optional green features (e.g. "*Anno Sicuro*", "*Per Te Plus*" and "*Energia Flessibile*"). These rate plans and optional features guarantee the renewable origin of the sources used for generating the electricity supplied, via the Renewable-Energy Certificate of Origin scheme managed by Gestore dei Servizi Energetici (GSE). Large companies 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 2012, an electricity & gas rate plan was introduced for small and medium enterprises. The plan involves not only the above-mentioned renewable-energy certification, but also the delivery of a kit of high-efficiency light bulbs.
Enel Energia also took some initiatives to enhance the efficiency of buildings and/or installations. It also developed an innovative Remote Energy Monitoring (REM) service, targeted at business customers having multiple sites. The service provides useful elements of information to optimize electricity consumption, by correlating metered values with environmental data and patterns of usage. In particular, the service allows the customer to monitor electricity usage, load by load, on a daily, monthly and yearly basis vs. historical or budget data, so as to improve electricity usage without penalizing productivity.
As to residential customers, Enel rebranded its green power rate plans ("*Tutto Compreso Luce*") in 2012. These rate plans now come not only with the guarantee of origin of electricity produced from renewable sources, but also 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 relative 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).

A market test was also conducted as part of the "*Come Consumo*" service, enabling household customers to view their real-time electricity usage data on an indoor display and on a dedicated website. The service is aimed at making customers more aware of their electricity usage patterns.

Other services are also available, e.g.: "*BollettaWeb*", whereby the customer receives invoices via email, thus reducing paper consumption and CO_2 emissions; and the on-line Easy Click-Web Data Management service, through which companies may keep their electricity and gas usage under control. In Lombardy, Piedmont and Emilia Romagna, Enel Energia offers energy audit certification services to owners of buildings wishing to sell, lease or restructure their buildings.

Enel Sole

Enel Sole is a leader in public lighting. In early 2009, it launched Archilede, a highly innovative lighting system based on the LED technology and bound to become a benchmark in this category in terms of energy and lighting performance. Thanks to its unique features, over 1,600 municipalities embraced this technology in 2012. The total systems sold were roughly 111,000, translating into about 28.9 GWh of energy savings (corresponding to the yearly average consumption of 10,700 households) and displacing 20,000 tonnes of CO_2 emissions into the atmosphere (the same result would have been obtained by planting approximately 2 million trees).

In the second half of 2012, Enel Sole unveiled an evolved version of the previous model – Archilede High Performance – testifying its further efforts to design and roll out street lighting systems with an increasingly advanced performance. The previous Archilede I system had a lighting efficiency of 65 lm/W vs. over 100 lm/W of the current Archilede HP. Another important feature of the new model is the improved distribution of the light flow through a multi-layer system, in addition to (as in the previous model) a set of optics with no upward dispersion of the light flow, in line with policies of alleviation of light pollution. Photometric performance remaining equal, Archilede HP saves about 50% more energy than the baseline technology of high-pressure sodium lighting fixtures and 60% more than mercury-vapor ones.

Archilede HP will have numerous applications thanks to its expected massive use under the "*Servizio Luce 2*" contract (integrated management of the street lighting service) that Consip SpA awarded to Enel Sole. At present, 9,000 Archilede HP installations are already in operation, totaling over 3 GWh of energy saved and more than 1 tonne of CO_2 emissions displaced. These results substantiate Enel Sole's position as the no.1 European operator in the area of LED-based street-lighting systems.

Enel.si

Enel.si Srl, belonging to Enel Green Power, is a company that manages activities connected with the development of the PV market and energy efficiency. In 2012, the company continued the repositioning and requalification of its retail network, confirming to be the leading Italian franchisor of solutions for electricity generation from renewables. In particular, at the end of 2012, the network included over 784 companies.

The year 2012 was particularly rich of new offerings concerning PV systems and additional green product lines for the consumer market. In 2012, Enel.si sold 148.8 MWp of photovoltaic (PV) modules, of which 56.1 MWp of kits delivered to the franchising network. The turn-key PV kit proposal was conceived to more aggressively address the retail market segment, which is increasingly becoming the Italian mainstream market.

The "*Raggio senza pensieri*" (hassle-free PV) kit had three versions during the year. The first version (extended to 20 kWp) came with offerings differentiated by type of module (EU and non-EU). The second one, developed in connection with the implementation of the 5th Feed-In Scheme, included a self-consumption monitoring device into the kit. The third one reorganized offerings into sizes (XS, S, M, L, XL) to make customers more aware of their requirements and consequent choice of the kit.

"*Scalda senza pensieri*" (hassle-free heating) is a solar thermal offering. In 2012, this offering came first in two versions (natural and forced circulation) and was then organized into sizes (as done in the PV sector) and associated with the vacuum technology.

During the year, the company also started to market solar thermodynamic panels: this is a particularly innovative technology for heating and production of domestic hot water.

The label "*Muoversi senza pensieri*" (mobility made easy) identifies the offering of electric bikes and scooters and the launch of new models with a view to covering the different needs of customers.

To expand its green offerings in terms of technologies used and customer segments targeted, the company developed its "*Casa Efficiente*" (efficient home) line of products and services for heating/cooling, lighting and home automation. While PV and solar thermal offerings require the ownership of a rooftop and are thus intended for single- or two-family homes, the efficient home line is also available for apartment blocks (over 24 million vs. 4 million single-family homes in Italy). It comes with a number of features, such as a new line of LED bulbs, a web-/smartphone-/tablet-based home automation system, particularly suitable for non-wired homes, condensing boilers and high-efficiency heat pumps.

Over and above offerings for the consumer market, Enel.si provides constantly updated solutions and specific products for the business market and for public administrations (PV canopies, easy EV recharging systems, mini- and micro-wind power systems).

In 2012, the company moved into the international arena, exploiting favorable conditions in some countries and promoting energy-saving products and services, especially in France and Brazil.

EN26 Management of water resources

The issue of water is bound to become increasingly significant in the coming years. This is why Enel set itself the target of cutting water consumption by 10% from its 2010 levels by 2020. Enel proceeded along this path also in 2012, achieving a reduction of about 5% on 2011.

The management of locally available water resources is central to biodiversity conservation, as well as to societal development and well-being. High rates of water consumption with respect to local natural flows may cause water stress. Enel constantly monitors all of its production sites in areas at risk of water scarcity, so as to manage water resources in the most efficient way. Actions are carried out at different levels:

> mapping of areas of potential water scarcity (average value of renewable water resources per person lower than FAO's reference value, i.e. 1,700 m^3/person/year) also via specific software programs (e.g. the Global Water Tool developed by the World Business Council for Sustainable Development) to identify possible production sites located in these areas;

> identification of "critical" production sites, i.e. using freshwater;

> more efficient management, thanks to retrofits of plant systems or processes aimed, among others, at maximizing the use of waste waters and sea water;

> monitoring of climate and vegetation data in each site.

The above analyses showed that, in 2012, only 5% of the Group's total electricity generation used freshwater resources for power-plant cooling (condensers) in areas of water scarcity and that the consumption of freshwater for other industrial uses was small or zero.

The steam-cycle plants of Costanera and the combined-cycle plants of Dock Sud (Argentina) and Ventanilla (Peru) recorded the highest consumption of freshwater in areas of water scarcity. However, also in these cases, the actual risks of inducing freshwater stress are negligible:

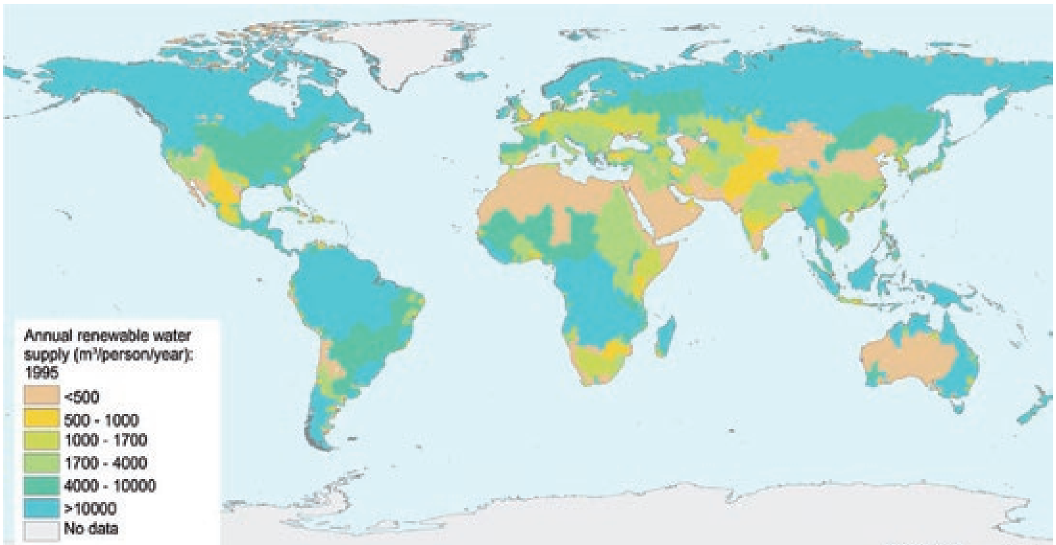
> the plants of Costanera and Dock Sud abstract water from Rio de la Plata, which has high discharge values throughout the year; these plants have a very low consumption of water for industrial uses, excluding cooling (the latter takes place in open cycle and the abstracted water is entirely returned to the river);

> the combined-cycle plant of Ventanilla provides a fundamental service at local level (city of Lima) and uses the best available technologies, resulting into limited water consumption.

Although there are currently no risks of significantly limiting water availability for local communities, it is worth recalling that, in many hydro power generation activities, water resources are managed by paying careful attention to the different local uses and to the specific requirements of local communities (agriculture, drinking water, fisheries, recreational activities).

Always in the sector of hydro power generation, Enel not only complies with the different regional-level river basin management plans (for plants located in the EU) imposing the release of the minimum in-stream flow, but also initiated studies in Spain and South America to gain further insight into hydropeaking, i.e. the change in daily discharge due to the intermittent injection of water turbined downstream of pondage and reservoir plants. The goal is to identify the actual effects of stream management for hydro power generation and acquire a better knowledge base, in order to carry out more targeted actions upon public consultations over the application or updating of legislation on the water footprint (e.g. in Europe, the update of the river basin management plans is scheduled in 2016, as per the Water Framework Directive - 2000/60/EC).

Enel deems it important to give wide visibility to its targets and performance in this area. Therefore, it decided to join the Water Disclosure initiative from 2013 on, extending the successful activity conducted within Endesa to the overall Group.



Biodiversity conservation

Biodiversity conservation is one of the strategic targets of Enel's environmental policy.

The Group promotes a number of projects, in Italy and abroad, 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.

Enel's efforts in the areas surrounding power plants and other installations are of different type: monitoring surveys, projects of conservation, research and improvement, environmental offsets or corrective measures and socio-environmental studies. Among ongoing projects of biodiversity conservation, two, developed in cooperation with local communities and research institutions, are of particular interest. The first, in the Huinay area (Chile), extends over more than 34,000 ha from the Comau or Leptepu fjord (province of Palena) to Argentina. This is a unique biodiversity hotspot and thus investigated by numerous researchers. The second project concerns the Fortuna Forest Reserve, an area (about 19,500 ha) of outstanding natural value along the Pacific coast of Panama. This area, making part of the UNESCO World Network of Biosphere Reserves (WNBR), is regarded as one of the most important ones for its rich biodiversity.

EN12 EN14 The Group's biodiversity strategies, actions and specific plans of action are mostly voluntary or based on agreements made during processes of authorization for construction of installations; in no case are these activities prescribed by national legislation or regulations.

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 and the presence of high-value ecosystems and of threatened biotopes, animal or plant species. Thanks to its knowledge of the species present in these areas, Enel can 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 thus the measures to be taken for their conservation.

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/en-GB/sustainability/environment/biodiversity/.

EN9 EN11 EN25 The website pages indicated above also provide details on: location of protected areas and streams; streams from which water is withdrawn for hydro power generation (whatever the volumes of withdrawal) and cooling; water releases exceeding 5% of the yearly average discharge of the stream or of the impoundment storage volume.

From the standpoint of active management of biodiversity, Enel conducts prior impact studies, systematically evaluating effects on the natural environment and, where necessary, adopting offsets for or improvements to the original situation. In environmental impact studies, Enel takes into consideration the protection of ecosystems and faunal migration routes, picking the best solutions in terms of structures, space requirements, materials and components to be used. For power grids, Enel also takes into account the geometry of supports and is progressively introducing insulated cables, which have a lower impact on landscape and fauna.

In many sites, by agreement with local institutions, independent parties conduct land-, river- and sea-based biomonitoring surveys to assess the influence of Enel's activities on biodiversity and the adequacy of environmental offsets or enhancements. At a later stage, Enel puts in place an environmental management system in accordance with the ISO 14001 standard and with its environmental policy and periodically evaluates its impacts on biodiversity. Then, Enel analyzes risks (including the risk of impact on biodiversity) and, finally, it makes its personnel aware of the possible risk of impact, of the measures needed to mitigate it and of its commitment to biodiversity conservation.

So far, all the monitoring surveys have showed no negative impact on biodiversity and the adequacy of the measures taken to avert the negative effects of emissions into the atmosphere, warm waste waters, noise and maintenance of distribution line corridors. Often, under arrangements with international, national and local bodies and organizations, the companies of the Group actively monitor the conservation status of ecosystems. Operational precautions include: reduction of water abstraction and releases; avoidance of impacts on fish fauna; and abatement of noise from equipment. Releasing the minimum in-stream flow makes the discharge of ephemeral streams, downstream of dams, more constant than the natural one, preventing their drying up; this is an unquestionable environmental enhancement, since it sustains the biodiversity of aquatic ecosystems.

Basins also act as minor wetlands favoring the migration of avian fauna.

The following tables display the biodiversity conservation projects initiated or fully implemented in 2012 and those continued or completed in the same year. Institutional stakeholders (agencies, associations, foundations, study centers, universities, etc.) are involved in the projects. The outcomes of these activities are made known through specific publications (Environmental Report, Annual Report, Sustainability Report, EMAS environmental declarations, flyers) or posted at 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

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 (CEPB) 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**
Wetland ecosystems C	Loire springs - natural zone of ecological, faunal and floral interest and Natura 2000 site: the zone is being monitored to assess the effect of the wind farm on: pre- and post-breeding migration of avian species (project duration: three years); migration, wintering and nesting of raptors (project duration: two years); and bat activity (project duration: two years). [Enel Green Power].	**EN13**

Italy	Project	GRI KPIs
White Stork (*Ciconia ciconia*) LC C	Cilento and Vallo di Diano national park (Sala Consilina, province of Salerno): improvement of storks' staging areas, also in view of educational-scientific activities. [Enel jointly with LIPU and WWF].	**EN13**
Griffon Vulture (*Gyps fulvus*) LC C	Sardinia: study and monitoring of the species and of its habitat in the area surrounding the town of Bosa (Nuoro); attention to threats to its survival; awareness actions in schools and among local communities; creation of sighting points and of a nature trail. [Enel jointly with Legambiente].	**EN13**
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** **EN14**
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**
Loggerhead Sea Turtle (*Caretta caretta*) EN C	Sea turtle rescue center of Brancaleone (Reggio Calabria): development of the center, which deals with rehabilitation and care of injured animals, conducts awareness & education actions and updates the relevant national database. [Enel jointly with CTS, owner].	**EN13**
	Sea turtle rescue centers of the lake Salso sanctuary (Foggia) and of the Rauccio forest (Lecce): support to the centers, study of habitats suitable for egg laying and youth awareness actions in local schools. [Enel jointly with Legambiente].	**EN13**

Italy	Project	GRI KPIs
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 reintroduction 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 collecting 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**
Mediterranean Tapeweed *(Posidonia oceanica)* LC C	Torrevaldaliga Nord thermal plant: sea-based monitoring of the benthic components and physico-chemical characteristics of the local sea water; monitoring of the Mediterranean tapeweed prairie (1 ha) planted in previous years; extension of the protected area of the Site of Community Importance to 435 ha. [Enel Produzione].	**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. For thermal plants, Enel conducted the following activities in 2012: - carried out characterization studies for the Giugliano plant; - went on with planning & design of soil remediation measures and completed groundwater safety measures for the Assemini plant; - 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 final design of environmental rehabilitation and restoration works in the area of the La Spezia plant and in some areas of the Sulcis and Portoscuso plants, responding – among others – to the request of additions made by the Environment Ministry; in previous years, Enel had already completed similar activities in the Fusina, Porto Marghera and Livorno plant areas; - 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 awaiting the related certificate of completion. [Enel Produzione].	**EU13**

Italy	Project	GRI KPIs
Marine, freshwater and wetland ecosystems	Porto Corsini plant (Ravenna): monitoring survey of the Pialassa Baiona lagoon over a surface area of 1,100 ha. At the end of the reporting period, results were good. [Enel Produzione].	**EN14**
	Priolo Gargallo plant: agreement with the managed nature reserve of the Priolo salt flats (RNO Saline) to conserve the wetland. [Enel Produzione].	**EN13**
C	Pietrafitta thermal plant: monitoring of the trophic state of the storage basin water with the methodologies used for developing the register of environmental aspects of the ISO 14001 environmental management system. 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**
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**
Flora, freshwater and wetland ecosystems C	Santa Barbara thermal plant: air quality biomonitoring surveys via passive sensors (lichens); regular surveys to measure algal concentration and composition, the Extended Biotic Index and some chemical parameters along the San Cipriano stream. The results of the surveys are forwarded to the environmental agency (ARPAT) and to local authorities. [Enel Produzione].	**EN14**
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].	**EN13**
	San Francesco forest (Assisi, Perugia): in cooperation with Fondo Ambiente Italiano (FAI), Enel contributes to conserving and restoring a 60-ha forested area, by surveying and cataloguing significant botanical species, cleaning the underwood and conservatively pruning trees and shrubs. [Enel].	**EN13**

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	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 2012, mounting of 52 circular platforms on power distribution line towers to favor nesting. [Enel Distributie Dobrogea and Enel Distributie Banat].	**EN13**

Romania	Project	GRI KPIs
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 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 (province of Timis). 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 (province of Timis). The goal of these activities was to provide Saker Falcons with good habitats after their migration from Hungarian regions to the area of Banat, in accordance with observations made by the Milvus Association with which Enel cooperates. [Milvus Association and Enel Distributie Banat].	**EN13**
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 province of Giurgiu, as part of the MEGA Tree project. The action was undertaken to support the Comana and Giurgiu Forestry Departments. The project will go on in 2013 with maintenance of the planted area and planting of one additional tree every 10 MWh of renewable electricity supplied to customers (based on data to be provided by Enel Green Power). [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) and in the Barsuchkovsky canal (Nevinnomisskaya plant – NGRES – site). Particular emphasis is placed on mitigation of this impact. Consequently, fish screens are being installed near the pumping stations. [OGK-5].	**EN14**
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 will be 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].	**EN14**
Grass Carp (*Ctenopharyngodon idella*) and macrophytes (*canna*, *eyhornia*) C	To prevent the proliferation of lacustrine vegetation, 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].	**EN13**

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 29 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 initiative will continue in 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). [Endesa].	EN14
Osprey (*Pandion haliaetus*), and Black Kite (*Milvus migrans*) LC C	Balearic Islands: projects of conservation (aimed above all at reducing collisions with power lines) continue under a cooperation program between Endesa and the Government of the Balearic Islands, [Endesa Distribución].	EN14
Bonelli's Eagle (*Hieraaetus fasciatus*) LC V	Catalonia: monitoring of the Bonelli's Eagle population, habitat and conservation status. In 2010, studies were conducted to determine the age, number, settlements and physical conditions of the eagles. 37 eagles were tagged to investigate their rates of dispersion and survival, as well as causes of mortality. In 2012, a nest was installed on an HV power line pole. [Endesa Distribución].	EN13
Egyptian Vulture (*Neophron percnopterus*) EN C/V	Canary Islands: study to assess the effectiveness of measures taken in the previous two years to minimize the risk of collision of the avian fauna with overhead MV power lines in Fuerteventura and Lanzarote. In 2012, bird diverters and anti-shock devices were installed on power lines to prevent collision and electrocution. [SEO-BirdLife and Endesa Distribución].	EN14
Flora, fauna, ecosystem and landscape C/V	Andorra, Puentes and Puertollano mining areas: hydrogeomorphological and landscape restoration to reinstate the original local biodiversity. In 2012, the project of environmental regeneration of the entire old mining site of Puentes and of the ash pond of the coal-fired plant of Carboneras was completed, by introducing 50 different local species and recreating the local semi-arid habitat. [Endesa].	EU13
V	Doñana national park (Andalusia): support to the initiatives of the Doñana 21 foundation for natural heritage conservation and maintenance of a wild birds' care center. [Enel Green Power España]. Development of an anti-shock device to prevent avian fauna electrocution. [Endesa].	EN13
Flora, fauna, ecological equilibrium and landscape V	Ebro-Pyrenees and Ibones (small lakes) region: in 2012, the environmental regeneration of the area was completed by removing obsolete installations and their appurtenances, restoring the landscape and recovering the autochthonous vegetation and fauna. [Endesa].	EU13
Cantabrian Capercaille (*Tetrao urogallus cantabricus*) LC C Dupont's Lark (*Chersophilus duponti*) NT C	Castilla y León: environmental monitoring surveys are under way in view of developing a plan for conservation of the populations of Cantabrian Capercailles (wind farm sites of Valdesamario, Peña del Gato and Manzanal) and Dupont's Larks (wind farm site of Padul). Actions to manage the habitats of these species are centered on: conservation of sheep and goat breeding, mountain crops, steppes and minimum use of pesticides inside the nature reserve. [Fundación Patrimonio Natural de Castilla y Léon and Enel Green Power].	EN13
Brown Bear (*Ursus arctos*) LC V	Asturias: reforestation of 250 ha of an abandoned farmland area, which is considered to be suitable for the settlement of the brown bear (*Ursus arctos*). The first stage of the project ended in 2012; on a voluntary basis, Enel started a 2nd stage of maintenance of the area. [Enel Green Power and Fondo para la Protección de los Animales Salvajes-FAPAS].	EN13
V	Northern Spain: cooperation agreement for implementing various projects of conservation of brown bears and of rural development in northern Spain. [Endesa and Fundación Oso Pardo].	EN13
Flora and fauna C	Moralets hydroelectric project: biodiversity risk analysis; protective and corrective measures (e.g. procedure for partially and gradually decreasing water level in the Llauset basin to avoid impacts and fencing of the construction site to avoid the entry of and possible damage to wild fauna); proper waste management; removal and subsequent restoration of top soil; installation of systems for clean-up of outlets; use of a floating boom to avoid the dispersion of solids during works for enlarging the intake structure on the Llauset river; restoration of the cliff which will accommodate the spoil from the construction site; consolidation of the unstable foot of the de Fogá gully (three-year project). [Endesa].	EN13 EN14
C	Jabalcon hydroelectric project: biodiversity risk analysis; protective and corrective measures, e.g. fencing of the site to avoid possible damage to fauna; preparation of the area by removing and subsequently restoring top soil; identification of nesting grounds to be protected during the most sensitive periods of breeding; and installation of a floating boom to avoid the dispersion of solids during works. Other planned measures: proper waste management and installation of an ultrasound system to prevent fishes from entering the basin. [Endesa].	EN13 EN14

Spain	Project	GRI KPIs
C	Balearic Islands: in 2012, Enel continued its biodiversity monitoring surveys (started in 2008) along the power distribution lines located in the Natura 2000 sites. The surveys are aimed at assessing the impacts of tree cutting and pruning and at adopting possible mitigative measures. In 2011, Enel completed its monitoring survey on the island of Minorca. [Endesa Distribución].	**EN14**
Avian fauna C/V	Electricity distribution in the Balearic Islands: in 2012, the "avilinea" (bird-friendly power lines) project (started in 2004 under an agreement between Endesa and the Government of the Balearic Islands) went on. The project is aimed at coordinating environmental efforts in connection with electricity distribution and at conserving the avian fauna. The agreement was renewed in 2010 and extended to include works on power line towers and the insulation of some power lines to protect the avian fauna from collision and electrocution. [Endesa].	**EN14**
C/V	Aragon: investments on infrastructures improved the protection of the avian fauna from the MV power lines of Magallon-Valdeferrín, Ricla-Purroy, Belsierre-Yeba, Fuentes Claras-Bello. The project ended in 2012. [Endesa].	**EN14**
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 power lines and electrocution. Development of other research projects in conjunction with research centers and public institutions. [Endesa Distribución].	**EN14**
C	Distribución Canarias: installation of diverters to prevent birds' collisions with MV power lines on the Island of Lanzarote. [Endesa Distribución].	**EN14**
Raptors C	Villahermosa del Río (province of Castellón): management of raptor shelter areas. [Enel Green Power].	**EU13**
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].	**EN14**
Terrestrial ecosystems C/V	Serralada Litoral national park, Barcelona: adaptation of the power distribution grid to avoid raptors' electrocution in the national park. Endesa Distribución supported studies on three species: European Honey Buzzard (*Pernis apivorus*), Short-Toed Snake-Eagle (*Circaetus gallicus*) and Northern Goshawk (*Accipiter gentilis*). [Endesa Distribución].	**EN13** **EN14**
Avian fauna C/V	Castilla y León: mitigation of biodiversity risks caused by overhead power lines by: conducting studies on retrofits of existing lines; introducing incident management protocols and procedures for maintaining power lines located in Special Protection Areas (SPAs) and Sites of Community Importance (SCIs); and carrying out studies for alternative impact mitigation projects. [Endesa Distribución].	**EN14**
Fluvial/lacustrine ecosystems and fish fauna V	Mongolia: 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].	**EN14**
C	Sant Llorenç basin: rescue of swan mussels (*Anodonta cygnea*) in October 2012 during partial emptying of the Sant Llorenç basin (Catalonia) for dam maintenance. In the summer of 2012, samples were collected to investigate the characteristics of fish, amphibian, bird and plant populations in the Sant Llorenç basin. [Endesa].	**EN13** **EN14**
Brown Trout (*Salmo trutta*) LC C/V Pyrenean Newt (*Calotriton asper*) NT V	Central Pyrenees: project of research on the application of the minimum in-stream flow in the Noguera-Ribagorzana river basin in the central Pyrenees. [Endesa]. Project of research to determine the impact of hydropeaking in the Noguera-Pallaresa river basin on the summer nutrition of the brown trout. Indicators (e.g. stomach filling and diet composition) were compared between sites affected by hydropeaking and one control site under natural-flow conditions. [Endesa]. In 2012, a study was conducted on the morphological and ecological characteristics of a population of Pyrenean newts in the Acherito mountain lake (central Pyrenees), with particular attention to neoteny phenomena. [Endesa].	**EN14**
Fluvial ecosystems C/V	Lower Ebro: in hydro and nuclear generation sites, identification of relations between underwater macrophytes and their nutrients, in particular phosphorus. Also the potential bioaccumulation of heavy metals and pesticides was investigated. [Endesa].	**EN14**

North America

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].	**EN14**
Atlantic salmon (*Salmo salar*), American shad (*Alosa sapidissima*) 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. Always in 2011, a similar study was conducted on the American shad, 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, whereas 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. 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].	**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. The project went on in 2012. [NHFGD and Enel Green Power North America].	**EN14**
Avian fauna and bats V	Rocky Ridge wind farm: 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*) LC C	Cove Fort geothermal plant: development of a plan jointly with federal agencies to minimize the impact of steam lines on local fauna migration routes (elks and Bactrian Wapitis). [Enel Green Power North America, US Forest Service-USFS and Bureau of Land Management-BLM].	**EN14**
Terrestrial fauna V	Stillwater geothermal plant: installation of fences in some areas of the Stillwater National Wildlife Refuge (listed as a Globally Important Bird Area) to protect local fauna from illegal hunting. [Enel Green Power North America and US Fish and Wildlife Service].	**EN14**

Latin America

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**

Brazil	Project	GRI KPIs
Flora C	Cachoeira hydro plant: continuing of the project of restoration of a riparian forest damaged by agro-pastoral activities in the areas surrounding the storage basin. 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 re-forested 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**
V	Sustainable rural communities: project of conservation, forest management and sustainable forestry in the Biosfera Caatinga 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].	**EN14**
Environment C	Bio-septic tanks: project intended to protect the natural environment from anthropogenic pollution by training workers skilled in construction of septic tanks in the Macizo de Baturité region. [Endesa].	**EN14**
C	Production of eco-friendly dielectric oil: pilot project to introduce and certify eco-friendly oil extracted from Brazilian natural components, to be used in place of petroleum-derived mineral oil. [Endesa].	**EN14**

Brazil	Project	GRI KPIs
Brown-Throated Parakeet (*Aratinga pertinax*) LC C	Protection of the indigenous fauna of the State of Ceará: the project consists in designing and installing nests 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. [Endesa].	**EN14**
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 the impoundment. Monitoring and management of forests to preserve their biodiversity and maintain a wildlife corridor. Access to these areas is controlled to prevent indiscriminate hunting and fishing. [Enel Green Power].	**EN14**
Fish fauna C	Laranja Doce basin: safeguarding of the fish fauna during emptying of the basin.	

Chile	Project	GRI KPIs
Flora V	Atacama desert: project of conservation of Incas' crops under agreements with local communities, which are aimed at creating new development opportunities and improving their quality of life. The project, initiated in 2008, provides technical support to the Caspana and Toconce communities (upper Loa river area) to improve production processes, to optimize the growing, treatment and yield of native crops (corn, quínoa, potato), to manufacture herbal teas and condiments, preserving the typical Ande-an and pre-Incan terrace farming and promoting the creation of fair and sustainable trading channels. [Fundación Semilla and GDN Chile (geothermal energy company)].	**EN13**
C	Chilectra: in compliance with the relevant legislation, trees were planted over an area of 1.19 ha sur-rounding the Andes substation. The project involves the planting of groundcover species to mitigate the environmental impact. [Endesa].	**EU13**
C	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, 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 Leptepu) 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**
Flora (*Baccharis macraei, Chorizanthe paniculata, Erigeron fasciculatus*) C	Canela wind farm: maintenance of the area reforested in 2010 (about 50 ha) under an environmental offset project and its protection from lagomorphs. [Endesa].	**EU13**
Cactus plants C	Canela wind farm: conservation of cactus plants relocated from some areas of the plant site to other areas owned by the company. [Endesa].	**EU13**
C	Taltal thermal plant: agreement with local governments for a study on cactus plant conservation in the area surrounding the plant. [Endesa]	**EN14**
Poultry and mammalian fauna C	Tarapacá thermal plant: quarterly monitoring of poultry and mammalian fauna to identify impacts on processes of migration and settlement of the different species. [Endesa].	**EN14**
Flora, ecosystem and landscape C	Ojos de Agua hydro plant: environmental offsets after tree logging and soil erosion. [Endesa].	**EU13**
C	Bocamina thermal plant: reforestation offset (planting of about 1,750 Monterey pine trees) after enlargement of the ash storage site near the plant. [Endesa].	**EU13**

Chile	Project	GRI KPIs
Herpetofauna and rodents	Canela II wind farm: controlled disturbance to avoid deaths or injuries of rodents living in tunnels; rescue and transfer of lizards present in construction sites. [Endesa].	**EN14**

Colombia	Project	GRI KPIs
Flora, fauna, ecosystem and landscape V	Cartagena thermal plant: project of biodiversity conservation in the lagoon located in the plant area, conducted jointly with *Instituto de Ciencias Naturales - Universidad Nacional de Colombia*. In 2011, 1.5 ha of land around the lagoon were reforested. In 2012, the 2nd stage of the project (analyzing the biological connectivity of the ecosystem and updating the flora and fauna inventory) was implemented. Thanks to the project, 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 recorded terrestrial species. An informational brochure was also published. [Endesa and Instituto de Ciencias Naturales, Universidad Nacional de Colombia].	**EN13** **EN14**
Fish fauna V	Betania basin: seeding of 360,500 individuals of autochthonous fish species jointly with local authorities and communities. [Endesa].	**EU13**
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. [Endesa].	**EN13**
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. [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, which will last one year, is expected to estimate the value of environmental conservation of the basin, by using native poultry fauna as an indicator of ecosystem improvement. [Endesa].	**EU13**

Guatemala	Project	GRI KPIs
Avian fauna C	Maintenance of corridors near transmission lines over a total surface area of about 6 ha. [Enel Latin America].	**EN12**

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 NT 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, the prohibited activities and the 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 Latin America jointly with the Smithsonian Tropical Research Institute and the National Conservancy Association].	**EN13** **EU13**

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. [Endesa].	**EN14**

Mapping of environmental compliance

In 2012, the Enel Group went ahead with the mapping of its environmental compliance, by assessing and quantifying the related risks. Enel's top management prompted the stepping-up of the implementation plan started in 2010, which was expected to cover more than 500 sites all over the world by 2014. The new deadline for completion was scheduled in 2013. At the same time, a process software upgrade program was initiated.

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 and financial resources connected with the operation of Enel's installations for power generation (excluding nuclear) and distribution. The purpose of the project is to provide the management with qualitative data and priority elements 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.

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.

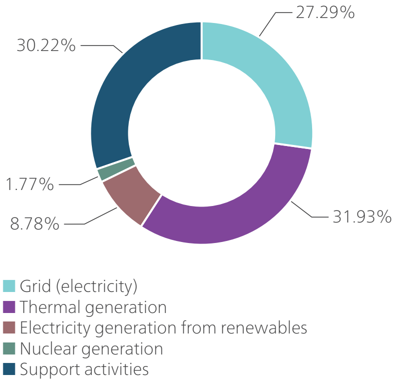
The methodology, based on predetermined criteria, consists of the following fundamental steps:

1. inherent risk assessment: assessment of the probability 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.

In 2012, the assessment covered 418 sites in 17 countries:

- 17 coal-fired thermal plants;
- 14 combined-cycle thermal plants;
- 36 oil/gas-fired thermal plants;
- 3 biomass-fired thermal plants;
- 82 hydro generation groups;
- 4 geothermal generation groups;
- 20 PV plants;
- 149 wind farms;
- 90 electricity distribution sites;
- 3 CHP plants.

Environmental training & education in 2012
Total: 83,421
(person-hours)



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 2012, Enel developed education modules for its environment-dedicated personnel: in the overall Group, 83,421 person-hours of courses were delivered, mostly on environmental management systems.

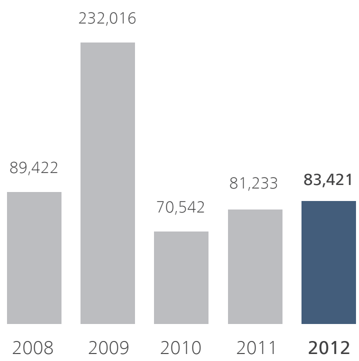
This value corroborates the positive trend recorded since 2011. Indeed, these initiatives are aimed at: building awareness of environmental issues, making personnel members accountable for the consequences of their decisions and actions on the environment; and promoting sustainable practices inside and outside workplaces.

Conversely, the peak recorded in 2009 was due to the construction of the Bocamina II power plant in Chile.
The following tables show the person-hours of courses by business or line of activity and geographic area.

Awareness activities inside and outside the Company

Enel's Intranet site has a thematic section with CEO's messages, environmental policy, Environmental Reports, data on environmental management systems and 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.
The page gives access to the Environmental Reports (available also in navigable form from 2009 on) and to the Group's environmental policy, commitment to the fight against climate change and to biodiversity conservation, EMAS and ISO 14001 environmental management systems, renewables, energy efficiency and innovative projects, especially those of emission abatement.

Environmental training & education in 2012 (person-hours)



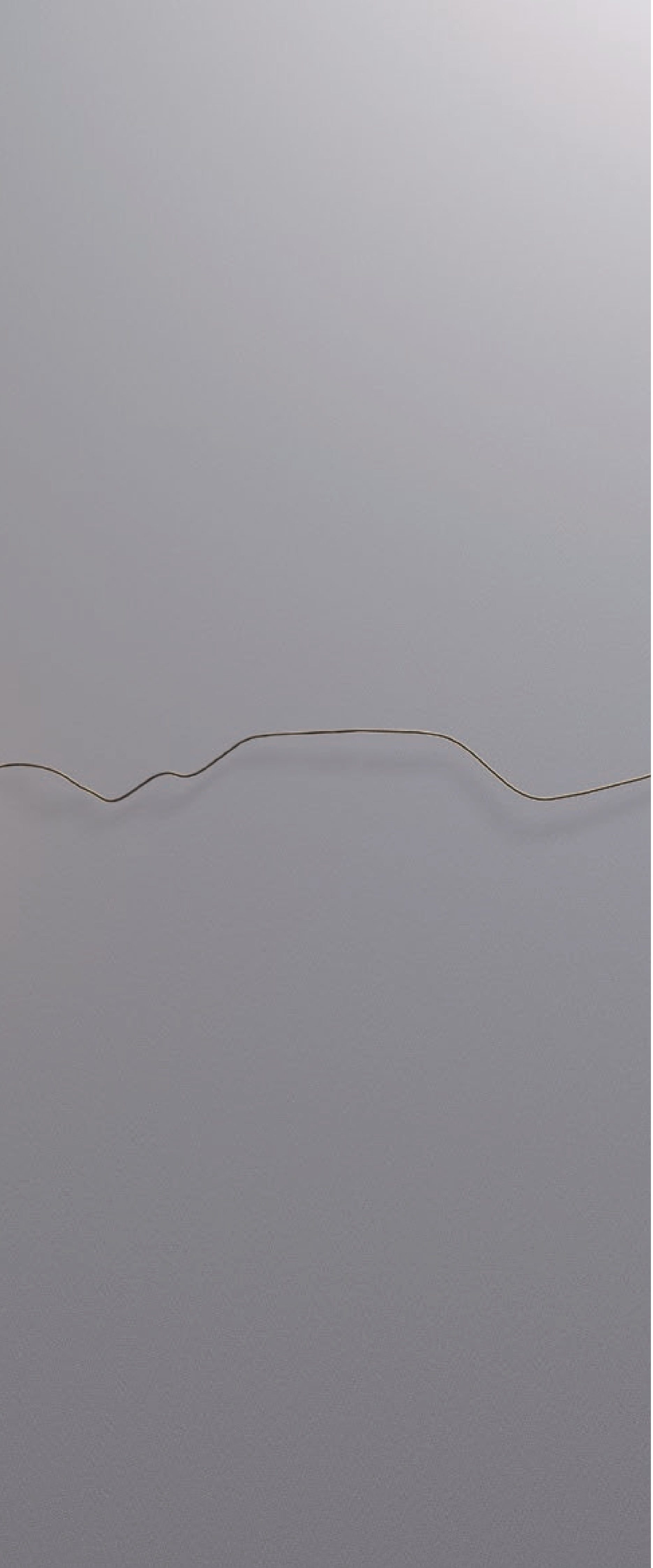
Business/line of activity (person-hours in 2012)

Thermal generation (including CHP)	Electricity generation from renewables	Nuclear generation (including CHP)	Electricity distribution	Environmental support	
26,640	7,325	1,480	22,766	25,210	83,421

Geographic area (person-hours in 2012)

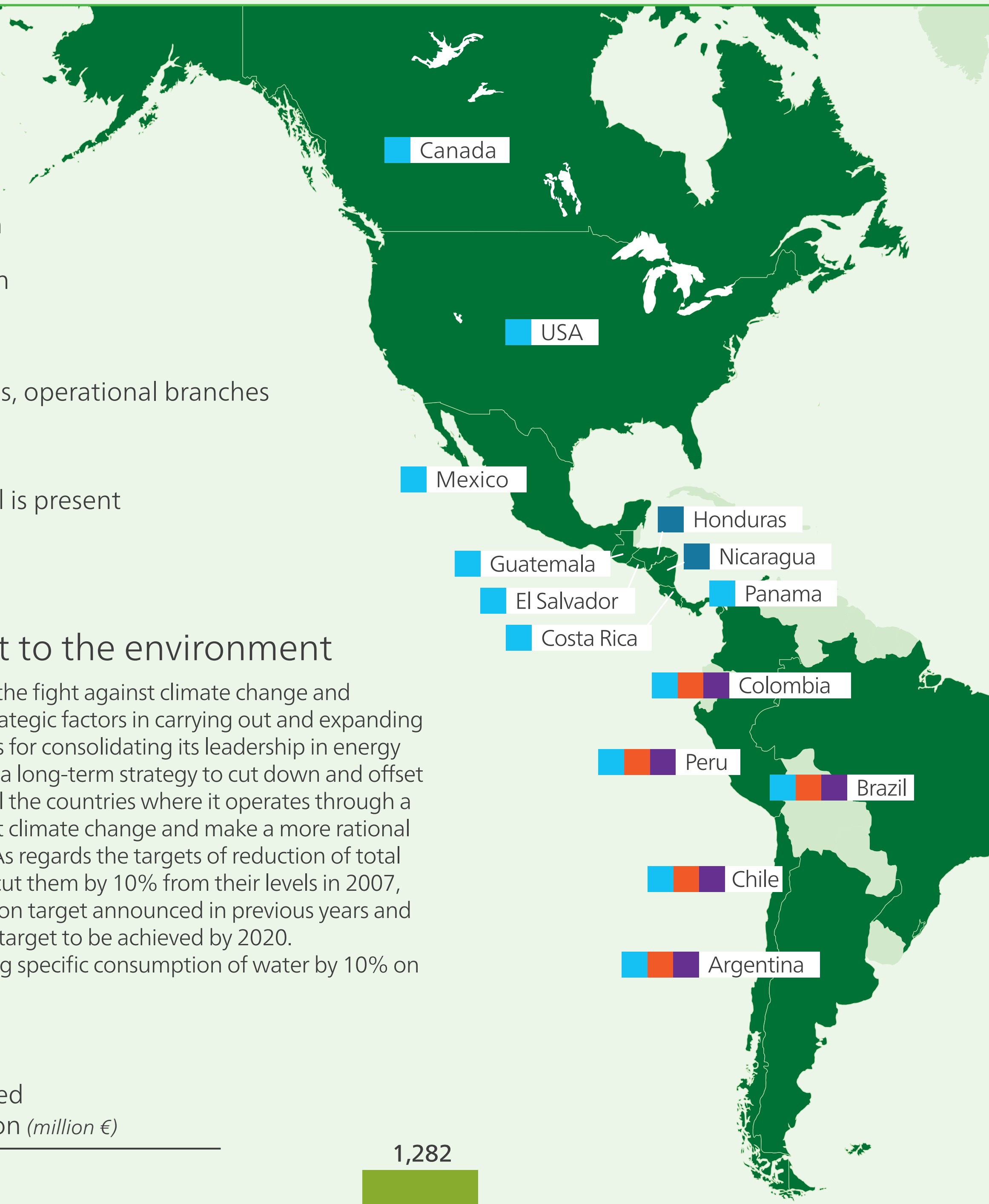
Italy	Spain	Russia	Rest of Europe	American continent	
20,751	18,554	11,782	18,229	14,105	83,421


Efficiency



Group's environmental results

Enel in the world

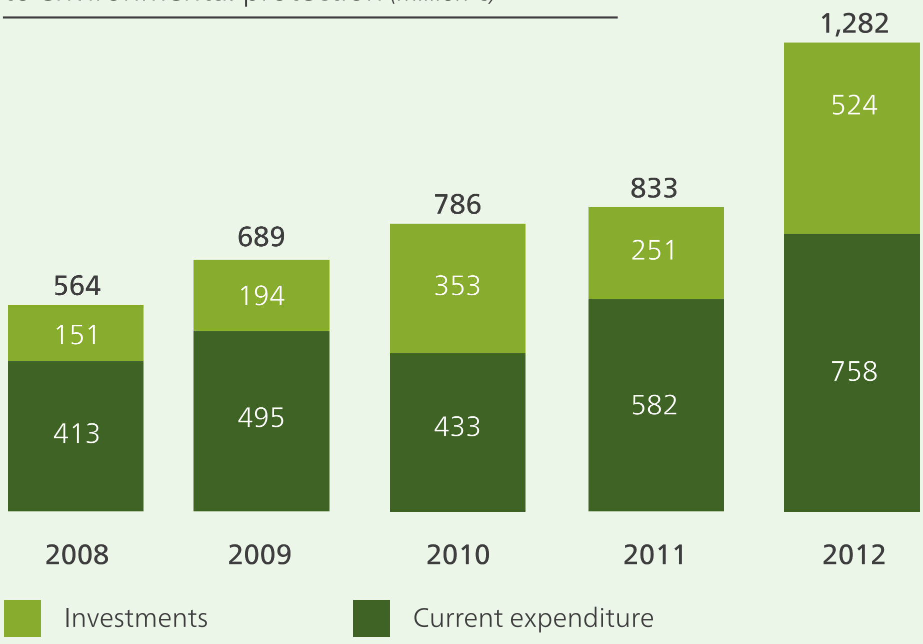


- Upstream gas
- Electricity generation
- Electricity distribution
- Market
- Representative offices, operational branches and other projects
- Countries where Enel is present

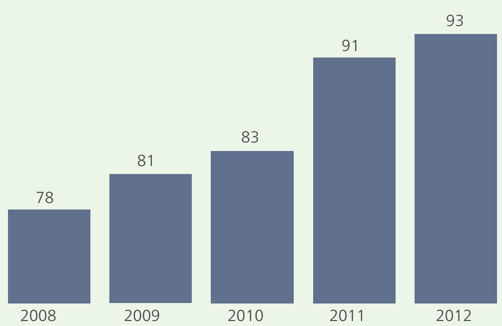
Enel's commitment to the environment

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 cut down 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 the targets of reduction of total specific emissions of CO_2, Enel cut them by 10% from their levels in 2007, thus surpassing the 7% reduction target announced in previous years and confirming the 15% reduction target to be achieved by 2020.
Enel also committed to reducing specific consumption of water by 10% on 2010 by 2020.

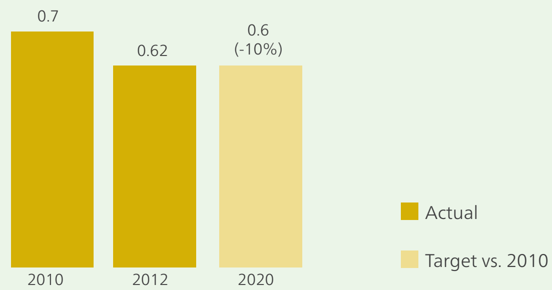
Financial resources allocated
to environmental protection *(million €)*



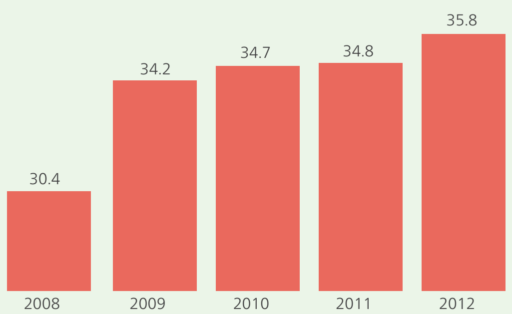
ISO 14001-certified net maximum capacity *(% coverage)*



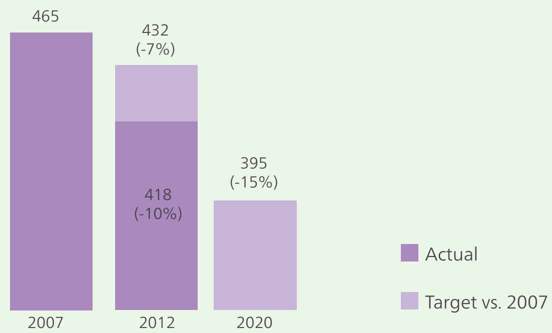
Net specific consumption of water for industrial uses *(liters/kWh net)*



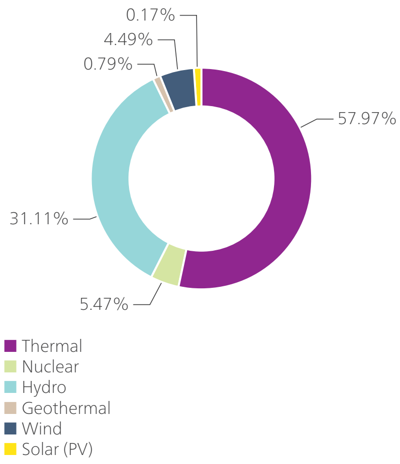
Renewable generating mix *(GW net installed)*



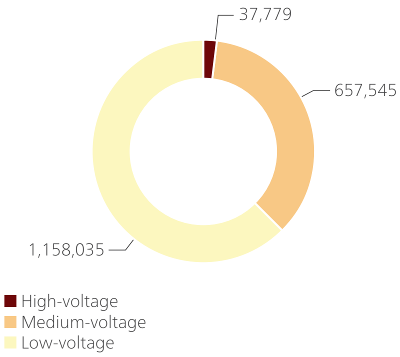
Specific emissions of CO_2 *(gCO_2/kWh total net)*



Net maximum electrical capacity of power plants as of Dec. 31, 2012
Total: 97,840 MW



Circuit-length of power lines as of Dec. 31, 2012
Total: 1,853,359 km



Electricity generation (especially thermal) is the activity of Enel that has the most significant effects on and interactions with the environment.
However, this Report 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 Environmental Report are divided into the following four parts [1], each of which shows not only absolute data, but also specific performance indicators:

> status data;
> resources;
> processes and products;
> emissions, waste waters 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 2008 to 2012 ("status data").
The status data and the absolute values of resources, processes and products, emissions, waste waters 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 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, gas distribution, service and real-estate management);
> CO_2 emissions (in this case, the activities are mining & extracting, fuel storage & handling, gas distribution, 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, gas distribution, service and real-estate management).

Status data

Absolute values

		2008	2009	2010	2011 [1]	2012
Power-generating installations						
Power plants	no.	1,158	1,070	1,112	1,125	1,171
thermal	no.	98	102	103	103	101
nuclear	no.	5	5	5	5	5
hydro	no.	858	768	811	789	797
geothermal	no.	32	34	35	35	35
wind	no.	161	155	151	175	192
solar (photovoltaic)	no.	4	6	7	18	41
Net maximum electrical capacity	MW	70,222	82,916	85,913	85,123	85,620
thermal	MW	38,088	46,046	47,832	46,836	46,316
nuclear	MW	2,442	3,522	3,514	3,527	3,535
hydro	MW	26,561	30,279	31,033	30,265	30,435
geothermal	MW	687	742	775	769	769
wind	MW	2,440	2,303	2,731	3,619	4,394
solar (photovoltaic)	MW	4.2	23.9	27.4	108	171
Combined heat & power installations						
Power plants	no.	21	22	22	24	23
thermal	no.	19	20	20	22	21
nuclear	no.	2	2	2	2	2
Net maximum electrical capacity	MW	11,218	11,283	11,360	12,212	12,220
thermal	MW	9,506	9,521	9,544	10,394	10,404
nuclear	MW	1,712	1,762	1,816	1,818	1,816
Useful thermal capacity	million kcal/h	3,198	3,340	3,329	3,613	3,577
thermal	million kcal/h	2,785	2,876	2,865	3,149	-
nuclear	million kcal/h	413	464	464	464	3,113
Power lines (circuit-length)						
Total	km	1,586,845	1,785,270	1,803,359	1,826,801	1,853,359
high-voltage	km	44,753	38,705	36,882	37,118	37,779
medium-voltage	km	544,795	638,698	645,479	651,084	657,545
low-voltage	km	997,297	1,107,866	1,120,999	1,138,599	1,158,035
Gas pipelines						
Total	km	31,765	3,440	0	0	0
high-pressure	km	205	1,007	0	0	0
medium-pressure	km	12,342	1,596	0	0	0
low-pressure	km	19,219	837	0	0	0

(1) For details about changes in assets, refer to the chapters devoted to the various countries where the Group is present.

		2008	2009	2010	2011 (1)	2012
Mining & extracting activities						
Mining activities						
Mines	no.	8	8	8	8	8
coal	*no.*	*5*	*5*	*4*	*4*	*4*
brown coal	*no.*	*3*	*3*	*4*	*4*	*4*
Amount of fuels extractable since the start of activities	Mt	60	60	399	402	403
Areas occupied by excavations and other activities	ha	2,724	5,351	4,448	4,510	4,435
coal mines	*ha*	*2,714*	*5,341*	*4,438*	*3,756*	*1,148*
brown coal mines	*ha*	*10*	*10*	*10*	*754*	*3,287*
Extracting activities (gas)						
Areas occupied by excavations, drilling and other activities	ha	500	0	0	0	0
Real-estate & service management						
Vehicle fleet						
service vehicles	no.	14,065	16,185	15,858	16,007	14,380
special vehicles	no.	2,244	2,537	2,164	2,054	2,096
vehicles for both private and service use	no.	1,019	1,244	1,153	1,911	2,529
Gross real-estate surface area	thousand m^2	1,749	1,836	2,549	45,317	41,382

(1) For details about changes in assets, refer to the chapters devoted to the various countries where the Group is present.

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 June 2008, Enel acquired a controlling stake in the Russian company OGK-5.

> In June 2008, Enel acquired a majority holding in the electricity distribution company Muntenia Sud (which then became Enel Distributie Muntenia) in Romania.

> In the same month, Enel sold the companies Viesgo Generación and Viesgo Distribución to E.ON.

> In July 2008, Enel inaugurated its first wind farm in France.

> In the same year, acquisitions of gas grid assets in Italy – especially of the infrastructures of Avisio (Trento) – were dominant over sales.

> 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 its activities in Belgium (thermal power generation) through its International Division, by commissioning a combined-cycle plant with a net maximum capacity of about 400 MW.
> During 2012, 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 Canada, Greece, Mexico, Spain and the United States and of hydro plants in Guatemala.
> 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.

Key Performance Indicators - KPIs

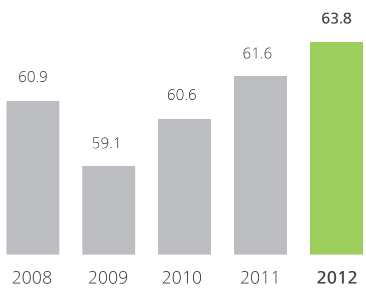
		2008	2009	2010	2011	**2012**	% ('12-'08)/'08	% ('12-'11)/'11
Land								
LV cable lines								
overhead	% of entire LV grid	45.4	43.1	45.4	46.6	48.8	7.50	4.70
underground	% of entire LV grid	32.7	33.2	33.2	33.4	34	4.00	1.80
Total cable lines	**% of entire LV grid**	**78**	**76.3**	**78.6**	**79.9**	**82.9**	**6.30**	**3.80**
MV cable lines								
overhead	% of entire MV grid	2.05	2.03	2.08	1.88	2.39	16.60	27.10
underground	% of entire MV grid	32.2	30.5	30.4	30.9	31.2	-3.10	1.00
Total cable lines	**% of entire MV grid**	**34.3**	**32.5**	**32.5**	**32.8**	**33.6**	**-2.00**	**2.40**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	60.9	59.1	60.6	61.6	63.8	4.80	3.60

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 of 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.

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



This ratio continues to grow and, in 2012, it was up by over 2 percentage points on 2011, with a total value of approximately 63.8%.

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 environmentally sustainable practices (e.g. all other conditions being equal, preference is given to ISO 14001-certified or EMAS-registered ones).

EN16-EN17 The following table shows the indirect emissions of CO_2 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 2012, it was equivalent to 63% 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 2012, it was equivalent to 32.4% 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 Enel's average CO_2 emission factor in the world.

In the case of coal extraction, emissions of greenhouse gases (CH_4) 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		2008	2009	2010	2011	2012
Total emissions	**kt**	**5,626**	**6,437**	**6,211**	**7,520**	**8,869**
Indirect CO_2 equivalent emissions (scope 2 EN16)	kt	220	232	245	332	1,140
Indirect CO_2 equivalent emissions (scope 3 EN17)	kt	5,406	6,205	5,966	7,188	7,729
from transport of coal by sea	kt	475	544	525	647	899
from transport of coal by rail	kt	449	483	440	581	488
from coal extraction	kt	4,457	5,151	4,974	5,933	6,313
from transport of materials	kt	2.3	2.2	2.1	2.3	2.2
from transport of other fuels (gas oil, biomass, RDF)	kt	4.0	4.7	4.2	3.8	3.3
from transport of waste	kt	18.2	20.5	20.5	20.8	21.6

Resources

Absolute values

		2008	2009	2010	2011	2012
EN1 EN3 Fossil fuels						
Thermal generation						
fuel oil	thousand t	2,862	3,104	2,625	2,328	2,423
	thousand toe	2,818	3,045	2,562	2,234	2,368
HS	*thousand t*	*6.18*	*6.92*	*4.36*	*0*	*0*
	thousand toe	*5.87*	*6.57*	*4.14*	*0*	*0*
MS	*thousand t*	*310*	*256*	*191*	*107*	*94.2*
	thousand toe	*300*	*248*	*185*	*103*	*90.8*
LS	*thousand t*	*1,708*	*2,180*	*2,186*	*2,032*	*2,056*
	thousand toe	*1,679*	*2,137*	*2,128*	*1,942*	*2,005*
VLS	*thousand t*	*838*	*661*	*245*	*189*	*273*
	thousand toe	*834*	*654*	*245*	*189*	*272*
gas oil *	thousand t	1,653	1,950	1,612	1,349	1,088
	thousand toe	1,619	1,995	1,663	1,373	1,091
natural gas	million m^3	10,130	9,146	9,746	10,159	8,826
	thousand toe	8,678	7,862	8,410	8,815	7,585
technologically captive use	*million m^3*	*8,391*	*7,806*	*8,719*	*9,284*	*8,115*
	thousand toe	*7,187*	*6,725*	*7,540*	*8,076*	*6,999*
of which in combined-cycle units	million m^3	7,809	7,257	8,057	8,553	7,217
	thousand toe	6,684	6,255	6,969	7,440	6,208
non-technologically captive use	*million m^3*	*1,739*	*1,339*	*1,027*	*875*	*711*
	thousand toe	*1,491*	*1,136*	*870*	*738*	*586*
coal	thousand t	19,998	20,598	17,535	23,538	26,896
	thousand toe	11,328	11,800	10,060	13,361	15,146
brown coal	thousand t	8,382	7,915	9,048	2,698	2,047
	thousand toe	1,548	1,440	1,556	856	639
coke-oven gas	million m^3	0.002	0.003	0.009	0.009	0.004
	thousand toe	0.002	0.003	0.01	0.01	0.005
Total	**thousand toe**	**25,991**	**26,142**	**24,251**	**26,638**	**26,830**
	TJ	**1,088,172**	**1,094,528**	**1,015,346**	**1,115,297**	**1,123,308**
Thermal generation (CHP)						
fuel oil	thousand t	84.4	89.4	62.9	68.2	82.5
	thousand toe	83.2	87	61.2	66.9	79.2

* Of which 2.4 thousand t (2.3 thousand toe) of orimulsion: residual amount of orimulsion whose use by the thermal plant of Brindisi was authorised as an exception by the Ministry of the Environment.

		2008	2009	2010	2011	2012
MS	*thousand t*	*55.4*	*59.7*	*50*	*33.6*	*52.2*
	thousand toe	*53.6*	*56.4*	*48.4*	*32.9*	*50.2*
LS	*thousand t*	*29*	*29.7*	*12.9*	*34.6*	*30.3*
	thousand toe	*29.6*	*30.5*	*12.8*	*34*	*29*
gas oil	thousand t	0.03	0.003	0.15	0.137	0.104
	thousand toe	0.033	0.004	0.136	0.069	0.094
natural gas	million m^3	3,948	6,185	6,778	7,523	7,131
	thousand toe	3,192	5,018	5,505	5,730	5,769
technologically captive use	*million m^3*	*185*	*65.6*	*105*	*403*	*1,061*
	thousand toe	*154*	*56.1*	*88.1*	*331*	*867*
of which in combined-cycle units	million m^3	168	51	88.4	359	1,020
	thousand toe	139	42.5	73.1	295	830
non-technologically captive use	*million m^3*	*3,764*	*6,119*	*6,673*	*7,120*	*6,070*
	thousand toe	*3,039*	*4,962*	*5,417*	*5,399*	*4,903*
coal	thousand t	7,936	11,993	13,933	12,821	13,291
	thousand toe	3,204	5,073	5,494	5,208	5,285
brown coal	thousand t	2,318	2,308	2,273	2,424	2,292
	thousand toe	585	571	575	600	501
Total	**thousand toe**	**7,064**	**10,749**	**11,636**	**11,604**	**11,635**
	TJ	**295,774**	**450,042**	**487,156**	**485,843**	**487,123**
Various activities	thousand toe	23.3	32.7	18.8	44.6	136
Grand total	**thousand toe**	**33,078**	**36,924**	**35,905**	**38,287**	**38,601**
	TJ	**1,385,822**	**1,546,937**	**1,504,310**	**1,603,009**	**1,612,229**
EN1 EN3 **Hydrogen**						
Thermal generation	thousand m^3	0	0	3.54	1.06	3.32
	thousand toe	0	0	0.881	0.263	0.828
	TJ	0	0	36.9	11.0	34.7
EN1 EN3 **Biomass and waste**						
Thermal generation						
Solid biomass	t	115,905	223,616	267,666	351,679	353,337
	toe	32,271	70,717	83,211	112,022	112,727
Liquid biomass	t	114	336	350	423	1,709
	toe	115	331	298	360	1,530
Biogas	thousand m^3	0	33,104	37,442	38,266	18,948
	toe	0	13,197	14,846	15,134	6,188
RDF	t	22,546	55,235	46,136	56,106	58,398
	toe	9,129	23,027	19,377	23,839	24,527
Thermal generation (CHP)						
Solid biomass	t	451,239	411,188	424,854	381,428	361,451
	toe	100,479	91,910	95,706	85,754	84,379
Grand total	**thousand toe**	**142**	**199**	**213**	**237**	**229**
	TJ	**5,945**	**8,339**	**8,936**	**9,927**	**9,603**
EN1 EN3 **Nuclear fuel**						
Nuclear generation						
Uranium	t	25.6	79.7	36.4	90.4	99.5
	thousand toe	0	6,191	6,040	6,857	7,349
Nuclear generation (CHP)						
Uranium	t	37.5	36	37.4	38.5	35.5
	thousand toe	na	3,727	3,782	3,972	3,997

		2008	2009	2010	2011	2012
Grand total	**thousand toe**	**0**	**9,918**	**9,822**	**10,828**	**11,346**
	TJ	**0**	**415,258**	**411,246**	**453,350**	**475,045**
EN1 EN3 **Geothermal fluid**						
Total fluid extracted	thousand t	59,371	76,375	93,280	94,292	91,696
net of reinjected fluids	*thousand t*	*29,855*	*28,462*	*27,486*	*26,878*	*27,808*
Used for electricity generation	thousand t	53,130	70,982	87,968	87,873	86,991
EN4 **Primary electricity**						
Various activities	million kWh	4.27	36.7	60.8	235	317
EN8 **Water for industrial uses**						
From rivers (including meteoric waters from secondary rainfall)	million m^3	157	156	134	136	143
From wells	million m^3	13.3	17.7	18.2	17.7	14.6
From aqueducts	million m^3	8.91	14.7	8.99	8.9	8.95
Total abstraction from inland waters	**million m^3**	**180**	**189**	**161**	**163**	**166**
From the sea (as-is)	million m^3	13	8.6	8.31	7.8	3.84
From the sea (desalinated)	million m^3	7.63	9.3	9.71	10.3	9.71
EN10 From waste waters (used inside plants)	million m^3	15.2	16.9	23.7	12.8	11.9
Total requirements	**million m^3**	**215**	**223**	**203**	**194**	**192**
for thermal generation	million m^3	111	116	104	97.5	96.4
for thermal generation (CHP)	million m^3	62.7	62.1	53.1	48.7	46.5
for nuclear generation	million m^3	0.929	1.47	1.4	1.81	1.93
for nuclear generation (CHP)	million m^3	38.5	40.4	41	43.7	44.5
for geothermal drilling	million m^3	0.007	0.211	0.059	0.047	0.001
for fuel storage & handling	million m^3	0.016	0.051	0.042	0.043	0.042
for mining & extracting activities	million m^3	2.64	3.09	2.92	2.11	2.18
EN8 EN21 **Open-cycle cooling water**						
For thermal generation (simple and CHP)	million m^3	20,166	22,837	23,635	23,150	20,471
For nuclear generation (simple and CHP)	million m^3	1,827	2,435	2,988	2,417	2,563
Total	**million m^3**	**21,993**	**25,271**	**26,622**	**25,567**	**23,034**
Water for non-industrial uses						
Real-estate & service management	million m^3	0	3.59	1.38	3.6	2.92
EN1 **Expendables**						
Resins	t	148	504	276	270	219
Hydrazine	t	58.3	83.4	68	68.7	67.5
Carbohydrazide	t	269	296	31.9	29.2	48.6
Hydrogen peroxide	t	46.3	0.231	0.749	1.1	1.07
Ammonia	t	20,127	20,567	15,669	18,363	20,371
Limestone for flue-gas desulfurization	t	1,136,959	1,097,191	1,028,003	1,108,004	1,039,550
Magnesium oxide	t	136	326	279	235	181
Sodium hypochlorite	t	7,450	5,827	4,488	6,497	8,356
Chlorine dioxide	t	0	0.514	0.875	0.709	285
Ferrous sulfate	t	255	272	279	311	381
Ferrous chloride	t	44.2	41	20.2	34.7	135
Trisodium phosphate	t	29.8	35.6	33.1	31.9	36.4
Lime	t	36,436	33,374	25,337	22,601	18,429
Ferric chloride	t	1,091	1,239	1,233	1,280	1,441
Polyelectrolyte	t	93.5	120	112	144	205
Sulfuric & hydrochloric acids	t	12,361	15,111	13,554	15,220	15,233

		2008	2009	2010	2011	2012
Caustic soda	t	21,154	32,118	30,623	35,557	54,970
Bentonite	t	1,696	1,739	518	937	709
Barite	t	0	471	216	0	60.6
Geothermal cement	t	3,909	4,559	2,905	2,254	2,161
Lubricating oil	t	12,005	17,702	7,239	7,174	6,755
Dielectric oil	t	1,604	1,383	1,333	1,149	25,896
Printing paper	t	0	152	195	1,251	1,159
Other	t	14,161	12,519	42,753	44,844	32,482
Total	**t**	**1,270,033**	**1,245,631**	**1,175,166**	**1,266,257**	**1,229,135**
for thermal generation	t	1,125,440	1,090,140	1,043,834	1,115,797	1,023,471
for thermal generation (CHP)	t	110,896	108,781	90,661	104,965	115,959
for nuclear generation	t	2,433	1,047	1,108	1,403	1,713
for nuclear generation (CHP)	t	5,738	6,361	6,145	6,776	5,769
for hydro generation	t	616	797	562	639	527
for geothermal activities	t	20,661	30,557	28,185	31,924	51,339
for wind generation	t	62.5	1,395	56.7	0	550
for fuel storage & handling	t	0.105	712	169	186	209
for electricity distribution	t	594	624	956	743	25,670
for gas distribution	t	91.8	0	0	0	0
EN1 **PCB survey** (1)						
Equipment & transformers with PCBs > 500 ppm (excluding their oil)	t	77.5	999	81.8	37	38.2
Oil with PCBs > 500 ppm contained in equipment & transformers	t	69.8	340	5.9	1.08	1.45
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding their oil)	t	988	20,377	24,766	19,525	18,084
Oil with PCBs > 50 ppm and ≤ 500 ppm contained in equipment & transformers	t	341	4,382	6,238	4,590	5,153
Recycling of materials						
Sulfuric acid (brine, a by-product from production demineralized water via osmosis)	%	0	0	0	0,46	0,19
Limestone for flue-gas desulfurization	%	0	0	0	0,372	0,195
Ferric chloride (sludge from waste water treatment)	%	0	0	0	0,312	0,689
Lubricating oil filtered	%	0	0	0	4,08	4,21
Dielectric oil filtered	%	1,37	10,3	59,4	52,7	93,3

(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.

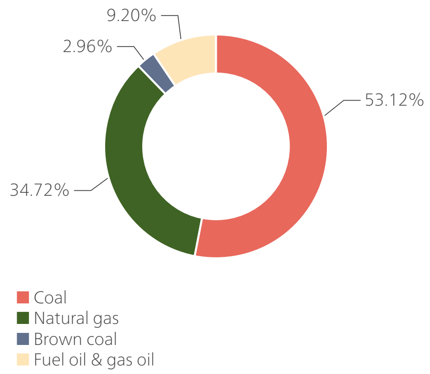
Natural gas and start-up gas oil feed the boilers which heat the fuel oil contained in storage tanks (heating fluidifies fuel oil before its transfer to destination). Small quantities of gas oil are also used for driving geothermal drilling equipment and in emergency generating sets, which are present 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 rose from ~38 Mtoe in 2011 to ~39 Mtoe in 2012, owing to lower hydraulicity and consequent higher thermal generation from coal.

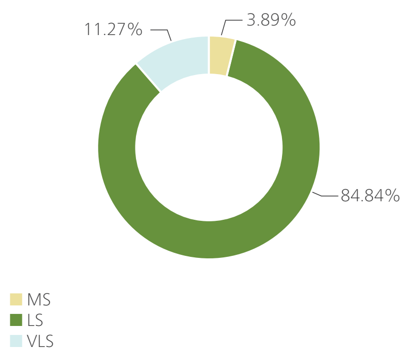
The fuel mix in 2012 showed an increase in the share of coal (about 4 percentage points) and a decrease in brown coal and gas oil (about 1 percentage point). The gas share was down by about 3 percentage points.

With respect to 2011, the consumption of oil products with different sulfur content was as follows: high-sulfur oil dropped to zero, while medium- and low-sulfur oil continued to decline (from ~4.6% to ~3.9% and from ~87.3% to ~84.8%, respectively) in favor of very low-sulfur oil (from ~8% to ~11%).

Fossil-fuel consumption for thermal generation (simple and CHP) in 2012
Total: 38.5 Mtoe

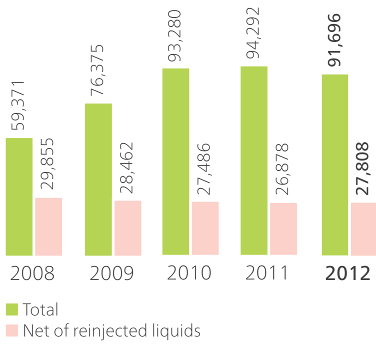


Fuel oil consumption for thermal generation in 2012
Total: 2.4 million t



EN1 EN3 Geothermal fluid

Consumption of geothermal fluid (thousand t)



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 2012, 95% of the overall geothermal fluid extracted was used for electricity generation.

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 in 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 in other pools or, in dry form, in 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 primary electricity used for fuel storage & handling, mining activities, real-estate management and services for the overall Group.

Indirect electricity consumption by activity

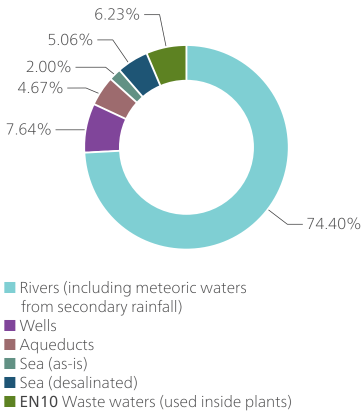
		2010	2011	**2012**
Fuel storage & handling	GJ	23,436	28,631	34,254
	GWh	6.5	8.0	9.5
Electricity distribution	GJ	1,589,990	2,161,001	1,851,458
	GWh	441.7	600.3	514.3
Real-estate management	GJ	558,965	767,729	1,079,640
	GWh	155.3	213.3	299.9
Mining	GJ	48,776	49,334	27,972
	GWh	13.5	13.7	7.8
Total consumption of electricity	**GJ**	**2,221,168**	**3,006,695**	**2,993,324**
	GWh	**617**	**835**	**832**

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.

Conversely, the increased consumption in fuel storage & handling is justified by a larger volume of activities, which is related in turn to higher thermal generation from fossil fuels (coal storage & handling).

EN8 Water for industrial uses

Coverage of water requirements for industrial uses in 2012
Total: 192 million m^3



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 requirements for industrial uses do 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 requirements from 2008 to date;

> the high contribution of sea water (7.1%) and surface water, thanks to their use in: closed-cycle cooling systems of nuclear power plants in Slovakia and Spain, 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 6.2% of requirements.

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.

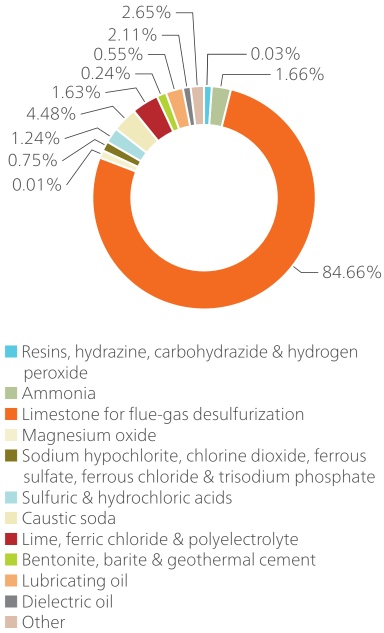
The figures shown for expendables are obtained from the accounting records of purchases, which are held in each installation. Given the small size of stocks and the high number of installations surveyed, the amounts purchased are practically equivalent to those consumed.

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.

Expendables in 2012

Total: 1,229 thousand t



Recycling of materials (%)

	2008	2009	2010	2011	2012
Sulfuric acid (1)			0.7	0.5	0.2
Limestone for flue-gas desulfurization (2)		1.1	1.3	0.4	0.2
Printing paper (3)	50	52.2	56	54.4	53.6
Ferric chloride (4)			0.5		0.7
Dielectric oil (5)	17.8	11.5	59	93	93.3
Lubricating oil (6)		1.1	3	1	4.2

(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% 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

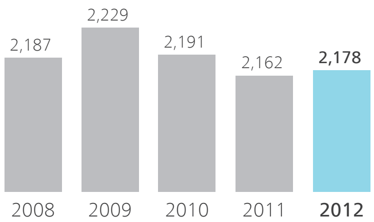
The survey makes it possible to identify the amounts of oil with a PCB content > 500 ppm or > 50 and ≤ 500 ppm, contained in equipment and transformers. The related trends are affected by the progressive participation of the various countries in this activity (ended in 2010). The weight of oil, equipment and transformers with a PCB content > 500 ppm increased in 2012, reflecting the addition of transformers in Andalusia that had not been included in the previous survey.

Also the amount of oil, equipment and transformers with a PCB content > 50 and ≤ 500 ppm went up, reflecting the addition of HV/MV transformers and neutral compensators in the Spanish distribution survey.

Key Performance Indicators - KPIs

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Resource conservation and quality								
EN1 EN3 Net heat rate of thermal generation	kcal/kWh	2,187	2,229	2,191	2,162	2,178	-0.4	0.7
EN1 EN3 Net heat rate of thermal generation (CHP)	kcal/kWh	2,204	2,151	2,182	2,162	2,100	-4.7	-2.9
EN1 EN3 Net heat rate of geothermal generation	kcal/kWh	5,724	6,022	6,422	6,234	6,209	8.5	-0.4
EN1 EN3 Net efficiency of hydro generation from pumped storage	%	72.6	77.7	77.4	68.8	63.9	-12.0	-7.1
EN4 Consumption of electricity for distribution grid operation	% of electricity distributed	0.106	0.101	0.6	0.143	0.124	17.0	-13.3
EN1 EN3 Consumption of natural gas for distribution grid operation	% of natural gas distributed	0.137	0	0	0	0	-100.0	-
Natural gas losses along the grid	% of natural gas distributed	0.65	0	0	0	0	-100.0	-
EN8 Net specific requirements of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	0.93	0.987	0.937	0.788	0.78	-16.1	-1.0
excluding contribution of as-is sea water	liters/kWh	0.821	0.914	0.863	0.725	0.749	-8.8	3.3
EN8 Net specific requirements of water for industrial uses in thermal generation (CHP)	liters/kWh	1.93	1.23	0.989	0.9	0.834	-56.8	-7.3
EN8 Net specific requirements of water for industrial uses in nuclear generation	liters/kWh	0.053	0.065	0.051	0.072	0.072	35.8	0.0
EN8 Net specific requirements of water for industrial uses in nuclear generation (CHP)	liters/kWh	3.02	2.95	2.88	2.93	2.97	-1.7	1.4
EN8 Net specific consumption of water for industrial uses	liters/kWh	0.84	0.75	0.67	0.65	0.62	-26.2	-2.8
EN8 Coverage of requirements of water for industrial uses								
from rivers (including meteoric waters from secondary rainfall)	% of requirements	72.3	69.4	66	70.3	74.3	2.8	5.7
from wells	% of requirements	5.65	7.13	7.6	8.14	7.64	17.3	-18.6
from aqueducts	% of requirements	4.13	6.5	4.42	4.58	4.67	12.3	1.3
Total from inland waters	**% of requirements**	**82.1**	**83**	**78**	**83**	**86.7**	**4.3**	**3.1**
from the sea (as-is)	% of requirements	6.05	3.85	4.1	4.02	2	-66.9	-50.2
from the sea (desalinated)	% of requirements	3.54	4.16	4.79	5.3	5.06	42.9	-4.5
EN10 from waste waters (used inside plants)	% of requirements	7.08	7.56	11.7	6.58	6.23	-12.0	-5.3
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	8.78	8.49	7.31	6.02	6.36	-27.6	5.6
gas oil	% of total fuel consumption	4.9	5.41	4.64	3.59	2.83	-42.2	-21.2
natural gas	% of total fuel consumption	35.9	34.9	38.8	38	34.7	-3.3	-8.7
coal	% of total fuel consumption	44	45.7	43.3	48.6	53.1	20.7	9.3
brown coal	% of total fuel consumption	6.45	5.45	5.94	3.81	2.96	-54.1	-22.3
HS fuel oil	% of total fuel oil consumption	0.202	0.21	0.158	0	0	-100.0	-
MS fuel oil	% of total fuel oil consumption	12.2	9.71	8.9	5.91	5.76	-52.8	-2.5
LS fuel oil	% of total fuel oil consumption	58.9	69.2	81.6	85.9	83.1	41.1	-3.3
VLS fuel oil	% of total fuel oil consumption	28.7	20.9	9.33	8.2	11.1	-61.3	35.4
natural gas, technologically captive use	% of total natural gas consumption	61.8	52.7	54.8	57.8	58.9	-4.7	1.9
of which in combined-cycle units	% of total natural gas consumption	57.5	48.9	50.6	53.2	52.7	-8.3	-0.9
natural gas, non-technologically captive use	% of total natural gas consumption	38.2	47.3	45.2	42.2	41.1	7.6	-2.6
Geothermal fluid for electricity generation	% of total geothermal fluid extracted	97.4	97.9	98.3	98	101	3.7	3.1

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



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 2012 was about 17 kcal/kWh higher than the one of 2011.

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 60 kcal/kWh from 2011.
In 2012, policies to improve the efficiency of thermal power plants (simple and CHP) decreased total energy consumption by 20,770 TJ (-8,765 TJ in simple thermal generation and -12,005 TJ in CHP thermal generation).

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 activity of more efficient plants, whose generation has gradually replaced the one of 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. Water consumption in 2012 was in line with the one of last year.

EN8 The **net specific consumption of water for industrial uses in CHP thermal generation** expresses the amount of water consumed per kWh thermal net. Thanks to water-saving policies, requirements continued to drop in 2012.

EN8 The **net specific consumption of water for industrial uses in nuclear generation** expresses the amount of water consumed per kWh nuclear net. Water consumption in 2012 was in line with the one of 2011.

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. In 2012, requirements grew as a result of the overall increase in heat & power generation.

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. As in previous years, Enel's policies in this regard continued to have positive effects. Indeed, total specific abstraction continued to decline (down by 4.6% on its reclassified value in 2011), in line with Enel's strategic targets to be achieved by 2020 (down by 10% from 2010 levels).

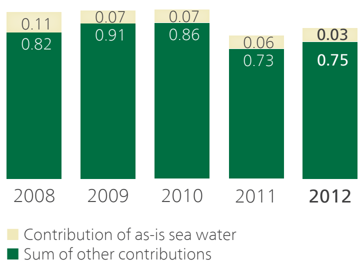
EN8 The **coverage of requirements of water for industrial uses** expresses the percentage contribution of the different water sources (inland waters, sea water, waste waters). The total contribution of inland waters (rivers, wells and aqueducts) went up owing to a decrease in the use of as-is sea water.

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.

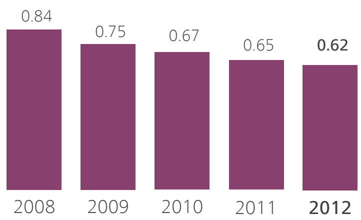
EN3 The **fossil fuel mix** (see § "Fuels") highlights a higher reliance on coal in 2012.

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

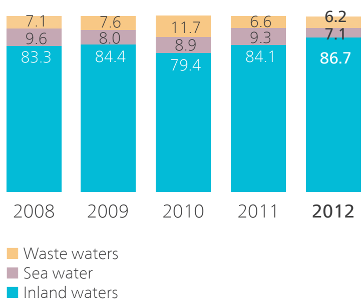
Net specific consumption of water for industrial uses in simple thermal generation (liters/kWh)



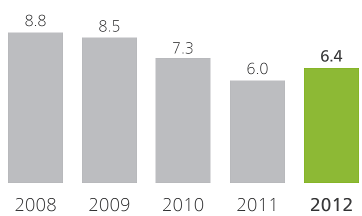
Net specific consumption of water for industrial uses in overall heat & power generation (liters/kWh)



Coverage of requirements of water for industrial uses (%)



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



Processes and products

Absolute values

		2008	2009	2010	2011	2012
Electricity generation (net)						
From fossil fuels	million kWh	145,798	159,006	156,072	168,250	170,175
simple	million kwh	118,830	117,290	110,671	123,230	123,157
fuel oil & gas oil	*million kWh*	*18,732*	*20,601*	*18,074*	*16,977*	*14,458*
natural gas	*million kWh*	*48,282*	*42,959*	*45,249*	*45,983*	*41,026*
of which in combined-cycle units	million kWh	40,850	37,729	40,132	41,025	37,183
coal	*million kWh*	*46,335*	*48,238*	*41,706*	*56,707*	*64,986*
brown coal	*million kWh*	*5,481*	*5,492*	*5,642*	*3,563*	*2,687*
combined with heat generation	million kwh	26,968	41,716	45,401	45,020	47,018
fuel oil & gas oil	*million kWh*	*118*	*119*	*59.6*	*90.5*	*113*
natural gas	*million kWh*	*12,257*	*19,176*	*21,153*	*22,676*	*23,866*
coal	*million kWh*	*12,953*	*20,780*	*22,549*	*20,517*	*21,446*
brown coal	*million kWh*	*1,640*	*1,640*	*1,639*	*1,738*	*1,593*
From waste (non-biodegradable fraction)	million kWh	21.2	51.9	30.8	39.4	47.1
From hydrogen	million kWh	0	0	2.17	0.275	1.5
From renewables	million kWh	64,989	85,682	86,898	79,906	81,300
biomass and biodegradable fraction of waste	million kWh	308	491	553	641	658
simple	*million kWh*	*135*	*334*	*351*	*443*	*457*
combined with heat generation	*million kWh*	*172*	*157*	*202*	*198*	*201*
geothermal	million kWh	5,218	5,150	5,278	5,568	5,492
hydro from natural flows	million kWh	55,505	75,621	75,971	67,368	65,815
wind	million kWh	3,955	4,392	5,069	6,274	9,139
solar (photovoltaic)	million kWh	2.94	27.8	27	56.2	196
Hydro from pumped storage	million kWh	6,228	5,890	5,127	2,965	2,858
Nuclear generation	million kWh	29,672	35,685	41,153	39,517	41,378
simple	million kWh	17,508	22,630	27,620	25,177	26,967
combined with heat generation	million kWh	12,164	13,055	13,534	14,340	14,411
Total	**million kWh**	**246,708**	**286,314**	**289,284**	**290,678**	**295,760**
simple	million kWh	207,404	231,386	230,147	231,120	234,130
combined with heat generation	million kWh	39,303	54,927	59,137	59,558	61,630
Electricity consumption for pumping	million kWh	8,581	7,580	6,628	4,312	4,475
Useful heat output (combined with power generation)						
In thermal power plants	million kcal	4,621,536	7,338,791	7,017,506	7,616,600	7,374,153
fossil fuels	million kcal	4,591,387	7,315,748	6,984,982	7,582,254	7,319,929
biomass and biodegradable fraction of waste	million kcal	30,149	23,042	32,524	34,346	54,224
In nuclear power plants	million kcal	478,592	541,146	596,857	527,923	504,474
Total	**million kcal**	**5,100,128**	**7,879,937**	**7,614,363**	**8,144,523**	**7,878,627**
	million kWh	**5,931**	**9,164**	**8,856**	**9,472**	**9,163**

		2008	2009	2010	2011	2012
Fuel storage & handling						
Fuel transferred to destination	t	42,282	10,144	4,510	15,216	75,641
Heat generation	million kcal	8,700	8,700	6,769	4,550	9,888
Geothermal drilling						
Extent	m	14,718	27,816	15,498	19,214	12,090
Electricity distribution						
Electricity distributed	million kWh	398,017	417,851	185,603	419,500	413,902
EN4 Electricity consumption for grid operation	million kWh	423	421	112	600	514
Natural gas distribution						
Natural gas distributed	million m^3	3,570	442	0	0	0
Natural gas consumption for grid operation	million m^3	4.9	0	0	0	0
Natural gas losses along the grid	million m^3	23.2	0	0	0	0
Mining & extracting activities						
Mining activities						
Fuel extracted in the reporting year	million t	1.38	1.9	1.84	1.01	0.926
Areas restored in the year (geomorphology, hydrogeology and landscape)						
Areas revegetated with plant, shrub and tree species	ha	69.9	23.1	0	283	268
Areas occupied by water bodies	ha	157	234	0	74.0	8
Areas restored since the start of activities (geomorphology, hydrogeology and landscape)						
Areas revegetated with plant, shrub and tree species	ha	1,532	2,287	2,904	3,345	3.552
Areas of high landscape-cultural value	ha	88.7	132	132	139	139
Areas occupied by water bodies	ha	198	509	509	1,042	1,107
Areas occupied by infrastructure (roads, canals, aqueducts, power lines)	ha	65.7	97.9	92.1	95.0	140
Areas awaiting final restoration	ha	168	271	207	1,550	1,538
Sales						
Open market						
Residential segment						
Green offerings						
Customers	no.	673,370	1,364,507	1,581,542	2,105,968	2,713,621
Power sold	million kWh	1,290	3,032	5,258	6,138	7,473
Time-of-use offerings						
Customers	no.	224,450	187,943	286,920	232,004	34,993
Power sold	million kWh	512	868	781	676	96
Total						
Customers	no.	902,126	1,703,764	2,454,591	2,867,588	3,233,598
Power sold	million kWh	2,345	4,322	6,657	8,370	8,973
Business segment						
Green offerings						
Customers	no.	204,024	367,527	407,884	190,630	182,637
Power sold	million kWh	3,230	3,950	5,901	3,874	3,109
Time-of-use offerings						
Customers	no.	168,370	569,217	690,075	862,021	890,278
Power sold	million kWh	17,603	16,786	17,227	17,524	15,839
Total						
Customers	no.	996,425	1,063,456	1,134,254	1,105,714	1,126,111
Power sold	million kWh	27,705	29,580	24,559	23,022	20,686

		2008	2009	2010	2011	2012
Large customers' segment						
Green offerings						
Customers	no.	16	7,925	5,612	654	77
Power sold	million kWh	80	986	126	94.1	164
Time-of-use offerings						
Customers	no.	27,441	38,115	46,518	46,851	42,107
Power sold	million kWh	8,054	8,088	7,419	5,615	5,827
Total						
Customers	no.	31,534	52,545	58,720	51,173	45,294
Power sold	million kWh	9,427	10,290	8,960	7,916	8,536
Very large customers' segment						
Total						
Customers	no.	101	134	119	67	123
Power sold	million kWh	15,390	30,471	25,771	25,765	39,868
Universal-service market						
Household customers' segment						
Time-of-use offerings						
Customers	no.	168,012	187,982	7,126,590	19,722,959	19,125,443
Power sold	million kWh	594	617	17,312	44,927	43,008
Total						
Customers	no.	24,816,711	25,135,660	24,313,927	23,304,781	22,380,167
Power sold	million kWh	54,071	53,082	50,656	51,864	49,141
Non-household customers' segment						
Time-of-use offerings						
Customers	no.	5,696	3,091,587	3,855,927	3,856,615	3,792,986
Power sold	million kWh	263	18,245	20,212	22,481	21,952
Total						
Customers	no.	4,824,492	4,607,488	4,458,415	4,318,693	4,161,178
Power sold	million kWh	26,914	26,767	25,209	26,265	25,431
Overall power sold						
high-voltage	million kWh	17,991	33,266	26,220	26,583	35,652
medium-voltage	million kWh	21,709	22,202	18,292	14,522	17,844
low-voltage	million kWh	113,781	112,372	109,443	104,232	99,139
Total	**million kWh**	**153,481**	**167,841**	**153,955**	**145,337**	**152,634**
Total RECS certificates canceled	**no. (MWh)**	**4,600,000**	**7,968,119**	**11,148,877**	**10,106,362**	**10,733,184**

Enel’s activities are today focused on electricity generation and electricity 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;

> 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);

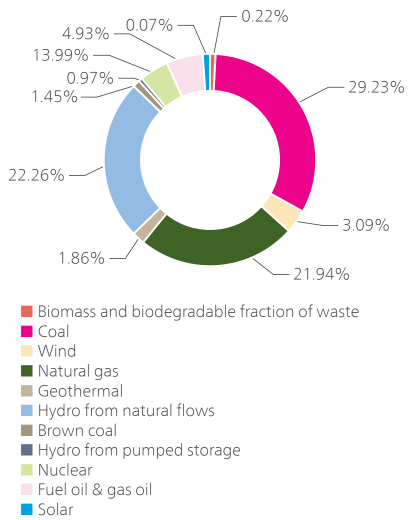
> combined heat & power generation (CHP) takes place in both thermal and nuclear power plants;

> actually available generation is the overall net generation, i.e. after deducting the electricity consumed for pumping.

In 2012, total available electricity generation rose thanks to the increase in generation from renewables (especially wind power generation whose growth has more than offset the decline in hydro generation, penalized in the past few years by low hydraulicity), thermal generation (as an effect of higher reliance on coal) and nuclear generation.

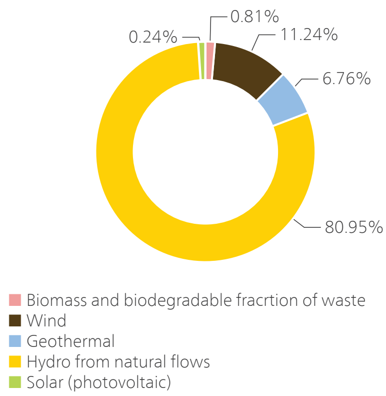
Net electricity generation (simple and CHP) by source in 2012

Total: 296 TWh



Net electricity generation from renewables in 2012

Total: 81.3 TWh



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, waste waters 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 shows 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, waste waters 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 (lower number of thermal power plants, higher generating efficiency and lower grid losses thanks to the shorter distance between generation and consumption).

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

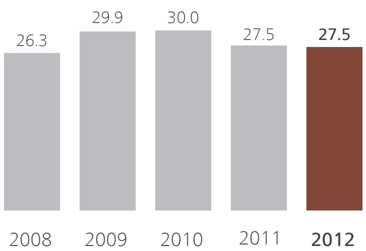
		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Electricity generation from renewables								
Thermal from biomass & biodegradable fraction of waste	% of total generation	0.13	0.17	0.19	0.22	0.22	78.4	1.4
Geothermal	% of total generation	2.12	1.80	1.82	1.92	1.86	-12.3	-3.1
Hydro from natural flows	% of total generation	22.50	26.40	26.30	23.20	22.30	-0.9	-3.9
Wind and solar (photovoltaic)	% of total generation	1.60	1.54	1.76	2.18	3.16	97.5	45
Total	% of total generation	26.30	29.90	30.00	27.50	27.50	4.6	0
Sales								
Residential segment								
Green power sold	% of power sold	55.00	70.20	79.00	73.30	83.30	51.5	13.6
Time-of-use power sold	% of power sold	21.80	20.10	11.70	8.08	1.07	-95.1	-86.8
Business segment								
Green power sold	% of power sold	11.70	13.40	24.00	16.80	15.00	28.2	-10.7
Time-of-use power sold	% of power sold	63.50	56.70	70.10	76.10	76.60	20.6	0.7
Large customers' segment								
Green power sold	% of power sold	0.85	9.58	1.41	1.19	1.93	127.3	62.2
Time-of-use power sold	% of power sold	85.40	78.60	82.80	70.90	68.30	-20	-3.7
Household customers' segment								
Time-of-use power sold	% of power sold	1.10	1.16	34.20	86.60	87.50	7,854.5	1
Non-household customers' segment								
Time-of-use power sold	% of power sold	0.98	68.20	80.20	85.60	86.30	8,733.2	0.8
Overall power sold								
high-voltage	% of power sold	11.70	19.80	17.00	18.30	23.40	100	27.9
medium-voltage	% of power sold	14.10	13.20	11.90	9.990	11.70	-17	17.1
low-voltage	% of power sold	74.10	67.00	71.10	71.70	65.00	-12.3	-9.3
Total green power sold	% of power sold	3.00	4.75	7.33	6.95	7.04	134.7	1.3
Total time-of-use power sold	% of power sold	17.60	26.60	40.90	62.8	56.80	222.7	-9.6
Mining & extracting activities								
Yield of the site (open-pit mine)	million m^3 of moved soil/million t of extracted mineral	4.79	4.17	3.80	2.68	2.45	-48.9	-8.6
Percentage of moved soil used to restore the area	%	0	0	2.49	2.39	5.44	0	127.6

In 2012, **electricity generation from renewables**, expressed as a percentage of total electricity generation, had the same levels as in 2011.

> **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 up on 2011.

> **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 2012 vs. 2011.

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



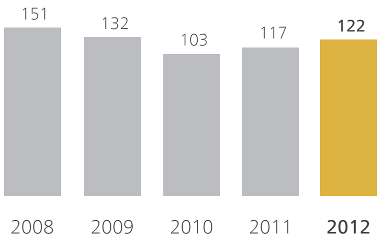
Emissions

Absolute values

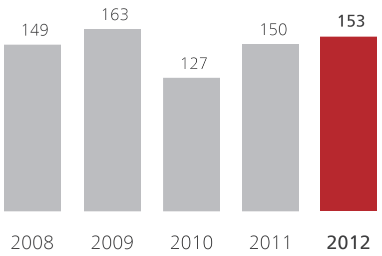
		Source		2008	2009	2010	2011	2012
Emissions into the atmosphere								
EN20	SO_2	thermal generation	thousand t	151	132	103	117	122
		thermal generation (CHP)	thousand t	117	156	184	164	181
		fuel storage & handling	thousand t	0	0	0	0	0
		Total	**thousand t**	**267**	**288**	**287**	**281**	**302**
EN20	NO_X	thermal generation	thousand t	149	163	127	150	153
		thermal generation (CHP)	thousand t	55	98.8	125	109	99
		fuel storage & handling	thousand t	0.002	0.002	0	0.001	0.002
		Total	**thousand t**	**204**	**261**	**251**	**259**	**252**
EN20	Particulates	thermal generation	thousand t	7.17	8.43	6.68	6.3	5.46
		thermal generation (CHP)	thousand t	94.2	120	148	104	96.6
		fuel storage & handling	thousand t	0	0	0	0	0
		Total	**thousand t**	**101**	**129**	**155**	**110**	**102**
EN16	CO_2 (scope 1)	fossil-fired thermal generation (from combustion)	thousand t	86,498	86,759	78,512	87,098	90,278
		fossil-fired thermal generation (from desulfurization)	thousand t	586	411	401	401	369
		Total from fossil-fired thermal generation	thousand t	87,084	87,170	78,913	87,499	90,647
		non-fossil-fired thermal generation (from fossil carbon)	thousand t	16.2	39.7	33.1	40.3	41.9
		Total from thermal generation	thousand t	87,100	87,210	78,946	87,540	90,689
		fossil-fired thermal generation (CHP) (from combustion)	thousand t	23,327	34,732	37,066	35,650	36,744
		Total from thermal generation (CHP)	thousand t	23,327	34,732	37,066	35,650	36,744
		fossil-fired thermal generation (CHP) (from desulfurization)	thousand t	37.3	37.6	35	39.4	45.6
		Total from thermal generation (CHP)	thousand t	23,364	34,770	37,101	35,689	36,789
		Various activities	thousand t	144	166	143	122	149
		Total	**thousand t**	**110,609**	**122,146**	**116,191**	**123,351**	**127,628**
EN16	SF_6	electricity generation	kg	2,282	1,378	1,619	2,729	2,247
			thousand t of CO_2 equivalent	52	31	37	62	51
		electricity distribution	kg	3,781	4,649	4,678	4,659	4,546
			thousand t of CO_2 equivalent	86	106	107	106	104

	Source		2008	2009	2010	2011	2012
	Total	**kg**	**6,064**	**6,027**	**6,297**	**7,388**	**6,793**
		thousand t of CO_2 equivalent	**138**	**137**	**144**	**168**	**155**
EN16 CH_4	gas distribution, mining & extracting activities	thousand t	16.6	1.57	1.52	0.837	0.744
		thousand t of CO_2 equivalent	415	39	38	21	19
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**111,162**	**122,323**	**116,372**	**123,540**	**127,801**
EN20 H_2S	geothermal generation (fluid)	thousand t	13.1	10.2	10.4	9.17	8.96
EN16 CO_2	geothermal generation (fluid)	thousand t	1,902	1,876	1,829	1,804	1,724
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	44,122	56,680	52,609	46,758	47,101
Due to geothermal generation		thousand t	3,610	3,861	3,883	4,138	4,289
Due to wind and solar generation		thousand t	3,237	3,610	4,129	5,158	7,367
Due to generation from biomass & biodegradable fraction of waste		thousand t	94	372	413	483	505
Due to generation from renewables		**thousand t**	**51,063**	**64,520**	**61,035**	**56,564**	**59,262**
Due to generation from hydrogen		thousand t	0	0	1.54	0.195	1.1
Due to nuclear generation (simple and CHP)		**thousand t**	**29,042**	**34,041**	**36,997**	**36,274**	**37,674**
Total		**thousand t**	**80,106**	**98,561**	**98,033**	**92,839**	**96,938**
EN20 **Radioactive emissions into the atmosphere**							
Noble gases	nuclear generation	TBq	24.4	24	15.2	40.7	72.6
	nuclear generation (CHP)	TBq	6.52	6.56	8.51	10.5	7.72
	Total	**TBq**	**30.9**	**30.6**	**23.7**	**51.1**	**80.4**
Iodine 131	nuclear generation	MBq	158	258	88.8	31.3	106
	nuclear generation (CHP)	MBq	0.648	0.556	0.608	0.979	0.662
	Total	**MBq**	**158**	**258**	**89.4**	**32.3**	**106**
Aerosol β and γ	nuclear generation	MBq	20,132	18,401	6,567	5,976	2,534
	nuclear generation (CHP)	MBq	18.1	20.8	18.7	16	28.5
	Total	**MBq**	**20,150**	**18,421**	**6,586**	**5,992**	**2,563**
Aerosol α	nuclear generation	kBq	35.9	63.7	31.4	39.2	28.8
	nuclear generation (CHP)	kBq	13.7	22.6	6.49	3.58	1.52
	Total	**kBq**	**49.7**	**86.3**	**37.9**	**42.8**	**30.4**
Strontium 89 and 90	nuclear generation	kBq	2,781	8,482	2,896	1,838	869
	nuclear generation (CHP)	kBq	133	91.5	74.7	64.7	55
	Total	**kBq**	**2,914**	**8,573**	**2,971**	**1,903**	**924**
EN21 **Waste waters (discharged quantity)**	thermal generation	million m^3	44.4	48.8	39.7	36.9	47.6
	thermal generation (CHP)	million m^3	27.5	40.6	39.8	30.9	31.7
	nuclear generation	million m^3	96.1	158	158	190	1.74
	nuclear generation (CHP)	million m^3	8.14	8.22	9.06	9.28	9.3
	Total electricity generation	million m^3	176	255	247	268	90.4
	Fuel storage & handling	million m^3	0.031	0.037	0.027	0.048	0.076
	Total	**million m^3**	**176**	**255**	**247**	**268**	**90.4**

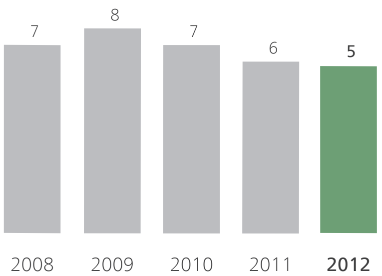
SO_2 emissions from simple thermal generation (thousand t)



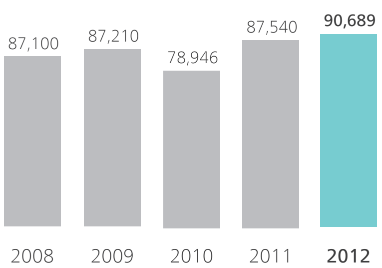
NO_x emissions from simple thermal generation (thousand t)



Particulate emissions from simple thermal generation (thousand t)



CO_2 emissions from simple thermal generation (thousand t)



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

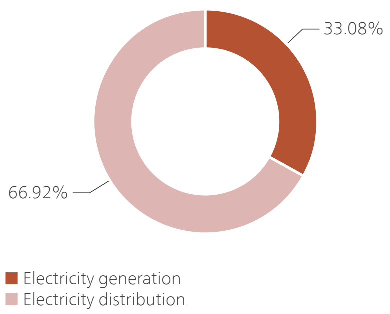
The World Business Council for Sustainable Development (WBCSD) categorizes direct and indirect greenhouse-gas (GHG) emissions and their origin into three broad scopes:
Scope 1: all direct GHG emissions from sources that are owned or controlled by the company, e.g. emissions directly resulting from production.
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. 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 – EU-ETS), 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.
In 2012, Enel recorded an increase in its specific emissions owing to low hydraulicity and thus higher use of coal (this trend was generalized among European utilities and driven by the relative price of commodities). In spite of this, Enel lowered these emissions by 10% from 2007, surpassing the 7% reduction target that it had previously announced. In contrast, specific emissions from CHP thermal plants showed a constantly downward trend throughout the time series, thanks to policies of improvement of plant efficiency, especially in Russia (see "EN5 Energy efficiency").
For emissions, Scopes 2 and 3, see page 86.

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.

Origin of emissions of SF_6 in 2012
Total: 6,793 kg



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.

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. The 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.

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 2012, the overall Group avoided about 97 million tonnes of CO_2 emissions (about 59 million tonnes thanks to electricity generation from renewables and roughly 38 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 32%. If also the contribution of nuclear generation is considered, then this percentage reaches 43%.

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 circuit, 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.

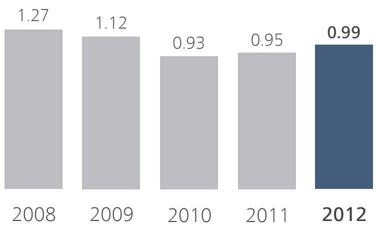
The abnormal pattern of radioactive emissions into the atmosphere in 2008 and 2009 (iodine 131, Sr89-Sr90, β and γ aerosols) is due above all to : i) natural deterioration (from 2007 on) of fuel elements in the Garoña plant (Castilla y León) and technology used (Boiling Water Reactor – BWR), different 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

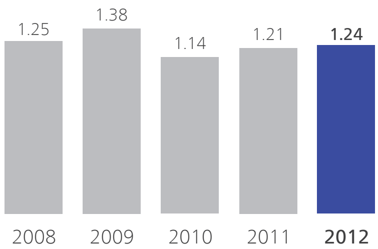
			2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Specific emissions into the atmosphere									
EN20	SO_2 (thermal generation)	g/kWh thermal net	1.27	1.12	0.929	0.95	0.985	-22.4	3.7
EN20	NO_X (thermal generation)	g/kWh thermal net	1.25	1.38	1.14	1.21	1.24	-0.8	2.5
EN20	Particulates (thermal generation)	g/kWh thermal net	0.06	0.072	0.06	0.051	0.044	-26.7	-13.7
EN16	CO_2 (thermal generation)	g/kWh thermal net	732	741	711	708	733	0.1	3.5
EN20	SO_2 (thermal generation - CHP)	g/kWh thermal net	3.59	3.1	3.43	3.03	3.24	-9.7	6.9
EN20	NO_X (thermal generation - CHP)	g/kWh thermal net	1.69	1.96	2.32	2.01	1.77	4.7	-11.9
EN20	Particulates (thermal generation - CHP)	g/kWh thermal net	2.9	2.38	2.75	1.92	1.73	-40.3	-9.9
EN16	CO_2 (thermal generation - CHP)	g/kWh thermal net	719	690	690	660	659	-8.3	-0.2
EN20	SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	1.06	0.975	0.964	0.937	0.992	-6.4	5.9
EN20	NO_X (total from thermal generation - simple and CHP)	g/kWh total net	0.806	0.884	0.843	0.862	0.827	2.6	-4.1
EN20	Particulates (total from thermal generation - simple and CHP)	g/kWh total net	0.401	0.435	0.519	0.367	0.335	-16.5	-8.7
EN16	CO_2 (total from thermal generation - simple and CHP)	g/kWh total net	437	413	389	411	418	-4.3	1.7
EN16	SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.687	0.555	0.82	0.94	0.768	11.8	-18.3
	CH_4+CO_2, expressed as CO_2 equivalent (gas distribution)	g/m^3 of natural gas	111	0	0	0	0	-100	0
EN20	H_2S (geothermal fluid)	g/kWh geothermal net	2.51	1.98	1.97	1.65	1.63	-35.1	-1.2
EN20	CO_2 (geothermal fluid)	g/kWh geothermal net	365	364	347	324	314	-14	-3.1
EN20	**Specific radioactive emissions into the atmosphere**								
	Nuclear generation								
	Noble gases	kBq/kWh	1	1	1	2	3	200	50.0
	Iodine 131	kBq/kWh	9	11	3	1	4	-55.6	300.0
	Aerosol β and γ	mBq/kWh	1,150	813	238	237	94	-91.8	-60.3
	Aerosol α	µBq/kWh	2	3	1	2	1	-50	-50.0
	Strontium 89 and 90	µBq/kWh	159	375	105	73	32	-79.9	-56.2
	Nuclear generation (CHP)								
	Noble gases	kBq/kWh	1	0	1	1	1	0	0.0
	Aerosol β and γ	mBq/kWh	1	2	1	1	2	100	100.0
	Aerosol α	µBq/kWh	1	2	0	0	0	-100	0
	Strontium 89 and 90	µBq/kWh	10	7	5	4	4	-60	0.0

Specific emissions into the atmosphere

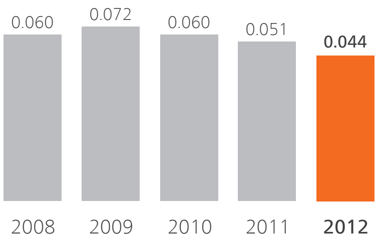
Specific SO_2 emissions from simple thermal generation
(g/kWh thermal net)



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 2012, total specific emissions of NO_x and particulates in simple and CHP thermal generation decreased, whereas those of SO_2 increased, owing above all to an increase in generation from coal and to a decrease in generation from natural gas in Italy and Spain, as well as to the new emission calculation methodology adopted in the Russian plant of Reftinskaya. In the next few years, all pollutants are expected to progressively decline, 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%).

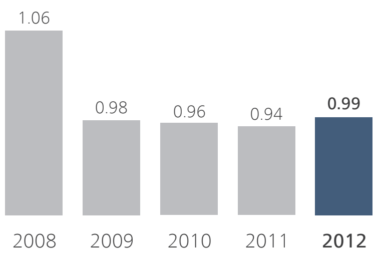
EN20 EN16

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:

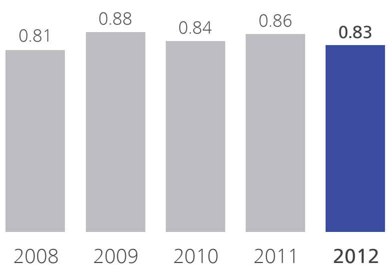
> for H_2S, the cumulated effect of the composition of geothermal steam, of the efficiency of geothermal power plants and of abatement systems; this indicator had a sharp decrease also in 2012;

> for CO_2, the cumulated effect of the composition of geothermal steam and of the efficiency of geothermal power plants.

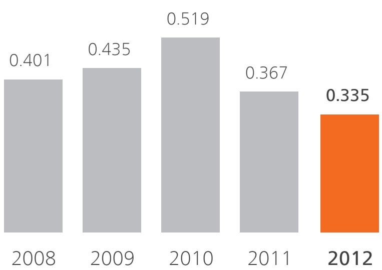
Specific SO_2 emissions from thermal generation (simple and CHP) vs. total electricity and heat generation
(g/kWh total net)



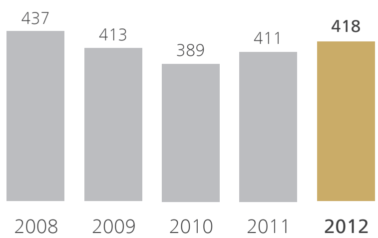
Specific NO_x emissions from thermal generation (simple and CHP) vs. total electricity and heat generation
(g/kWh total net)



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]

	Source		2008	2009	2010	2011	2012
EN21 Conventional polluting load in waste waters discharged by installations							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	7,245	66,132	85,846	10,046	6,963
	in some plants with an overall capacity of	MW	24,492	27,936	26,765	26,482	24,995
	thermal generation (CHP)	kg	89,549	53,085	42,430	46,111	64,873
	in some plants with an overall capacity of	MW	8,183	6,979	6,979	5,135	5,145
	nuclear generation	kg	49.7	70.3	104	15.2	249
	on an overall capacity of	MW	2,442	3,522	3,514	3,527	3,535
	nuclear generation (CHP)	kg	168	158	366	257	567
	on an overall capacity of	MW	1,712	1,762	1,816	1,818	1,816
	Total electricity generation	kg	97,012	119,444	128,746	56,430	72,651
	Fuel storage & handling	kg	12.2	7.7	4	22.3	35.1
	Total	**kg**	**97,025**	**119,452**	**128,750**	**56,452**	**72,686**
Total nitrogen (expressed as N)	thermal generation	kg	110,133	286,230	337,125	67,282	557,984
	in some plants with an overall capacity of	MW	27,114	28,147	27,716	26,136	25,841
	thermal generation (CHP)	kg	0	0	0	34.1	371
	in some plants with an overall capacity of	MW	0	0	0	2,277	2,318
	nuclear generation	kg	7,407	17,612	5,888	10,664	10,293
	on an overall capacity of	MW	2,442	3,522	3,514	3,527	3,535
	nuclear generation (CHP)	kg	40,295	34,566	32,130	33,275	34,847
	on an overall capacity of	MW	1,712	1,762	1,816	1,818	1,816
	Total electricity generation	kg	157,835	338,409	375,143	111,255	603,496
	Fuel storage & handling	kg	16.9	12.6	45	57.5	108
	Total	**kg**	**157,852**	**338,421**	**375,188**	**111,312**	**603,604**
Total phosphorus (expressed as P)	thermal generation	kg	8,873	16,625	23,217	12,110	39,899
	in some plants with an overall capacity of	MW	24,246	21,970	24,233	25,795	24,830
	thermal generation (CHP)	kg	0	0	0	75	21.5
	in some plants with an overall capacity of	MW	0	0	0	21.4	21.4
	nuclear generation	kg	99.4	118	1,189	1,152	1,085
	on an overall capacity of	MW	2,442	3,522	3,514	3,527	3,535
	nuclear generation (CHP)	kg	2,319	2,213	2,491	2,721	2,257
	on an overall capacity of	MW	1,712	1,762	1,816	1,818	1,816
	Total electricity generation	kg	11,292	18,956	26,897	16,059	43,263
	Fuel storage & handling	kg	1.83	1.85	3	23	83.8
	Total	**kg**	**11,294**	**18,958**	**26,900**	**16,082**	**43,347**

(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.

	Source		2008	2009	2010	2011	2012
COD	thermal generation	kg	289,006	335,660	347,461	240,730	559,362
	in some plants with an overall capacity of	MW	27,957	26,654	28,898	25,720	25,164
	thermal generation (CHP)	kg	131,714	72,306	79,815	94,625	802,574
	in some plants with an overall capacity of	MW	1,275	1,255	1,275	1,234	1,255
	nuclear generation	kg	2,064	2,714	24,125	29,400	25,773
	on an overall capacity of	MW	2,442	3,522	3,514	3,527	3,535
	nuclear generation (CHP)	kg	105,591	111,648	140,870	134,170	168,912
	on an overall capacity of	MW	1,712	1,762	1,816	1,818	1,816
	Total electricity generation	kg	528,375	522,329	592,271	498,925	1,556,621
	Fuel storage & handling	kg	38.5	397	375	7,691	14,279
	Total	**kg**	**528,413**	**522,726**	**592,646**	**506,616**	**1,570,899**
BOD	thermal generation	kg	69,734	75,016	118,955	810,493	311,870
	in some plants with an overall capacity of	MW	18,224	21,126	21,177	19,858	19,200
	thermal generation (CHP)	kg	18,167	14,208	15,874	16,724	187,468
	in some plants with an overall capacity of	MW	1,275	3,508	1,275	3,511	1,255
	nuclear generation	kg	1,376	1,792	4,623	7,986	4,624
	on an overall capacity of	MW	2,442	3,522	3,514	3,527	3,535
	nuclear generation (CHP)	kg	15,497	17,605	16,021	21,474	24,469
	on an overall capacity of	MW	1,712	1,762	1,816	1,818	1,816
	Total electricity generation	kg	104,775	108,621	155,473	856,677	528,430
	Fuel storage & handling	kg	12.2	167	119	2,581	3,970
	Total	**kg**	**104,787**	**108,787**	**155,592**	**859,258**	**532,401**
EN21 **Radionuclides in waste waters discharged by plants**							
Tritium	nuclear generation	GBq	58,777	57,746	71,013	78,993	112,192
	nuclear generation (CHP)	GBq	12,444	21,621	19,359	20,960	21,358
	Total	**GBq**	**71,221**	**79,367**	**90,372**	**99,953**	**133,550**
Corrosion and fission products	nuclear generation	GBq	12.8	21.7	9.82	19	22.8
	nuclear generation (CHP)	GBq	0.034	0.032	0.035	0.038	0.042
	Total	**GBq**	**12.9**	**21.8**	**9.85**	**19.1**	**22.8**

EN21 Waste waters

Waste waters include residual waters for industrial uses and meteoric waters collected from the outdoor areas of thermal and nuclear 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 requirements 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.
As is obvious, 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 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

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Net specific conventional polluting load of waste waters discharged by plants (thermal generation)								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net	na	na	1.670	0.194	0.154	-	-20.6
Total nitrogen (expressed as N)	mg/kWh thermal net	na	na	6.630	1.410	12.100	-	758.2
Total phosphorus (expressed as P)	mg/kWh thermal net	na	na	0.520	0.235	0.878	-	273.6
COD	mg/kWh thermal net	na	na	6.210	5.330	13.400	-	151.4
BOD	mg/kWh thermal net	na	na	3.000	23.900	10.400	-	-56.5
Net specific conventional polluting load of waste waters discharged by plants (thermal generation - CHP)								
Metals and compounds (expressed as metal equivalents)	mg/kWh	na	na	0.985	1.400	1.850	-	32.1
Total nitrogen (expressed as N)	mg/kWh	na	na	0	0.004	0.043	-	975.0
Total phosphorus (expressed as P)	mg/kWh	na	na	0	0.360	0.101	-	-71.9
COD	mg/kWh	na	na	27.300	35.200	289.000	-	721.0
BOD	mg/kWh	na	na	5.440	1.400	67.400	-	4,714.3
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	0.003	0.004	0.001	0.009	200.0	800.0
Total nitrogen (expressed as N)	mg/kWh	0.423	0.778	0.213	0.424	0.382	-9.7	-9.9
Total phosphorus (expressed as P)	mg/kWh	0.006	0.005	0.043	0.046	0.040	566.7	-13.0
COD	mg/kWh	0.118	0.120	0.873	1.170	0.956	710.2	-18.3
BOD	mg/kWh	0.079	0.079	0.167	0.317	0.171	116.5	-46.1
EN21 **Net specific conventional polluting load of waste waters discharged by plants (nuclear generation - CHP)**								
Metals and compounds (expressed as metal equivalents)	mg/kWh	0.013	0.012	0.026	0.017	0.038	192.3	123.5
Total nitrogen (expressed as N)	mg/kWh	3.170	2.530	2.260	2.230	2.320	-26.8	4.0
Total phosphorus (expressed as P)	mg/kWh	0.182	0.162	0.175	0.182	0.150	-17.6	-17.6
COD	mg/kWh	8.300	8.160	9.900	8.970	11.300	36.1	26.0
BOD	mg/kWh	1.220	1.290	1.130	1.440	1.630	33.6	13.2
EN21 **Net specific polluting load of radionuclides in waste waters**								
Nuclear generation Tritium	kBq/kWh	3.360	2.550	2.570	3.140	4.160	23.8	32.5
Nuclear generation (CHP) Tritium	kBq/kWh	0.978	1.580	1.360	1.400	1.420	45.2	1.4

Specific polluting load of waste water

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.

As is obvious, 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

Waste

Absolute values

			2008	2009	2010	2011	2012
EN22 **Non-hazardous special waste**							
Coal bottom ash	fossil-fired thermal generation (simple and CHP)						
production		t	696,718	680,732	640,309	678,165	695,857
delivery to recovery operators		t	86,622	111,219	106,876	286,778	207,244
Coal flyash	fossil-fired thermal generation (simple and CHP)						
production		t	6,771,554	7,838,149	8,435,452	8,301,381	8,936,906
delivery to recovery operators		t	2,697,738	2,259,685	1,814,307	2,226,832	2,335,140
Oil bottom ash	fossil-fired thermal generation (simple and CHP)						
production		t	0	63	1.84	0	0
delivery to recovery operators		t	0	0	1.84	0	0
Other non-hazardous ash	fossil-fired thermal generation (simple and CHP)						
production		t	0	3,511	6,352	6,310	6,235
delivery to recovery operators		t	0	0	0	6,310	0
Gypsum from desulfurization	fossil-fired thermal generation (simple and CHP)						
production		t	1,782,515	1,698,998	1,563,570	1,978,796	1,806,912
delivery to recovery operators		t	320,523	328,029	577,405	533,579	517,920
Other							
production	electricity generation & geothermal drilling	t	730,790	812,714	565,439	352,988	359,287
	electricity distribution	t	129,505	208,474	193,385	259,602	219,597
	various activities	t	1,397	7,091	3,038	1,233	2,389
	Total	**t**	**861,692**	**1,028,280**	**761,862**	**613,822**	**581,274**
delivery to recovery operators	electricity generation & geothermal drilling	t	102,061	85,743	111,333	82,453	61,874
	electricity distribution	t	32,945	42,687	46,975	133,851	80,628
	various activities	t	1,336	3,019	2,669	1,115	2,136
	Total	**t**	**136,342**	**131,450**	**160,977**	**217,418**	**144,638**
Total							
production	electricity generation & geothermal drilling	t	9,981,578	11,034,167	11,211,124	11,317,640	11,805,197
	electricity distribution	t	129,505	208,474	193,385	259,602	219,597
	various activities	t	1,397	7,091	3,038	1,233	2,389
	Total	**t**	**10,112,479**	**11,249,733**	**11,407,546**	**11,578,474**	**12,027,183**

			2008	2009	2010	2011	2012
delivery to recovery operators	electricity generation & geothermal drilling	t	3,206,944	2,784,676	2,609,923	3,135,951	3,122,178
	electricity distribution	t	32,945	42,687	46,975	133,851	80,628
	various activities	t	1,336	3,019	2,669	1,115	2,136
	Total	**t**	**3,241,226**	**2,830,382**	**2,659,567**	**3,270,917**	**3,204,941**
EN22 **Hazardous special waste**							
Oil flyash	fossil-fired thermal generation (simple and CHP)						
production		t	1,403	1,122	1,352	1,395	1,289
delivery to recovery operators		t	0	753	909	1,080	0.08
Other ash	fossil-fired thermal generation (simple and CHP)						
production		t	0	8.17	8.9	31	16.6
delivery to recovery operators		t	0	0.19	8.6	0	0
Other							
production	electricity generation & geothermal drilling	t	23,402	48,248	49,060	36,350	46,847
	electricity distribution	t	39,959	20,488	22,727	22,414	39,338
	various activities	t	1,034	1,481	176	638	104
	Total	**t**	**64,394**	**70,217**	**71,963**	**59,402**	**86,289**
of which with PCBs	electricity generation & geothermal drilling	t	2,966	4,135	4,634	4,357	3,046
	electricity distribution	t	2,025	1,428	1,306	1,906	1,171
	various activities	t	0.64	403	1.07	3.97	2.54
	Total	**t**	**4,991**	**5,966**	**5,941**	**6,267**	**4,220**
delivery to recovery operators	electricity generation & geothermal drilling	t	4,416	6,075	8,959	21,418	17,247
	electricity distribution	t	18,496	15,837	17,586	15,624	31,482
	various activities	t	102	312	16	130	17
	Total	**t**	**23,014**	**22,225**	**26,561**	**37,171**	**48,746**
of which with PCBs	electricity generation & geothermal drilling	t	2,512	3,893	4,408	4,058	2,693
	electricity distribution	t	1,723	1,069	1,262	1,865	954
	various activities	t	0	0	0.574	2.74	1.44
	Total	**t**	**4,236**	**4,962**	**5,671**	**5,925**	**3,648**
Total							
production	electricity generation & geothermal drilling	t	24,805	49,378	50,421	37,776	48,153
	electricity distribution	t	39,959	20,488	22,727	22,414	39,338
	various activities	t	1,034	1,481	176	638	104
	Total	**t**	**65,797**	**71,347**	**73,324**	**60,828**	**87,595**
delivery to recovery operators	electricity generation & geothermal drilling	t	4,416	6,829	9,876	22,498	17,247
	electricity distribution	t	18,496	15,837	17,586	15,624	31,482
	various activities	t	102	312	16	130	17
	Total	**t**	**23,014**	**22,978**	**27,478**	**38,251**	**48,746**
EN22 **Total special waste**							
production	electricity generation & geothermal drilling	t	10,006,382	11,083,546	11,261,545	11,355,416	11,853,350
	electricity distribution	t	169,463	228,963	216,111	282,016	258,935
	various activities	t	2,430	8,572	3,214	1,870	2,493
	Total	**t**	**10,178,276**	**11,321,080**	**11,480,871**	**11,639,302**	**12,114,778**
delivery to recovery operators	electricity generation & geothermal drilling	t	3,211,360	2,791,504	2,619,799	3,158,449	3,139,425
	electricity distribution	t	51,441	58,524	64,561	149,475	112,110
	various activities	t	1,439	3,332	2,685	1,244	2,153
	Total	**t**	**3,264,240**	**2,853,360**	**2,687,045**	**3,309,168**	**3,253,687**

			2008	2009	2010	2011	2012
EN22 Radioactive waste							
Low-, intermediate- and high-level: stored inside the plants	nuclear generation (simple and CHP)						
liquid		m^3	2,795	2,643	2,540	2,240	2,040
solid		m^3	1,231	2,953	1,528	1,449	1,529
solid		t	338	310	307	278	285
Low- and intermediate-level: production	nuclear generation (simple and CHP)						
liquid		m^3	119	90.2	76.2	56.6	35
of which: fraction not storable in off-site surface or subsurface sites		*m^3*	*0*	*0*	*0*	*0*	*0*
solid		t	127	220	238	289	482
of which: fraction not storable in off-site surface or subsurface sites		*m^3*	*72.5*	*0*	*33.4*	*32.3*	*45.1*
solid		t	39.4	31.7	29.3	31	31.4
of which: fraction not storable in off-site surface or subsurface sites		*t*	*0*	*0*	*0*	*0*	*0*
High-level: production	nuclear generation (simple and CHP)						
liquid		m^3	0	0	0	0	0
solid		m^3	0	22.1	4.62	8.81	23.9
solid		t	4.93	1.01	12.1	11.7	56.3

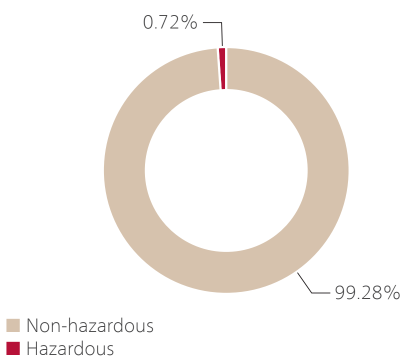
EN22 Special waste

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".

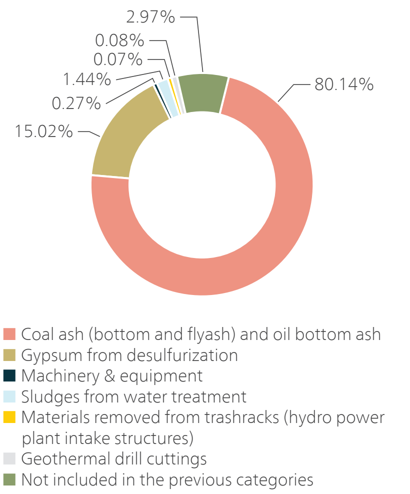
Special waste in 2012

Total production: 12.11 million t

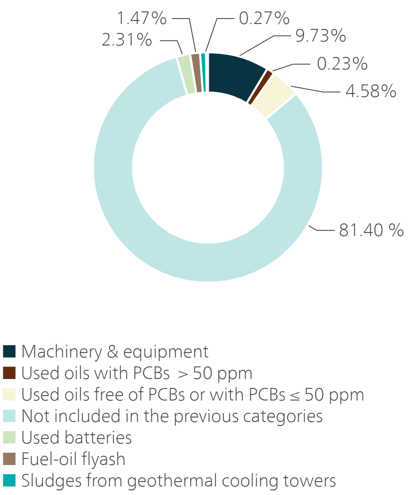


The typical items that are individually inventoried are: machinery & equipment and their parts; sludges from water treatment (waste waters and waters from dredging or septic tanks); materials removed by Enel from the trashracks of hydro power plant intake structures; the portion of alluvial sediments – 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

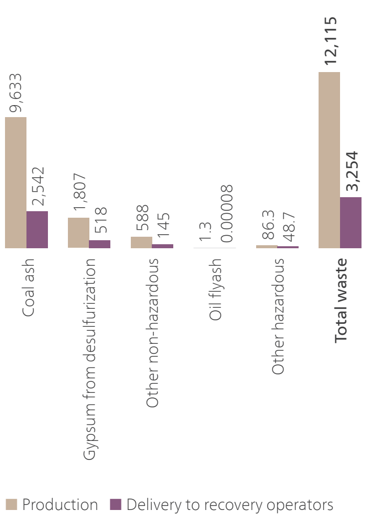
Non-hazardous special waste in 2012
Total production: 12.03 million t



Hazardous special waste in 2012
Total production: 87,595 t



Main categories of special waste in 2012 (thousand t)



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 meteoric waters potentially contaminated by oils and collected in the vats underlying the transformers of high-voltage/medium-voltage substations in the electricity distribution grid.

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 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 defined in the 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 liquid intermediate- and low-level radioactive waste has a downward trend, in line with the program of reduction that was introduced after retrofitting the sewage and drainage system of the Slovak plants. These retrofits permit to recirculate liquid radioactive waste (containing boric acid) inside the plants and thus to avoid its discharge.

The production of solid intermediate- and low-level radioactive waste has an upward trend owing to activities of maintenance and efficiency enhancement in the Spanish plants.

The production of solid high-level radioactive waste rose in 2012, owing above all to the replacement of fuel rods and to their temporary storage into the pools of the Spanish plants of Vandellos, Ascó, Almaraz and Garoña.

Key Performance Indicators - KPIs

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN22 Specific waste production								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	79.1	70	69.3	59	56.7	-28.3	-3.9
Oil flyash (thermal generation)	g/kWh net from fuel oil & gas oil	0.075	0.054	0.075	0.082	0.089	18.7	8.5
Oil bottom ash (thermal generation)	g/kWh net from fuel oil & gas oil	0.075	0.058	0.075	0.082	0.089	18.7	8.5
Coal and brown-coal ash (thermal generation - CHP)	g/kWh net from coal and brown coal	219	204	231	234	242	10.5	3.4
EN22 Specific production of radioactive waste								
Nuclear generation								
low- and intermediate-level								
liquid	mg/kWh net	0.072	0	0	0	0.021	-70.8	-
solid	mm^3/kWh net	7.24	9.7	8.62	11.5	17.9	147.2	55.7
high-level								
solid	mm^3/kWh net	0	0	0.37	0.406	2.08	-	412.3
	mg/kWh net	0	0.975	0.167	0.35	0.887	-	153.4
Nuclear generation (CHP)								
low- and intermediate-level								
liquid	mm^3/kWh net	9.24	6.59	5.36	3.78	2.29	-75.2	-39.4
solid	mg/kWh net	3.1	2.32	2.06	2.07	2.09	-32.6	1
high-level								
solid	mg/kWh net	0.388	0.074	0.135	0.101	0.012	-96.9	-88.1
EN22 Low-, intermediate- and high-level radioactive waste stored inside plants								
liquid	% in volume of production since the start of operation	64.3	58.2	53.6	46.7	42.2	-34.4	-9.6
solid	% in weight of production since the start of operation	37.1	32.8	30.8	27	26.9	-27.5	-0.4
	% in volume of production since the start of operation	21.5	69.9	27.1	25.1	25.9	20.5	3.2
EN22 Waste recovery								
Non-hazardous special waste								
Coal and brown-coal ash	% production	37.3	27.8	21.2	28	26.4	-29.2	-5.7
bottom ash	% production	12.4	16.3	16.7	42.3	29.8	140.3	-29.6
flyash	% production	39.8	28.8	21.5	26.8	26.1	-34.4	-2.6
Gypsum from desulfurization	% production	18	19.3	36.9	27	28.7	59.4	6.3
Other non-hazardous special waste								
electricity generation & geothermal drilling	% production	14	10.5	19.5	24.7	17.2	22.9	-26.5
electricity distribution	% production	25.4	20.5	24.3	51.6	36.7	44.5	-28.9
fuel storage & handling, gas distribution	% production	93.5	21.4	88.7	100	85.7	-8.3	-14.3
Total	**% production**	**15.8**	**12.5**	**20.7**	**36**	**24.9**	**57.6**	**-29.7**
Total non-hazardous special waste								
electricity generation & geothermal drilling	% production	32.1	25.2	23.3	27.7	26.4	-17.8	-4.7
electricity distribution	% production	25.4	20.5	24.3	51.6	36.7	44.5	-28.9
fuel storage & handling, gas distribution	% production	93.5	21.4	88.7	100	85.7	-8.3	-14.3
Total	**% production**	**32**	**25.1**	**23.3**	**28.2**	**26.6**	**-17.1**	**-6**

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Hazardous special waste								
Oil flyash	% production	0	67.1	67.2	77.4	0.006	-	-100
Other hazardous special waste								
electricity generation & geothermal drilling	% production	18.9	12.6	18.3	58.9	36.8	94.7	-37.5
electricity distribution	% production	46.3	77.3	77.4	69.7	80	72.8	14.8
fuel storage & handling, gas distribution	% production	1.25	0	17.6	49.6	73.4	5772	48
Total	**% production**	**35.7**	**31.9**	**37**	**63**	**56.5**	**58.3**	**-9.7**
Total hazardous special waste								
electricity generation & geothermal drilling	% production	17.8	13.8	19.6	59.6	35.8	101.1	-39.9
electricity distribution	% production	46.3	77.3	77.4	69.7	80	72.8	14.8
fuel storage & handling, gas distribution	% production	1.25	0	17.6	49.6	73.4	5,772	48
Total	**% production**	**34.9**	**32.4**	**37.5**	**63.3**	**55.6**	**59.3**	**12.2**
Total special waste								
electricity generation & geothermal drilling	% production	32.1	25.2	23.3	27.8	26.5	-17.4	-4.7
electricity distribution	% production	30.4	25.6	29.9	53	43.3	42.4	-18.3
fuel storage & handling, gas distribution	% production	42.3	20.6	80.2	97.5	85.6	102.4	-12.2
Total	**% production**	**32.1**	**25.2**	**23.4**	**28.4**	**26.9**	**-16.2**	**-5.3**

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.
Net specific production of coal and brown-coal ash from thermal generation was down by roughly 4% on 2011 (56.7 g/kWh in 2012), whereas the one of coal and brown-coal ash from CHP thermal generation grew, owing above all to the higher amount of unburnt carbon particles in the coal used in Russia.
For nuclear generation, the tables show two indicators that are typical of the sector:

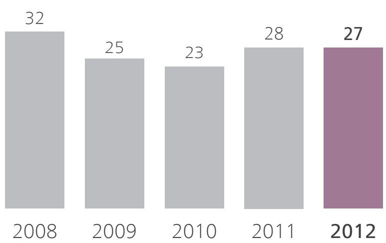
> production of radioactive waste (distinguished by activity and state of aggregation) per unit of electricity produced in the year;
> ratio of the amount of liquid and solid radioactive waste stored in the plant site to the overall amount of the same waste produced since the beginning of operation of the plant.

Specific production of liquid intermediate- and low-level radioactive waste in simple nuclear generation (Spanish plants) had an upward trend in the last three years, owing to activities of plant maintenance and efficiency enhancement.
Over the five-year period, specific production of liquid intermediate- and low-level radioactive waste in CHP nuclear plants has a declining trend; this result is to be attributed to retrofits of the sewage and drainage systems of the Slovak plants, permitting to recirculate liquid radioactive waste (containing boric acid) inside the plants and thus to avoid its discharge.
In 2012, specific production of solid high-level radioactive waste in CHP plants dropped owing to slower rates of replacement of reactor metal internals (exposed to less stresses than in previous years).
Specific production of solid high-level radioactive waste in simple nuclear generation grew in 2012. The increase is to be mainly ascribed to the replacement of fuel rods and to their temporary storage into the pools of the Spanish plants of Vandellos, Ascó, Almaraz and Garoña.

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 2012, special waste recovery decreased; the decrease is to be attributed to the lower amount of gypsum and ash recovered from coal- and brown-coal-fired plants, reflecting in turn a lower demand for these products by the building industry, especially in Spain.

Total waste recovery
(% of waste production)



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 two factors: i) the change of Enel's assets in 2007 and 2008 (Endesa, OGK-5 and Muntenia, sale of gas assets); and ii) 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).

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.

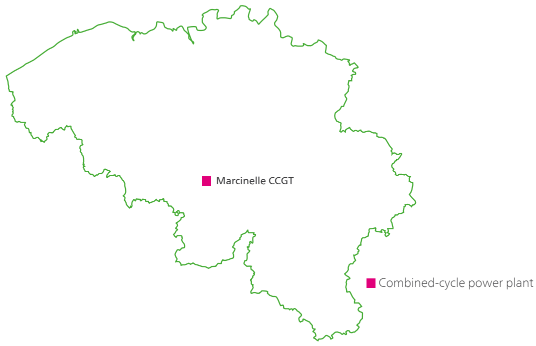

Safety

Europe

Belgium

Thermal generation

Marcinelle Energie SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
1	406	1,183

Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Gas turbines for CHP	1	1	406

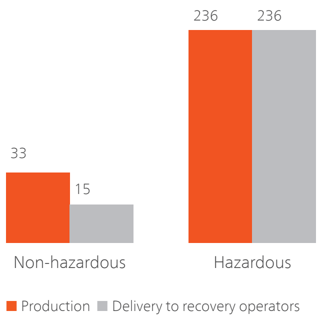
Net maximum electrical capacity
Total: 406 MW

Net electricity generation
Total: 1,183 million kWh

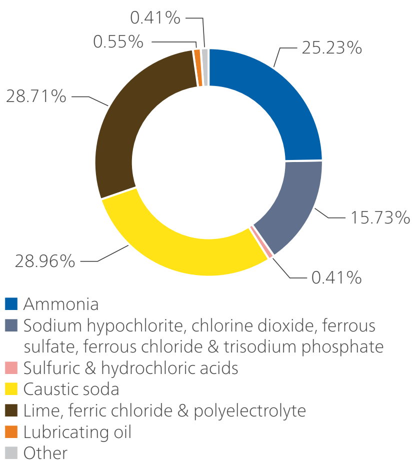
Fuel consumption
(100% natural gas)
Total: 203,062 t
of oil equivalent

Special waste

Total production: **269 t**
Total delivery to recovery operators: **251 t**



Expendables
Total: 386.58 t



Waste waters
Discharged: 1,332,058 m^3

Waste waters include those 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 requirements:
2,170,560 m^3
Total abstraction from inland waters: 2,170,560 m^3

Emissions into the atmosphere

CO_2: **483,610 t**

Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants	no.					**1**
thermal	no.					1
Net maximum electrical capacity	MW					**406**

Resources

		2008	2009	2010	2011	2012
EN1 EN3 **Fossil fuels**						
Thermal generation						
gas oil	thousand t					0.004
	thousand toe					0.004
natural gas	million m^3					233
	thousand toe					203
technologically captive use	million m^3					228
	thousand toe					198
of which in combined-cycle units	million m^3					228
	thousand toe					198
non-technologically captive use	million m^3					5.41
	thousand toe					4.71
Total	thousand toe					203
	TJ					8,502
EN8 **Water for industrial uses**						
From rivers (including meteoric waters from secondary rainfall)	million m^3					2.17
Total requirements	million m^3					2.17
EN1 **Expendables**						
Ammonia	t					1.59
Sodium hypochlorite	t					3.84
Ferrous chloride	t					107
Ferric chloride	t					107
Polyectrolyte	t					4.84
Sulfuric & hydrochloric acids	t					97.5
Caustic soda	t					1.59
Lubricating oil	t					2.13
Other	t					60.8
Total	**t**					**387**

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From fossil fuels	million kWh					**1,183**
natural gas	million kWh					1,183
of which in combined-cycle units	million kWh					1,183
Total	**million kWh**					**1,183**

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 NO_x							
	thermal generation	thousand t					0.103
	Total	**thousand t**					**0.103**
EN16 CO_2							
	fossil-fired thermal generation (from combustion)	thousand t					484
	Total from thermal generation	thousand t					484
	Total	**thousand t**					**484**
EN16 CH_4							
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		thousand t of CO_2 equivalent					484
EN21 **Waste waters (discharged quantity)**							
	thermal generation	million m^3					1.33
	Total	**million m^3**					**1.33**
EN21 **Conventional polluting load in waste waters discharged by installations**							
Metals and compounds (expressed as metal equivalents)							
	thermal generation	kg					200
	in some plants with an overall capacity of	MW					406
Total nitrogen (expressed as N)							
	thermal generation	kg					10,950
	in some plants with an overall capacity of	MW					406
COD							
	thermal generation	kg					35,646
	in some plants with an overall capacity of	MW					406
BOD							
	thermal generation	kg					4,396
	in some plants with an overall capacity of	MW					406
EN22 **Non-hazardous special waste**							
production	electricity generation	t					33.1
	Total	**t**					**33.1**
delivery to recovery operators	electricity generation	t					15.2
	Total	**t**					**15.2**
EN22 **Hazardous special waste**							
production	electricity generation	t					236
	Total	**t**					**236**
delivery to recovery operators	electricity generation	t					236
	Total	**t**					**236**

	Source		2008	2009	2010	2011	2012
EN22 Total special waste							
production	electricity generation	t					269
	Total	**t**					**269**
delivery to recovery operators	electricity generation	t					251
	Total	**t**					**251**

Indicators

		2008	2009	2010	2011	2012
Resource conservation and quality						
EN1 EN3 Net heat rate of thermal generation	kcal/kWh					1,717
Net specific consumption of water for industrial uses	liters/kWh					1.84
EN8 Coverage of requirements of water for industrial uses						
From rivers (including meteoric waters from secondary rainfall)	% of requirements					100
Total from inland waters	**% of requirements**					**100**
EN1 EN3 Fossil fuel consumption for thermal generation						
natural gas	% of total fuel consumption					100
Specific emissions into the atmosphere						
EN20 NO_X (thermal generation, simple)	g/kWh thermal net					0.087
EN16 CO_2 (thermal generation, simple)	g/kWh thermal net					409
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
Total nitrogen (expressed as N)	mg/kWh thermal net					9.23
COD	mg/kWh thermal net					30
BOD	mg/kWh thermal net					3.7

Highlights of 2012

At the end of March 2012, the Group's International Division inaugurated activities in Belgium by commissioning a combined-cycle thermal power plant with a net maximum capacity of approximately 400 MW.

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

EN26 Environmental enhancements.

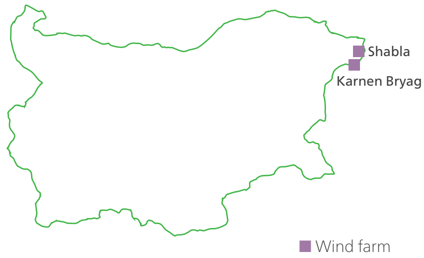
Noise

> Installation of a pressure relief (blow-off) valve to mitigate noise upon steam-turbine start-up and shut-down.

Bulgaria

Wind power generation

Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
2	42	83

Power installations

Power plants no.	Net maximum electrical capacity MW
2	42

Net maximum electrical capacity

Total: 42 MW

Equivalent yearly hours of utilization*

Wind: **1,976 hours**

* Yearly generation/capacity ratio.

Net electricity generation

Total: 83 million kWh

Avoided CO_2 emissions

Due to wind generation: **98,031 t**

Emissions from the otherwise necessary fossil-fired thermal generation.

Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants	no.	1	3	3	2	2
thermal	no.	1	1	1	0	0
wind	no.	0	2	2	2	2
Net maximum electrical capacity	MW	602	796	850	42	42
thermal	MW	602	775	808	0	0
wind	MW	0	21.0	42.0	42	42
Service & real-estate management						
Vehicle fleet						
service vehicles	no.	0	0	9	0	0
Gross real-estate surface area	thousand m^2	0	0	0.955	0	0

Resources

		2008	2009	2010	2011	2012
EN1 EN3 **Fossil fuels**						
Thermal generation						
fuel oil (HS)	thousand t	6.18	6.92	4.36	0	0
	thousand toe	5.87	6.57	4.14	0	0
brown coal	thousand t	6,969	6,702	8,268	0	0
	thousand toe	1,114	1,071	1,309	0	0
Total	**thousand toe**	**1,120**	**1,077**	**1,313**	**0**	**0**
	TJ	**46,897**	**45,102**	**54,964**	**0**	**0**
Grand total	**thousand toe**	**1,120**	**1,077**	**1,313**	**0**	**0**
	TJ	**46,897**	**45,102**	**54,964**	**0**	**0**
EN4 **Primary electricity**						
Various activities	million kWh	0	0	0.072	0	0
EN8 **Water for industrial uses**						
From rivers (including meteoric waters from secondary rainfall)	million m^3	23.5	20.3	20.1	0	0
From wells	million m^3	0.036	0.113	0	0	0
Total abstraction from inland waters	**million m^3**	**23.6**	**20.4**	**20.1**	**0**	**0**
EN10 From waste waters (used inside plants)	million m^3	4.15	3.18	9.83	0	0
Total requirements	**million m^3**	**27.7**	**23.6**	**30**	**0**	**0**
for thermal generation	million m^3	27.7	23.6	30	0	0
EN1 **Expendables**						
Resins	t	38.4	92.8	2.4	0	0
Hydrazine	t	2.11	1.6	1.69	0	0
Ammonia	t	7.9	2.65	5.66	0	0
Limestone for flue-gas desulfurization	t	400,081	387,675	466,716	0	0
Sodium hypochlorite	t	0	10.2	32.4	0	0
Trisodium phosphate	t	1.85	2.78	3.15	0	0
Lime	t	331	762	886	0	0
Ferric chloride	t	127	119	73.2	0	0
Polyectrolyte	t	1.37	1.81	1.75	0	0
Sulfuric & hydrochloric acids	t	738	611	1,143	0	0
Caustic soda	t	669	248	244	0	0
Lubricating oil	t	194	142	98.7	0.29	0
Dielectric oil	t	0	0	0.55	0	0
Printing paper	t	0	0	0.165	0	0
Other	t	59	73.7	82.7	0	0
Total	**t**	**402,251**	**389,743**	**469,292**	**0.29**	**0**
for thermal generation	t	402,251	389,743	469,292	0	0
for wind generation	t	0	0	0	0.29	0

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From fossil fuels	**million kWh**	**3,720**	**3,731**	**4,673**	**0**	**0**
fuel oil & gas-oil	million kWh	19.5	22.8	14.7	0	0
brown coal	million kWh	3,700	3,709	4,658	0	0
From renewables (wind)	**million kWh**	**0**	**11.1**	**59.8**	**66.6**	**83.3**
Total	**million kWh**	**3,720**	**3,743**	**4,733**	**66.6**	**83.3**

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	28.5	14.9	15.5	0	0
	Total	**thousand t**	**28.5**	**14.9**	**15.5**	**0**	**0**
EN20 NO_x	thermal generation	thousand t	4.78	3.87	3.86	0	0
	Total	**thousand t**	**4.78**	**3.87**	**3.86**	**0**	**0**
EN20 Particulates	thermal generation	thousand t	0.816	0.837	0.13	0	0
	Total	**thousand t**	**0.816**	**0.837**	**0.13**	**0**	**0**
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	4,996	5,004	5,892	0	0
	fossil-fired thermal generation (from desulfurization)	thousand t	171	162	195	0	0
	Total	**thousand t**	**5,167**	**5,166**	**6,086**	**0**	**0**
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**5,167**	**5,166**	**6,086**	**0**	**0**
EN18 **Avoided CO_2 emissions**		thousand t	0	15.4	77.9	85.7	98
Total		thousand t	0	15.4	77.9	85.7	98
EN21 **Waste waters (discharged quantity)**	thermal generation	million m^3	7.63	4.64	4.36	0	0
EN21 **Conventional polluting load in waste waters discharged by installations**							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	4.912	939	773	0	0
	in some plants with an overall capacity of	MW	602	775	808	0	0
Total nitrogen (expressed as N)	thermal generation	kg	33,111	23,417	18,652	0	0
	in some plants with an overall capacity of	MW	602	775	808	0	0
Total phosphorus (expressed as P)	thermal generation	kg	1,487	783	413	0	0
	in some plants with an overall capacity of	MW	602	775	808	0	0
COD	thermal generation	kg	2,981	1,504	1,854	0	0
	in some plants with an overall capacity of	MW	602	775	808	0	0
BOD	thermal generation	kg	876	404	583	0	0
	in some plants with an overall capacity of	MW	602	775	808	0	0
EN22 **Non-hazardous special waste**							
Coal bottom ash production	thermal generation	t	111,780	106,808	120,792	0	0
delivery to recovery operators		t	0	500	0	0	0

	Source		2008	2009	2010	2011	2012
Coal flyash	thermal generation						
production		t	1,006,024	961,275	1,087,130	0	0
delivery to recovery operators		t	0	4,500	0	0	0
Gypsum from desulfurization	thermal generation						
production		t	682,941	655,280	787,517	0	0
delivery to recovery operators		t	0	1,456	219,692	0	0
Other							
production		t	38,863	28,845	27,138	28.6	0
delivery to recovery operators		t	5,523	3,542	2,578	0	0
Total							
production		**t**	**1,839,608**	**1,752,208**	**2,022,578**	**28.6**	**0**
delivery to recovery operators		**t**	**5,523**	**9,998**	**222,270**	**0**	**0**
EN22 **Hazardous special waste**							
production		t	1,114	134	266	0.643	0
of which with PCBs		*t*	*67.9*	*106*	*144*	*0.643*	*0*
delivery to recovery operators		t	76.1	124	140	0	0
of which with PCBs		*t*	*58.3*	*124*	*139*	*0*	*0*
EN22 **Total special waste**							
production	electricity generation	t	1,840,722	1,752,343	2,022,844	29.3	0
delivery to recovery operators	electricity generation	t	5,599	10,122	222,410	0	0

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Resource conservation and quality								
EN1EN3 Net heat rate of thermal generation	kcal/kWh	3,011	2,887	2,809	0	0	-100	0
EN8 Net specific requirements of water for industrial uses for thermal generation								
including contribution of as-is sea water	liters/kWh	7.45	6.32	6.41	0	0	-100	0
excluding contribution of as-is sea water	liters/kWh	7.45	6.32	6.41	0	0	-100	0
Net specific consumption of water for industrial uses	liters/kWh	7.45	6.3	6.33	0	0	-100	0
EN8 Coverage of requirements of water for industrial uses								
from rivers (including meteoric waters from secondary rainfall)	% of requirements	84.9	86	67.2	0	0	-100	0
from wells	% of requirements	0.13	0.479	0	0	0	-100	0
Total from inland waters	**% of requirements**	**85**	**86.5**	**67.2**	**0**	**0**	**-100**	**0**
EN10 From waste waters (used inside plants)	% of requirements	15	13.5	32.8	0	0	-100	0
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	0.524	0.61	0.315	0	0	-100	0
brown coal	% of total fuel consumption	99.5	99.4	99.7	0	0	-100	0
HS fuel oil	% of total fuel-oil consumption	100	100	100	0	0	-100	0
Electricity generation from renewables								
wind	% of total generation	0	0.297	1.26	100	100	0	0
Total	**% of total generation**	**0**	**0.297**	**1.26**	**100**	**100**	**0**	**0**
Specific emissions into the atmosphere								
EN20 SO_2 (thermal generation, simple)	g/kWh thermal net	7.66	3.99	3.32	0	0	-100	0
EN20 NO_X (thermal generation, simple)	g/kWh thermal net	1.28	1.04	0.827	0	0	-100	0
EN20 Particulates (thermal generation, simple)	g/kWh thermal net	0.219	0.224	0.028	0	0	-100	0
EN16 CO_2 (thermal generation, simple)	g/kWh thermal net	1.389	1.385	1.302	0	0	-100	0
EN20 SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	7.66	3.98	3.28	0	0	-100	0
EN20 NO_x (total from thermal generation - simple and CHP)	g/kWh total net	1.28	1.03	0.816	0	0	-100	0

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN20 Particulates (total from thermal generation - simple and CHP)	g/kWh total net	0.219	0.224	0.027	0	0	-100	0
EN16 CO_2 (total from thermal generation - simple and CHP)	g/kWh total net	1,389	1,380	1,286	0	0	-100	0
Net specific conventional polluting load of waste waters discharged by plants (thermal generation)								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net	1.32	0.252	0.165	0	0	-100	0
Total nitrogen (expressed as N)	mg/kWh thermal net	8.9	6.28	3.99	0	0	-100	0
Total phosphorus (expressed as P)	mg/kWh thermal net	0.4	0.21	0.088	0	0	-100	0
COD	mg/kWh thermal net	0.801	0.403	0.397	0	0	-100	0
BOD	mg/kWh thermal net	0.236	0.108	0.125	0	0	-100	0
EN22 **Specific waste production**								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	302	288	259	0	0	-100	0
EN22 **Waste recovery**								
Coal and brown-coal ash	% production	0	0.468	0	0	0	0	0
bottom ash	*% production*	*0*	*0.468*	*0*	*0*	*0*	*0*	*0*
flyash	*% production*	*0*	*0.468*	*0*	*0*	*0*	*0*	*0*
Gypsum from desulfurization	% production	0	0.222	27.9	0	0	0	0
Other non-hazardous special waste electricity generation	% production	14.2	12.3	9.5	0	0	-100	0
Total non-hazardous special waste electricity generation	% production	0.3	0.571	11	0	0	-100	0
Other hazardous special waste electricity generation	% production	6.84	92.1	52.6	0	0	-100	0
Total hazardous special waste electricity generation	% production	6.84	92.1	52.6	0	0	-100	0
Total special waste electricity generation	% production	0.304	0.578	11	0	0	-100	0
Total	**% production**	**0.304**	**0.578**	**11**	**0**	**0**	**-100**	**0**

Highlights of 2012

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

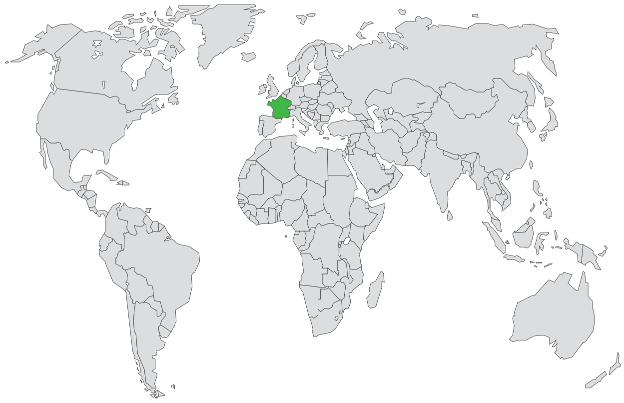
Enel Green Power owns wind farms with a net maximum capacity of 42 MW.

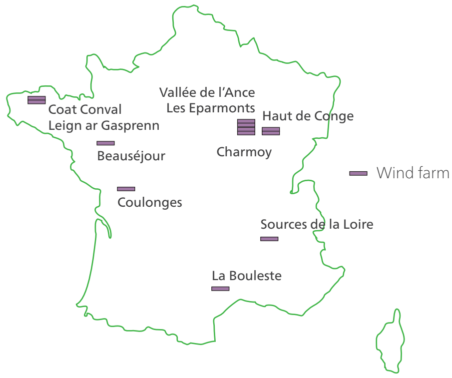
EN18 Wind power displaced about 98,000 t of CO_2 emissions into the atmosphere (about 13% more than last year) thanks to a proportional increase in generation.

France

Wind power generation

Enel Green Power SpA





The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
16	166	364

Power installations

Power plants no.	Net maximum electrical capacity MW
16	**166**

Net maximum electrical capacity

Total: 166 MW

Net electricity generation

Total: 364 million kWh

Equivalent yearly hours of utilization*

Wind: **2,190 hours**

* Yearly generation/capacity ratio.

Avoided CO_2 emissions

Due to wind generation: **225,007 t**

Emissions from the otherwise necessary fossil-fired thermal generation.

Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants (wind)	**no.**	**1**	**7**	**10**	**16**	**16**
Net maximum electrical capacity (wind)	**MW**	**11.6**	**68.1**	**102**	**166**	**166**
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	0	10	9	11	10
special vehicles	no.	0	0	0	0	4
vehicles for both private and service use	no.	0	0	0	0	10
Gross real-estate surface area	thousand m^2	0	0.7	1.18	1.18	2

Resources

		2008	2009	2010	2011	2012
EN1 EN3 **Fossil fuels**						
Real-estate management	thousand toe	0	0.013	0.013	0.018	0.009
	TJ	0	0.544	0.544	0.754	0.377
EN4 **Primary electricity**						
Real-estate management	million kWh	0	0.013	0.028	0.076	0.131
Water for non-industrial uses						
Real-estate & service management	million m^3	0	0.001	0.001	0	0
EN1 **Expendables**						
Lubricating oil	t	0	0	19.2	0	0
Dielectric oil	t	0	0	5.5	0	0
Printing paper	t	0	0.499	0.798	0.936	0.836
Total	**t**	**0**	**0.499**	**25.5**	**0.936**	**0.836**

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From renewables (wind)	million kWh	7	65.9	149	245	364
Open market						
Business segment						
Customers	no.	0	0	0	0	7
Power sold	million kWh	0	0	0	0	2.09
Large customers' segment						
Green offerings						
Customers	no.	0	0	0	0	1
Power sold	million kWh	0	0	0	0	90.2
Time-of-use offerings						
Customers	no.	0	0	0	0	2
Power sold	million kWh	0	0	0	0	60.3
Total						
Customers	no.	0	0	0	0	30
Power sold	million kWh	0	0	0	0	860
Very large customers' segment						
Customers	no.	0	0	0	0	19
Power sold	million kWh	0	0	0	0	8,039
Total						
Total green offerings	**million kWh**	**0**	**0**	**0**	**0**	**90.2**
Total time-of-use offerings	**million kWh**	**0**	**0**	**0**	**0**	**60.3**

Overall power sold						
high-voltage	million kWh	0	0	0	0	3,584
medium-voltage	million kWh	0	0	0	0	5,317
Total	**million kWh**	**0**	**0**	**0**	**0**	**8,901**
Total RECs certificates cancelled	**no. (MWh)**	**0**	**0**	**0**	**0**	**90,180**

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN16 CO_2	real-estate management	thousand t	0	0.039	0.039	0.056	0.028
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**0**	**0.039**	**0.039**	**0.056**	**0.028**
EN18 **Avoided CO_2 emissions**							
Due to wind power generation		thousand t	4.56	42.9	97	159	225
Total		**thousand t**	**4.56**	**42.9**	**97**	**159**	**225**
EN22 **Non-hazardous special waste**							
production	electricity generation	t	0	0	0	0	0.125
delivery to recovery operators	electricity generation	t	0	0	0	0	0.125
EN22 **Hazardous special waste**							
production	electricity generation	t	0	0	0	4	0
	various activities	t	0	0	0.087	0.412	0.28
of which with PCBs							
	Total	**t**	**0**	**0**	**0.087**	**4.41**	**0.28**
EN22 **Total special waste**							
production	electricity generation	t	0	0	0	4	0.125
	various activities	t	0	0	0.087	0.412	0.28
	Total	**t**	**0**	**0**	**0.087**	**4.41**	**0.405**
delivery to recovery operators	electricity generation	t	0	0	0	0	0.125

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Electricity generation from renewables								
wind	% of total generation	100	100	100	100	100	0	0
EN6 **Sales**								
Large customers' segment								
Green power sold	% of power sold					10.5		
Time-of-use power sold	% of power sold					7.01		
Overall power sold								
high-voltage	% of power sold					40.3		
medium-voltage	% of power sold					59.7		
Total green power sold	**% of power sold**					**1.01**		
Total time-of-use power sold	**% of power sold**					**0.677**		

Highlights of 2012

Enel operates in France through Enel Green Power (wind power generation) and Enel France (sale of electricity).

Enel Green Power owns wind farms with a net maximum capacity of 166 MW. In the next few years, Enel Green Power will capture additional development opportunities in France through a pipeline of hydro, solar and wind power projects totaling more than 1,000 MW.

EN18 Wind power displaced about 225,000 t of CO_2 emissions into the atmosphere (over 41% more than last year) thanks to an equivalent increase in generation.

EN26 Environmental enhancements.

Noise

> Implementation of a systematic noise abatement plan in all wind farm sites.

Waste

> Continuing of the separate waste collection scheme (started in 2011) in offices.

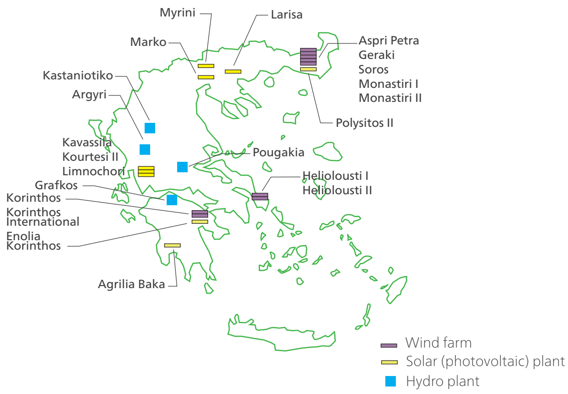
Other

> Continuing of the analysis of the impact of each wind farm (started in 2011) with a view to defining mitigative measures and environmental enhancements.

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)
28	248	475.84

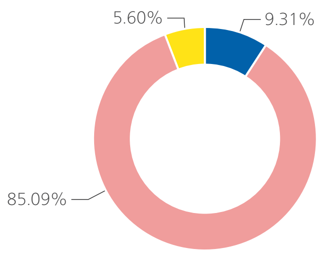
Power installations

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	199

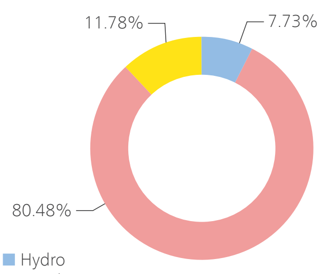
SOLAR PHOTOVOLTAIC	Power plants no.	Net maximum electrical capacity MW
	6	29

Net electricity generation
Total: 475.84 million kWh



Hydro from natural flows
Wind
Solar (photovoltaic)

Net maximum capacity
Total: 247.69 MW



Hydro
Wind
Solar (photovoltaic)

Equivalent yearly hours of utilization*

Wind: **2,031 hours**
Solar (photovoltaic): **912 hours**
Hydro: **2,313 hours**

* Yearly generation/capacity ratio.

Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	39.037
Due to wind generation	356.808
Due to solar (photovoltaic) generation	23.463
Total	**419.308**

Expendables
Total: 2.79 t

Other data
Wind & solar photovoltaic generation

Wind systems

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

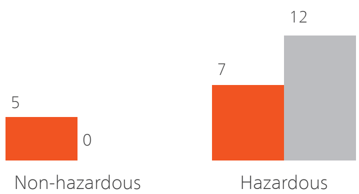
Solar (photovoltaic) systems

Surface area occupied by modules: **12.82 ha**

Total surface area affected by the installations: **47.3 ha**

Special waste

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



Production ▪ Delivery to recovery operators

Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants	**no.**	**16**	**13**	**16**	**20**	**28**
hydro	no.	7	2	4	4	5
wind	no.	9	11	12	15	17
solar (photovoltaic)	no.	0	0	0	1	6
Net maximum electrical capacity	**MW**	**107**	**133**	**143**	**191**	**248**
hydro	MW	9.58	10	13.6	13.6	19.2
wind	MW	97.2	123	129	172	199
solar (photovoltaic)	MW	0	0	0	5	29.2
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	0	7	7	0	0
special vehicles	no.	0	4	4	0	0
vehicles for both private and service use	no.	0	0	0	21	12

Resources

		2008	2009	2010	2011	2012
EN1 EN3 **Fossil fuels**						
Various activities	thousand toe	0	0	0	0	0.014
Grand total	**thousand toe**	**0**	**0**	**0**	**0**	**0.014**
	TJ	**0**	**0**	**0**	**0**	**0.586**
EN4 **Electricity**						
Real-estate & service management	million kWh	0	0.467	0.467	0	0
Water for non-industrial uses						
Real-estate & service management	million m^3	0	0.006	0.006	0	0
EN1 **Expendables**						
Lubricating oil	t	1.53	0.5	1.22	3.47	2.79
Printing paper	t	0	1.25	0	0	0.004
Other	t	0.04	0	0	0	0
Total	**t**	**1.57**	**1.75**	**1.22**	**3.47**	**2.79**
for hydro generation	t	0	0.5	0.76	1.4	0.66
for wind generation	t	1.57	0	0.462	2.07	2.13

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From renewables	**million kWh**	**243**	**262**	**310**	**349**	**476**
hydro from natural flows	million kWh	2.81	17.1	27.7	25.3	44.3
wind	million kWh	240	245	282	322	405
solar (photovoltaic)	million kWh	0	0	0	1.49	26.6
Total	**million kWh**	**243**	**262**	**310**	**349**	**476**
simple	million kWh	243	262	310	349	476
Available generation	**million kWh**	**243**	**262**	**310**	**349**	**476**

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN16 CO_2	various activities	thousand t	0	0	0	0	0.04
	Total	**thousand t**	**0**	**0**	**0**	**0**	**0.04**
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	2.7	16.4	26.6	24.3	39
Due to wind and solar (photovoltaic) generation		thousand t	230	235	271	311	380
Due to generation from renewables		thousand t	233	251	297	335	419
Total		**thousand t**	**233**	**251**	**297**	**335**	**419**
EN22 **Non-hazardous special waste**							
Other production	electricity generation	t	5.24	1.52	1.18	0.801	4.83
	various activities	t	0	0	0	0	2
	Total	**t**	**5.24**	**1.52**	**1.18**	**0.801**	**6.83**
delivery to recovery operators	electricity generation	t	4.76	0.6	0.261	0.621	0.35
	Total	**t**	**4.76**	**0.6**	**0.261**	**0.621**	**0.35**
EN22 **Hazardous special waste**							
Other production	electricity generation	t	3.6	11.4	0.462	8.27	6.8
of which with PCBs		*t*	*1.78*	*11.4*	*0.462*	*2.07*	*3.16*
delivery to recovery operators	electricity generation	t	1.04	11.4	0	0	11.7
of which with PCBs		*t*	*0*	*11.4*	*0*	*0*	*4.1*
EN22 **Total special waste**							
production	electricity generation	t	8.84	13	1.64	9.07	11.6
	various activities	t	0	0	0	0	2
	Total	**t**	**8.84**	**13**	**1.64**	**9.07**	**13.6**
delivery to recovery operators	electricity generation	t	5.8	12	0.261	0.621	12.1
	Total	**t**	**5.8**	**12**	**0.261**	**0.621**	**12.1**

Indicators

		2008	2009	2010	2011	**2012**	% ('12-'08)/'08	% ('12-'11)/'11
Electricity generation from renewables								
hydro from natural flows	% of total generation	1.16	6.54	8.94	7.26	9.31	702.6	28.2
wind and solar (photovoltaic)	% of total generation	98.8	93.5	91.1	92.7	90.7	-8.2	-2.2
EN22 **Waste recovery**								
Other non-hazardous special waste electricity generation	% production	90.7	39.4	22.1	77.5	7.2	-92.1	-90.1
Other hazardous special waste electricity generation	% production	28.9	100	0	0	172	495.2	-
Total special waste electricity generation	% production	65.6	92.9	15.9	6.85	88.5	34.9	1,192

Highlights of 2012

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 renewable power plants with an overall net maximum capacity of 53 MW:

> the wind farms of Korinthos and Korinthos International, totaling 27.2 MW, and the photovoltaic plant of Enolia Korinthos (2.8 MW) in the town of Corinth;
> the photovoltaic plant of Polysitos II (0.82 MW) in Thrace;
> the two photovoltaic plants of Myrini and Marko (0.87 MW) in Thessaly, commissioned by Esse (joint venture with Sharp);
> the photovoltaic plants of Kavassila (4.9 MW), Kourtesi II (4.9 MW) and Limnochori (4.8 MW) in western Greece;
> the photovoltaic plant of Agrilia Baka (4.9 MW) in the Peloponnese region;
> the photovoltaic plant of Larisa (2 MW) in the central Macedonia region.

Enel also increased the capacity of its hydro plant of Argyri by 5.6 MW.

EN18 Renewable power plants (wind, hydro and photovoltaic) displaced about 419,000 tonnes of CO_2 emissions into the atmosphere (20% more than last year) thanks to a proportional increase in generation.

The percentage of waste delivered to recovery operators in 2012 was equal to 88.5% (this figure includes hazardous waste stored in previous years and recovered only in 2012).

EN26 Environmental enhancements.

Materials

> Recycling of paper, batteries, electronic devices and toner cartridges.

Water

> Water quality monitoring by collecting samples upstream and downstream of mini-hydro plants to determine the impact of their operation.

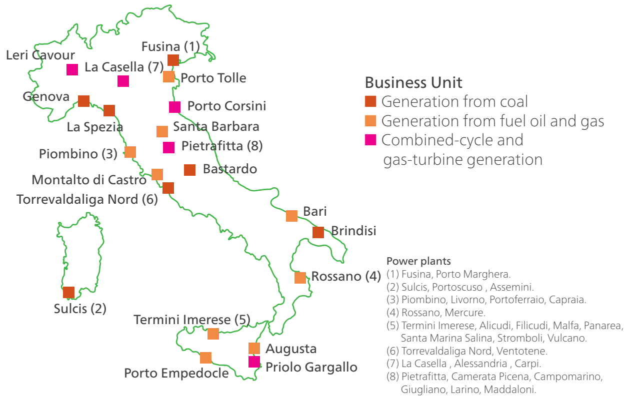
Waste

> Putting in place of green points (areas for temporary storage of waste in the plant sites).

Italy

Thermal power generation

Enel Produzione SpA



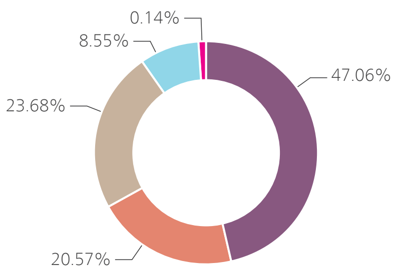
The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
43	24,723	48,440

Power installations

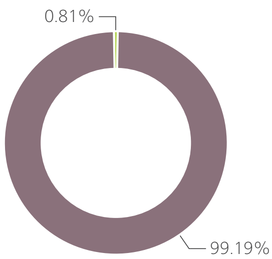
	Power plants no.	Units no.	Net maximum electrical capacity MW
Steam (condensing)	16	44	11,636
Steam repowered with gas turbines	2	8	5,085
Combined-cycle gas turbines	7	15	5,855
Gas turbines	9	27	2,113
Diesel engines	9	40	34
	43	**134**	**24,723**

Net maximum electrical capacity
Total: 24,722.8 MW



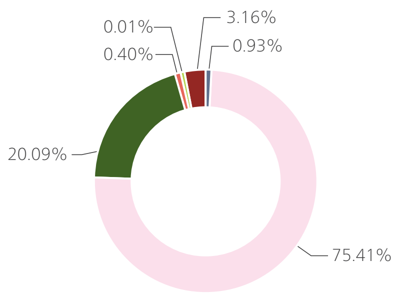
- Steam (condensing)
- Steam repowered with gas turbines
- Combined-cycle gas turbines
- Gas turbines
- Diesel engines

Net electricity generation
Total: 48,440 million kWh



- From fossil fuels
- From biomass & waste

Fuel consumption
Total: 10,866,639 t of oil equivalent



- Biomass & waste
- Coal
- Natural gas
- Gas-oil (including orimulsion*)
- Hydrogen
- Fuel oil

* Of which 2.4 thousand t (2.3 thousand toe) of orimulsion: residual amount of orimulsion whose use by the thermal plant of Brindisi was authorised as an exception by the Ministry of the Environment.

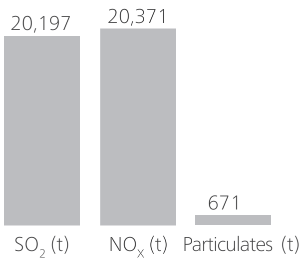
Waste waters

Discharged: **6,008,750 m^3**
Used inside plants: **5,278,296 m^3**

Avoided CO_2 emissions

Electricity generation from biomass and biodegradable fraction of waste: **270,170 t**

Emissions into the atmosphere

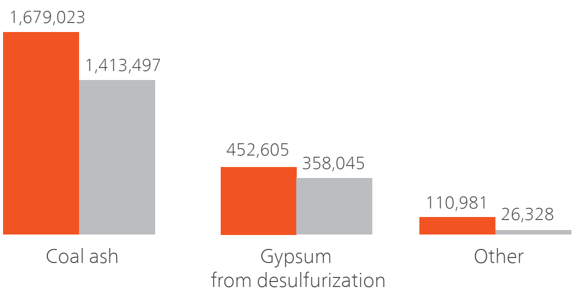


CO_2 (t)	37,991,997
CO_2 from desulfurization (t)	168,837
from combustion	*37,820,900*
from desulfurization (computed stoichiometrically)	*167,317*
SF_6 (kg)	869.73
(t of CO_2 equivalent)	equal to 19,308.006
Total (t of CO_2 equivalent)	38,011,305

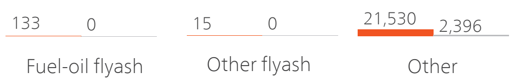
Special waste

Total production: **2,264,287 t**
Total delivery to recovery operators: **1,800,651 t**

Non-hazardous
Production: 2,242,609 t
Delivery to recovery operators:1,797,861 t



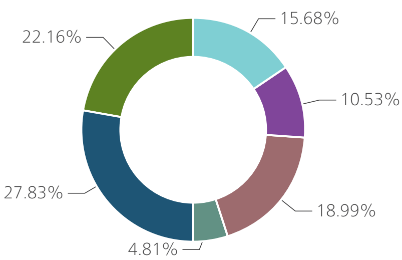
Hazardous
Production: 21,678 t
Delivery to recovery operators: 2,396 t



Production | Delivery to recovery operators

Water for industrial uses

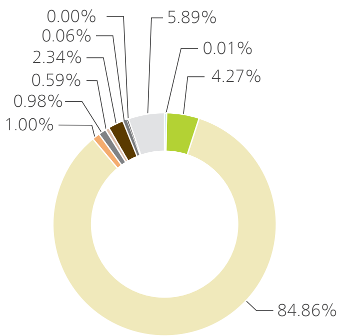
Total requirements: 23.8 million m^3
Total abstraction from inland waters: 10.8 million m^3



From rivers
From wells
From aqueducts
From the sea (as-is)
From the sea (desalinated)
From waste waters (used inside plants)

Expendables

Total: 448,100 t



Resins, hydrazine, carbohydrazide & hydrogen peroxide
Ammonia
Limestone for flue-gas desulfurization
Sodium hypochlorite, chlorine dioxide, ferrous sulfate, ferrous chloride & trisodium phosphate
Sulfuric & hydrochloric acids
Caustic soda
Lime, ferric chloride & polyelectrolyte
Lubricating oil
Dielectric oil
Other

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.

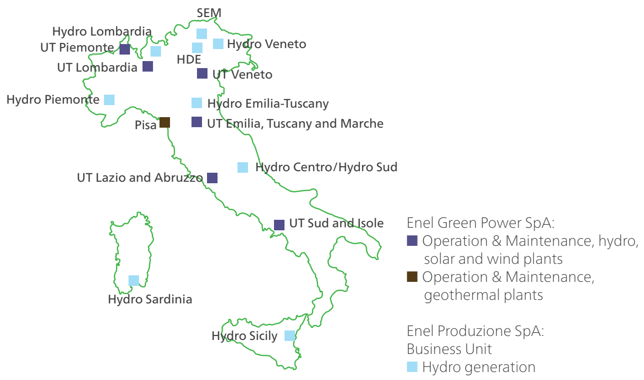
Overall length of supply pipelines, from sea terminal and from AGIP dock: **28 km**
Capacity of storage tanks: **183,630 m^3**
Length of transfer pipeline to Porto Tolle: **92 km**
Fuel oil transferred to Porto Tolle: **75,641 t**
Heat generation - 15 bar and 210°C steam:
9,888 million kcal
Electricity consumption: **1.5 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)
580	15,190	25,996

Power installations

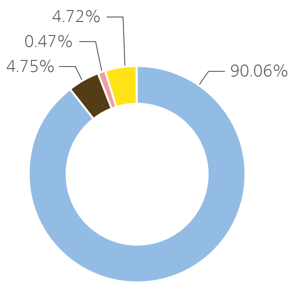
HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	300	318	1,902
Pondage/reservoir	167	177	4,534
Pure/mixed pumped storage	18	19	7,244
	485	**514**	**13,680**

GEO	Power plants no.	Generating units no.	Net maximum electrical capacity MW
Condensing	32	34	722
Atmospheric exhaust	1	1	0
	33	**35**	**722**

WIND	Power plants no.	Net maximum electrical capacity MW
	32	**716**

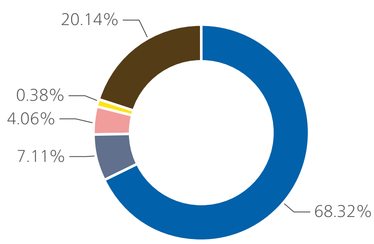
SOLAR PHOTOVOLTAIC	Power plants no.	Net maximum electrical capacity MW
	30	**101**

Net maximum electrical capacity
Total: 15,219 MW



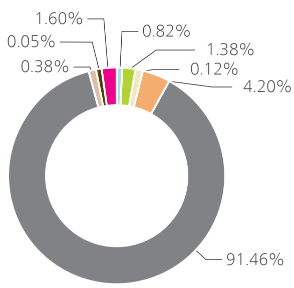
- Hydro
- Geothermal
- Solar (photovoltaic)
- Wind

Net electricity generation
Total: 25,996.25 million kWh



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

Expendables
Total: 51,516.12 t



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

Equivalent yearly hours of utilization*

7,249 geo

2,760 hydro

1,472 wind

1,370 solar photovoltaic

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

Avoided CO_2 emissions (t)

Hydro generation from natural flows	13,929.016
Geothermal generation	4,105.605
Wind generation	826.926
Solar photovoltaic generation	77.246
Total	**18,938.793**

Emissions into the atmosphere

SF_6 - all types of generation (kg)	436
(t of CO_2 equivalent)	9,675
CO_2 (t)	8,413
Carbon dioxide emissions from gas-oil combustion.	
H_2S - from geothermal fluid (t)	8,964
CO_2 - from geothermal fluid (t)	1,724,000

Geothermal fluid

Total fluid extracted: 47,648,000 t

net of reinjected liquids: **27,808,000 t**

Steam used for electricity generation: 42,943,000 t

Fluid used for supply of heat: **589,000 t**

Total fluid used for supply of heat: 589,000 t

Water for industrial uses

550 m^3

Abstraction from inland waters (from rivers only)

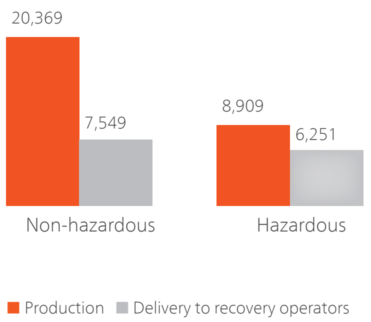
Gas-oil

2,732 toe

Total consumption

Special waste

Total production: **29,279 t**
Total delivery to recovery operators: **13,800 t**



Other data

Hydro

Emptied reservoirs

Quantity: **11**

Alluvial sediments removed by flushing them out through bottom outlets: **69,116 m^3**

Alluvial sediments removed by mechanical equipment: **5,024.875 m^3**
(of which reused locally: **4,984.735 m^3**)

Geothermal activities

Drilled wells

New: **4**

Rehabilitated:

Extent of drilling: 12,090 m

In-service wells: 489

for steam production: 314

for reinjection: 68

for other uses: 107

Solar (photovoltaic) activities

Solar (photovoltaic) systems

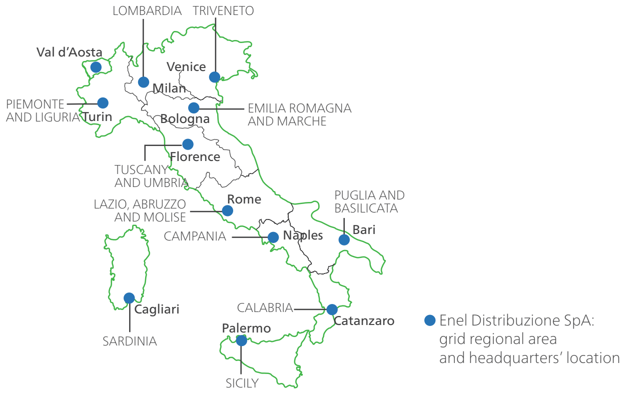
Surface area occupied by modules: **12 ha**

Total surface area affected: **12 ha**

Italy

Electricity distribution

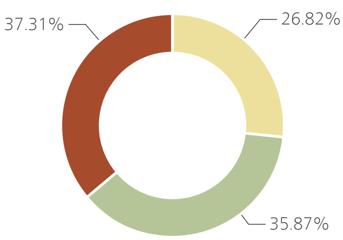
Enel Distribuzione SpA



The Numbers

Substations no.	Capacity (MVA)	Lines (km)
572,997	192,272	1,124,965

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



Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	2,144	101,640
MV/LV	436,203	78,578
MV/MV	134,161	12,054
Satellite substations and MV units	489	
	572,997	**192,272**

LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	0	0	0	**0**
LV	107,629	407,705	261,705	**777,039**
MV	194,091	11,998	141,836	**347,926**
	301,720	**419,703**	**403,542**	**1,124,965**

General data

Municipalities served: **7,539**

Surface area served: **276,324 km²**

Customers connected to the grid: **31,690,889**

Resource consumption

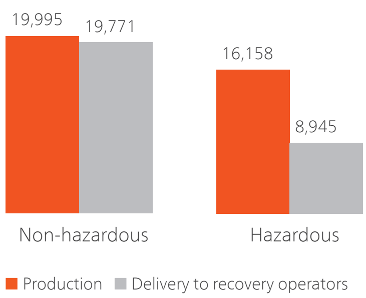
Expendables: **135.2 t**

Gas-oil: **408.64 toe**

Special waste

Total production: **36,153 t**

Total delivery to recovery operators: **28,716 t**



Electricity

Total electricity distributed: **238,163.35 million kWh**

Own consumption for grid operation: **393 million kWh**

Emissions into the atmosphere

SF_6: **3,704 kg** (82,229 t of CO_2 eq.)

CO_2: **1,260 t**

Total greenhouse gases: **83,489 t of CO_2 eq.**

Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants	no.	604	607	603	603	623
thermal	no.	43	43	43	43	43
hydro	no.	501	502	496	483	485
geothermal	no.	31	32	33	33	33
wind	no.	25	25	25	29	32
solar (photovoltaic)	no.	4	5	6	15	30
Net maximum electrical capacity	MW	40,324	40,422	40,525	39,882	39,942
thermal	MW	24,862	24,855	24,833	24,825	24,723
hydro	MW	14,424	14,431	14,417	13,647	13,680
geothermal	MW	671	695	728	722	722
wind	MW	362	429	533	623	716
solar (photovoltaic)	MW	4.2	11.6	14.1	65.3	101
Power lines (circuit length)						
Total	km	1,112,164	1,099,683	1,101,518	1,112,927	1,124,965
high-voltage	km	18,952	56.5	56.6	0	0
medium-voltage	km	340,424	342,290	344,029	345,586	347,926
low-voltage	km	752,789	757,337	757,433	767,341	777,039
Gas pipelines						
Total	km	31,765	0	0	0	0
high-pressure	km	205	0	0	0	0
medium-pressure	km	12,342	0	0	0	0
low-pressure	km	19,219	0	0	0	0
Mining & extracting activities						
Mining activities						
Mines	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
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	14,065	13,382	12,786	11,697	11,525
special vehicles	no.	2,244	2,218	1,832	1,645	1,595
vehicles for both private and service use	no.	1,019	1,031	1,080	1,152	1,179
Gross real-estate surface area	thousand m^2	1,749	1,460	1,360	1,800	1,880

Resources

		2008	2009	2010	2011	2012
EN1 EN3 **Fossil fuels**						
Thermal generation						
fuel oil	thousand t	1,389	910	419	276	344
	thousand toe	1,374	899	414	273	343
MS	*thousand t*	*308*	*249*	*97.9*	*72.5*	*48.2*
	thousand toe	*297*	*240*	*94.7*	*70.1*	*46.6*
LS	*thousand t*	*249*	*173*	*86.5*	*21.8*	*29.4*
	thousand toe	*244*	*169*	*84.4*	*21.2*	*28.4*
VLS	*thousand t*	*832*	*488*	*235*	*182*	*267*
	thousand toe	*832*	*490*	*235*	*182*	*268*
gas-oil*	thousand t	93.4	96.1	52.1	40.9	44.8
	thousand toe	95.7	98.4	53.1	42	45.5

* Of which 2.4 thousand t (2.3 thousand toe) of orimulsion: residual amount of orimulsion whose use by the thermal plant of Brindisi was authorised as an exception by the Ministry of the Environment.

		2008	2009	2010	2011	2012
natural gas	million m^3	6,652	4,216	4,114	3,737	2,595
	thousand toe	5,639	3,579	3,494	3,166	2,183
technologically captive use	*million m^3*	*5,286*	*3,476*	*3,557*	*3,410*	*2,232*
	thousand toe	*4,469*	*2,950*	*3,019*	*2,887*	*1,893*
of which in combined-cycle units	million m^3	4,997	3,357	3,478	3,364	2,209
	thousand toe	4,221	2,847	2,951	2,848	1,875
non-technologically captive use	*million m^3*	*1,367*	*740*	*557*	*327*	*363*
	thousand toe	*1,171*	*629*	*476*	*279*	*290*
coal	thousand t	11,724	11,122	10,741	12,375	13,629
	thousand toe	6,919	6,587	6,344	7,373	8,193
coke-oven gas	million m^3	0.002	0.003	0.009	0.009	0.004
	thousand toe	0.002	0.003	0.01	0.01	0.005
Total	**thousand toe**	**14,027**	**11,163**	**10,306**	**10,854**	**10,765**
	TJ	**587,300**	**467,385**	**431,472**	**454,434**	**450,694**
Various activities	thousand toe	24.9	27.9	27.3	26.4	26.2
Grand total	**thousand toe**	**14,052**	**11,191**	**10,333**	**10,880**	**10,791**
	TJ	**588,343**	**468,552**	**432,617**	**455,538**	**451,790**
EN1 EN3 **Hydrogen**						
Thermal generation	thousand m^3	0	0	3.54	1.06	3.32
	thousand toe	0	0	0.881	0.263	0.828
	TJ	0	0	36.9	11	34.7
EN1 EN3 **Biomass and waste**						
Thermal generation						
solid biomass	t	115,905	153,842	201,406	260,439	260,698
	toe	32,271	43,983	57,825	75,814	76,042
liquid biomass	t	114	336	350	423	678
	toe	115	331	298	360	602
RDF	t	22,546	55,235	46,136	56,106	58,398
	toe	9,129	23,027	19,377	23,839	24,527
Grand total	**thousand toe**	**41.5**	**67.3**	**77.5**	**100**	**101**
	TJ	**1,738**	**2,819**	**3,245**	**4,187**	**4,236**
EN1 EN3 **Geothermal fluid**						
Total fluid extracted	thousand t	50,172	46,778	47,807	50,370	47,648
net of reinjected fluids	*thousand t*	*29,855*	*28,462*	*27,486*	*26,878*	*27,808*
Used for electricity generation	thousand t	43,931	41,385	42,495	43,951	42,943
EN4 **Electricity**						
Various activities	million kWh	131	130	115	115	111
EN8 **Water for industrial uses**						
From rivers (including meteoric waters from secondary rainfall)	million m^3	8.48	7.43	5.08	5.06	3.74
From wells	million m^3	6.56	6.73	2.97	2.81	2.51
From aqueducts	million m^3	6.5	5.81	4.48	4.86	4.55
Total abstraction from inland waters	**million m^3**	**21.5**	**20**	**12.5**	**12.7**	**10.8**
From sea (as-is)	million m^3	10	5.87	5.5	5.05	1.15
From sea (desalinated)	million m^3	5.87	6.16	6.24	6.31	6.63
EN10 From waste waters (used inside plants)	million m^3	2.09	4.8	5.59	5.05	5.28
Total requirements	**million m^3**	**39.5**	**36.8**	**29.9**	**29.1**	**23.8**
for thermal generation	million m^3	39.1	36.7	29.8	29.1	23.8
for geothermal drilling	million m^3	0.007	0.069	0.059	0.047	0.001
for fuel storage & handling	million m^3	0.016	0.024	0.013	0.015	0.024
for mining & extracting activities	million m^3	0.4	0	0	0	0
EN8 EN21 **Open-cycle cooling water**						
For thermal generation	million m^3	11,729	10,460	10,235	10,164	9,044
Water for non-industrial uses						
Real-estate & service management	million m^3	1.52	1.06	1.3	1.78	1.95
EN1 **Expendables**						
Resins	t	22.8	32.6	39.6	57.4	16.3
Hydrazine	t	0.1	0	0	0	0
Carbohydrazide	t	262	260	18.9	25.1	24.6
Hydrogen peroxide	t	46.2	0.033	0.212	0.126	0.054
Ammonia	t	17,708	18,702	14,691	17,390	19,123
Limestone for flue-gas desulfurization	t	249,858	260,830	286,619	321,696	380,266
Magnesium oxide	t	0	8.58	0	0	0
Sodium hypochlorite	t	2,543	1,701	1,370	1,732	4,442
Ferrous sulfate	t	0	6.94	4.69	0	0
Ferrous chloride	t	44.2	41	20.2	34.7	28.4
Trisodium phosphate	t	2	1.64	1.8	1.91	3.44
Lime	t	8,244	7,039	8,710	8,409	9,640

		2008	2009	2010	2011	2012
Ferric chloride	t	654	759	742	757	716
Polyectrolyte	t	59	76.5	62.5	93.6	140
Sulfuric & hydrochloric acids	t	4,278	4,825	3,896	4,911	4,819
Caustic soda	t	16,784	26,778	26,056	30,653	49,764
Bentonite	t	1,696	1,359	518	937	709
Barite	t	0	211	216	0	60.6
Geothermal cement	t	3,909	3,329	2,905	2,254	2,161
Lubricating oil	t	7,792	13,492	890	538	467
Dielectric oil	t	554	369	147	227	168
Printing paper	t	1,224	1,132	1,023	938	823
Other	t	2,884	4,885	23,297	28,345	27,206
Total	**t**	**318,563**	**345,838**	**371,227**	**419,000**	**500,579**
for thermal generation	t	296,221	314,268	341,693	385,785	448,100
for hydro generation	t	253	224	209	227	167
for geothermal activities	t	20,660	28,665	28,185	31,924	51,339
for wind generation	t	0.6	1,341	6.5	6.49	9.42
for fuel storage & handling	t	0.105	0.533	0.266	0.407	0.415
for electricity distribution	t	113	207	98.8	111	135
for gas distribution	t	91.8	0	0	0	0
EN1 **PCB survey**						
Equipment & transformers with PCBs > 500 ppm (excluding their oil)	t	77.5	0	0.17	0	0
Oil with PCBs > 500 ppm contained in equipment & transformers	t	69.8	0	0.18	0	0
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding their oil)	t	939	14,181	17,226	12,481	11,706
Oil with PCBs > 50 ppm and ≤ 500 ppm contained in equipment & transformers	t	334	3,021	3,438	2,503	2,342

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From fossil fuels	million kWh	64,163	49,431	46,759	49,653	48,047
fuel oil & gas-oil	million kWh	5,259	3,405	1,481	948	1,290
natural gas	million kWh	31,208	19,254	18,759	17,449	11,586
of which in combined-cycle units	million kWh	25,828	17,047	17,540	17,045	11,195
coal	million kWh	27,696	26,772	26,520	31,256	35,171
From waste (non-biodegradable fraction)	**million kWh**	**21.2**	**51.9**	**30.8**	**39.4**	**47.1**
From hydrogen	**million kWh**	**0**	**0**	**2.17**	**0.275**	**1.5**
From renewables	**million kWh**	**26,478**	**29,437**	**30,809**	**26,963**	**24,493**
biomass and biodegradable fraction of waste	million kWh	135	207	266	348	344
simple	million kWh	135	207	266	348	344
geothermal	million kWh	5,181	5,000	5,030	5,300	5,235
hydro from natural flows	million kWh	20,695	23,725	24,784	20,479	17,761
wind	million kWh	464	499	723	806	1,054
solar (photovoltaic)	million kWh	2.94	5.82	5.86	29.4	98.5
Hydro from pumped storage	**million kWh**	**5,418**	**4,655**	**3,580**	**1,772**	**1,847**
Total	**million kWh**	**96,080**	**83,575**	**81,180**	**78,429**	**74,436**
Electricity consumption for pumping	million kWh	7,540	5,754	4,409	2,523	2,636
Fuel storage & handling						
Fuel transferred to destination	t	42,282	10,144	4,510	15,216	75,641
Heat generation	million kcal	8,700	8,700	6,769	4,550	9,888
Geothermal drilling						
Extent	m	13,130	14,824	15,498	19,062	12,090
Electricity distribution						
Electricity distributed	million kWh	260,473	241,817	932	246,355	238,163
EN4 Electricity consumption for grid operation	million kWh	365	318	2.45	364	393
Natural-gas distribution						
Natural-gas distributed	million m^3	3,570	0	0	0	0
Natural-gas consumption for grid operation	million m^3	4.9	0	0	0	0
Natural-gas losses along the grid	million m^3	23.2	0	0	0	0

		2008	2009	2010	2011	2012
Mining & extracting activities						
Restored areas since the beginning of activities considering the geomorphological, hydraulic and landscape aspects						
Areas revegetated with plant shrub and tree species	ha	0	0	841	843	843
Areas occupied by water bodies	ha	0	0	0	150	150
Areas occupied by infrastructure (roads, canals, aqueducts, power lines)	ha	0	0	2	2	2
Areas awaiting final restoration	ha	0	0	0	1,429	1,429
Sales						
Open market						
Residential segment						
Green offerings						
Customers	no.	673,370	1,364,507	1,581,542	2,105,968	2,713,621
Power sold	million kWh	1,290	3,032	5,258	6,138	7,473
Time-of-use offerings						
Customers	no.	224,450	183,328	286,920	232,004	34,993
Power sold	million kWh	512	847	781	676	96
Total						
Customers	no.	902,126	1,603,426	2,359,385	2,779,536	3,159,837
Power sold	million kWh	2,345	4,099	6,418	8,102	8,702
Business segment						
Green offerings						
Customers	no.	204,024	367,527	407,884	190,630	182,621
Power sold	million kWh	3,230	3,950	5,901	3,874	3,105
Time-of-use offerings						
Customers	no.	168,350	569,160	690,034	861,974	890,197
Power sold	million kWh	17,600	16,770	17,221	17,517	15,829
Total						
Customers	no.	995,287	1,057,383	1,125,473	1,091,372	1,109,910
Power sold	million kWh	27,495	25,789	23,691	22,179	19,736
Large customers' segment						
Green offerings						
Customers	no.	16	7,925	5,612	654	72
Power sold	million kWh	80	986	126	94.1	65
Time-of-use offerings						
Customers	no.	27,434	38,109	46,514	46,843	42,096
Power sold	million kWh	8,020	8,068	7,397	5,583	5,740
Total						
Customers	no.	31,377	52,373	58,475	50,854	44,855
Power sold	million kWh	9,015	9,733	7,679	5,983	6,106
Very large customers' segment						
Total						
Customers	no.	101	133	88	33	65
Power sold	million kWh	15,375	14,402	6,154	5,071	7,612
Universal-service market						
Household customers' segment						
Time-of-use offerings						
Customers	no.	164,127	178,917	7,120,327	19,716,896	19,119,434
Power sold	million kWh	584	599	17,294	44,908	42,988
Total						
Customers	no.	23,479,632	22,750,962	21,883,251	20,849,634	19,905,057
Power sold	million kWh	52,199	49,193	46,639	47,738	44,771
Non-household customers' segment						
Time-of-use offerings						
Customers	no.	574	3,077,277	3,844,711	3,846,194	3,782,826
Power sold	million kWh	1.2	15,121	18,556	20,914	20,549
Total						
Customers	no.	4,712,437	4,435,542	4,287,945	4,149,267	3,994,640
Power sold	million kWh	24,578	22,080	21,124	22,692	21,831
Overall power sold						
high-voltage	million kWh	17,763	15,148	6,520	5,449	8,128
medium-voltage	million kWh	21,129	18,645	15,318	11,696	9,334
low-voltage	million kWh	110,364	104,832	102,009	96,755	91,297
Total	million kWh	149,256	138,625	123,847	113,900	108,758
Total RECs certificates cancelled	no. (MWh)	4,600,000	7,968,119	11,148,877	10,106,362	10,643,004

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	34.5	26.1	18.5	17.1	20.2
EN20 NO_x	thermal generation	thousand t	31.8	24.7	19.3	19.5	20.4
	fuel storage & handling	thousand t	0.002	0.002	0	0.001	0.002
	Total	**thousand t**	**31.8**	**24.7**	**19.3**	**19.5**	**20.4**
EN20 Particulates	thermal generation	thousand t	1.51	1.2	0.951	0.718	0.671
EN16 CO_2	*fossil-fired thermal generation (from combustion)*	*thousand t*	*44,290*	*36,905*	*34,126*	*36,645*	*37,779*
	fossil-fired thermal generation (from desulfurization)	*thousand t*	*109*	*114*	*135*	*159*	*169*
	Total from fossil-fired thermal generation	thousand t	44,399	37,019	34,261	36,804	37,947
	non-fossil-fired thermal generation (from fossil carbon)	thousand t	16.2	39.7	33.1	40.3	41.9
	Total from thermal generation	thousand t	44,415	37,059	34,294	36,845	37,989
	Various activities	thousand t	83.4	82.4	81.4	77.8	77.4
	Total	**thousand t**	**44,498**	**37,141**	**34,376**	**36,923**	**38,067**
EN16 SF_6	electricity generation	kg	1,562	1,080	1,376	1,776	1,306
	electricity distribution	kg	3,319	4,023	4,102	4,156	3,704
	Total	**kg**	**4,881**	**5,103**	**5,478**	**5,932**	**5,010**
EN16 CH_4	gas distribution, mining & extracting activities	thousand t	15.5	0	0	0	0
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**44,996**	**37,258**	**34,500**	**37,058**	**38,181**
EN20 H_2S	geothermal generation (fluid)	thousand t	13.1	10.2	10.4	9.17	8.96
EN16 CO_2	geothermal generation (fluid)	thousand t	1,902	1,876	1,829	1,804	1,724
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	14,291	17,694	18,062	15,079	13,929
Due to geothermal generation		thousand t	3,578	3,729	3,665	3,902	4,106
Due to wind and solar (photovoltaic) generation		thousand t	322	377	531	615	904
Due to generation from biomass & biodegradable fraction of waste		thousand t	93.6	154	194	256	270
Due to generation from hydrogen		thousand t	0	0	1.58	0.202	1.18
Due to generation from renewables		**thousand t**	**18,284**	**21,954**	**22,452**	**19,853**	**19,209**
Total		**thousand t**	**18,284**	**21,954**	**22,454**	**19,853**	**19,210**
EN21 **Waste waters (discharged quantity)**	thermal generation	million m^3	11.4	9.04	7.75	6.77	5.97
	Fuel storage & handling	million m^3	0.031	0.037	0.014	0.021	0.034
	Total	**million m^3**	**11.4**	**9.08**	**7.76**	**6.79**	**6.01**
EN21 **Conventional polluting load in waste waters discharged by installations**							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	2,333	3,372	4,114	2,042	2,345
	in some plants with an overall capacity of	MW	23,890	21,539	20,021	20,011	18,575
	Total electricity generation	kg	2,333	3,372	4,114	2,042	2,345
	Fuel storage & handling	kg	12.2	7.7	4	11.2	13.8
	Total	**kg**	**2,346**	**3,380**	**4,118**	**2,053**	**2,359**

	Source		2008	2009	2010	2011	2012
Total nitrogen (expressed as N)	thermal generation	kg	66,818	40,525	30,797	26,194	23,343
	in some plants with an overall capacity of	MW	23,890	23,986	20,021	20,011	18,575
	Total electricity generation	kg	66,818	40,525	30,797	26,194	23,343
	Fuel storage & handling	kg	16.9	12.6	45	26.2	35.3
	Total	**kg**	**66,835**	**40,538**	**30,842**	**26,220**	**23,378**
Total phosphorus (expressed as P)	thermal generation	kg	7,268	5,221	3,419	1,273	887
	in some plants with an overall capacity of	MW	21,580	19,230	18,531	18,605	15,810
	Total electricity generation	kg	7,268	5,221	3,419	1,273	887
	fuel storage & handling	kg	1.83	1.85	3	3.31	1.93
	Total	**kg**	**7,269**	**5,223**	**3,422**	**1,276**	**888**
COD	thermal generation	kg	259,942	245,687	212,591	164,177	135,741
	in some plants with an overall capacity of	MW	23,890	21,539	20,021	19,817	18,575
	Total electricity generation	kg	259,942	245,687	212,591	164,177	135,741
	fuel storage & handling	kg	38.5	132	375	315	376
	Total	**kg**	**259,981**	**245,819**	**212,966**	**164,493**	**136,117**
BOD	thermal generation	kg	66,976	60,861	51,988	45,414	38,539
	in some plants with an overall capacity of	MW	16,864	17,221	16,434	16,425	15,224
	Total electricity generation	kg	66,976	60,861	51,988	45,414	38,539
	fuel storage & handling	kg	12.2	52.9	119	98.9	132
	Total	**kg**	**66,989**	**60,914**	**52,107**	**45,512**	**38,671**
EN22 **Non-hazardous special waste**							
Coal bottom ash	thermal generation						
production		t	14,855	31,714	34,861	59,989	92,931
delivery to recovery operators		t	14,519	28,876	33,016	60,021	87,811
Coal flyash	thermal generation						
production		t	1,440,304	1,280,130	1,223,299	1,346,700	1,586,092
delivery to recovery operators		t	1,258,693	1,067,575	1,030,514	822,574	1,325,687
Other non-hazardous ash	thermal generation						
production		t	0	2.75	0	0	0
Gypsum from desulfurization	thermal generation						
production		t	322,667	291,901	320,489	393,871	452,605
delivery to recovery operators		t	300,060	294,916	307,579	390,773	358,045
Other							
production	electricity generation & geothermal drilling	t	129,539	171,146	158,616	147,094	131,341
	electricity distribution	t	24,345	15,389	15,428	20,779	19,995
	various activities	t	1,104	1,663	1,942	848	839
	Total	**t**	**154,988**	**188,197**	**175,987**	**168,722**	**152,175**
delivery to recovery operators	electricity generation & geothermal drilling	t	80,837	59,084	65,174	43,903	33,880
	electricity distribution	t	23,480	14,350	13,667	16,473	19,771
	various activities	t	1,058	1,660	1,791	752	753
	Total	**t**	**105,375**	**75,094**	**80,632**	**61,128**	**54,404**
Total							
production	**electricity generation & geothermal drilling**	**t**	**1,907,365**	**1,774,893**	**1,737,265**	**1,947,655**	**2,262,969**
	electricity distribution	**t**	**24,345**	**15,389**	**15,428**	**20,779**	**19,995**
	various activities	**t**	**1,104**	**1,663**	**1,942**	**848**	**839**
	Total	**t**	**1,932,814**	**1,791,945**	**1,754,635**	**1,969,282**	**2,283,803**
delivery to recovery operators	**electricity generation & geothermal drilling**	**t**	**1,654,110**	**1,450,451**	**1,436,283**	**1,317,272**	**1,805,422**
	electricity distribution	**t**	**23,480**	**14,350**	**13,667**	**16,473**	**19,771**
	various activities	**t**	**1,058**	**1,660**	**1,791**	**752**	**753**
	Total	**t**	**1,678,647**	**1,466,461**	**1,451,741**	**1,334,496**	**1,825,946**
EN22 **Hazardous special waste**							
Oil flyash	thermal generation						
production		t	868	369	383	98.7	133
Other ash	thermal generation						
production		t	0	0	0	30.4	15.2
Other							
production	electricity generation & geothermal drilling	t	11,772	35,671	39,979	21,803	30,439
	electricity distribution	t	20,536	14,314	15,601	16,664	16,158

	Source		2008	2009	2010	2011	2012
	various activities	t	892	12.4	61.6	35.4	23.6
	Total	**t**	**33,200**	**49,997**	**55,641**	**38,503**	**46,620**
of which with PCBs	*electricity generation & geothermal drilling*	*t*	*726*	*918*	*911*	*684*	*512*
	electricity distribution	*t*	*818*	*426*	*416*	*443*	*279*
	various activities	*t*	*0.64*	*0*	*0*	*0*	*0*
	Total	***t***	***1,545***	***1,344***	***1,327***	***1,127***	***791***
delivery to recovery operators	electricity generation & geothermal drilling	t	1,748	1,809	1,415	10,957	8,647
	electricity distribution	t	12,899	10,960	10,916	9,906	8,945
	various activities	t	16.7	2.05	2.43	5.62	0.64
	Total	**t**	**14,664**	**12,771**	**12,334**	**20,869**	**17,593**
of which with PCBs	*electricity generation & geothermal drilling*	*t*	*717*	*796*	*923*	*553*	*484*
	electricity distribution	*t*	*721*	*424*	*397*	*431*	*279*
	Total	*t*	*1,438*	*1,220*	*1,320*	*984*	*763*
Total production	**electricity generation & geothermal drilling**	**t**	**12,639**	**36,039**	**40,361**	**21,932**	**30,587**
	electricity distribution	**t**	**20,536**	**14,314**	**15,601**	**16,664**	**16,158**
	various activities	**t**	**892**	**12.4**	**61.6**	**35.4**	**23.6**
	Total	**t**	**34,068**	**50,366**	**56,024**	**38,632**	**46,769**
delivery to recovery operators	**electricity generation & geothermal drilling**	**t**	**1,748**	**1,809**	**1,415**	**10,957**	**8,647**
	electricity distribution	**t**	**12,899**	**10,960**	**10,916**	**9,906**	**8,945**
	various activities	**t**	**16.7**	**2.05**	**2.43**	**5.62**	**0.64**
	Total	**t**	**14,664**	**12,771**	**12,334**	**20,869**	**17,593**
EN22 Total special waste							
production	electricity generation & geothermal drilling	t	1,920,004	1,810,933	1,777,626	1,969,587	2,293,557
	electricity distribution	t	44,881	29,703	31,030	37,443	36,153
	various activities	t	1,996	1,675	2,003	884	862
	Total	**t**	**1,966,881**	**1,842,311**	**1,810,659**	**2,007,914**	**2,330,572**
delivery to recovery operators	electricity generation & geothermal drilling	t	1,655,858	1,452,260	1,437,698	1,328,229	1,814,069
	electricity distribution	t	36,379	25,310	24,584	26,379	28,716
	various activities	t	1,075	1,662	1,793	757	754
	Total	**t**	**1,693,311**	**1,479,232**	**1,464,075**	**1,355,365**	**1,843,539**

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN29 Land								
LV cable lines								
overhead	% of entire LV grid	52.6	52.6	52.6	52.6	52.5	-0.2	-0.2
underground	% of entire LV grid	32.2	32.7	32.7	32.9	33.7	4.7	2.4
Total	**% of entire LV grid**	**84.8**	**85.3**	**85.3**	**85.5**	**86.1**	**1.5**	**0.7**
MV cable lines								
overhead	% of entire MV grid	2.6	2.72	2.79	3.06	3.45	32.7	12.7
underground	% of entire MV grid	38.8	39.2	39.5	40.4	40.8	5.2	1
Total	**% of entire MV grid**	**41.4**	**41.9**	**42.3**	**43.4**	**44.2**	**6.8**	**1.8**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	70.1	71.8	71.9	72.4	73.2	4.4	1.1
Resource conservation and quality								
EN1EN3 Net heat rate of thermal generation	kcal/kWh	2,186	2,258	2,204	2,186	2,240	2.5	2.5
EN1EN3 Net heat rate of geothermal generation	kcal/kWh	5,473	5,344	5,459	5,356	5,318	-2.8	-0.7
EN1EN3 Net efficiency of hydro generation from pumped storage	%	71.9	80.9	81.2	70.3	70.1	-2.5	-0.3
EN4 Consumption of electricity for distribution grid operation	% of electricity distributed	0.14	0.131	0.263	0.148	0.165	17.9	11.5

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN1EN3 Natural-gas consumption for grid operation	% of natural gas distributed	0.137	0	0	0	0	-100	0
Natural-gas losses along the grid	% of natural gas distributed	0.65	0	0	0	0	-100	0
EN8 Net specific requirements of water for industrial uses for thermal generation								
including contribution of as-is sea water	liters/kWh	0.608	0.739	0.633	0.581	0.492	-19.1	-15.3
excluding contribution of as-is sea water	liters/kWh	0.452	0.621	0.516	0.48	0.468	3.5	-2.5
Net specific consumption of water for industrial uses	liters/kWh	0.407	0.44	0.368	0.371	0.32	-21.4	-13.7
EN8 Coverage of requirements of water for industrial uses								
from rivers (including meteoric waters from secondary rainfall)	% of requirements	20.4	20.2	17	17.4	15.7	-23	-9.8
from wells	% of requirements	16.6	18.3	9.95	9.66	10.5	-36.7	8.7
from aqueducts	% of requirements	16.4	15.8	15	16.7	19.1	16.5	14.4
Total from inland waters	**% of requirements**	**53.5**	**54.3**	**42**	**43.7**	**45.3**	**-15.3**	**3.7**
from the sea (as-is)	% of requirements	25.4	16	18.4	17.3	4.81	-81.1	-72.2
from the sea (desalinated)	% of requirements	14.8	16.7	20.9	21.7	27.8	87.8	28.1
EN10 from waste waters (used inside plants)	% of requirements	5.28	13	18.7	17.3	22.1	318.6	27.7
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	9.79	8.05	4.02	2.52	3.19	-67.4	26.6
orimulsion	% of total fuel consumption	0	0	0	0	0.022	-	-
gas oil	% of total fuel consumption	0.682	0.882	0.515	0.387	0.401	-41.2	3.6
natural gas	% of total fuel consumption	40.2	32.1	33.9	29.2	20.3	-49.5	-30.5
coal	% of total fuel consumption	49.3	59	61.6	67.9	76.1	54.4	12.1
MS fuel oil	% of total fuel-oil consumption	21.6	26.7	22.9	25.7	13.6	-37	-47.1
LS fuel oil	% of total fuel-oil consumption	17.8	18.8	20.4	7.76	8.28	-53.5	6.7
VLS fuel oil	% of total fuel-oil consumption	60.6	54.5	56.8	66.6	78.2	29	17.4
natural gas, technologically captive use	% of total natural-gas consumption	79.2	82.4	86.4	91.2	86.7	9.5	-4.9
of which in combined-cycle units	*% of total natural-gas consumption*	*74.8*	*79.5*	*84.5*	*89.9*	*85.9*	*14.8*	*-4.4*
natural gas, non-technologically captive use	% of total natural-gas consumption	20.8	17.6	13.6	8.82	13.3	-36.1	50.8
Geothermal steam for electricity generation	% of total geothermal fluid extracted	97.3	97.6	97.9	97.5	101	3.8	3.6
Electricity generation from renewables								
thermal from biomass & biodegradable fraction of waste	% of total generation	0.141	0.248	0.328	0.444	0.463	228.4	4.3
geothermal	% of total generation	5.39	5.98	6.2	6.76	7.03	30.4	4
hydro from natural flows	% of total generation	21.5	28.4	30.5	26.1	23.9	11.2	-8.4
wind and solar (photovoltaic)	% of total generation	0.486	0.604	0.897	1.07	1.55	218.9	44.9
Total	**% of total generation**	**27.6**	**35.2**	**38**	**34.4**	**32.9**	**19.2**	**-4.4**
EN6 Sales								
Residential segment								
Green power sold	% of power sold	55	74	81.9	75.8	85.9	56.2	13.3
Time-of-use power sold	% of power sold	21.8	20.7	12.2	8.34	1.1	-95	-86.8
Business segment								
Green power sold	% of power sold	11.7	15.3	24.9	17.5	15.7	34.2	-10.3
Time-of-use power sold	% of power sold	64	65	72.7	79	80.2	25.3	1.5
Large customers' segment								
Green power sold	% of power sold	0.887	10.1	1.64	1.57	1.07	20.6	-31.8
Time-of-use power sold	% of power sold	89	82.9	96.3	93.3	94	5.6	0.8
Household customers' segment								
Time-of-use power sold	% of power sold	1.12	1.22	37.1	94.1	96	8,471.4	2

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Non-household customers' segment								
Time-of-use power sold	% of power sold	0.005	68.5	87.8	92.2	94.1	1,881,900	2.1
Overall power sold								
high-voltage	% of power sold	11.9	10.9	5.27	4.78	7.47	-37.2	56.3
medium-voltage	% of power sold	14.2	13.5	12.4	10.3	8.58	-39.6	-16.7
low-voltage	% of power sold	73.9	75.6	82.4	84.9	83.9	13.5	-1.2
Total green power sold	**% of power sold**	**3.08**	**5.75**	**9.11**	**8.87**	**9.79**	**217.9**	**10.4**
Total time-of-use power sold	**% of power sold**	**17.9**	**29.9**	**49.5**	**78.7**	**78.3**	**337.4**	**-0.5**
Specific emissions into the atmosphere								
EN20 SO_2 (thermal generation, simple)	g/kWh thermal net	0.537	0.525	0.394	0.341	0.417	-22.3	22.3
EN20 NO_X (thermal generation, simple)	g/kWh thermal net	0.494	0.498	0.41	0.389	0.421	-14.8	8.2
EN20 Particulates (thermal generation, simple)	g/kWh thermal net	0.024	0.024	0.02	0.014	0.014	-41.7	0
EN16 CO_2 (thermal generation, simple)	g/kWh thermal net	691	746	729	736	784	13.5	6.5
EN20 SO_2 (total from thermal generation, simple)	g/kWh total net	0.359	0.312	0.228	0.218	0.271	-24.5	24.3
EN20 NO_x (total from thermal generation, simple)	g/kWh total net	0.331	0.296	0.237	0.248	0.274	-17.2	10.5
EN20 Particulates (total from thermal generation, simple)	g/kWh total net	0.016	0.014	0.012	0.009	0.009	-43.8	0
EN16 CO_2 (total from thermal generation, simple)	g/kWh total net	462	443	422	470	510	10.4	8.5
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	1.02	1.07	1.16	1.27	1.06	3.9	-16.5
CH_4+CO_2, expressed as CO_2 eq (gas distribution)	g/m^3 of natural gas distributed	111	0	0	0	0	-100	-
EN20 H_2S (geothermal fluid)	g/kWh geothermal net	2.53	2.04	2.06	1.73	1.71	-32.4	-1.2
EN20 CO_2 (geothermal fluid)	g/kWh geothermal net	367	375	364	340	329	-10.4	-3.2
Net specific conventional polluting load of waste waters discharged by plants (thermal generation)								
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net	0.037	0.095	0.149	0.079	0.11	197.3	39.2
Total nitrogen (expressed as N)	mg/kWh thermal net	1.05	0.822	1.11	1.01	1.09	3.8	7.9
Total phosphorus (expressed as P)	mg/kWh thermal net	0.128	0.167	0.146	0.056	0.049	-61.7	-12.5
COD	mg/kWh thermal net	4.07	6.92	7.69	6.33	6.35	56	0.3
BOD	mg/kWh thermal net	1.62	1.9	2.17	2	2.11	30.2	5.5
EN22 **Specific waste production**								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	52.5	49	47.4	45	47.7	-9.1	6
Oil flyash (thermal generation)	g/kWh net from fuel oil & gas-oil	0.165	0.108	0.259	0.104	0.103	-37.6	-1
Oil bottom ash (thermal generation)	g/kWh net from fuel oil & gas-oil	0.165	0.108	0.259	0.104	0.103	-37.6	-1
EN22 **Waste recovery**								
Coal and brown-coal ash	% production	87.5	83.6	84.5	62.7	84.2	-3.8	34.3
bottom ash	*% production*	*97.7*	*91.1*	*94.7*	*100*	*94.5*	*-3.3*	*-5.5*
flyash	*% production*	*87.4*	*83.4*	*84.2*	*61.1*	*83.6*	*-4.3*	*36.8*
Gypsum from desulfurization	% production	93	101	96	99.2	79.1	-14.9	-20.3
Other non-hazardous special waste								
electricity generation & geothermal drilling	% production	62.4	34.5	41.1	29.8	25.8	-58.7	-13.4
electricity distribution	% production	96.4	93.3	88.6	79.3	98.9	2.6	24.7
fuel storage & handling, gas distribution	% production	93.5	95.9	100	100	100	7	0
Total	**% production**	**67.9**	**39.4**	**45.4**	**36.1**	**35.8**	**-47.3**	**-0.8**
Total non-hazardous special waste								
electricity generation & geothermal drilling	% production	86.7	81.7	82.7	67.6	79.8	-8	18.0
electricity distribution	% production	96.4	93.3	88.6	79.3	98.9	2.6	24.7
fuel storage & handling, gas distribution	% production	93.5	95.9	100	100	100	7	0
Total	**% production**	**86.8**	**81.8**	**82.7**	**67.8**	**80.0**	**-7.9**	**18.0**

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Other hazardous special waste								
electricity generation & geothermal drilling	% production	14.8	5.07	3.54	50.2	28.4	91.9	-43.4
electricity distribution	% production	62.8	76.6	70	59.4	55.4	-11.8	-6.7
fuel storage & handling, gas distribution	% production	1.25	0	3.28	12.8	0	-100	0
Total	**% production**	**44.2**	**25.5**	**22.2**	**54.2**	**37.7**	**-14.7**	**-30.4**
Total hazardous special waste								
electricity generation & geothermal drilling	% production	13.8	5.02	3.51	50	28.3	105.1	-43.4
electricity distribution	% production	62.8	76.6	70	59.4	55.4	-11.8	-6.7
fuel storage & handling, gas distribution	% production	1.25	0	3.28	12.8	0	-100	0
Total	**% production**	**43**	**25.4**	**22**	**54**	**37.6**	**-12.6**	**-30.4**
Total special waste								
electricity generation & geothermal drilling	% production	86.2	80.2	80.9	67.4	79.1	-8.2	17.4
electricity distribution	% production	81.1	85.2	79.2	70.5	79.4	-2.1	12.6
fuel storage & handling, gas distribution	% production	42.3	85.6	86.4	96.4	100	136.4	3.7
Total	**% production**	**86.1**	**80.3**	**80.9**	**67.5**	**79.1**	**-8.1**	**17.2**
Mining & extracting activities								
Yield of the site (open-pit mine)	million m^3 of moved soil/ million t of extracted mineral	0.022	0	0.017	0.031	0.027	22.7	-12.9

Highlights of 2012

In 2012, electricity generation continued to decline (-~4 TWh) reflecting the economic crisis and the consequent contraction of demand. Lower generation from renewables was almost exclusively due to lower hydro generation from natural flows (-~2.5 TWh), whereas thermal generation was mainly affected by a sharp decrease in the share of natural gas (-~6 TWh) in spite of an increase of coal (+~4%). However, photovoltaic and wind power generation had a sharp growth (+~70 GWh and +~250 GW, respectively).

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 (electricity distribution); and the Market Division (sale of electricity and gas).

EN1 Most of the expendables used in geothermal and thermal generation (especially limestone for flue-gas desulfurization and ammonia for denitrification) recorded an increase.

EN1 EN3 Overall consumption of fossil fuels in thermal generation had more or less the same level as in 2011 (in spite of an 11% increase in the use of coal). The use of biomass was up by 1.2%.
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.

The Fusina plant burned 58,400 t of RDF (+4.1% on 2011), taking a further step towards the upper limit of 70,000 t specified in the relevant ministerial authorization.
This outstanding result is to be attributed to both electricity market conditions and to excellent generating performance: by offering a competitive product on the power exchange, the plant acquired the opportunity to operate for a high number of hours.

In the fossil fuel mix, coal went up, while gas oil and fuel oil went down. In particular, the contribution of very low-sulfur oil was up by ~12 percentage points, while low-sulfur oil was up by ~0.5 percentage points to the expense of medium-sulfur oil.

EN5 EN6 EN18 Enel Green Power Italia put into service over 30 MW of photovoltaic plants:

> Catania (Malaventano area, province of Catania, Sicily);
> Rosolini (province of Siracusa, Sicily);
> Altomonte 2 (province of Cosenza, Calabria);
> Istia (province of Catanzaro, Calabria);
> Paglialonga 2 (province of Cosenza, Calabria);
> plant owned by SEV Granataro (province of Vibo Valentia, Calabria);
> Pontinia (province of Latina, Lazio);
> Casoli (province of Chieti, Abruzzo);
> Nocciano (province of Pescara, Abruzzo);
> Termoli A, B, C, D and E (province of Campobasso, Molise);
> Acerra 1 plant, owned by Montegranaro, and Acerra 2 plant, owned by Colbuccaro (Acerra, province of Naples, Campania);
> "Lotto CIS", "Lotto CIS 1" and "Lotto CIS central" plants ("Interporto di Nola", province of Naples, Campania);

and over 88 MW of wind farms:

> Cutro (province of Crotone, Calabria);
> Bagaladi (province of Reggio Calabria, Calabria);
> Potenza Pietragalla (province of Potenza, Basilicata).

In 2012, Enel Green Power put its Rancia 2 geothermal plant (Radicondoli, province of Siena, Tuscany) back into operation after its total renovation and completed the authorization process for its Bagnore 4 geothermal plant (Santa Fiora, province of Grosseto, Tuscany) to be commissioned in 2013. Revamping of the Rancia 1 (Radicondoli) and Le Prata (Castelnuovo Val di Cecina, province of Pisa, Tuscany) plants is under way, while works for total renovation of the three geothermal plants in the Mount Amiata area (Piancastagnaio, province of Siena, Tuscany) are expected to start soon.

Enel Produzione placed unit 4 of its Federico II plant (Brindisi, Apulia) back into service after non-routine maintenance and environmental enhancements (total investment: about € 90 million). The works (completed ahead of schedule) consisted of: installation of new bag filters and new coal mills, improvement of denitrification systems, upgrade of the desulfurizer and of air heaters, overhaul of the turbine and generator. Additionally, under the Aeolian Islands project, Enel Produzione commissioned its plant of Stromboli (6 new generating units and an overall capacity of 4 MW). The project took off in May 2010 with the submission of the authorization application to the relevant authorities. It involves the modernization of 30 generating units located in the various islands and ensuring electricity supply to both residents and numerous vacationers in the summer period. Of the 30 units installed, 23 will be replaced with latest-generation ones, while 7 will be upgraded and fitted with new high-performance filters. The project will be completed in 2013.

EN6 EN7 EN18 Since 2010, the Market Division has been offering all-inclusive green power rate plans, including supply of electricity generated by hydro plants and neutralization of CO_2 emissions from the invoicing process (consumption of paper and materials) and from the consumption of electricity by hydro power plant auxiliaries. The statement of CO_2 emissions was issued by Det Norske Veritas (DNV). The emissions will be offset by purchasing and subsequently canceling Verified Emission Reductions (VERs) and Certified Emission Reductions (CERs).
The Italian commercial activity is also centered on time-of-use rate plans, which shift electricity demand to night time, thus improving the overall efficiency of the power system and reducing wastage and negative environmental impacts. With respect to 2011, the amount of green power sold was up by more than 500 GWh, whereas the amount of time-of-use power sold was down by 4.4 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 ~15% (including the contribution of as-is sea water) and by ~3% (excluding the contribution of as-is sea water) on 2011. In absolute terms, the reuse of waste waters amounted to 5.3 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 1,772,500 m^3 in 2012).

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, mounted to 510 g/kWh (+8.5%) owing to higher thermal generation from coal and lower generation from hydro.

EN20 Increased reliance on coal caused net specific emissions of macro-pollutants, referred to thermal generation alone, to grow significantly – SO_2 by 22.3% and NO_x by 8.2% – whereas particulates had the same values as in 2011. Specific emissions of H_2S from geothermal generation continued to drop (-1.1% on 2011) thanks to the effect of AMIS abatement systems (see EN26).

EN18 In 2012, the emissions of CO_2 displaced by carbon-free generation amounted to roughly 19 million tonnes.

EN22 In 2012, Enel Distribuzione (making part of 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 2012, the contaminated equipment (power transformers, measuring transformers, capacitors, bushing insulators, circuit-breakers, etc.) covered by the plan diminished by about 30,000 units (about 400 units in 2012).

The percentage of waste delivered to recovery operators in 2012 was about 80%. The rise (roughly +13%) on 2011 is mainly due to the higher amount of coal flyash recovered, reflecting in turn the recovery of demand by the building sector as compared to last year.

EN19 Ozone-depleting substances:

R22

Emission of 1,464 kg (equivalent to 81 kg of CFC11), determined from gas replenishments in air conditioning systems.

Location: this gas (withdrawn from the market in 2010) is used in the air conditioning/heating systems of about 900 office buildings, which are occupied by Enel's personnel and managed by Enel Servizi. Investigations are being conducted on a replacement gas to be progressively introduced. The replacement is scheduled in 2014.

EN23 Spills:

Italy	*Description*	*Impact and mitigation*
Enel Distribuzione Amount: **66 m^3**	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 the results of 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 saved water by: i) increasing its reuse of waste waters thanks to better maintenance of its water treatment and recycling systems; ii) reusing waste waters as make-up waters in cooling towers; iii) continuing its 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.

> Enel Green Power: removal of the flexible membrane lining of the forebay and waterproofing of its joints (hydro plant of Coscile, province of Cosenza, Calabria).

Emissions

> Improved emission abatement in thermal generation by: using very low-sulfur fuel oil (in particular, heavy fuel with a 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). Reduction of emissions of CO_2, SO_2 and particulates after installation of new dual-fuel generating units (3 and 4) in the thermal plant of the Capraia island (province of Livorno, Tuscany).

> Enel Green Power installed AMIS systems in 2 geothermal plants, cutting emissions by about 70%.

> 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 vehicle fleet fell by about 2.5%, corresponding to an estimated reduction of about 300 t of CO_2.

Materials and Resources

> Enel Green Power and Enel Produzione: progressive replacement of polluting and toxic products with alternative, biodegradable and atoxic ones (hydrazine with carbohydrazide, biodegradable oil and grease in place of mineral oil).

> In the liquid release treatment system of the Priolo Gargallo plant, reuse of sludges in the secondary

neutralizer and of brine from vaporizers (for pH balancing).

> Enel Servizi: lower consumption of paper and toner cartridges and removal of most of the non-shared printers.

Landscape

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

> Enel Green Power: conservative restoration and improvement of the outer appearance of the Ponte San Martino hydro power plant and other appurtenant structures (province of Treviso, Veneto); restoration of the area near the Brenta river for recreational fishing, even by people with disabilities (Ca' Barzizza hydro plant, province of Vicenza, Veneto); reinstatement of roads of access to the wind farm of Gangi (province of Palermo, Sicily).

Waste

> Enel Produzione and Enel Green Power (geothermal energy): continuing of the plan of removal of all asbestos-containing materials.

> For 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 (waste oil) thanks to the introduction of electric vehicles into the fleet; reduction of special waste (used toner cartridges) thanks to document digitization. Improvement of separate collection of used batteries in the main sites and of wet waste collection in sites with canteens.

Renewables

> Installation of dual-fuel generating units (using gas oil or biodiesel) in the plant of the Capraia island. Actually, all dual-fuel generating units use biodiesel.

> Total renovation (with improved energy efficiency and acquisition of green certificates) of the Lappago, Molini di Tures and Sarentino hydro plants (province of Bolzano, Trentino Alto Adige), owned by SE Hydropower.

Noise

> Preliminary studies, noise measuring surveys and mitigation of noise emissions in various sites.

> Enel Servizi: increased number of electric vehicles and abatement of noise in workplaces thanks to printing minimization.

Waste waters

> Enel Green Power: installation of floating-tube oil skimmers in the hydro plants of Corenno (province of Lecco), Porto Torre (province of Varese) and Vizzola (province of Varese) in Lombardy; improved oil containment with a system capable of collecting all the oil present (Somana hydro power plant, province of Lecco, Lombardy); conversion of the generating-equipment cooling system to closed cycle (Forno Allione hydro plant, province of Brescia, Lombardy); installation of oil detectors in waste water collection tanks (hydro plants of Funghera and Susa-province of Turin, of San Damiano and Vinadio-province of Cuneo, Piedmont).

Soil

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

> Enel Green Power: tightness tests and inspections to identify priorities of replacement of underground tanks (Isola Serafini hydro plant, province of Piacenza, Emilia Romagna); replacement of oil-insulated transformers with resin-insulated ones (hydro plants of Val da Rin, Ciampato and Campo di Sotto-province of Belluno, Spresiano, Priula and Arcade-province of Treviso, Veneto).

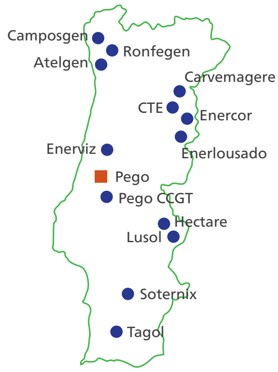
Other

> Enel Servizi: preference of hotels that are ISO 14001-certified (so far, the list contains 50 hotels) and have electric-car recharging posts.

Portugal

Thermal generation, simple and CHP

Endesa SA
Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
16	1,123	2,902

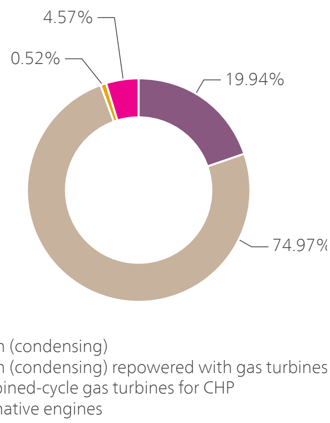
Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW	Useful thermal capacity 10^6 kcal/h
Steam (condensing)	1	2	224	-
Combined-cycle gas turbines	1	2	842	-
Single-cycle gas turbines for CHP	2	2	6	-
Alternative engines for CHP	12	16	51	6.04
	16	**22**	**1,123**	**6**

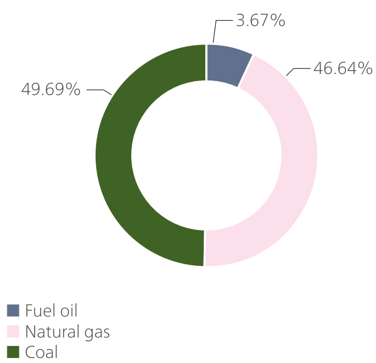
Net heat & power generation
Total: 3,154 million kWh

Useful heat output (combined with power generation)
Total: 276,651.181 million kcal
(equal to 322 million kWh)

Net maximum electrical capacity
Total: 1,123 MW



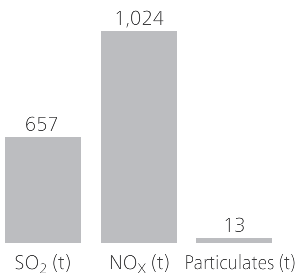
Fuel consumption
Total: 637,138 t of oil-equivalent



Waste waters

Discharged: **339,830 m³**

Emissions into the atmosphere

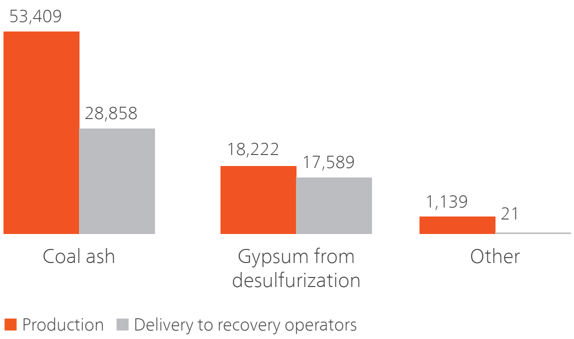


CO_2 (t)	2,015,144
CO_2 from desulfurization (t)	4,450
from combustion	*2,010,664*
from desulfurization (computed stoichiometrically)	*4,443*
Total (t of CO_2 equivalent)	2,015,114

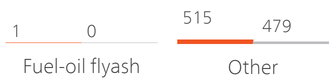
Special waste

Total production: **73,286 t**
Total delivery to recovery operators: **46,947 t**

Non-hazardous
Production: 72,770 t
Delivery to recovery operators: 46,468 t

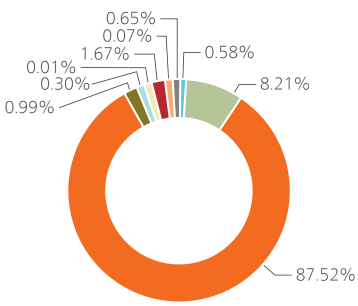


Hazardous
Production: 516 t
Delivery to recovery operators: 479 t



Expendables

Total: 11,537.31 t



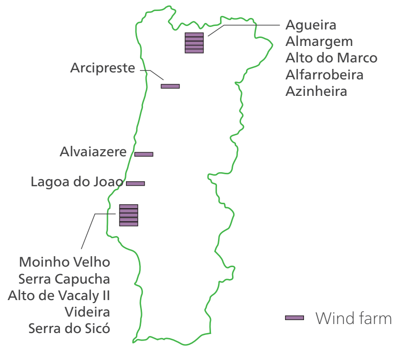
- Resins, hydrazine, carbohydrazide & hydrogen peroxide
- Ammonia
- Limestone for flue-gas desulfurization
- Sodium hypochlorite, chlorine dioxide, ferrous sulfate, ferrous chloride & trisodium phosphate
- Sulfuric & hydrochloric acids
- Caustic soda
- Lime, ferric chloride & polyelectrolyte
- Lubricating oil
- Dielectric oil

Water for industrial uses

Total requirements: 6,161,910 m³
Total abstraction from inland waters: 6,161,910 m³

Portugal

Wind power generation   Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
13	126	303

Power installations

	Power plants no.	Net maximum electrical capacity MW
	13	**126**

Avoided CO_2 emissions

Due to wind generation: **188,728 t**

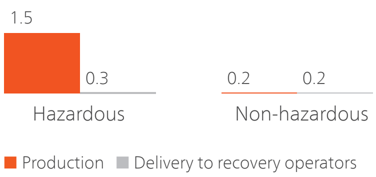
Equivalent yearly hours of utilization*

Wind: **2,405 hours**

* Yearly generation/capacity ratio.

Special waste

Total production: **1.7 t**
Total delivery to recovery operators: **0.5 t**



Other data

Wind generation

Wind systems

Surface area occupied by platforms, service roads, buildings: **15.4 ha**

Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants	no.	17	11	11	13	15
thermal	no.	1	1	1	2	2
wind	no.	16	10	10	3	13
Net maximum electrical capacity	MW	258	295	299	760	1,192
thermal	MW	148	221	224	644	1,066
wind	MW	110	74.5	74.5	116	126
Combined heat & power installations						
Power plants (thermal)	no.	4	5	5	14	14
Net maximum electrical capacity (thermal)	MW	22	25.7	44.4	69.9	57.2
Useful thermal capacity (thermal)	million kcal/h	18.7	27.9	27.9	78.6	78.6
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.					16
Gross real-estate surface area	thousand m^2					650

Resources

		2008	2009	2010	2011	2012
EN1 EN3 **Fossil fuels**						
Thermal generation						
fuel oil	thousand t	1.8	4.41	3.04	2.39	2.15
	thousand toe	1.74	4.25	3.1	2.44	2.11
fuel oil (LS)	thousand t	1.8	4.41	3.04	2.39	2.15
	thousand toe	1.74	4.25	3.1	2.44	2.11
gas oil	thousand t	0.002	0.002	0.002	0.008	0.006
	thousand toe	0.002	0.002	0.002	0.003	0.007
natural gas	million m^3	0	0	0	272	263
	thousand toe	0	0	0	251	239
technologically captive use	*million m^3*	*0*	*0*	*0*	*272*	*263*
	thousand toe	*0*	*0*	*0*	*251*	*239*
of which in combined-cycle units	million m^3	0	0	0	272	263
	thousand toe	0	0	0	251	239
coal	thousand t	355	461	265	356	542
	thousand toe	209	274	157	211	317
Total	thousand toe	210	278	161	464	558
	TJ	8,810	11,637	6,720	19,447	23,368
Thermal generation combined with heat generation						
fuel oil	thousand t	5.76	4.99	4.49	27.4	21.6
	thousand toe	5.67	4.91	4.42	27	21.3
fuel oil (LS)	thousand t	5.76	4.99	4.49	27.4	21.6
	thousand toe	5.67	4.91	4.42	27	21.3
gas oil	thousand t	0.03	0.003	0.15	0.137	0.104
	thousand toe	0.033	0.004	0.136	0.069	0.094
natural gas	million m^3	26.3	31.9	29.7	65.1	63.7
	thousand toe	23.8	29.2	26.8	58.8	57.7
technologically captive use	*million m^3*	*16.2*	*14.6*	*16.7*	*39.2*	*37.9*
	thousand toe	*14.7*	*13.6*	*15*	*35.5*	*34.3*
non-technologically captive use	*million m^3*	*10.1*	*17.3*	*13*	*25.9*	*25.9*
	thousand toe	*9.11*	*15.7*	*11.8*	*23.4*	*23.4*
Total	thousand toe	29.5	34.2	31.3	85.9	79
Various activities	thousand toe	0	0	0	0	0.03
Grand total	**thousand toe**	**240**	**312**	**192**	**550**	**637**
	TJ	**10,043**	**13,067**	**8,031**	**23,043**	**26,679**

		2008	2009	2010	2011	2012
EN4 Electricity						
Various activities	million kWh	0	0	0	0	0.118
EN8 Water for industrial uses						
From rivers (including meteoric waters from secondary rainfall)	million m^3	2.73	4.73	3.64	4.21	6.16
From wells	million m^3	0.001	0.001	0.001	0.001	0.001
Total abstraction from inland waters	**million m^3**	**2.73**	**4.73**	**3.64**	**4.22**	**6.16**
for thermal generation	million m^3	2.73	4.73	3.64	4.22	6.16
Water for non-industrial uses						
Real-estate & service management	million m^3					0.001
EN1 Expendables						
Resins	t	0	0	0	7.31	7
Hydrazine	t	1.3	1.1	0.854	0.373	0.521
Carbohydrazide	t	0	0	0	0.1	0
Ammonia	t	894	958	466	597	948
Limestone for flue-gas desulfurization	t	3,335	8,740	4,831	6,503	10,097
Sodium hypochlorite	t	121	26.2	13.7	22.4	35
Trisodium phosphate	t	0.024	0.075	0.227	0	0
Lime	t	0.536	87.4	1.65	110	101
Ferric chloride	t	1.3	2.28	2.57	3.7	11.9
Polyectrolyte	t	14.7	22.8	0.778	1.56	1.56
Sulfuric & hydrochloric acids	t	150	113	47.5	52.5	66.6
Caustic soda	t	193	152	38.9	42	75.6
Lubricating oil	t	51.2	51.1	21.1	284	192
Dielectric oil	t	0.05	0.286	0.743	0.503	1.31
Printing paper	t	0	0	0	0	1.04
Other	t	0	0	0	0.642	0.104
Total	**t**	**4,762**	**10,154**	**5,424**	**7,626**	**11,538**
for thermal generation	t	4,695	10,116	5,412	7,346	11,352
for thermal generation combined with heat generation (CHP)	t	66.3	36.8	12.4	279	185
for wind generation	t	0	0.576	0.043	0.668	0.106

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From fossil fuels	**million kWh**	**998**	**1,300**	**815**	**1,880**	**3,154**
natural gas	*million kWh*	*0*	*0*	*0*	*785*	*1,542*
of which in combined-cycle units	million kWh	0	0	0	785	1,542
coal	*million kWh*	*915*	*1,195*	*658*	*883*	*1,360*
combined with heat generation	**million kwh**	**83.6**	**105**	**156**	**212**	**251**
fuel oil & gas-oil	*million kWh*	*18.3*	*31.1*	*35.8*	*70.1*	*73.7*
natural gas	*million kWh*	*65.3*	*73.7*	*121*	*142*	*178*
From renewables (wind)	**million kWh**	**202**	**188**	**153**	**247**	**303**
Total	**million kWh**	**1,200**	**1,488**	**968**	**2,127**	**3,457**
simple	million kWh	1,117	1,383	811	1,915	3,205
combined with heat generation	million kWh	83.6	105	156	212	251
Useful heat output (combined with power generation)						
fossil fuels	**million kcal**	**128,746**	**111,781**	**74,047**	**289,551**	**276,651**
	million kWh	**150**	**130**	**86.1**	**337**	**322**

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	2.35	0.511	0.262	0.424	0.657
	thermal generation combined with heat generation	thousand t	0	0	0	0	0.188
	Total	**thousand t**	**2.35**	**0.511**	**0.262**	**0.424**	**0.845**

	Source		2008	2009	2010	2011	2012
EN20 NO_x	thermal generation	thousand t	1.6	0.843	0.466	0.77	1.02
	thermal generation combined with heat generation	thousand t	0	0	0	0	0.731
	Total	**thousand t**	**1.6**	**0.843**	**0.466**	**0.77**	**1.76**
EN20 Particulates	thermal generation	thousand t	0.096	0.035	0.012	0.012	0.013
	Total	**thousand t**	**0.096**	**0.035**	**0.012**	**0.012**	**0.013**
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	838	1,068	628	1,425	1,803
	fossil-fired thermal generation (from desulfurization)	thousand t	1.47	9.63	2.12	2.86	4.45
	Total from fossil-fired thermal generation	thousand t	839	1,077	630	1,428	1,807
	Total from thermal generation	thousand t	839	1,077	630	1,428	1,807
	fossil-fired thermal generation - CHP (from combustion)	thousand t	70	81.6	76.1	237	208
	Total fossil-fired thermal generation - CHP (from combustion)	thousand t	70	81.6	76.1	237	208
	Total thermal generation combined with heat generation	thousand t	70	81.6	76.1	237	208
	Various activities	thousand t	0	0	0	0	0.093
	Total	**thousand t**	**909**	**1,159**	**706**	**1,665**	**2,015**
EN16 SF_6	electricity generation	kg	0.003	0	0	0	0
	Total	**kg**	**0.003**	**0**	**0**	**0**	**0**
EN16 CH_4							
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**909**	**1,159**	**706**	**1,665**	**2,015**
EN18 **Avoided CO_2 emissions** Due to wind and solar (photovoltaic) generation		thousand t	185	170	147	211	189
EN21 **Waste waters (discharged quantity)**	thermal generation	million m^3	0.973	3.57	0.276	0.216	0.34
	thermal generation combined with heat generation	million m^3	0.113	0	0	0	0
	Total electricity generation	million m^3	1.09	3.57	0.276	0.216	0.34
	Total	**million m^3**	**1.09**	**3.57**	**0.276**	**0.216**	**0.34**
EN21 **Conventional polluting load in waste waters discharged by installations** Metals and compounds (expressed as metal equivalents)	thermal generation	kg	0	0	54.1	1.01	2.72
	in some plants with an overall capacity of	MW	0	0	224	224	224
	Total electricity generation	kg	0	0	54.1	1.01	2.72
	Total	**kg**	**0**	**0**	**54.1**	**1.01**	**2.72**
Total nitrogen (expressed as N)	thermal generation	kg	0	0	1,242	1,197	1,882
	in some plants with an overall capacity of	MW	0	0	224	224	224
	Total electricity generation	kg	0	0	1,242	1,197	1,882
	Total	**kg**	**0**	**0**	**1,242**	**1,197**	**1,882**
Total phosphorus (expressed as P)	thermal generation	kg	0	0	226	333	513
	in some plants with an overall capacity of	MW	0	0	224	224	224
	Total electricity generation	kg	0	0	226	333	513
	Total	**kg**	**0**	**0**	**226**	**333**	**513**

	Source		2008	2009	2010	2011	2012
COD	thermal generation	kg	0	0	18,478	8,562	28,000
	in some plants with an overall capacity of	MW	0	0	224	224	224
	Total electricity generation	kg	0	0	18,478	8,562	28,000
	Total	**kg**	**0**	**0**	**18,478**	**8,562**	**28,000**
BOD	thermal generation	kg	0	0	5,941	960	5,206
	in some plants with an overall capacity of	MW	0	0	224	224	224
	Total electricity generation	kg	0	0	5,941	960	5,206
	Total	**kg**	**0**	**0**	**5,941**	**960**	**5,206**
EN22 **Non-hazardous special waste**							
Coal bottom ash	fossil-fired thermal generation (simple and CHP)						
production		t	2,745	3,834	2,167	2,691	3,335
delivery to recovery operators		t	56.1	70.8	11,197	2,300	31.9
Coal flyash	fossil-fired thermal generation (simple and CHP)						
production		t	3,225	61,123	25,034	29,160	50,074
delivery to recovery operators		t	289	44,777	22,814	20,570	28,826
Gypsum from desulfurization	fossil-fired thermal generation (simple and CHP)						
production		t	3,964	16,395	10,515	11,393	18,222
delivery to recovery operators		t	1,224	14,436	5,262	13,559	17,589
Other	electricity generation						
production		t	26.5	149	920	1,173	1,139
delivery to recovery operators		t	25.7	3.03	91.4	18.4	21.6
Total	**electricity generation**						
production		t	9,960	81,501	38,636	44,418	72,770
delivery to recovery operators		t	1,595	59,287	39,365	36,447	46,468
EN22 **Hazardous special waste**							
Oil flyash	fossil-fired thermal generation (simple and CHP)						
production		t	0	0	0	1.51	0.116
delivery to recovery operators		t	0	0	0	0.18	0.08
Other ash	fossil-fired thermal generation (simple and CHP)						
production		t	0	7.98	8.6	0	1.39
delivery to recovery operators		t	0	0	8.6	0	0
Other	electricity generation						
production		t	238	11.2	176	723	516
of which with PCBs		*t*	*35.1*	*7.96*	*10.2*	*17.6*	*11.9*
delivery to recovery operators		t	205	18.6	183	716	479
of which with PCBs		*t*	*6.6*	*16.3*	*16.5*	*17.6*	*11.9*
Total	electricity generation						
production		t	238	19.2	185	725	518
delivery to recovery operators		t	205	18.6	191	717	479
EN22 **Total special waste**							
production	electricity generation	t	10,199	81,520	38,821	45,142	73,288
delivery to recovery operators	electricity generation	t	1,800	59,305	39,556	37,164	46,947

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Resource conservation and quality								
EN1 EN3 Net heat rate of thermal generation	kcal/kWh	2,300	2,325	2,439	2,785	1,923	-16.4	-31
EN1 EN3 Net heat rate of thermal generation (CHP)	kcal/kWh	1,263	1,454	1,291	1,566	1,379	9.2	-11.9
EN8 Net specific requirements of water for industrial uses for thermal generation								
including contribution of as-is sea water	liters/kWh	2.99	3.96	5.54	2.53	2.12	-29.1	-16.2
excluding contribution of as-is sea water	liters/kWh	2.99	3.96	5.54	2.53	2.12	-29.1	-16.2
Total net specific consumption of water for industrial uses	liters/kWh	2.02	2.93	3.46	1.71	1.63	-19.3	-4.7
EN8 Coverage of requirements of water for industrial uses								
from rivers (including meteoric waters from secondary rainfall)	% of requirements	100	100	100	100	100	0	0
from wells	% of requirements	0.037	0.021	0.027	0.024	0.016	-56.8	-33.3
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	3.09	2.93	3.92	5.34	3.67	18.8	-31.3
gas oil	% of total fuel consumption	0.015	0.002	0.072	0.013	0.016	6.7	23.1
natural gas	% of total fuel consumption	9.91	9.37	14	56.2	46.6	370.2	-17.1
coal	% of total fuel consumption	87	87.7	82.1	38.4	49.7	-42.9	29.4
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	61.7	46.4	55.9	92.4	92.1	49.3	-0.3
of which in combined-cycle units	*% of total natural-gas consumption*	*0*	*0*	*0*	*81*	*80.6*	*-*	*-0.5*
natural gas, non-technologically captive use	% of total natural-gas consumption	38.3	53.6	44.1	7.55	7.87	-79.5	4.2
Electricity generation from renewables								
wind	% of total generation	16.8	12.6	15.8	11.6	8.77	-47.8	-24.4
Specific emissions into the atmosphere								
EN20 SO_2 (thermal generation, simple)	g/kWh thermal net	2.57	0.428	0.398	0.254	0.226	-91.2	-11
EN20 NO_X (thermal generation, simple)	g/kWh thermal net	1.75	0.705	0.708	0.462	0.353	-79.8	-23.6
EN20 Particulates (thermal generation, simple)	g/kWh thermal net	0.105	0.029	0.018	0.007	0.004	-96.2	-42.9
EN16 CO_2 (thermal generation, simple)	g/kWh thermal net	917	901	957	856	623	-32.1	-27.2
EN20 SO_2 (thermal generation - CHP)	g/kWh thermal net	0	0	0	0	0.328	-	-
EN20 NO_x (thermal generation - CHP)	g/kWh thermal net	0	0	0	0	1.28	-	-
EN16 CO_2 (thermal generation - CHP)	g/kWh thermal net	300	347	314	432	362	20.7	-16.2
EN20 SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	1.74	0.316	0.249	0.172	0.224	-87.1	30.2
EN20 NO_x (total from thermal generation - simple and CHP)	g/kWh total net	1.19	0.521	0.442	0.313	0.464	-61	48.2
EN20 Particulates (total from thermal generation - simple and CHP)	g/kWh total net	0.071	0.022	0.011	0.005	0.003	-95.8	-40
EN16 CO_2 (total from thermal generation - simple and CHP)	g/kWh total net	673	716	670	676	533	-20.8	-21.2
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.23	0	0	0	0	-100	-
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	0.082	0.001	0.002	-	100
Total nitrogen (expressed as N)	mg/kWh thermal net	0	0	1.89	1.36	1.38	-	1.5
Total phosphorus (expressed as P)	mg/kWh thermal net	0	0	0.344	0.377	0.377	-	-
COD	mg/kWh thermal net	0	0	28.1	9.7	20.6	-	112.4

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
BOD	mg/kWh thermal net	0	0	9.03	1.09	3.83	-	251.4
EN22 **Specific waste production**								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	6.53	54.3	41.3	36.1	39.3	501.8	8.9
EN22 **Waste recovery**								
Coal and brown-coal ash	% production	5.78	69	125	71.8	54	834.3	-24.8
bottom ash	% production	2.04	1.85	517	85.4	0.956	-53.1	-98.9
flyash	% production	8.95	73.3	91.1	70.5	57.6	543.6	-18.3
Gypsum from desulfurization	% production	30.9	88.1	50	119	96.5	212.3	-18.9
Other non-hazardous special waste electricity generation	% production	97.2	2.03	9.94	1.57	1.90	-98	21
Total non-hazardous special waste electricity generation	% production	16	72.7	102	82.1	63.9	299.4	-22.2
Oil flyash	% production	0	0	0	11.9	69	-	479.8
Other hazardous special waste electricity generation	% production	85.9	96.7	103	99	92.8	8	-6.3
Total special waste electricity generation	% production	17.6	72.7	102	82.3	64	263.6	-22.2

Highlights of 2012

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

EN1 EN3 In the 2012 fossil fuel mix, the share of coal went up (nearly 50% of total fuel consumption) owing to increased generation by the simple-cycle thermal plant of Pego, in spite of the doubling of generation from natural gas by the combined-cycle thermal plant of Pego.

The increase in thermal generating capacity as against 2011 is due to the 100% consolidation of the combined-cycle thermal plant of Pego (previously consolidated at 50%). The plant was commissioned in 2011.

EN8 EN10 Specific water consumption continued to drop (roughly -5% on 2011) thanks to careful water management (see EN26).

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, fell from 676 to 533 g/kWh in 2012 owing, above all, to the 100% consolidation of the combined-cycle thermal plant of Pego and, to a lesser extent, to higher generation by the more efficient CHP plants.

EN20 Net specific emissions of SO_2, NO_x and particulates, referred to thermal generation alone, diminished thanks to the 100% consolidation of the combined-cycle thermal plant of Pego.

EN18 In 2012, wind power generation displaced about 189,000 tonnes of CO_2 emissions into the atmosphere.

EN22 In 2012, waste delivered to recovery operators accounted for 64% of total waste production; this figure was lower than in 2011 owing to a lower percentage of ash recovery (generalized crisis in Europe and consequent contraction of ash demand by the building sector), which was not offset by the almost total recovery of gypsum from desulfurization (about 97% of production).

EN26 Environmental enhancements.

Materials

> Use of biodegradable lubricating oils.

Water

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

Waste

> Monitoring of the combustion process and of the status of flue-gas treatment systems with a view to obtaining ash and gypsum suitable for complete reuse.

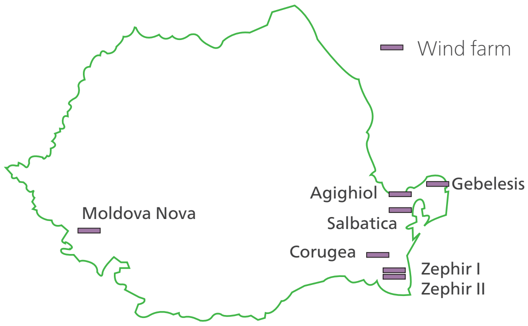
Other

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

Romania

Wind power generation

Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
7	498	589

Power installations

Power plants no.	Net maximum electrical capacity MW
7	498

Net maximum electrical capacity

Total: 498.4 MW

Equivalent yearly hours of utilization*

Wind: **1,182 hours**

* Yearly generation/capacity ratio.

Net electricity generation

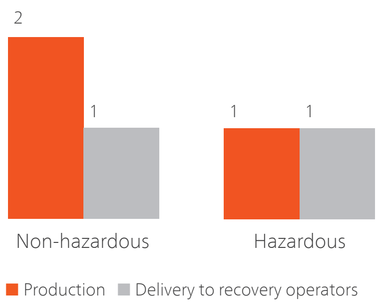
Total: 589.12 million kWh

Avoided CO_2 emissions

Due to wind generation: **593.002 t**

Special waste

Total production: **3 t**
Total delivery to recovery operators: **2 t**



Romania

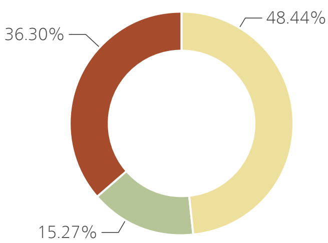
Electricity distribution

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

Provinces (and corresponding company districts) served
- Enel Distributie Banat
- Enel Distributie Dobrogea
- Enel Distributie Muntenia
- Headquarters

The Numbers

Substations	Capacity (MVA)	Total lines (km)
21,398	21,310	90,394



Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	280	13,049.061
MV/LV	20,760	7,422.79
MV/MV	138	701.714
Satellite substations and MV units	220	136
	21,398	**21,309.565**

LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	6,333	-	253	**6,586**
MV	22,505	128	12,323	**34,956**
LV	14,946	13,672	20,234	**48,852**
	43,784	**13,800**	**32,810**	**90,394**

General data

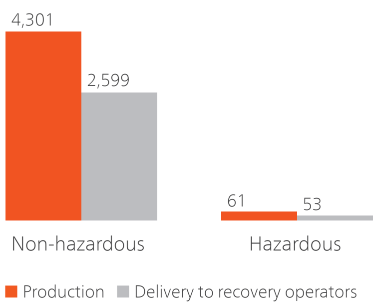
Municipalities served: **2,854**
Surface area served: **62,492 km^2**
Customers connected to the grid: **2,649,000**

Resource consumption

Expendables: **77.93 t**
Gas-oil: **87.6 toe**

Special waste

Total production: **4,363 t**
Total delivery to recovery operators: **2,652 t**



Electricity

Total electricity distributed:
14,605.87 million kWh
Own consumption for grid operation:
20.68 million kWh

Emissions into the atmosphere

SF_6: **41.4 kg** (919 t of CO_2 equivalent)
Co_2: **272 t**
Total greenhouse gases: **1,192 t** of $CO_{2\ eq.}$

Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants (wind)	no.	0	0	1	4	7
Net maximum electrical capacity (wind)	MW	0	0	64	269	498
Power lines (circuit length)						
Total	km	90,240	91,550	89,240	89,944	90,394
high-voltage	km	5,090	6,023	6,583	6,584	6,586
medium-voltage	km	37,591	37,761	34,439	34,665	34,956
low-voltage	km	47,559	47,766	48,218	48,695	48,852
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	0	1,162	1,161	1,142	1,108
special vehicles	no.	0	79	101	159	162
vehicles for both private and service use	no.	0	61	62	95	89
Gross real-estate surface area	thousand m^2	0	93.5	91.8	92.2	95.2

Resources

		2008	2009	2010	2011	2012
EN1 EN3 **Fossil fuels**						
Real-estate & service management	thousand toe	0	1.94	2.31	2.91	2.61
	TJ	0	81.3	96.5	122	109
EN4 **Primary electricity**						
Real-estate & service management	million kWh	0	10.9	5.37	10.8	20.4
Water for non-industrial uses						
Real-estate & service management	million m^3	0	0.15	0.16	0.147	0.391
EN1 **Expendables**						
Lubricating oil	t	0.24	0.83	1.8	1.24	3.58
Dielectric oil	t	164	91.9	94.6	115	77.4
Printing paper	t	0	74.2	100	123	109
Total	**t**	**165**	**167**	**197**	**239**	**190**
for wind generation	t			na	na	3
for electricity distribution	t	165	92.7	96.4	116	77.9
EN1 **PCB survey**						
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding their oil)	t	49	36	3.83	23.5	53.3
Oil with PCBs >50 ppm and ≤ 500 ppm contained in equipment & transformers	t	6.79	3.09	0.202	11.3	26.5

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From renewables (wind)	million kWh	0	0	3.97	132	589
Electricity distribution						
Electricity distributed	million kWh	10,909	13,224	13,827	14,263	14,606
EN4 Electricity consumption for grid operation	million kWh	34.3	23.7	21.3	23.8	20.7

		2008	2009	2010	2011	2012
EN6 Sales						
Open market						
Household customers' segment						
Total						
Customers	no.	0	0	0	0	1
Power sold	million kWh	0	0	0	0	0.118
Business segment						
Green offerings						
Customers	no.	0	0	0	0	16
Power sold	million kWh	0	0	0	0	4.96
Time-of-use offerings						
Customers	no.	20	39	41	47	81
Power sold	million kWh	3.17	11.3	6.41	7.42	10.4
Total						
Customers	no.	1,138	1,589	4,053	9,835	11,300
Power sold	million kWh	209	466	563	565	628
Large customers' segment						
Green offerings						
Customers	no.	0	0	0	0	4
Power sold	million kWh	0	0	0	0	9.1
Time-of-use offerings						
Customers	no.	7	6	4	8	9
Power sold	million kWh	33,8	20	22,1	32,7	26,9
Total						
Customers	no.	157	172	146	192	230
Power sold	million kWh	411	557	361	520	560
Universal-service market						
Household customers' segment						
Time-of-use offerings						
Customers	no.	3,885	9,065	6,263	6,063	6,009
Power sold	million kWh	9.94	18.1	17.9	18.7	19.5
Total						
Customers	no.	1,337,079	2,384,698	2,430,676	2,455,147	2,475,110
Power sold	million kWh	1,872	3,889	4,017	4,126	4,370
Time-of-use offerings						
Customers	no.	5,122	14,310	11,216	10,421	10,160
Power sold	million kWh	262	3,124	1,656	1,567	1,403
Total						
Customers	no.	112,055	171,946	170,470	169,426	166,538
Power sold	million kWh	2,336	4,687	4,085	3,573	3,600
Overall power sold						
high-voltage	million kWh	212	369	294	300	263
medium-voltage	million kWh	579	2,153	1,630	1,395	1,450
low-voltage	million kWh	3,417	7,077	7,102	7,090	7,445
Total	**million kWh**	**4,208**	**9,599**	**9,026**	**8,785**	**9,158**

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN16 CO_2	various activities	thousand t	0	5.62	6.71	8.38	7.65
EN16 SF_6	electricity distribution	kg	18.5	122	14.5	26.6	41.4
		thousand t of CO_2 equivalent	0.422	2.79	0.331	0.606	0.945
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		**thousand t of CO_2 equivalent**	**0.422**	**8.41**	**7.05**	**8.98**	**8.59**
EN18 **Avoided CO_2 emissions**							
Due to wind power generation		thousand t			3.03	101	593
EN22 **Non-hazardous special waste**							
Other production	electricity generation	t			na	na	1.90
	electricity distribution	t	2,447	2,112	3,330	4,389	4,301
	Total	**t**	**2,447**	**2,112**	**3,330**	**4,389**	**4,303**

	Source		2008	2009	2010	2011	2012
delivery to recovery operators	electricity generation	t			na	na	1.1
	electricity distribution	t	1,526	812	2,150	2,969	2,599
	Total	**t**	**1,526**	**812**	**2,150**	**2,969**	**2,600**
EN22 Hazardous special waste							
Other production	electricity generation	t			na	na	1
	electricity distribution	t	70.5	93.9	73.6	120	61.3
	Total	**t**	**70.5**	**93.9**	**73.6**	**120**	**62.3**
of which with PCBs							
	electricity generation	t			na	na	1
	electricity distribution	t	62.8	78.4	34.6	85.2	40.3
	Total	**t**	**62.8**	**78.4**	**34.6**	**85.2**	**41.3**
delivery to recovery operators	electricity generation	t			na	na	1
	electricity distribution	t	65.4	50.7	78.8	116	53
	Total	**t**	**65.4**	**50.7**	**78.8**	**116**	**54**
of which with PCBs							
	electricity generation	t			na	na	1
	electricity distribution	t	57.7	46	74	85.2	37.4
	Total	**t**	**57.7**	**46**	**74**	**85.2**	**38.4**
EN22 Total special waste							
production	electricity generation	t	0	0	0	0	2.9
	electricity distribution	t	2,518	2,206	3,404	4,509	4,363
	Total	**t**	**2,518**	**2,206**	**3,404**	**4,509**	**4,366**
delivery to recovery operators	electricity generation	t	0	0	0	0	2.1
	electricity distribution	t	1,591	862	2,229	3,085	2,652
	Total	**t**	**1,591**	**862**	**2,229**	**3,085**	**2,654**

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN29 Land								
LV cable lines								
overhead	% of entire LV grid	21.5	24.1	25.7	27.6	28	30.2	1.4
underground	% of entire LV grid	40.9	41.6	41.3	41.3	41.4	1.2	0.2
Total	**% of entire LV grid**	**62.4**	**65.6**	**67.1**	**68.9**	**69.4**	**11.2**	**0.7**
MV cable lines								
overhead	% of entire MV grid	0	0.098	0.086	0.175	0.367	-	109.7
underground	% of entire MV grid	36.4	36.9	34.2	34.7	35.3	-3	1.7
Total	**% of entire MV grid**	**36.4**	**37**	**34.3**	**34.9**	**35.6**	**-2.2**	**2**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	48.3	49.8	49.7	51	51.6	6.8	1.2
Resource conservation and quality								
EN4 Consumption of electricity for distribution grid operation	% of electricity distributed	0.314	0.179	0.154	0.167	0.142	-54.8	-15
Electricity generation from renewables								
wind	% of total generation			100	100	100	-	0
EN6 Sales								
Open market								
Business segment								
Green power sold	% of power sold	0	0	0	0	0.79	-	-
Time-of-use power sold	% of power sold	1.52	2.43	1.14	1.31	1.66	9.2	26.7
Large customers' segment								
Green power sold	% of power sold	0	0	0	0	1.63	-	-
Time-of-use power sold	% of power sold	8.22	3.59	6.13	6.28	4.81	-41.5	-23.4
Universal-service market								
Household customers' segment								
Time-of-use power sold	% of power sold	0.531	0.466	0.445	0.453	0.447	-15.8	-1.3
Non-household customers' segment								
Time-of-use power sold	% of power sold	11.2	66.7	40.5	43.9	39	248.2	-11.2

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Overall power sold								
high-voltage	% of power sold	5.05	3.85	3.26	3.42	2.87	-43.2	-16.1
medium-voltage	% of power sold	13.8	22.4	18.1	15.9	15.8	14.5	-0.6
low-voltage	% of power sold	81.2	73.7	78.7	80.7	81.3	0.1	0.7
Total green power sold	**% of power sold**	**0**	**0**	**0**	**0**	**0.154**	**-**	**-**
Total time-of-use power sold	**% of power sold**	**7.33**	**33.1**	**18.9**	**18.5**	**15.9**	**116.9**	**-14.1**
Specific emissions into the atmosphere								
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.1	0.494	0.05	0.068	0.092	-8	35.3
EN22 **Waste recovery**								
Total non-hazardous special waste								
electricity generation	% production			na	na	57.9	-	-
electricity distribution	% production	62.3	38.4	64.6	67.7	60.4	-3	-10.8
Total	**% production**	**62.3**	**38.4**	**64.6**	**67.7**	**76.4**	**22.6**	**12.9**
Total hazardous special waste								
electricity generation	% production			na	na	100	-	-
electricity distribution	% production	92.7	54	107	96.7	86.4	-6.8	-10.7
Total	**% production**	**92.7**	**54**	**107**	**96.7**	**86.6**	**-6.1**	**-10.4**
Total special waste								
electricity generation	% production			na	na	72.4	-	-
electricity distribution	% production	63.2	39.1	65.5	68.4	60.8	-3.8	-11.1
Total	**% production**	**63.2**	**39.1**	**65.5**	**68.4**	**60.8**	**-3.8**	**-11.1**

Highlights of 2012

EN5 EN6 EN18 In 2012, Enel Green Power commissioned the following wind farms, thus increasing its net maximum capacity in Romania by 206 MW:

> the wind farm of Gebelesis (27 MW) in the Tulcea region;

> the wind farms of Zephir I and II (179 MW in total) in the Dobrogea region.

Moreover, the wind farm of Moldova Nouă in the Banat region was expanded by 23 MW.

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. The percentage of power sold under these rate plans in total power sold remained practically unaltered as compared to 2011. In 2012, green offerings were introduced.

EN18 Wind power generation displaced 593,000 tonnes of CO_2 emissions into the atmosphere.

EN22 The percentage of waste recovery dropped from 68% to about 61%.

In Romania, Enel is active in wind 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).

EN23 Spills:

Romania	*Description*	*Impact and mitigation*
Enel Distributie Dobrogea Amount: **0.235 m³**	Explosion of two MV/LV transformers at Bucu (province of Ialomița). The spill affected a total area of 10 m^3.	Soil treatment with biodegradable absorbent material and replacement of the equipment.
Enel Distributie Muntenia Amount: **0.3 m³**	Explosion of one transformer in the Hotarele HV substation (province of Giurgiu) and of a second transformer at Clinceni (province of Ilfov).	Collection of soil samples from the affected areas and surrounding areas. No significant levels of contamination were observed.

EN26 Environmental enhancements.

Waste

> In March 2012, Enel Distributie Banat signed an agreement with Recolamp (non-profit organization) to continue the partnership for recovering used lamps and bulbs.

> The PCB survey was extended to 200 additional transformers; oil contaminated with PCBs was found in a single transformer.

Noise

> Enel Distributie Banat replaced noisy metering equipment.

> Enel Distributie Muntenia signed a contract to build a noise barrier in the area of the Salaj substation (Bucharest) during 2013.

> 324 surveys were conducted to monitor noise emissions from installations (310 of which located in populated areas).

Soil and water

> Enel Distributie Muntenia continued its soil and groundwater monitoring survey near five HV/LV substations (Dudesti, Buftea, Giurgiu Vest, Măgurele and Ozunu); the survey indicated no soil contamination due to hydrocarbons.

Russia

Combined heat
& power thermal generation

OGK-5

The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
4	9,052	44,511

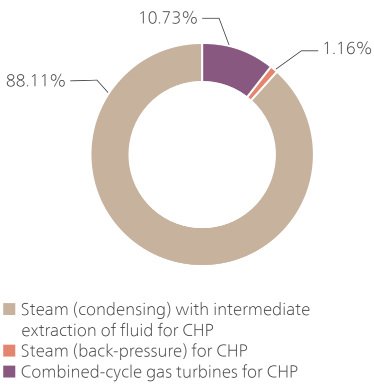
Power installations

	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	33	7,976	-
Steam (back-pressure) for CHP	0	5	105	-
Combined-cycle gas turbines for CHP	0	3	971	-
	4	**41**	**9,052**	**646**

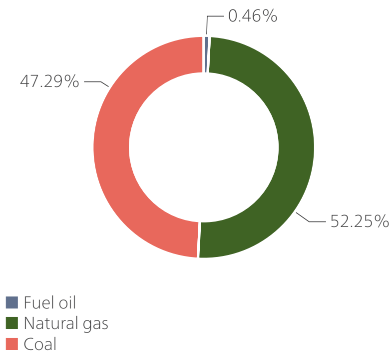
Net electricity generation
Total: 44,511 million kWh

Useful heat output (combined with power generation)
Total: 6,624,966 million kcal
(equal to 7,705 million kWh)

Net maximum electrical capacity
Total: 9,052 MW



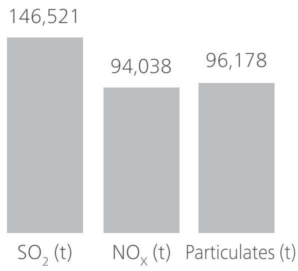
Fuel consumption
Total: 10,866,620 t
of oil-equivalent



Waste waters

Discharged: **28,319,309.54 m^3**
Used inside plants: **6,055,195 m^3**

Emissions into the atmosphere



CO_2 (t)	33,601,772
from combustion	*33,601,772*
Total (t of CO_2 equivalent)	33,601,772

Special waste

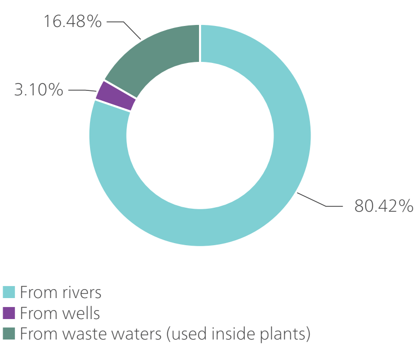
Total production: **5,220,217 t**
Total delivery to recovery operators: **235,411 t**

Non-hazardous
Production: 5,217,558 t
Delivery to recovery operators: 231,794 t

Hazardous
Production: 2,659 t
Delivery to recovery operators: 3,617 t

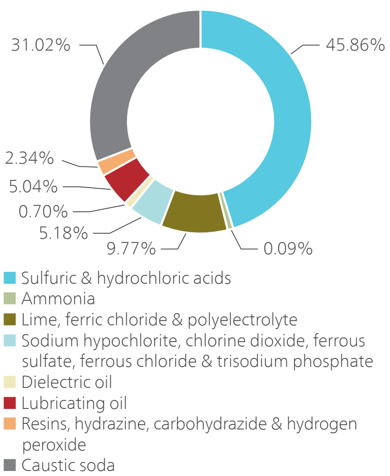
Water for industrial uses

Total requirements: 36,734,051 m^3
Total abstraction from inland waters: 30,678,856 m^3



Expendables

Total: 7,723 t



Environmental Results

Status data

		2008	2009	2010	2011	**2012**
Combined heat & power installations						
Power plants (thermal)	no.	4	4	4	4	4
Net maximum electrical capacity (thermal)	MW	8,183	8,198	8,198	9,027	9,052
Useful thermal capacity (thermal)	million kcal/h	2,373	2,406	2,406	2,612	2,582
Mining & extracting activities						
Extracting activities						
Areas occupied by excavations, drilling and other activities	ha	500	0	0	0	0
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	0	0	14	6	22

Resources

		2008	2009	2010	2011	**2012**
EN1 EN3 **Fossil fuels**						
Thermal generation combined with heat generation						
fuel oil (MS)	thousand t	55.4	59.7	50	33.6	52.2
	thousand toe	53.6	56.4	48.4	32.9	50.2
natural gas	million m^3	3,906	6,143	6,716	7,421	7,030
	thousand toe	3,154	4,976	5,449	5,642	5,678
technologically captive use in combined-cycle units	*million m^3*	*168*	*51*	*88,4*	*330*	*996*
	thousand toe	*139*	*42,5*	*73,1*	*269*	*808*
non-technologically captive use	*million m^3*	*3,738*	*6,092*	*6,628*	*7,091*	*6,033*
	thousand toe	*3,015*	*4,933*	*5,376*	*5,373*	*4,870*
coal	thousand t	7,280	11,630	13,654	12,572	13,026
	thousand toe	2,806	4,852	5,325	5,059	5,139
Total	**thousand toe**	**6,014**	**9,884**	**10,823**	**10,733**	**10,867**
Various activities	thousand toe	1.31	0	0.059	0.053	0.159
Grand total	**thousand toe**	**6,015**	**9,884**	**10,823**	**10,733**	**10,867**
	TJ	**251,847**	**413,825**	**453,141**	**449,386**	**454,970**
EN4 **Electricity**						
Real-estate management	million kWh	0	0	0	0.805	0.802
EN8 **Water for industrial uses**						
From rivers (including meteoric waters from secondary rainfall)	million m^3	36	35	27.9	25.4	29.5
from wells	million m^3	0.31	2.94	3.11	3.09	1.14
Total abstraction from inland waters	**million m^3**	**36.4**	**38**	**31**	**28.5**	**30.7**
EN10 From waste waters (used inside plants)	million m^3	8.46	8.48	7.67	6.92	6.06
Total requirements	**million m^3**	**44.8**	**46.4**	**38.7**	**35.4**	**36.7**
for thermal generation combined with heat generation (CHP)	million m^3	44.8	46.4	38.7	35.4	36.7
for mining & extracting activities	million m^3	0.025	0	0	0	0
EN8 EN21 **Open-cycle cooling water**						
For thermal generation (simple and CHP)	million m^3	4,012	6,463	7,735	7,377	6,005
Total	**million m^3**	**4,012**	**6,463**	**7,735**	**7,377**	**6,005**
Water for non-industrial uses						
Real-estate & service management	million m^3	0	0	0	0.002	0.002
EN1 **Expendables**						
Resins	t	64.1	345	173	111	142
Hydrazine	t	1.99	1.7	1.53	1.74	0.877
Carbohydrazide	t	0	0	0	0	2.58
Hydrogen peroxide	t	0.001	0	0	0	0

		2008	2009	2010	2011	2012
Ammonia	t	14.2	11	8.4	9.33	5.71
Sodium hypochlorite	t	0	0	2.93	5.82	7.1
Ferrous sulfate	t	213	200	253	256	307
Trisodium phosphate	t	7.17	11.6	8.51	8.97	7.83
Lime	t	384	735	611	562	606
Sulfuric & hydrochloric acids	t	1,583	2,704	2,276	2,577	2,846
Caustic soda	t	1,080	1,632	1,553	1,660	1,925
Lubricating oil	t	225	452	342	376	313
Dielectric oil	t	97	162	166	90.9	43.6
Printing paper	t	0	0	15	4.29	4.49
Other	t	1,009	1,849	1,708	1,802	1,517
Total	**t**	**4,678**	**8,103**	**7,119**	**7,465**	**7,728**
for thermal generation combined with heat generation (CHP)	t	4,678	8,103	7,104	7,461	7,723

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From fossil fuels (combined with heat generation)	**million kWh**	**23,752**	**39,112**	**42,835**	**42,433**	**44,511**
natural gas	million kWh	12,148	19,066	20,844	22,410	23,597
coal	million kWh	11,605	20,046	21,991	20,023	20,913
Useful heat output (combined with power generation)						
In thermal power plants	**million kcal**	**3,982,193**	**6,766,684**	**6,519,608**	**6,776,922**	**6,624,966**
	million kWh	**4,631**	**7,870**	**7,582**	**7,882**	**7,705**
Sales						
Open market						
Residential segment						
Time-of-use offerings						
Customers	no.	0	4,615	0	0	0
Power sold	million kWh	0.005	20.8	0	0	0
Total						
Customers	no.	0	100,338	95,206	88,052	73,760
Power sold	million kWh	0.218	223	239	269	270
Business segment						
Time-of-use offerings						
Customers	no.	0	18	0	0	0
Power sold	million kWh	0.01	4.35	0	0	0
Total						
Customers	no.	0	4,484	4,728	4,507	4,894
Power sold	million kWh	0.703	3,325	306	277	319
Large customers' segment						
Total						
Customers	no.	0	0	99	127	179
Power sold	million kWh	1.26	0	921	1,412	1,010
Very large customers' segment						
Total						
Customers	no.	0	1	31	34	39
Power sold	million kWh	15.1	16,069	19,616	20,694	24,217
Overall power sold						
high-voltage	million kWh	15.1	17,749	19,405	20,834	23,677
medium-voltage	million kWh	1.82	1,405	1,345	1,431	1,743
low-voltage	million kWh	0.401	462	332	387	397
Total	million kWh	17.3	19,617	21,082	22,653	25,817

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 SO_2	thermal generation combined with heat generation	thousand t	80.8	124	147	124	147
EN20 NO_x	thermal generation combined with heat generation	thousand t	49.3	93.5	120	104	94
EN20 Particulates	thermal generation combined with heat generation	thousand t	93.5	120	148	103	96.2
EN16 CO_2	fossil-fired thermal generation - CHP (from combustion)	thousand t	19,136	31,202	33,988	32,408	33,602
	Various activities	thousand t	3.9	0	0.181	0.157	0.472
	Total	**thousand t**	**19,140**	**31,202**	**33,988**	**32,408**	**33,602**
EN16 SF_6	electricity generation	kg	42.5	47.2	18.7	26.3	15
		thousand t of CO_2 equivalent	0.968	1.08	0.427	0.6	0.34
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**19,141**	**31,203**	**33,989**	**32,408**	**33,603**
EN21 **Waste waters (discharged quantity)**	thermal generation combined with heat generation	million m^3	17.8	34.6	34.2	25.4	28.3
EN21 **Conventional polluting load in waste waters discharged by installations**							
Metals and compounds (expressed as metal equivalents)	thermal generation combined with heat generation	kg	89,549	53,085	42,430	46,111	64,873
	in some plants with an overall capacity of	MW	8,183	6,979	6,979	5,135	5,145
	Total electricity generation	kg	89,549	53,085	42,430	46,111	64,873
	Total	**kg**	**89,549**	**53,085**	**42,430**	**46,111**	**64,873**
Total nitrogen (expressed as N)	thermal generation combined with heat generation	kg	0	0	0	34.1	95.2
	in some plants with an overall capacity of	MW	0	0	0	2,277	2,297
	Total electricity generation	kg	0	0	0	34.1	95.2
	Total	**kg**	**0**	**0**	**0**	**34.1**	**95.2**
BOD	thermal generation combined with heat generation	kg	0	694	0	102	0
	in some plants with an overall capacity of	MW	0	2,252	0	2,277	0
	Total electricity generation	kg	0	694	0	102	0
	Total	**kg**	**0**	**694**	**0**	**102**	**0**
EN22 **Non-hazardous special waste**							
Coal bottom ash	fossil-fired thermal generation (simple and CHP)						
production		t	144,032	214,636	274,951	242,506	247,489
Coal flyash	thermal generation combined with heat generation						
production		t	2,736,606	4,078,082	5,076,426	4,607,616	4,949,779
delivery to recovery operators		t	119,673	93,584	135,463	174,029	225,646
Other							
production	electricity generation	t	12,343	19,455	19,432	20,654	20,290
delivery to recovery operators	electricity generation	t	0	5,338	3,759	6,942	6,148

	Source		2008	2009	2010	2011	2012
Total production	electricity generation	t	2,892,981	4,312,173	5,370,809	4,870,777	5,217,558
delivery to recovery operators	electricity generation	t	119,673	98,922	139,222	180,971	231,794
EN22 **Hazardous special waste**							
Other production	electricity generation	t	1,607	399	462	1,796	2,659
of which with PCBs	*electricity generation*	*t*	*158*	*258*	*199*	*207*	*148*
delivery to recovery operators	electricity generation	t	2.4	364	223	148	3,617
of which with PCBs	*electricity generation*	*t*	*0*	*307*	*207*	*139*	*96.6*
EN22 **Total special waste**							
production	electricity generation	t	2,894,588	4,312,572	5,371,272	4,872,573	5,220,217
	Total	**t**	**2,894,588**	**4,312,572**	**5,371,272**	**4,872,573**	**5,220,217**
delivery to recovery operators	electricity generation	t	119,676	99,285	139,444	181,119	235,411
	Total	**t**	**119,676**	**99,285**	**139,444**	**181,119**	**235,411**

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Resource conservation and quality								
EN1 EN3 Net heat rate of thermal generation (CHP)	kcal/kWh	2,119	2,104	2,147	2,133	2,081	-1.8	-2.4
EN8 Net specific requirements of water for industrial uses for thermal generation (CHP)	liters/kWh	1.58	0.988	0.767	0.704	0.704	-55.4	0
Net specific consumption of water for industrial uses	liters/kWh	1.58	0.988	0.767	0.704	0.704	-55.4	0
EN8 Coverage of requirements of water for industrial uses								
From rivers (including meteoric waters from secondary rainfall)	% of requirements	80.4	75.4	72.1	71.7	80.4	0	12.1
from wells	% of requirements	0.683	6.33	8.04	8.74	3.1	353.9	-64.5
Total from inland waters	**% of requirements**	**81.1**	**81.7**	**80.2**	**80.5**	**83.5**	**3**	**3.7**
EN10 from waste waters (used inside plants)	% of requirements	18.9	18.3	19.8	19.5	16.5	-12.7	-15.4
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	0.891	0.571	0.448	0.307	0.462	-48.1	50.5
natural gas	% of total fuel consumption	52.4	50.3	50.4	52.6	52.2	-0.4	-0.8
coal	% of total fuel consumption	46.7	49.1	49.2	47.1	47.3	1.3	0.4
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	4.41	0.855	1.34	4.76	14.2	222	198.3
of which in combined-cycle units	*% of total natural-gas consumption*	*4.41*	*0.855*	*1.34*	*4.76*	*14.2*	*222*	*198.3*
natural gas, non-technologically captive use	% of total natural-gas consumption	95.6	99.1	98.7	95.2	85.8	-10.3	-9.9
EN6 **Sales**								
Residential segment								
Time-of-use power sold	% of power sold	2.27	9.35	0	0	0	-100	0
Business segment								
Time-of-use power sold	% of power sold	1.41	0.131	0	0	0	-100	0
Overall power sold								
high-voltage	% of power sold	87.2	90.5	92	92	91.7	5.2	-0.3
medium-voltage	% of power sold	10.5	7.16	6.38	6.32	6.75	-35.7	6.8
low-voltage	% of power sold	2.32	2.36	1.57	1.71	1.54	-33.6	-9.9
Total time-of-use power sold	% of power sold	0.086	0.128	0	0	0	-100	0
Specific emissions into the atmosphere								
EN20 SO_2 (thermal generation - CHP)	g/kWh thermal net	2.85	2.63	2.92	2.46	2.81	-1.4	14.2
EN20 NO_x (thermal generation - CHP)	g/kWh thermal net	1.74	1.99	2.38	2.06	1.8	3.4	-12.6

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN20 particulates (thermal generation - CHP)	g/kWh thermal net	3.29	2.54	2.93	2.05	1.84	-44.1	-10.2
EN16 CO_2 (thermal generation - CHP)	g/kWh thermal net	674	664	674	644	644	-4.5	0
EN20 SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	2.85	2.63	2.92	2.46	2.81	-1.4	14.2
EN20 NO_x (total from thermal generation - simple and CHP)	g/kWh total net	1.74	1.99	2.38	2.06	1.8	3.4	-12.6
EN20 particulates (total from thermal generation - simple and CHP)	g/kWh total net	3.29	2.54	2.93	2.05	1.84	-44.1	-10.2
CO_2 (total from thermal generation - simple and CHP)	g/kWh total net	674	664	674	644	644	-4.5	0
SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.919	1.1	0.267	0.348	0.136	-85.2	-60.9
Net specific conventional polluting load of waste waters discharged by installations (thermal generation - CHP)								
Metals and compounds (expressed as metal equivalents)	mg/kWh	3.16	1.33	0.985	1.4	1.85	-41.5	32.1
Total nitrogen (expressed as N)	mg/kWh	0	0	0	0.004	0.011	0	175
BOD	mg/kWh	0	0.093	0	0.011	0	0	0
EN22 **Waste recovery**								
Coal and brown-coal ash (thermal generation - CHP)	g/kWh net from coal and brown-coal	242	209	238	236	242	0	2.5
Coal and brown-coal ash (flyash)	% production	4.15	2.18	2.53	3.59	4.34	4.6	20.9
Other non-hazardous special waste electricity generation	% production	0	27.4	19.3	33.6	0	0	0
Total non-hazardous special waste electricity generation	% production	4.14	2.29	2.59	3.72	4.34	4.8	16.7
Other hazardous special waste electricity generation	% production	0.149	91.2	48.1	8.24	23.5	15,671.8	185.2
Total special waste electricity generation	% production	4.13	2.3	2.6	3.72	4.34	5.1	16.7

Highlights of 2012

EN1 EN3 The fuel mix remained practically unaltered as against 2011. However, the level of generation climbed from a little less than 42 TWh to over 44 TWh.

The heat rate dropped from 2,103 kcal/kWh in 2011 to 2,081 kcal/kWh in 2012 thanks, in part, to the contribution of the new and more efficient combined-cycle units installed in the plants of Sredneuralskaya (near Yekaterinburg, in the Sverdlovsk region, Urals) and of Nevinnomysskaya (in the Stavropol region, southern Russia).

EN5 Installed capacity rose as a result of measures improving the efficiency of units U6, U7, U8, U9 and U10 in the plant of Nevinnomysskaya and increasing their capacity by 5 MW each and by 25 MW in total.

EN8 EN10 Water consumption continued to be optimized in 2012. Indeed, specific water consumption for industrial uses recorded the same levels as in 2011 (0.704 liters/kWh).

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

In Russia, Enel is involved in thermal power generation (through OGK-5) and sale of electricity (through RusEnergoSbyt).

EN16 Net specific emissions of CO_2, referred to overall electricity generation, continued to decline, passing from 644.1 to 643.5 g/kWh thanks, in part, to the contribution of the two high-efficiency CCGT units in the plants of Sredneuralskaya and Nevinnomysskaya.

EN20 The decrease of net specific emissions of particulates and NO_x (roughly 12% down on 2011) is due to the higher weight of natural gas in the fuel mix (see EN1 EN3). The increase of specific emissions of SO_2 (+14% on 2011) is to be ascribed to the new calculation methodology adopted in the coal-fired CHP plant of Reftinskaya.

EN22 The increase in non-hazardous waste recovery in 2012 was due to the higher amount of coal flyash recovered.

EN23 Spills:

Russia	*Description*	*Impact and mitigation*
Reftinskaya power plant: Amount: **2 m³**	1) Oil spill from the cooling system of units 8 and 4: iridescent oil film on the water surface of lake Reftinsky, in the fish farming cages near the plant and in the cooling water discharge channel.	1) Installation of barriers; purchase of absorbent materials; purchase of new equipment for oil cooling; and program of investments in 2013 on design and installation of equipment to remove oil possibly spilled into the discharge channel.
	2) Leakage of heavy fuel oil from a tank, affecting a 15-m^2 area on an embankment; the low temperature prevented the oil from infiltrating into the soil.	2) The tank was emptied. The fuel oil was collected and transferred to the fuel management area of the plant. The affected area was treated with sand.

EN26 Environmental enhancements.

Water

> Better water resource management made it possible to save water for the plants of Nevinnomyskaya and Konakovskaya (the latter is a CCGT plant located in the Tver region, central Russia).

> A dry ash-removal system, which will significantly reduce water consumption, is being built; the system is planned to be completed and put into operation in 2014.

Emissions

> Reftinskaya plant: revamping of unit 5 with installation of low-NO_x burners and particulate bag filters is still under way. Moreover, 35 ha of the ash pond were covered with clay to prevent fugitive particulate emissions.

Waste

> In the Reftinskaya plant, the construction of a dry ash-removal system, scheduled to become operational in 2014, is ongoing. The new system will recover a higher amount of ash (ash recovery already mounted by about 21% on 2011).

Slovakia

Combined heat
& power thermal generation

Slovenské elektrárne AS

Brown coal- and biomass-fired thermal power plant
Coal-, natural gas- and biomass-fired thermal power plant

The Numbers

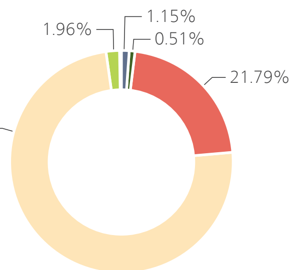
Power plants	Net capacity (MW)	Generation (million kWh)
2	1,254	2,202

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**	**211.4**

Fuel consumption

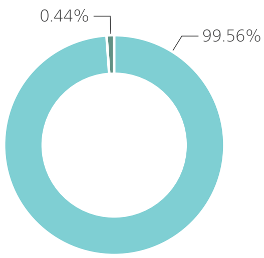
Total: 672,000 t of oil-equivalent



Fuel oil
Natural gas
Coal
Brown coal
Biomass & waste

Water for industrial uses

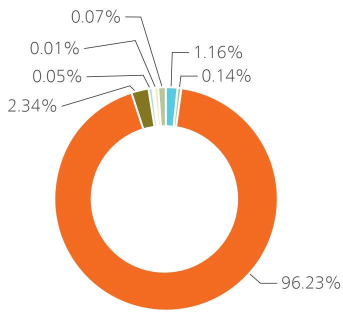
Total requirements: 8,932,384 m³
Total abstraction from inland waters: 8,892,689 m³



From rivers
From waste waters (used inside plants)

Expendables

Total: 108,007 t



Sulfuric & hydrochloric acids
Ammonia
Limestone for flue-gas desulfurization
Lime, ferric chloride & polyelectrolyte
Sodium hypochlorite, chlorine dioxide, ferrous sulfate, ferrous chloride & trisodium phosphate
Caustic soda
Resins, hydrazine, carbohydrazide & hydrogen peroxide

Net electricity generation

2,202 million kWh

Useful heat output (combined with power generation)

313,643 million kcal
equal to 365 million kWh

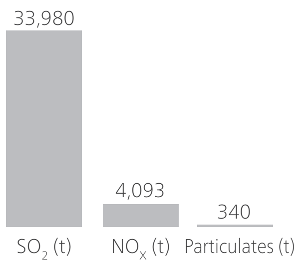
Waste waters

Discharged: **3,392,801 m^3**
Used inside plants: **39,695 m^3**

Avoided CO_2 emissions

Due to generation from biomass and biodegradable fraction of waste: **25,469 t**

Emissions into the atmosphere

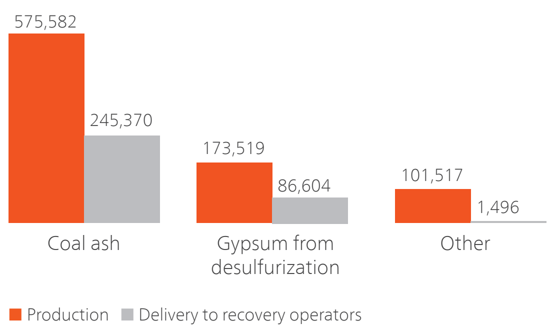


CO_2 (t)	2,890,273
from combustion	*2,844,660*
from desulfurization	*45,730*
Total (t of CO_2 equivalent)	2,890,273

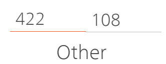
Special waste

Total production: **851,040 t**
Total delivery to recovery operators: **333,578 t**

Non-hazardous
Production: 850,618 t
Delivery to recovery operators: 333,470 t



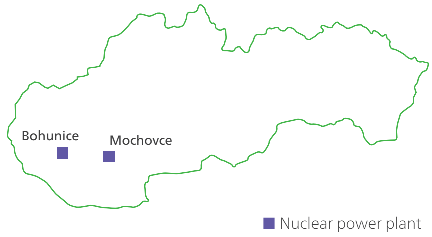
Hazardous
Production: 422 t
Delivery to recovery operators: 108 t



Slovakia

Nuclear combined heat & power generation

Slovenské elektrárne AS



The Numbers

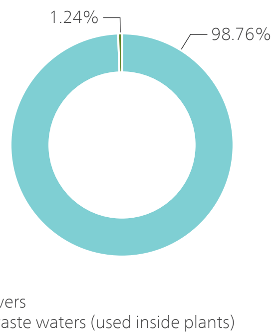
Power plants	Net capacity (MW)	Generation (million kWh)
2	1,816	14,411

Power installations

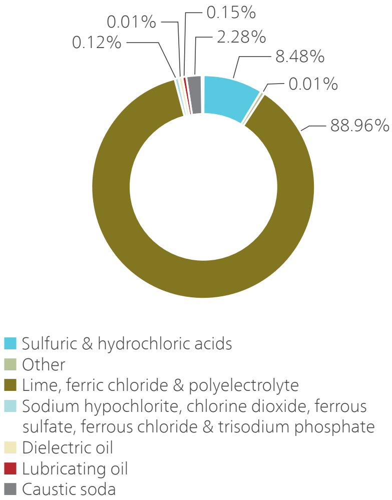
	Power plants no.	Units no.	Net maximum electrical capacity MW	Useful thermal capacity 10^6 kcal/h
Steam (condensing)	**2**	**4**	**1,816**	**232.2**

Useful heat output (combined with power generation)
Total: 504,474 million kcal (equal to 587 million kWh)

Water for industrial uses
Total requirements: 44,519,760 m^3
Total abstraction from inland waters: 43,966,180 m^3



Expendables
Total: 5,769 t



Radionuclides in discharged waste waters

Tritium

21,358 GBq

Waste waters

Discharged: **9,298,034 m^3**
Used inside plants: **553,583 m^3**

Avoided CO_2 emissions

Due to nuclear generation: **14,683,000 t**

Radioactive emissions into the atmosphere

Aerosol α 1.52 kBq

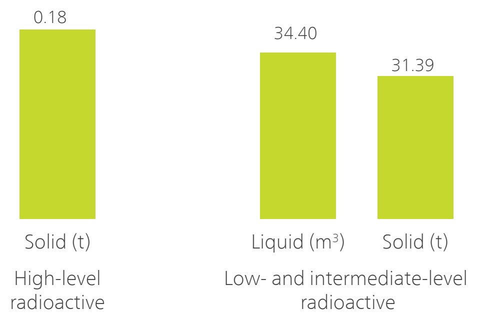
Areosols β and γ 28.5 MBq

Noble gases 7.72 TBq

Iodine 131 0.662 MBq

Strontium 89 and 90 55 kBq

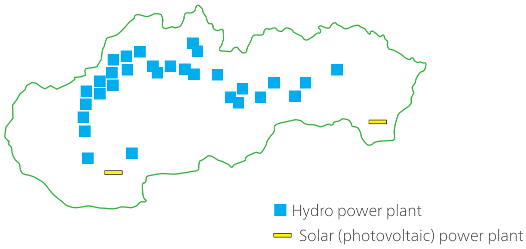
Radioactive waste



Slovakia

Hydro power and photovoltaic generation

Slovenské elektrárne AS



The Numbers

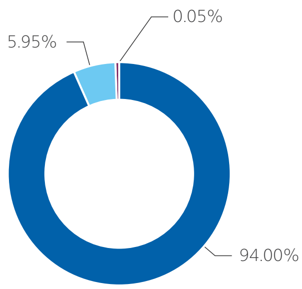
Power plants	Net capacity (MW)	Generation (million kWh)
36	2,330	4,107

Power installations

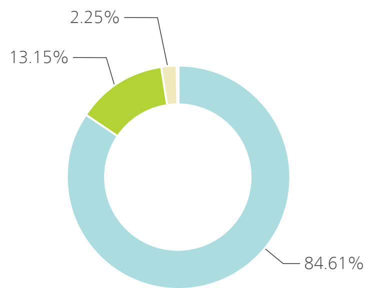
HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	16	43	1,042
Pondage/reservoir	14	31	279
Pure/mixed pumped storage	4	15	1,007
	34	**89**	**2,328**

SOLAR PHOTOVOLTAIC	Power plants no.	Net maximum electrical capacity MW
	2	**1.9**

Net electricity generation
Total: 4,107 million kWh



Expendables
Total: 79 t



Equivalent yearly hours of utilization*

1,102 Solar photovoltaic

2,921 Hydro

* Yearly generation/capacity ratio.

Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	3,779,327
Due to solar (photovoltaic) generation	2,050
Total	**3,781,377**

Emissions into the atmosphere

SF_6 - all types of generation (kg)	48
(t of $CO_{2\ eq.}$)	1,075

Gas-oil

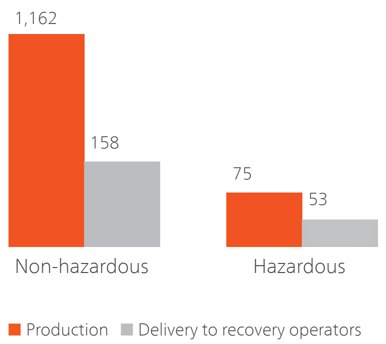
4 toe

Total consumption

Used for feeding emergency generating sets.

Special waste

Total production: **1,238 t**
Total delivery to recovery operators: **211 t**



Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants	no.	30	30	34	34	36
hydro	no.	30	30	34	34	34
solar (photovoltaic)	no.	0	0	0	0	2
Net maximum electrical capacity	MW	1,590	1,590	2,329	2,329	2,330
hydro	MW	1,590	1,590	2,329	2,329	2,329
solar (photovoltaic)	MW	0	0	0	0	1.9
Combined heat & power installation						
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	2,966	3,012	3,070	3,072	3,070
thermal	MW	1,254	1,250	1,254	1,254	1,254
nuclear	MW	1,712	1,762	1,816	1,818	1,816
Useful thermal capacity	million kcal/h	787	887	887	887	887
thermal	million kcal/h	373	423	423	423	423
nuclear	million kcal/h	413	464	464	464	464
Service & real-estate management						
Vehicle fleet						
service vehicles	no.	na	395	422	399	542
special vehicles	no.	na	208	159	102	58

Resources

		2008	2009	2010	2011	2012
EN1 EN3 **Fossil fuels**						
Thermal generation combined with heat generation						
fuel oil	thousand t	5.37	5.42	8.42	7.23	8.68
	thousand toe	5.34	5.35	8.37	7.03	7.73
LS	thousand t	5.37	5.42	8.42	7.23	8.68
	thousand toe	5.34	5.35	8.37	7.03	7.73
natural gas	million m^3	5.17	3.89	5.87	3.24	4.47
	thousand toe	4.23	3.19	4.83	2.37	3.42
non-technologically captive use	million m^3	5.17	3.89	5.87	3.24	4.47
	thousand toe	4.23	3.19	4.83	2.37	3.42
coal	thousand t	656	363	279	249	265
	thousand toe	398	221	169	149	146
brown coal	thousand t	2,318	2,308	2,273	2,424	2,292
	thousand toe	585	571	575	600	501
Total	thousand toe	992	801	757	758	659
Various activities	thousand toe	1.33	1.72	1.88	2.04	1.71
Grand total	thousand toe	994	802	759	760	660
	TJ	41,605	33,595	31,777	31,823	27,652
EN1 EN3 **Biomass and waste**						
Thermal generation combined with heat generation						
Solid biomass	t	350	8,311	22,286	27,186	39,111
	toe	66.9	2,190	6,055	7,524	13,195
Grand total	thousand toe	0.067	2.19	6.06	7.52	13.2
	TJ	2.81	91.7	254	315	552

		2008	2009	2010	2011	2012
EN1 EN3 Nuclear fuel						
Nuclear combined heat & power generation						
Uranium	t	37.5	36	37.4	38.5	35.5
	thousand toe	0	3,727	3,782	3,972	3,997
Grand total	**thousand toe**	**0**	**3,727**	**3,782**	**3,972**	**3,997**
EN4 Primary electricity						
Real-estate & service management	million kWh	0	1.41	1.94	1.77	1.64
EN8 Water for industrial uses						
From rivers (including meteoric waters from secondary rainfall)	million m^3	55.2	55	54.1	55.7	52.9
Total abstraction from inland waters	**million m^3**	**55.2**	**55**	**54.1**	**55.7**	**52.9**
EN10 From waste waters (used inside plants)	million m^3	0.543	0.432	0.57	0.637	0.594
Total requirements	**million m^3**	**55.7**	**55.4**	**54.7**	**56.3**	**53.5**
for thermal generation combined with heat generation (CHP)	million m^3	17.2	15	13.7	12.5	8.93
for nuclear generation (CHP)	million m^3	38.5	40.4	41	43.7	44.5
EN8 EN21 Open-cycle cooling water						
For thermal generation (simple and CHP)	million m^3	3.26	0.428	0.636	0	76.7
Total	**million m^3**	**3.26**	**0.428**	**0.636**	**0**	**76.7**
Water for non-industrial uses						
Real-estate & service management	million m^3	0	0.419	0.44	0.432	0.003
EN1 Expendables						
Resins	t	0	2.5	26.5	26.5	26.5
Hydrazine	t	12.5	15.3	15.5	15.6	14.9
Ammonia	t	1,464	835	416	261	158
Limestone for flue-gas desulfurization	t	84,861	85,377	72,619	88,768	103,932
Sodium hypochlorite	t	28.2	23.8	6.11	5.9	5.81
Chlorine dioxide	t	0	0.514	0.875	0.709	0.835
Trisodium phosphate	t	6.86	7.92	8.07	5.8	9.16
Lime	t	23,218	18,545	14,681	13,018	7,468
Ferric chloride	t	119	105	108	96.4	113
Polyectrolyte	t	0	0	36.9	33.6	36.9
Sulfuric & hydrochloric acids	t	1,563	1,530	1,430	1,406	1,733
Caustic soda	t	470	439	288	234	189
Lubricating oil	t	165	125	105	195	147
Dielectric oil	t	133	4.46	2.92	5	2.16
Printing paper	t	0	54	61.2	71.5	41.8
Other	t	3.49	0	0	0.2	19.5
Total	**t**	**112,044**	**107,065**	**89,804**	**104,143**	**113,898**
for thermal generation combined with heat generation (CHP)	t	106,077	100,593	83,517	97,212	108,007
for nuclear generation (CHP)	t	5,738	6,361	6,145	6,776	5,769
for hydro generation	t	229	57	81.4	83.6	79.4

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From fossil fuels	**million kWh**	**2,996**	**2,400**	**2,235**	**2,259**	**2,176**
combined with heat generation	million kwh	2,996	2,400	2,235	2,259	2,176
fuel oil & gas-oil	million kWh	15.5	15.5	23.8	20.4	39
natural gas	million kWh	7.569	10.6	13.9	7.84	11.1
coal	million kWh	1,348	734	558	493	533
brown coal	million kWh	1,640	1,640	1,639	1,738	1,593
From renewables	**million kWh**	**1,715**	**1,830**	**4,813**	**3,455**	**3,888**
biomass	million kWh	0	7.31	20.2	23.1	26
hydro from natural flows	million kWh	1,715	1,823	4,793	3,432	3,860
solar (photovoltaic)	million kWh	0	0	0	0	2,09
Hydro from pumped storage	**million kWh**	**195**	**235**	**386**	**360**	**244**
Nuclear (simple)	**million kWh**	**12,164**	**13,055**	**13,534**	**14,340**	**14,411**
combined with heat generation	million kWh	12,164	13,055	13,534	14,340	14,411
Total	**million kWh**	**17,069**	**17,521**	**20,968**	**20,414**	**20,720**
simple	million kWh	1,910	2,058	5,179	3,791	4,107
combined with heat generation	million kWh	15,159	15,463	15,789	16,622	16,613
Electricity consumption for pumping	million kWh	275	321	528	494	345
Available generation	million kWh	16,794	17,200	20,440	19,919	20,375

		2008	2009	2010	2011	2012
Useful heat output (combined with power generation)						
In thermal power plants	million kcal	401,871	359,842	382,203	351,819	313,643
fossil fuels	*million kcal*	*401,871*	*359,842*	*382,203*	*346,589*	*292,039*
biomass	*million kcal*	*0*	*0*	*0*	*5,230*	*21,604*
In nuclear power plants	million kcal	478,592	541,146	596,857	527,923	504,474
Total	**million kcal**	**880,463**	**900,988**	**979,060**	**879,742**	**818,117**
	million kWh	**1,024**	**1,048**	**1,139**	**1,023**	**951**

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 SO_2	thermal generation combined with heat generation	thousand t	35.9	32.9	36.9	40.2	34
EN20 NO_x	thermal generation combined with heat generation	thousand t	5.69	5.21	4.53	4.85	4.09
EN20 Particulates	thermal generation combined with heat generation	thousand t	0.626	0.543	0.379	0.451	0.34
EN16 CO_2	*fossil-fired thermal generation - CHP (from combustion)*	*thousand t*	*4,042*	*3,362*	*2,973*	*2,933*	*2,845*
	non-fossil-fired thermal generation (from desulfurization)	*thousand t*	*37.3*	*37.6*	*35*	*39.4*	*45.7*
	Total thermal generation combined with heat generation	**thousand t**	**4,079**	**3,400**	**3,008**	**2,972**	**2,890**
	Various activities	thousand t	0	2.88	2.64	3.24	5.62
	Total	**thousand t**	**4,079**	**3,403**	**3,011**	**2,975**	**2,896**
EN16 SF_6	electricity generation	kg	246	198	83	222	60.6
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**4,085**	**3,407**	**3,012**	**2,980**	**2,897**
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	2,003	2,129	5,040	3,608	3,779
Due to solar (photovoltaic) generation		thousand t	0	0	0	0	2.05
Due to electricity generation from biomass		thousand t	0	8.54	21.3	24.3	25.5
Due to generation from renewables		**thousand t**	**2,003**	**2,138**	**5,062**	**3,633**	**3,807**
Due to nuclear generation (simple and CHP)		**thousand t**	**14,857**	**15,983**	**14,962**	**15,725**	**14,683**
Total		**thousand t**	**16,861**	**18,121**	**20,023**	**19,358**	**18,490**
EN20 **Radioactive emissions into the atmosphere**							
Noble gases	nuclear generation (CHP)	TBq	6.52	6.56	8.51	10.5	7.72
Iodine 131	nuclear generation (CHP)	MBq	0.648	0.556	0.608	0.979	0.662
Areosols β and γ	nuclear generation (CHP)	MBq	18.1	20.8	18.7	16	28.5
Aerosol α	nuclear generation (CHP)	kBq	13.7	22.6	6.49	3.58	1.52
Strontium 89 and 90	nuclear generation (CHP)	kBq	133	91.5	74.7	64.7	55
EN21 **Waste waters (discharged quantity)**	thermal generation combined with heat generation	million m^3	9.42	5.91	5.49	5.4	3.39
	nuclear generation (CHP)	million m^3	8.14	8.22	9.06	9.28	9.3
	Total electricity generation	**million m^3**	**17.6**	**14.1**	**14.6**	**14.7**	**12.7**

	Source		2008	2009	2010	2011	**2012**
EN21 Conventional polluting load in waste waters discharged by installations							
Metals and compounds (expressed as metal equivalents)	nuclear generation (CHP)	kg	168	158	366	257	567
	on an overall capacity of	MW	1,712	1,762	1,816	1,818	1,816
	Total electricity generation	**kg**	**168**	**158**	**366**	**257**	**567**
Total nitrogen (expressed as N)	nuclear generation (CHP)	kg	40,295	34,566	32,130	33,275	34,847
	on an overall capacity of	MW	1,712	1,762	1,816	1,818	1,816
	Total electricity generation	**kg**	**40,295**	**34,566**	**32,130**	**33,275**	**34,847**
Total phosphorus (expressed as P)	nuclear generation (CHP)	kg	2,319	2,213	2,491	2,721	2,257
	on an overall capacity of	MW	1,712	1,762	1,816	1,818	1,816
	Total electricity generation	**kg**	**2,319**	**2,213**	**2,491**	**2,721**	**2,257**
COD	thermal generation combined with heat generation	kg	117,379	71,867	75,484	94,625	802,330
	in some plants with an overall capacity of	MW	1,254	1,234	1,254	1,234	1,234
	nuclear generation (CHP)	kg	105,591	111,648	140,870	134,170	168,912
	on an overall capacity of	MW	1,712	1,762	1,816	1,818	1,816
	Total electricity generation	**kg**	**222,970**	**183,515**	**216,354**	**228,795**	**971,242**
BOD	thermal generation combined with heat generation	kg	12,450	12,405	11,696	16,622	186,090
	in some plants with an overall capacity of	MW	1,254	1,234	1,254	1,234	1,234
	nuclear generation (CHP)	kg	15,497	17,605	16,021	21,474	24,469
	on an overall capacity of	MW	1,712	1,762	1,816	1,818	1,816
	Total electricity generation	**kg**	**27,947**	**30,009**	**27,717**	**38,096**	**210,559**
EN21 Radionuclides in waste waters discharged by plants							
Tritium	nuclear generation (CHP)	GBq	12,444	21,621	19,359	20,960	21,358
Corrosion and fission products	nuclear generation (CHP)	GBq	0.034	0.032	0.035	0.038	0.042
EN22 Non-hazardous special waste							
Coal bottom ash	fossil-fired thermal generation (CHP)						
production		t	141,754	108,238	56,970	90,714	97,655
delivery to recovery operators		t	0	59,087	45,187	70,193	18,509
Coal flyash	fossil-fired thermal generation (CHP)						
production		t	312,060	316,529	355,049	455,721	477,927
delivery to recovery operators		t	213,436	165,057	164,358	382,097	226,861
Gypsum from desulfurization	fossil-fired thermal generation (CHP)						
production		t	23,127	7,673	8,212	174,526	173,519
delivery to recovery operators		t	18,359	7,673	8,212	75,148	86,604

	Source		2008	2009	2010	2011	2012
Other production	*electricity generation*	*t*	*513,498*	*386,088*	*332,789*	*117,573*	*108,376*
	various activities	*t*	*0*	*149*	*35.9*	*13.8*	*66.9*
	Total	t	513,498	386,237	332,825	117,587	108,443
delivery to recovery operators	electricity generation	t	12,160	15,358	19,979	15,360	12,707
	Total	t	12,160	15,358	19,979	15,360	12,707
Total production	***electricity generation***	***t***	***990,439***	***818,528***	***753,020***	***838,534***	***857,477***
	various activities	***t***	***0***	***149***	***35.9***	***13.8***	***66.9***
	Total	**t**	**990,439**	**818,677**	**7,530.56**	**838,548**	**857,544**
delivery to recovery operators	**electricity generation**	**t**	**243,955**	**247,174**	**237,735**	**542,798**	**344,680**
	Total	**t**	**243,955**	**247,174**	**237,735**	**542,798**	**344,680**
EN22 **Hazardous special waste**							
production	electricity generation	t	769	1,017	490	506	790
	various activities	t	0	1,017	0.023	0.03	0.022
	Total	**t**	**769**	**2,035**	**490**	**506**	**790**
of which with PCBs	*electricity generation*	*t*	*404*	*400*	*306*	*274*	*165*
	various activities	*t*	*0*	*400*	*0*	*0*	*0*
	Total	**t**	**404**	**801**	**306**	**274**	**165**
delivery to recovery operators	electricity generation	t	280	584	377	331	426
	Total	**t**	**280**	**584**	**377**	**331**	**426**
of which with PCBs	electricity generation	t	164	397	304	272	162
	Total	**t**	**164**	**397**	**304**	**272**	**162**
Total production	electricity generation	t	769	1,017	490	506	790
	various activities	t	0	1,017	0.023	0.03	0.022
	Total	**t**	**769**	**2,035**	**490**	**506**	**790**
delivery to recovery operators	electricity generation	t	280	584	377	331	426
	Total	**t**	**280**	**584**	**377**	**331**	**426**
EN22 **Total special waste**							
production	electricity generation	t	991,208	819,545	753,510	839,039	858,267
	various activities	t	0	1,166	35.9	13.9	66.9
	Total	**t**	**991,208**	**820,711**	**753,546**	**839,053**	**858,334**
delivery to recovery operators	electricity generation	t	244,235	247,758	238,112	543,129	345,106
	Total	**t**	**244,235**	**247,758**	**238,112**	**543,129**	**345,106**
EN22 **Radioactive waste**							
Low-, intermediate- and high-level radioactive waste stored inside plants	nuclear generation (CHP)						
	liquid	m^3	2,778	2,585	2,508	2,207	2,005
	solid	t	338	310	307	278	285
Low- and intermediate-level: production	nuclear generation (CHP)						
	liquid	m^3	118	90.2	76.2	56.6	34.4
	solid	t	39.4	31.7	29.3	31	31.4
High-level: production	nuclear generation (CHP)						
	solid	t	4.93	1.01	1.92	1.51	0.175

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Resource conservation and quality								
EN1 EN3 Net heat rate of thermal generation (CHP)	kcal/kWh	2,866	2,841	2,827	2,844	2,618	-8.7	-7.9
EN1 EN3 Net efficiency of hydro generation from pumped storage	%	70.7	73.3	73	72.8	70.9	0.3	-2.6
EN8 Net specific requirements of water for industrial uses for thermal generation (CHP)	liters/kWh	4.98	5.31	5.08	4.66	3.48	-30.1	-25.3
EN8 Net specific requirements of water for industrial uses in nuclear generation (CHP)	liters/kWh	3.02	2.95	2.88	2.93	2.97	-1.7	1.4

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Net specific consumption of water for industrial uses	liters/kWh	3.08	2.98	2.48	2.63	2.47	-19.8	-6.1
EN8 Coverage of requirements of water for industrial uses								
From rivers (including meteoric waters from secondary rainfall)	% of requirements	99	99.2	99	98.9	98.9	-0.1	0
Total from inland waters	**% of requirements**	**99**	**99.2**	**99**	**98.9**	**98.9**	**-0.1**	**0**
EN10 From waste waters (used inside plants)	% of requirements	0.975	0.78	1.04	1.13	1.11	13.8	-1.8
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	0.538	0.668	1.11	0.927	1.17	117.5	26.2
natural gas	% of total fuel consumption	0.427	0.398	0.637	0.312	0.518	21.3	66
coal	% of total fuel consumption	40.1	27.7	22.3	19.7	22.2	-44.6	12.7
brown coal	% of total fuel consumption	59	71.3	76	79.1	76.1	29	-3.8
LS fuel oil	% of total fuel-oil consumption	100	100	100	100	100	0	0
natural gas, non-technologically captive use	% of total natural-gas consumption	100	100	100	100	100	0	0
Electricity generation from renewables								
thermal from biomass	% of total generation	0	0.042	0.096	0.113	0.126	-	11.5
hydro from natural flows	% of total generation	10	10.4	22.9	16.8	18.6	86	10.7
solar (photovoltaic)	% of total generation	0	0	0	0	0.01	-	-
Total	**% of total generation**	**10**	**10.4**	**23**	**16.9**	**18.8**	**88**	**11.2**
Specific emissions into the atmosphere								
EN20 SO_2 (thermal generation - CHP)	g/kWh thermal net	10.4	11.6	13.7	14.9	13.2	26.9	-11.4
EN20 NO_x (thermal generation - CHP)	g/kWh thermal net	1.64	1.84	1.68	1.8	1.6	-2.4	-11.1
EN20 Particulates (thermal generation - CHP)	g/kWh thermal net	0.181	0.192	0.14	0.168	0.132	-27.1	-21.4
EN16 CO_2 (thermal generation - CHP)	g/kWh thermal net	1,178	1,203	1,114	1,104	1,126	-4.4	2
EN20 SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	1.99	1.77	1.67	1.88	1.57	-21.1	-16.5
EN20 NO_x (total from thermal generation - CHP)	g/kWh total net	0.314	0.28	0.205	0.226	0.189	-39.8	-16.4
EN20 Particulates (total from thermal generation - CHP)	g/kWh total net	0.035	0.029	0.017	0.021	0.016	-54.3	-23.8
EN16 CO_2 (total from thermal generation - CHP)	g/kWh total net	225	183	136	139	133	-40.9	-4.3
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.696	0.553	0.229	0.616	0.172	-75.3	-72.1
EN20 Specific radioactive emissions into the atmosphere								
Nuclear generation (CHP)								
Noble gases	kBq/kWh	1	0	1	1	1	0	0
Areosols β and γ	mBq/kWh	1	2	1	1	2	100	100
Aerosol α	µBq/kWh	1	2	0	0	0	-100	-
Strontium 89 and 90	µBq/kWh	10	7	5	4	4	-60	0
Net specific conventional polluting load of waste waters discharged by installations (thermal generation - CHP)								
COD	mg/kWh	33.9	25.4	28	35.2	313	823.3	789.2
BOD	mg/kWh	3.6	4.39	4.33	6.18	72.5	1,913.9	1,073.1
EN21 Net specific conventional polluting load of waste waters discharged by plants (nuclear generation - CHP)								
Metals and compounds (expressed as metal equivalents)	mg/kWh	0.013	0.012	0.026	0.017	0.038	192.3	123.5
Total nitrogen (expressed as N)	mg/kWh	3.17	2.53	2.26	2.23	2.32	-26.8	4
Total phosphorus (expressed as P)	mg/kWh	0.182	0.162	0.175	0.182	0.15	-17.6	-17.6
COD	mg/kWh	8.3	8.16	9.9	8.97	11.3	36.1	26
BOD	mg/kWh	1.22	1.29	1.13	1.44	1.63	33.6	13.2
EN21 Net specific polluting load of radionuclides in waste waters (nuclear generation - CHP)								
Tritium	kBq/kWh	0.978	1.58	1.36	1.4	1.42	45.2	1.4

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN22 Specific waste production radioactive								
low- and medium-level								
liquid	mm^3/kWh net	9.24	6.59	5.36	3.78	2.29	-75.2	-39.4
solid	mg/kWh net	3.1	2.32	2.06	2.07	2.09	-32.6	1
high-level								
solid	mg/kWh net	0.388	0.074	0.135	0.101	0.012	-96.9	-88.1
EN22 Low-, intermediate- and high-level radioactive waste stored inside plants								
liquid	% in volume of production since the start of operation	64.2	57.8	53.6	46.6	42	-34.6	-9.9
solid	% in weight of production since the start of operation	37.1	32.8	30.8	27	26.9	-27.5	-0.4
EN22 Waste recovery								
Coal and brown-coal ash	% production	47	52.8	50.9	82.8	42.6	-9.4	-48.6
bottom ash	*% production*	*0*	*54.6*	*79.3*	*77.4*	*19*	*0*	*-75.5*
flyash	*% production*	*68.4*	*52.1*	*46.3*	*83.8*	*47.5*	*-30.6*	*-43.3*
Gypsum from desulfurization	% production	79.4	100	100	43.1	49.9	-37.2	15.8
Total non-hazardous special waste electricity generation	% production	24.6	30.2	31.6	64.7	40.2	63.4	-37.9
Other hazardous special waste								
Total	% production	36.4	57.4	76.9	65.4	53.9	48.1	-17.6
Total special waste electricity generation	% production	24.6	30.2	31.6	64.7	40.2	63.4	-37.9

Highlights of 2012

In Slovakia, Enel is active (through Slovenské elektrárne) in thermal, nuclear (both CHP) and renewable (hydro and solar photovoltaic) power generation.

Overall electricity generation recorded a slight increase thanks, above all, to the higher contribution of hydro generation (+12.5% on 2011).

EN1 EN2 With regard to expendables, the consumption of limestone grew owing above all to the lower efficiency of the desulfurizer (due to deterioration of its components) in the thermal plant of Nováky (Previzdia district, Trenčín region). The amount of limestone includes the share coming from the paper industry as a by-product (see the "Environmental Management Systems" chapter).
Reused oil: some plants carry out an intense activity of treatment of waste oils. At the Vojany plant, waste oils are cleaned mechanically and electrostatically. At the nuclear plant of Bohunice (Trnava district and region), used dielectric oils are filtered and degasified.

EN22 The production of gypsum shrank owing to lower consumption of brown coal (and thus lower production of SO_2) and higher consumption of biomass for co-firing.

EN16 EN20 Net specific emissions (referred to thermal generation) of all macro pollutants decreased thanks to higher consumption of biomass for co-firing 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 generation from renewables.

EN18 In 2012, avoided CO_2 emissions exceeded 18 million tonnes. The difference with respect to 2011 does not reflect the reality of facts (overall increase of electricity generated by biomass-fired, hydro, photovoltaic and nuclear plants): the reference value of specific emissions for 2012 – albeit lower than in 2011 (133.3 g/kWh vs. 138.6 g/kWh) – multiplied by the value of nuclear generation proved to be lower than in 2011 and weighed more on the total value.

EN8 Specific consumption of water in CHP thermal generation had a sharp decrease (-~25% vs. 2011) due to the passage from closed-cycle to open-cycle cooling in the Vojany plant.

EN22 The production of liquid intermediate- and low-level radioactive waste had a declining trend, in line with the reduction program started in 2010; under the program, retrofits of the sewage and drainage systems make it possible to recirculate liquid radioactive waste (containing boric acid) inside the plants and avoid its discharge.
In 2012, specific production of solid high-level radioactive waste in CHP plants diminished due to the slower rate of replacement of reactor metal internals (less exposed to stresses than in previous years).

EN19 Ozone-depleting substances:

R22

Emission: **9.6 kg, equivalent to about 500 g of CFC11**. This amount was determined on the basis of gas replenishments in the nuclear plant of Mochovce (located between Levice and Nitra, Nitra region) and in the thermal plant of Nováky.

EN23 At the pumped-storage hydro plant of Ružín (Košice region), about 1.5 l of oil spilled into water. The organization conducted tightness tests on equipment containing hazardous substances with a view to preventing this kind of events. The list of the pieces of equipment involved is reviewed on a yearly basis. Moreover, surfaces are protected and, where possible, use is made of efficient monitoring systems, special devices, new technologies and procedures.

EN26 Environmental enhancements.

Materials and resources

- The reuse of sludges containing calcium carbonate and coming from the paper industry saves a considerable amount of natural limestone (despite the fact that desulfurizers require increasing amounts of limestone due to their currently low efficiency).

Waste waters

- In the site of the Vojany plant, installation of flow meters to measure the water discharged into the Laborec river and of a system to monitor hydrocarbon content in water.

Waste

- Continuing of the sale of waste items of commercial value (metals, ash, gypsum and sludges from water treatment) via electronic auctions.

Renewables

- Consolidation of the use of biomass in co-firing in the Nováky and Vojany plants. Additionally, two photovoltaic systems were installed in the sites of the Mochovce and Vojany plants (total capacity: about 2 MW).

Noise

- At the Vojany plant, a noise monitoring survey began in 2011 to check compliance with noise limits. The noise levels measured in 2012 proved to be compliant with the limits mandated by law.

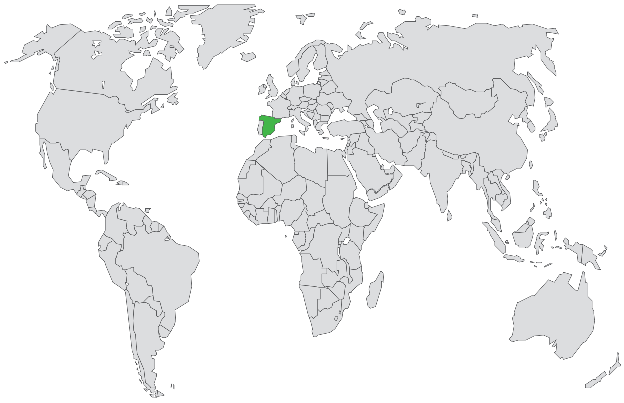
Other

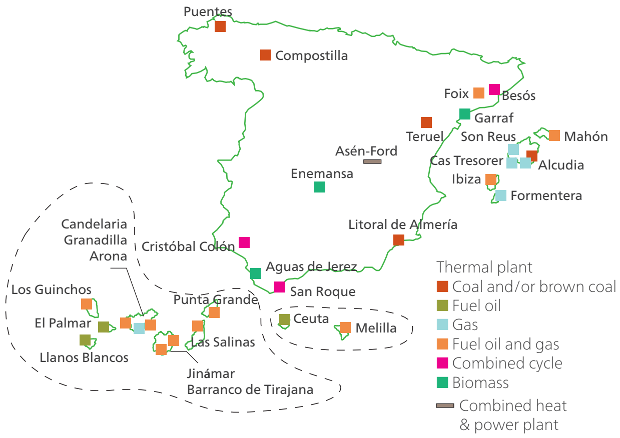
- Launch of the Mapping of Environmental Compliance (MAPEC) assessment for the Nováky plant (see "Mapping of Environmental Compliance" chapter).

Spain

Thermal power generation (simple and CHP)

Endesa SA
Enel Green Power SpA





The Numbers

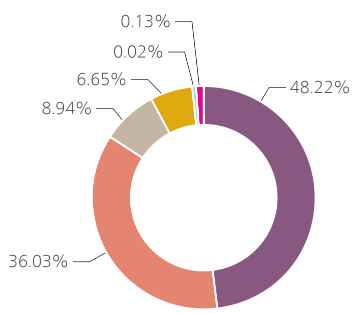
Power plants	Net capacity (MW)	Generation (million kWh)
33	12,836	42,360

Net electricity generation
Total: 42,360 million kWh

Power installations

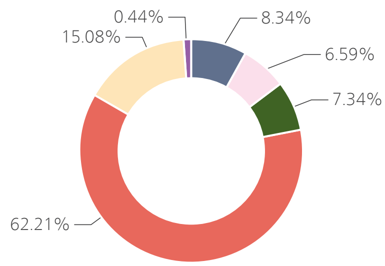
	Power plants no.	Units no.	Net maximum electrical capacity MW	Useful thermal capacity 10^6 kcal/h
Steam (condensing)	8	30	6,190	-
Steam (condensing) with intermediate extraction of fluid for CHP	0	2	0	0
Steam repowered with gas turbines	9	14	4,625	-
Combined-cycle gas turbines for CHP	1	1	17	30
Single-cycle gas turbines	5	40	1,148	-
Single-cycle gas turbines for CHP	0	1	3	0
Alternative engines	10	106	853	-
	33	**194**	**12,836**	**30**

Net maximum electrical capacity
Total: 12,835.7 MW



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

Fuel consumption
Total: 9,721,200 t of oil-equivalent



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

Useful heat output (combined with power generation)
Total: 126,273 million kcal equal to 147 million kWh

Waste waters

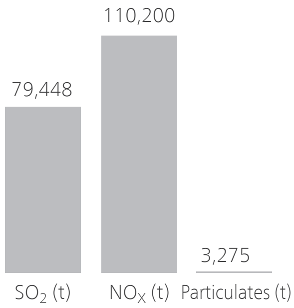
Discharged: **32,649,558 m^3**

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

Avoided CO_2 emissions

Due to generation from biomass and biodegradable fraction of waste: **96,168 t**

Emissions into the atmosphere



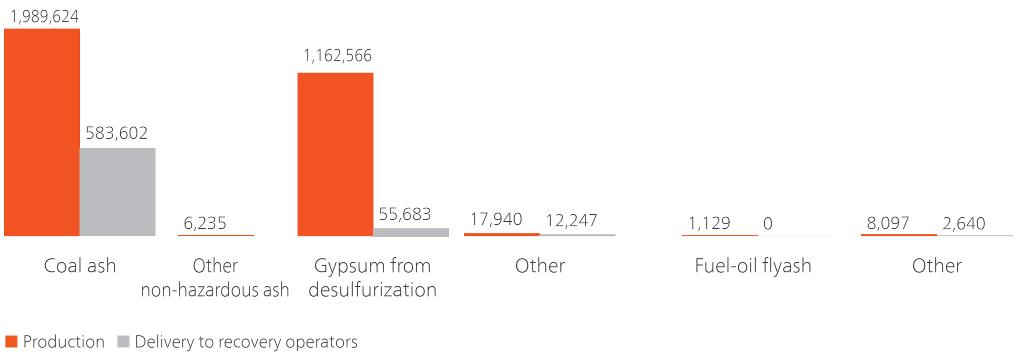
CO_2 (t)	36,135,711
CO_2 from desulfurization (t)	195,383
from combustion	*35,940,328*
from desulfurization (computed stoichiometrically)	*239,912*
SF_6 (kg)	86.59
(t of CO_2 equivalent)	1,974
Total (t of CO_2 equivalent)	36,137,683

Special waste

Total production: **3,190,934 t**
Total delivery to recovery operators: **10,025 t**

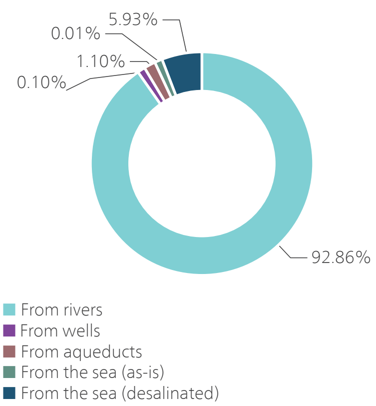
Non-hazardous
Production: 3,176,365 t
Delivery to recovery operators: 651,532 t

Hazardous
Production: 9,226 t
Delivery to recovery operators: 2,640 t



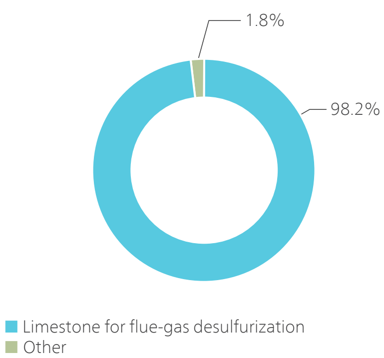
Water for industrial uses

Total requirements: 47,456,330 m3
Total abstraction from inland waters: 44,640,070 m3



Expendables

Total: 555,020 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.

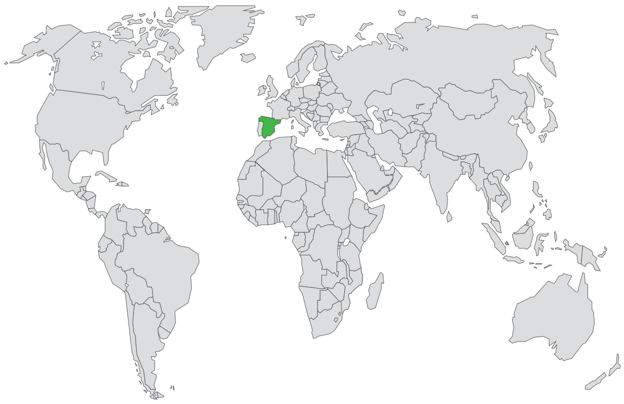
Distance from Ferrol to Puentes: about **60 km**
Distance from Carboneras to Almería: about **1 km**
Distance from Los Barrios to E.ON's plant: about **3 km**
Total coal transferred to the plants: **9,121,060 t**
Total electricity consumption: **7.3 million kWh**

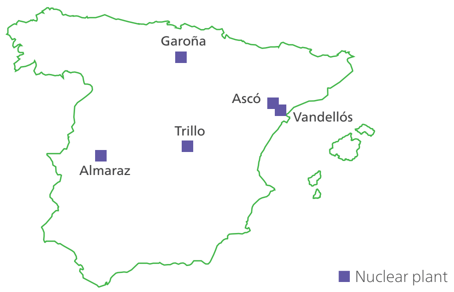
In the following pages. the other flow data (consumption of natural gas and gas-oil, expendables, water for industrial uses, waste waters, releases into the atmosphere and into water bodies, waste) are included among the thermal generation data.

Spain

Nuclear power generation

Endesa SA





The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
5	3,535	26,967

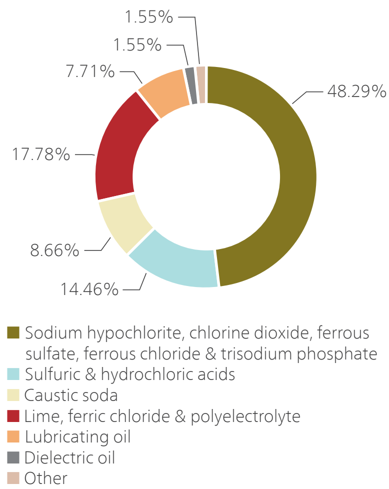
Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Steam (condensing)	**5**	**7**	**3,535**

Net electricity generation
Total: 26,967 million kWh

Water for industrial uses
Total requirements: 1,930,791 m^3
Total abstraction from inland waters: 1,930,791 m^3

Expendables
Total: 1,713 t



Radionuclides in discharged waste waters

Corrosion and fission products

23 GBq

Tritium

112,192 GBq

Waste waters

Discharged: **1,736,066 m^3**
Used inside plants: **6,497 m^3**

Waste waters include those 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 28.8 kBq

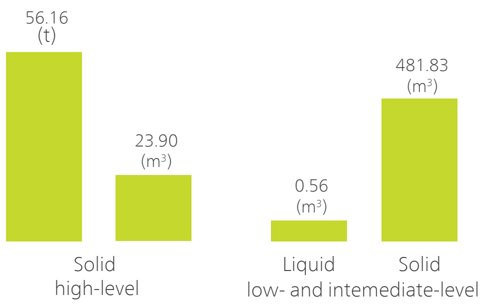
Areosols β and γ 2,534 MBq

Noble gases 72.6 TBq

Iodine 131 106 MBq

Strontium 89 and 90 869 kBq

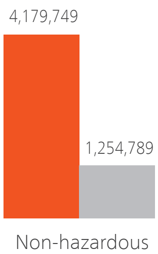
Radioactive waste



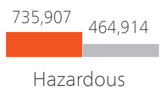
Special waste

Total production: **4,915,656 t**
Total delivery to recovery operators: **1,719,703 t**

Non-hazardous
Production: 4,179,749 t
Delivery to recovery operators: 1,254,789 t



Hazardous
Production: 735,907 t
Delivery to recovery operators: 464.914 t

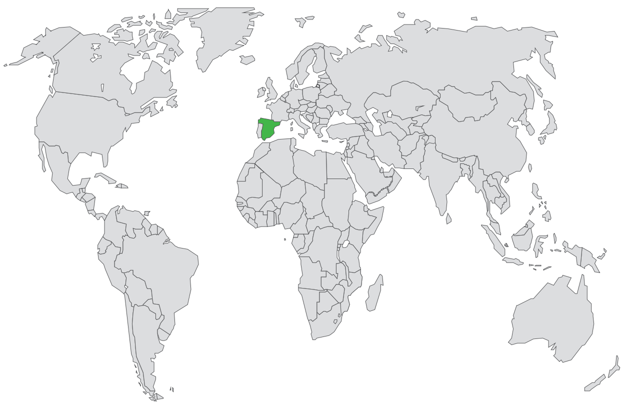


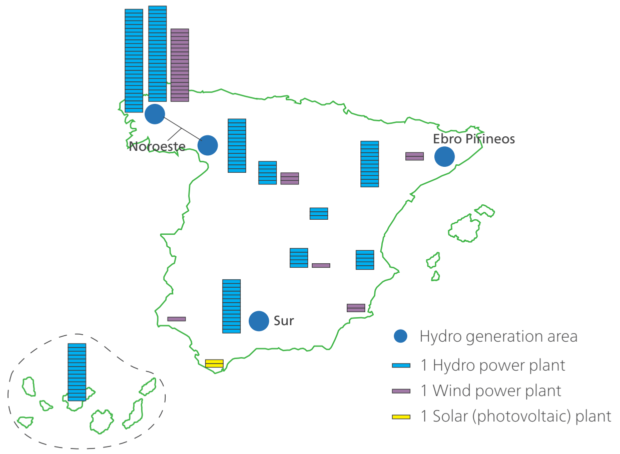
■ Production ■ Delivery to recovery operators

Spain

Electricity generation
from renewables

Endesa SA
Enel Green Power SpA





The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
216	6,311	8,945

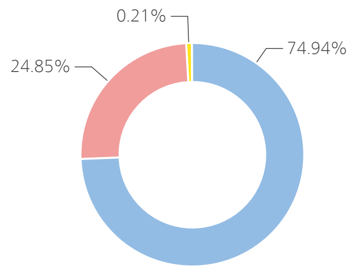
Power installations

HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	59	88	497
Pondage/reservoir	72	142	2,869
Pure/mixed pumped storage	6	17	1,364
	137	**247**	**4,730**

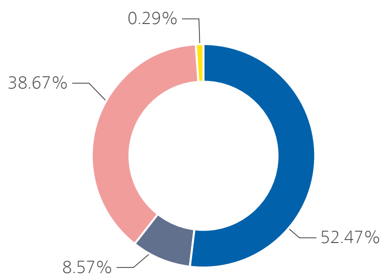
WIND	Power plants no.	Net maximum electrical capacity MW
	77	**1,568**

SOLAR PHOTOVOLTAIC	Power plants no.	Net maximum electrical capacity MW
	2	**13**

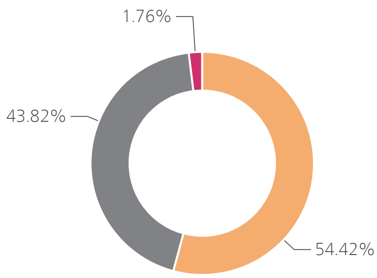
Net maximum
electrical capacity
Total: 6,311 MW



Net electricity generation
Total: 8,945 million kWh



Expendables
Total: 219.852 t



Equivalent yearly hours of utilization*

1,394 hydro

2,206 wind

1,953 solar photovoltaic

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

Avoided CO_2 emissions (t)

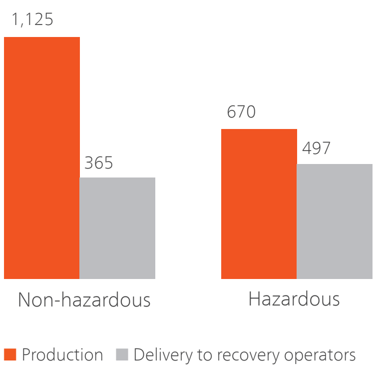
Due to hydro generation from natural flows	4,000,785
Due to wind generation	2,949,146
Due to solar photovoltaic generation	22,328
Total	**6,972,259**

Emissions into the atmosphere

SF_6 - all technologies (kg)	19
(t of CO_2 equivalent)	433
CO_2 (t)	433

Special waste

Total production: **1,795 t**
Total delivery to recovery operators: **862 t**



Other data

Hydro

Emptied reservoirs

Quantity: **1**

Alluvial sediments removed by flushing them out through bottom outlets:
141 m^3

Fish ladders: **15**

Wind and solar (photovoltaic) activities

Wind systems

Surface area occupied by platforms, service roads, buildings: **205 ha**

Solar (photovoltaic) systems

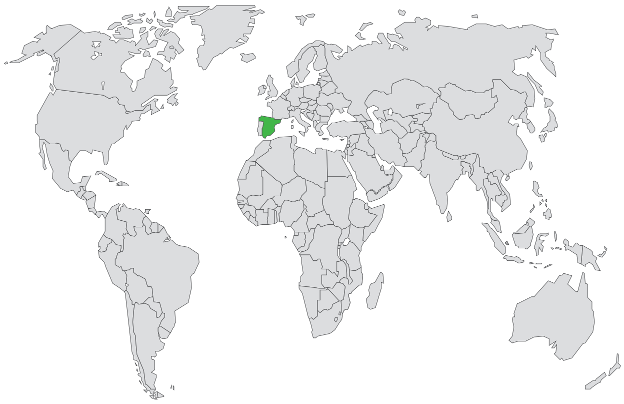
Surface area occupied by modules: **30 ha**

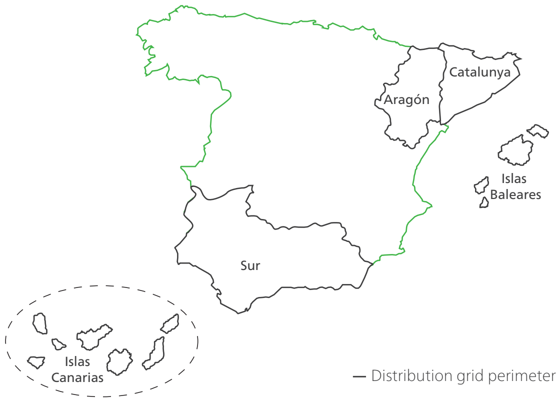
Total surface area affected by the installations: **41 ha**

Spain

Electricity distribution

Endesa SA



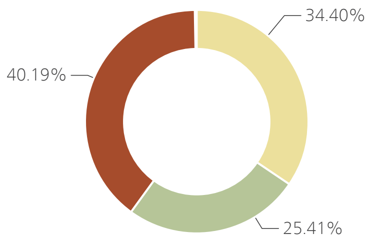


The Numbers

Substations	Capacity (MVA)	Total lines (km)
167,452	142,225	325,295

Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	1,004	81,372
MV/LV	166,240	58,631
MV/MV	206	2,199
Satellite substations and MV units	2	23
	167,452	**142,225**



LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	18,813	-	728	**19,541**
MV	79,470	0	40,164	**119,634**
LV	13,628	82,663	89,829	**186,120**
	111,911	**82,663**	**130,721**	**325,295**

General data

Municipalities served: **3,083**

Surface area served: **207,495 km²**

Customers connected to the grid: **11,846,348**

Resource consumption

Expendables: **24,589 t**

Gas-oil: **274 toe**

Electricity

Total electricity distributed: **101,408 million kWh**

Own consumption for grid operation: **0.89 million kWh**

Emissions into the atmosphere

SF_6: **402 kg** (9,011 t of CO_2 equivalent)

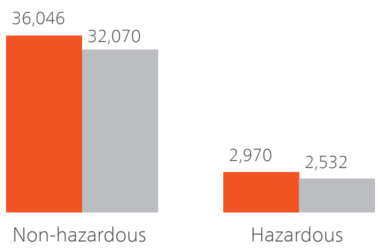
CO_2: **841 t**

Total greenhouse gases: **9,852 t** of CO_2 eq.

Special waste

Total production: **39,015 t**

Total delivery to recovery operators: **34,602 t**



Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants	no.	342	215	248	254	253
thermal	no.	32	32	32	33	32
nuclear	no.	5	5	5	5	5
hydro	no.	204	102	144	140	137
wind	no.	101	75	65	74	77
solar (photovoltaic)	no.	0	1	2	2	2
Net maximum electrical capacity	MW	15,690	21,744	23,441	23,120	22,662
thermal	MW	8,040	12,441	13,934	13,372	12,816
nuclear	MW	2,442	3,522	3,514	3,527	3,535
hydro	MW	3,791	4,688	4,700	4,684	4,729
wind	MW	1,417	1,080	1,279	1,524	1,568
solar (photovoltaic)	MW	0	12.3	13.3	13.4	13.4
Combined heat & power installations						
Power plants	no.	8	8	8	1	1
thermal	no.	8	8	8	1	1
Net maximum electrical capacity	MW	26	26.3	26.3	21.4	19.7
thermal	MW	26	26.3	26.3	21.4	19.7
Useful thermal capacity	million kcal/h	13.8	13.5	2.6	30	30
thermal	million kcal/h	13.8	13.5	2.6	30	30
Power lines (circuit length)						
Total	km	204,421	313,158	317,275	321,462	325,295
high-voltage	km	14,177	21,352	18,880	19,022	19,541
medium-voltage	km	77,091	117,238	118,668	118,799	119,634
low-voltage	km	113,154	174,568	179,727	183,641	186,120
Gas pipelines						
Total	km	0	3,440	0	0	0
high-pressure	km	0	1,007	0	0	0
medium-pressure	km	0	1,596	0	0	0
low-pressure	km	0	837	0	0	0
Mining & extracting activities						
Mining activities						
Mines	no.	5	5	5	4	5
coal	no.	5	5	4	3	4
brown coal	no.	0	0	1	1	1
Amount of fuels extractable since the start of activities	Mt	0	0	339	342	343
brown coal	Mt					
Areas occupied by excavation and other activities	ha	2,714	5,341	4,438	4,500	4,425
coal mines	ha	2,714	5,341	4,438	3,756	1,148
brown-coal mines	ha	0	0	0	744	3,277
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	0	1,229	1,375	1,712	41
special vehicles	no.	0	10	65	140	133
vehicles for both private and service use	no.	0	152	0	579	715
Gross real-estate surface area	thousand m^2	0	281	1,093	217	202

Resources

		2008	2009	2010	2011	2012
EN1 EN3 Fossil fuels						
Thermal generation						
fuel oil	thousand t	1,133	1,660	1,620	1,480	1,505
	thousand toe	1,111	1,627	1,572	1,405	1,462
LS	*thousand t*	*1,127*	*1,660*	*1,610*	*1,473*	*1,502*
	thousand toe	*1,109*	*1,626*	*1,563*	*1,399*	*1,459*
VLS	*thousand t*	*6.37*	*0.242*	*9.47*	*6.38*	*3.05*
	thousand toe	*1.44*	*0.236*	*9.39*	*6.2*	*2.97*
gas oil	thousand t	751	1,063	1,020	909	813
	thousand toe	766	1,079	1,060	926	808
natural gas	million m^3	1,228	1,229	753	1,071	775
	thousand toe	1,130	1,097	697	997	711
technologically captive use	*million m^3*	*1,133*	*1,143*	*725*	*1,061*	*751*
	thousand toe	*1,042*	*1,017*	*671*	*987*	*690*
of which in combined-cycle units	million m^3	1,133	1,143	725	1,061	721
	thousand toe	1,042	1,017	671	987	664
non-technologically captive use	*million m^3*	*95.4*	*86.3*	*28.3*	*10.5*	*24.4*
	thousand toe	*88.6*	*80.2*	*26.2*	*9.59*	*21.8*
coal	thousand t	7,210	7,830	5,647	9,955	11,701
	thousand toe	3,787	4,245	3,036	5,270	6,028
brown coal	thousand t	1,413	1,213	780	2,698	2,047
	thousand toe	434	370	247	856	639
Total	**thousand toe**	**7,228**	**8,416**	**6,612**	**9,455**	**9,648**
	TJ	**302,635**	**352,363**	**276,845**	**395,861**	**403,935**
Thermal generation combined with heat generation						
fuel oil	thousand t	17.9	19.3	0	0	0
	thousand toe	18.6	20.3	0	0	0
LS	*thousand t*	*17.9*	*19.3*	*0*	*0*	*0*
	thousand toe	*18.6*	*20.3*	*0*	*0*	*0*
natural gas	million m^3	10.7	6.19	26.3	33.1	33.4
	thousand toe	9.99	9.9	24.1	26.9	30.3
technologically captive use	*million m^3*	*0*	*0*	*0*	*33.1*	*26.9*
	thousand toe	*0*	*0*	*0*	*26.9*	*24.4*
of which in combined-cycle units	million m^3	0	0	0	29	24.1
	thousand toe	0	0	0	26.6	21.8
non-technologically captive use	*million m^3*	*10.7*	*6.19*	*26.3*	*0*	*6.54*
	thousand toe	*9.99*	*9.9*	*24.1*	*0*	*5.93*
Total	**thousand toe**	**28.6**	**30.2**	**24.1**	**26.9**	**30.3**
Various activities	thousand toe	17.2	24.8	11.4	11.1	9.36
Grand total	**thousand toe**	**7,274**	**8,471**	**6,648**	**9,493**	**9,688**
	TJ	**304,554**	**354,664**	**278,333**	**397,453**	**405,597**
EN1 EN3 Biomass and waste						
Thermal generation						
Solid biomass	t	0	69,774	66,260	91,240	92,639
	toe	0	26,733	25,386	36,208	36,685
Biogas	thousand m^3	0	33,104	37,442	38,266	18,948
	toe	0	13,197	14,846	15,134	6,188
Thermal generation combined with heat generation						
Grand total	**thousand toe**	**0**	**39.9**	**40.2**	**51.3**	**42.9**
	TJ	**0**	**1,672**	**1,684**	**2,150**	**1,795**
EN1 EN3 Nuclear fuel						
Nuclear generation						
Uranium	t	25.6	79.7	36.4	90.4	99.5
	thousand toe	0	6,191	6,040	6,857	7,349
EN4 Primary electricity						
Various activities	million kWh	0	20.4	51.5	54.4	44.1
EN8 Water for industrial uses						
From rivers (including meteoric waters from secondary rainfall)	million m^3	31.1	32.8	20.6	44.8	46.2
From wells	million m^3	1.2	1.84	2.82	1.96	1.99
From aqueducts	million m^3	0.158	1.12	0.493	0.414	0.795
Total abstraction from inland waters	**million m^3**	**32.5**	**35.8**	**23.9**	**47.2**	**48.9**

		2008	2009	2010	2011	2012
From sea (as-is)	million m^3	3.02	2.73	2.62	2.56	0.003
From sea (desalinated)	million m^3	1.39	2.55	2.87	3.43	2.81
EN10 From waste waters (used inside plants)	million m^3	0.005	0.008	0.028	0.015	0.006
Total requirements	**million m^3**	**36.9**	**41.1**	**29.4**	**53.2**	**51.8**
for thermal generation	million m^3	33.7	36.5	25.1	49.2	47.5
for thermal generation combined with heat generation (CHP)	million m^3	0	0	0	0	0.186
for nuclear generation	million m^3	0.929	1.47	1.4	1.81	1.93
for fuel storage & handling	million m^3	0	0.026	0.029	0.028	0.018
for mining & extracting activities	million m^3	2.22	3.09	2.92	2.11	2.18
EN8 EN21 **Open-cycle cooling water**						
For thermal generation (simple and CHP)	million m^3	2,518	3,574	3,405	3,356	3,420
For nuclear generation	million m^3	1,827	2,435	2,988	2,417	2,563
Total	**million m^3**	**4,345**	**6,009**	**6,392**	**5,773**	**5,982**
Water for non-industrial uses						
Real-estate & service management	million m^3	0	2.74	0.046	0.204	0.281
EN1 **Expendables**						
Resins	t	11.9	18.9	22.3	28	23.4
Hydrazine	t	21.2	43.7	19.5	20.1	22.4
Carbohydrazide	t	6.98	36.2	12.8	3.9	21.4
Hydrogen peroxide	t	0.136	0.198	0.537	0.971	1.01
Ammonia	t	31.3	47.4	67.7	85.1	118
Limestone for flue-gas desulfurization	t	398,825	354,569	197,218	691,037	545,256
Magnesium oxide	t	136	318	279	235	181
Sodium hypochlorite	t	2,731	858	830	1,541	919
Chlorine dioxide	t	0	0	0	0	284
Ferrous sulfate	t	0	0	0.1	0	1.5
Trisodium phosphate	t	8.48	6.09	6.96	10	12.2
Lime	t	4,258	6,202	445	500	614
Ferric chloride	t	172	240	294	411	484
Polyectrolyte	t	17.9	18	8.85	13.7	20.6
Sulfuric & hydrochloric acids	t	1,752	2,035	1,156	2,334	2,064
Caustic soda	t	706	995	629	966	1,057
Lubricating oil	t	3,429	3,288	5,398	5,556	5,090
Dielectric oil	t	294	164	321	286	24,703
Printing paper	t	0	17.6	14.9	59.9	69.5
Other	t	4,413	5,670	17,560	14,589	3,435
Total	**t**	**416,815**	**374,527**	**224,284**	**717,677**	**584,377**
for thermal generation	t	410,607	367,401	219,315	713,104	554,787
for thermal generation combined with heat generation (CHP)	t	0	30	15.3	0	24.8
for nuclear generation	t	2,433	1,047	1,108	1,403	1,713
for hydro generation	t	56.2	98.6	158	200	170
for wind generation	t	60.1	52.1	19.6	14	49.5
for fuel storage & handling	t	0	711	169	186	208
for electricity distribution	t	159	103	201	146	24,589
EN1 **PCB survey**						
Equipment & transformers with PCBs > 50 ppm (excluding their oil)	t	0	997	46	1.33	1.66
Oil with PCBs > 500 ppm contained in equipment & transformers	t	0	309	4.92	0.34	0.51
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding oil)	t	0	6,100	7,447	6,645	6,220
Oil with PCBs > 50 ppm and ≤ 500 ppm contained in equipment & transformers	t	0	1,307	2,791	2,062	2,760

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From fossil fuels	million kWh	33,381	37,446	29,182	42,251	42,247
thermal generation (simple)						
fuel oil & gas-oil	*million kWh*	*8,191*	*11,291*	*11,597*	*11,143*	*9,918*
natural gas	*million kWh*	*7,053*	*6,569*	*3,904*	*4,945*	*3,842*
of which in combined-cycle units	million kWh	6,728	6,292	3,815	4,446	3,647
coal	*million kWh*	*16,221*	*17,704*	*12,523*	*22,484*	*25,720*
brown coal	*million kWh*	*1,780*	*1,783*	*983*	*3,563*	*2,687*
combined with heat generation	million kwh	136	98.9	175	117	80
fuel oil & gas-oil	*million kWh*	*84.6*	*72.8*	*0*	*0*	*0*
natural gas	*million kWh*	*51.5*	*26.1*	*175*	*117*	*80*
From renewables	million kWh	7,137	10,268	10,520	8,455	8,291
biomass	million kWh	0	127	84,8	94,6	113
hydro from natural flows	million kWh	4,858	7,995	8,212	5,479	4,693
wind	million kWh	2,279	2,123	2,202	2,857	3,459
solar (photovoltaic)	million kWh	0	21.9	21.1	25.3	26.2
Hydro from pumped storage	million kWh	615	998	1,162	833	767
Nuclear (simple)	million kWh	17,508	22,630	27,620	25,177	26,967
Total	million kWh	58,641	71,341	68,483	76,716	78,272
simple	million kWh	58,505	71,242	68,308	76,600	78,192
combined with heat generation	million kWh	136	98,9	175	117	80
Electricity consumption for pumping	million kWh	765	1,409	1,592	1,295	1,398
Available generation	million kWh	57,876	69,932	66,891	75,421	76,874
Useful heat output (combined with power generation)						
In thermal power plants	million kcal	78,577	77,442	9,124	169,192	126,273
fossil fuels	million kcal	78,577	77,442	9,124	169,192	126,273
Electricity distribution						
Electricity distributed	million kWh	80,144	104,938	103,943	101,789	101,408
EN4 Electricity consumption for grid operation	million kWh	0	14.6	0	0.818	0.888
Natural-gas distribution						
Natural-gas distributed	million m^3	0	442	0	0	0
Mining & extracting activities						
Mining activities						
Fuel extracted in the year	million t	1.38	1.9	1.84	1.01	0.926
Areas restored in the year (geomorphology, hydrogeology and landscape)						
Areas revegetated with plant shrub and tree species	ha	69.9	23.1	0	283	268
Areas occupied by water bodies	ha	157	234	0	74	8
Areas occupied by infrastructure (roads, canals, aqueducts, power lines)	ha	0	0	0	0	45
Areas restored since the start of activities (geomorphology, hydrogeology and landscape)						
Areas revegetated with plant shrub and tree species	ha	1,532	2,287	2,063	2,502	2,709
Areas of high landscape-cultural value	ha	88.7	132	132	139	139
Areas occupied by water bodies	ha	198	509	509	892	957
Areas occupied by infrastructure (roads, canals, aqueducts, power lines)	ha	65.7	97.9	90.1	93	138
Areas awaiting final restoration	ha	168	271	207	121	109

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	66.4	64.2	45.3	78.8	79.4
EN20 NO_x	thermal generation	thousand t	95.4	111	76.8	105	110
EN20 Particulates	thermal generation	thousand t	3.05	3.02	1.74	2.97	3.28
EN16 CO_2	*fossil-fired thermal generation (from combustion)*	*thousand t*	*26,631*	*29,778*	*23,141*	*34,228*	*35,851*
	fossil-fired thermal generation (from desulfurization)	*thousand t*	*305*	*125*	*69.5*	*239*	*195*
	Total from thermal generation	thousand t	26,936	29,903	23,210	34,467	36,046
	Total fossil-fired thermal generation - CHP (from combustion)	thousand t	79.8	85.7	29	72.4	89.6
	Various activities	thousand t	55.2	74.7	51.8	26.3	30.2
	Total	**thousand t**	**27,071**	**30,063**	**23,291**	**34,566**	**36,166**
EN16 SF_6	electricity generation	kg	432	47.7	111	99.8	594
	electricity distribution	kg	228	196	139	158	402
	Total	**kg**	**660**	**244**	**249**	**258**	**995**
EN16 CH_4	gas distribution, mining & extracting activities	thousand t	1.14	1.57	1.52	0.837	0.744
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**27,114**	**30,108**	**23,335**	**34,593**	**36,207**
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	3,936	6,380	6,552	4,472	4,001
Due to wind and solar (photovoltaic) generation		thousand t	1,846	1,712	1,773	2,352	2,971
Due to electricity generation from biomass		thousand t	0	102	67.6	77.2	96.2
Due to generation from renewables		thousand t	5,782	8,193	8,393	6,901	7,068
Due to nuclear generation (simple and CHP)		thousand t	14,185	18,058	22,035	20,549	22,991
Total		**thousand t**	**19,967**	**26,251**	**30,428**	**27,451**	**30,059**
EN20 **Radioactive emissions into the atmosphere**							
Noble gases	nuclear generation	TBq	24.4	24	15.2	40.7	72.6
Iodine 131	nuclear generation	MBq	158	258	88.8	31.3	106
Areosols β and γ	nuclear generation	MBq	20,132	18,401	6,567	5,976	2,534
Aerosol α	nuclear generation	kBq	35.9	63.7	31.4	39.2	28.8
Strontium 89 and 90	nuclear generation	kBq	2,781	8,482	2,896	1,838	869
EN21 **Waste waters (discharged quantity)**	*thermal generation*	*million m^3*	*22.7*	*28.8*	*23*	*24.2*	*32.6*
	nuclear generation	*million m^3*	*96.1*	*158*	*158*	*190*	*1.74*
	Total electricity generation	million m^3	119	187	181	215	34.3
	Fuel storage & handling	million m^3	0	0	0.013	0.027	0.042
	Total	**million m^3**	**119**	**187**	**181**	**215**	**34.4**
EN21 **Conventional polluting load in waste waters discharged by installations**							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	0	58,684	68,367	2,823	4,273
	in some plants with an overall capacity of	MW	0	4,622	4,344	5,118	4,785
	nuclear generation	kg	49.7	70.3	104	15.2	249
	on an overall capacity of	MW	2,442	3,522	3,514	3,527	3,535
	Total electricity generation	kg	49.7	58,754	68,471	2,838	4,521

	Source		2008	2009	2010	2011	2012
	Fuel storage & handling	kg	0	0	0	11.1	21.3
	Total	**kg**	**49.7**	**58,754**	**68,471**	**2,849**	**4,542**
Total nitrogen (expressed as N)	thermal generation	kg	10,204	221,409	284,571	38,248	520,851
	in some plants with an overall capacity of	MW	2,622	1,588	5,265	4,574	5,309
	nuclear generation	kg	7,407	17,612	5,888	10,664	10,293
	on an overall capacity of	MW	2,442	3,522	3,514	3,527	3,535
	Total electricity generation	kg	17,611	239,021	290,459	48,912	531,144
	Fuel storage & handling	kg	0	0	0	31.3	72.9
	Total	**kg**	**17,611**	**239,021**	**290,459**	**48,943**	**531,217**
Total phosphorus (expressed as P)	thermal generation	kg	119	10,028	19,028	10,008	38,228
	in some plants with an overall capacity of	MW	2,064	488	3,593	5,570	7,010
	nuclear generation	kg	99.4	118	1,189	1,152	1,085
	on an overall capacity of	MW	2,442	3,522	3,514	3,527	3,535
	Total electricity generation	kg	218	10,146	20,217	11,160	39,313
	Fuel storage & handling	kg	0	0	0	19.7	81.9
	Total	**kg**	**218**	**10,146**	**20,217**	**11,179**	**39,395**
COD	thermal generation	kg	26,083	77,778	16,365	7,061	4,406
	in some plants with an overall capacity of	MW	3,466	2,705	4,094	1,792	2,073
	nuclear generation	kg	2,064	2,714	24,125	29,400	25,773
	on an overall capacity of	MW	2,442	3,522	3,514	3,527	3,535
	Total electricity generation	kg	28,147	80,492	40,491	36,461	30,179
	Fuel storage & handling	kg	0	265	0	7,376	13,903
	Total	**kg**	**28,147**	**80,757**	**40,491**	**43,837**	**44,082**
BOD	thermal generation	kg	1,882	4,912	2,783	750,856	100,851
	in some plants with an overall capacity of	MW	759	1,096	2,076	1,646	1,784
	nuclear generation	kg	1,376	1,792	4,623	7,986	4,624
	on an overall capacity of	MW	2,442	3,522	3,514	3,527	3,535
	Total electricity generation	kg	3,258	6,704	7,406	758,842	105,474
	Fuel storage & handling	kg	0	114	0	2,482	3,839
	Total	**kg**	**3,258**	**6,818**	**7,406**	**761,324**	**109,313**
EN21 Radionuclides in waste waters discharged by plants							
Tritium	nuclear generation	GBq	58,777	57,746	71,013	78,993	112,192
Corrosion and fission products	nuclear generation	GBq	12.8	21.7	9.82	19	22.8
EN22 Non-hazardous special waste							
Coal bottom ash	fossil-fired thermal generation (simple and CHP)						
production		t	208,742	133,769	77,428	243,908	211,560
delivery to recovery operators		t	59,697	8,556	7,376	100,688	71,903
Coal flyash	fossil-fired thermal generation (simple and CHP)						
production		t	1,177,396	1,050,321	601,802	1,773,881	1,778,064
delivery to recovery operators		t	1,080,210	860,169	438,567	808,927	511,699
Oil bottom ash	fossil-fired thermal generation (simple and CHP)						
production		t	0	0	1.84	0	0
delivery to recovery operators		t	0	0	1.84	0	0

	Source		2008	2009	2010	2011	2012
Other non-hazardous ash	fossil-fired thermal generation (simple and CHP)						
production		t	0	3,508	6,352	6,310	6,235
delivery to recovery operators		t	0	0	0	6,310	0
Gypsum from desulfurization	fossil-fired thermal generation (simple and CHP)						
production		t	749,817	727,750	436,838	1,399,006	1,162,566
delivery to recovery operators		t	879	9,549	36,661	54,099	55,683
Other							
production	electricity generation	t	34,568	203,426	19,457	25,940	22,590
	electricity distribution	t	98,615	115,842	79,110	67,996	36,046
	various activities	t	292	1,619	1,059	363	1,477
	Total	**t**	**133,476**	**320,887**	**99,626**	**94,299**	**60,113**
delivery to recovery operators	electricity generation	t	3,470	2,062	18,554	12,833	7,073
	electricity distribution	t	5,100	7,355	21,613	67,996	32,070
	various activities	t	279	1,360	878	363	1,382
	Total	**t**	**8,849**	**10,777**	**41,045**	**81,192**	**40,525**
Total							
production	electricity generation	t	2,170,523	2,118,774	1,141,878	3,449,045	3,181,015
	electricity distribution	t	98,615	115,842	79,110	67,996	36,046
	various activities	t	292	1,619	1,059	363	1,477
	Total	t	2,269,431	2,236,235	1,222,047	3,517,403	3,218,538
delivery to recovery operators	electricity generation	t	1,144,256	880,335	501,160	982,856	646,357
	electricity distribution	t	5,100	7,355	21,613	67,996	32,070
	various activities	t	279	1,360	878	363	1,382
	Total	t	1,149,635	889,051	523,651	1,051,215	679,809
EN22 **Hazardous special waste**							
Oil flyash	fossil-fired thermal generation (simple and CHP)						
production		t	535	753	909	1,225	1,129
delivery to recovery operators		t	0	753	909	1,012	0
Other ash	fossil-fired thermal generation (simple and CHP)						
production		t	0	0.19	0.3	0.6	0
delivery to recovery operators		t	0	0.19	0	0	0
Other							
production	electricity generation	t	5,976	9,124	6,164	9,027	9,497
	electricity distribution	t	18,414	4,865	5,593	4,891	2,970
	various activities	t	142	317	110	136	74.9
	Total	**t**	**24,532**	**14,306**	**11,867**	**14,054**	**12,542**
	of which with PCBs						
	electricity generation	*t*	*1,413*	*1,976*	*2,661*	*2,878*	*1,858*
	electricity distribution	*t*	*646*	*348*	*301*	*956*	*120*
	various activities	*t*	*0*	*2.2*	*1.07*	*2.74*	*1.66*
	Total	***t***	***2,059***	***2,326***	***2,962***	***3,837***	***1,979***
delivery to recovery operators	electricity generation	t	1,920	2,776	6,026	8,040	3,598
	electricity distribution	t	5,212	4,382	5,331	4,891	2,532
	various activities	t	85.7	310	13.5	124	16.3
	Total	**t**	**7,218**	**7,469**	**11,371**	**13,054**	**6,147**
	of which with PCBs						
	electricity generation	*t*	*1,412*	*1,962*	*2,545*	*2,875*	*1,745*
	electricity distribution	*t*	*641*	*348*	*282*	*956*	*133*
	various activities	*t*	*0*	*0*	*0.574*	*2.74*	*1.44*
	Total	***t***	***2,052***	***2,310***	***2,827***	***3,834***	***1,880***

	Source		2008	2009	2010	2011	2012
Total production	electricity generation	t	6,511	9,878	7,073	10,253	10,627
	electricity distribution	t	18,414	4,865	5,593	4,891	2,970
	various activities	t	142	317	110	136	74.9
	Total	t	25,067	15,060	12,776	15,280	13,671
delivery to recovery operators	electricity generation	t	1,920	3,530	6,935	9,052	3,598
	electricity distribution	t	5,212	4,382	5,331	4,891	2,532
	various activities	t	85.7	310	13.5	124	16.3
	Total	t	7,218	8,223	12,279	14,066	6,147
EN22 Total special waste							
production	electricity generation	t	2,177,034	2,128,652	1,148,951	3,459,298	3,191,642
	electricity distribution	t	117,029	120,707	84,704	72,887	39,015
	various activities	t	434	1,936	1,169	499	1,552
	Total	**t**	**2,294,497**	**2,251,295**	**1,234,823**	**3,532,683**	**3,232,209**
delivery to recovery operators	electricity generation	t	1,146,176	883,866	508,095	991,908	649,955
	electricity distribution	t	10,312	11,738	26,944	72,887	34,602
	various activities	t	364	1,670	892	487	1,399
	Total	**t**	**1,156,853**	**897,273**	**535,930**	**1,065,281**	**685,955**
EN22 Radioactive waste							
Low-, intermediate- and high-level radioactive waste stored inside plants	nuclear generation simple						
	liquid	m^3	16.6	58.5	32.1	33.8	34.8
	solid	m^3	1,231	2,953	1,528	1,449	1,529
Low- and intermediate-level: production	nuclear generation simple						
	liquid	m^3	1.25	0	0	0	0.56
	solid	m^3	127	220	238	289	482
	of which fraction not storable in off-site surface or subsurface sites	*m^3*	*72.5*	*0*	*33.4*	*32.3*	*45.1*
High-level: production	nuclear generation simple						
	solid	t	0	0	10.2	10.2	56.2
	solid	m^3	0	22.1	4.62	8.81	23.9

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN29 Land								
LV cable lines								
overhead	% of entire LV grid	24.2	21.7	38.1	44.6	44.4	83.5	-0.4
underground	% of entire LV grid	45.2	46.2	47.3	47.8	48.3	6.9	1
Total	**% of entire LV grid**	**69.3**	**67.9**	**85.4**	**92.3**	**92.7**	**33.8**	**0.4**
MV cable lines								
overhead	% of entire MV grid	1.13	1.11	1.11	0	0	-100	0
underground	% of entire MV grid	30.6	31.6	32.4	33	33.6	9.8	1.8
Total	**% of entire MV grid**	**31.7**	**32.7**	**33.6**	**33**	**33.6**	**6**	**1.8**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	50.7	50.4	61.1	65.2	65.6	29.4	0.6
Resource conservation and quality								
EN1EN3 Net heat rate of thermal generation	kcal/kWh	2,174	2,253	2,280	2,244	2,288	5.2	2
EN1EN3 Net heat rate of thermal generation (CHP)	kcal/kWh	1,258	1,598	1,298	859	1,337	6.3	55.6

		2008	2009	2010	2011	**2012**	% ('12-'08)/'08	% ('12-'11)/'11
EN1EN3 Net efficiency of hydro generation from pumped storage	%	80.4	70.8	73	64.3	54.8	-31.8	-14.8
EN4 Consumption of electricity for distribution grid operation	% of electricity distributed	0	0.014	0	0.001	0.001	0	0
EN8 Net specific requirements of water for industrial uses for thermal generation								
including contribution of as-is sea water	liters/kWh	1.01	0.974	0.861	1.17	1.12	10.9	-4.3
excluding contribution of as-is sea water	liters/kWh	0.924	0.901	0.771	1.11	1.12	21.2	0.9
EN8 Net specific requirements of water for industrial uses for thermal generation (CHP)	liters/kWh	0	0	0	0	0.82	0	-
EN8 Net specific requirements of water for industrial uses in nuclear generation	liters/kWh	0.053	0.065	0.051	0.072	0.072	35.8	0
Net specific consumption of water for industrial uses	liters/kWh	0.59	0.532	0.387	0.664	0.632	7.1	-4.8
EN8 Coverage of requirements of water for industrial uses								
From rivers (including meteoric waters from secondary rainfall)	% of requirements	81.5	77.1	69.5	83.9	88.8	9	5.8
from wells	% of requirements	0.065	0.163	0.184	0.111	0.097	49.2	-12.6
from aqueducts	% of requirements	0.429	2.38	1.6	0.739	1.41	228.7	90.8
Total from inland waters	**% of requirements**	**82**	**79.6**	**71.3**	**84.8**	**90.3**	**10.1**	**6.5**
from the sea (as-is)	% of requirements	8.18	6.64	8.91	4.81	0.006	-99.9	-99.9
from the sea (desalinated)	% of requirements	3.77	6.2	9.77	6.45	5.44	44.3	-15.7
EN10 from waste waters (used inside plants)	% of requirements	0.014	0.019	0.095	0.028	0.012	-14.3	-57.1
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	15.6	19.5	23.7	14.8	15.1	-3.2	2
gas oil	% of total fuel consumption	10.6	12.8	16	9.77	8.35	-21.2	-14.5
natural gas	% of total fuel consumption	15.7	13.1	10.9	10.8	7.67	-51.1	-29
coal	% of total fuel consumption	52.2	50.3	45.7	55.6	62.3	19.3	12.1
brown coal	% of total fuel consumption	5.97	4.38	3.73	9.03	6.6	10.6	-26.9
LS fuel oil	% of total fuel-oil consumption	99.9	100	99.4	99.6	99.8	-0.1	0.2
VLS fuel oil	% of total fuel-oil consumption	0.127	0.014	0.597	0.441	0.203	59.8	-54
natural gas, technologically captive use	% of total natural-gas consumption	91.4	91.9	93	99.1	96.3	5.4	-2.8
of which in combined-cycle units	*% of total natural-gas consumption*	*91.4*	*91.9*	*93*	*99*	*92.4*	*1.1*	*-6.7*
natural gas, non-technologically captive use	% of total natural-gas consumption	8.65	8.14	6.97	0.937	3.74	-56.8	299.1
Electricity generation from renewables								
thermal from biomass & biodegradable fraction of waste	% of total generation	0	0.179	0.124	0.123	0.144	0	17.1
hydro from natural flows	% of total generation	8.28	11.2	12	7.14	6	-27.5	-16
wind and solar (photovoltaic)	% of total generation	3.89	3.01	3.25	3.76	4.45	14.4	18.4
Total	**% of total generation**	**12.2**	**14.4**	**15.4**	**11**	**10.6**	**-13.1**	**-3.6**
Specific emissions into the atmosphere								
EN20 SO_2 (thermal generation, simple)	g/kWh thermal net	2	1.71	1.56	1.87	1.88	-6	0.5
EN20 NO_x (thermal generation, simple)	g/kWh thermal net	2.87	2.97	2.64	2.48	2.61	-9.1	5.2
EN20 Particulates (thermal generation, simple)	g/kWh thermal net	0.092	0.081	0.06	0.07	0.077	-16.3	10
EN16 CO_2 (thermal generation, simple)	g/kWh thermal net	810	798	798	816	853	5.3	4.5
EN16 CO_2 (thermal generation - CHP)	g/kWh thermal net	351	453	156	231	395	12.5	71
EN20 SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	1.13	0.899	0.661	1.03	1.01	-10.6	-1.9
EN20 NO_x (total from thermal generation - simple and CHP)	g/kWh total net	1.62	1.56	1.12	1.36	1.41	-13	3.7

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN20 Particulates (total from thermal generation - simple and CHP)	g/kWh total net	0.052	0.042	0.025	0.039	0.042	-19.2	7.7
EN16 CO_2 (total from thermal generation - simple and CHP)	g/kWh total net	460	420	339	449	461	0.2	2.7
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.201	0.051	0.271	0.144	0.38	89.1	163.9
EN20 Specific radioactive emissions into the atmosphere								
Nuclear generation								
Noble gases	kBq/kWh	1	1	1	2	3	200	50
Iodine 131	kBq/kWh	9	11	3	1	4	-55.6	300
Areosols β and γ	mBq/kWh	1,150	813	238	237	94	-91.8	-60.3
Aerosol α	µBq/kWh	2	3	1	2	1	-50	-50
Strontium 89 and 90	µBq/kWh	159	375	105	73	32	-79.9	-56.2
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	4.18	6.19	0.151	0.25	-	65.6
Total nitrogen (expressed as N)	mg/kWh thermal net	0.877	34.7	26.3	2.63	31.2	3,457.6	1.086.3
Total phosphorus (expressed as P)	mg/kWh thermal net	0.011	7.73	1.8	0.463	1.78	16,081.8	284.4
COD	mg/kWh thermal net	1.84	9.62	2.2	2.14	1.32	-28.3	-38.3
BOD	mg/kWh thermal net	0.598	1.82	1.09	207	31.4	5,150.8	-84.8
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	0.003	0.004	0.001	0.009	200	800
Total nitrogen (expressed as N)	mg/kWh	0.423	0.778	0.213	0.424	0.382	-9.7	-9.9
Total phosphorus (expressed as P)	mg/kWh	0.006	0.005	0.043	0.046	0.04	566.7	-13
COD	mg/kWh	0.118	0.12	0.873	1.17	0.956	710.2	-18.3
BOD	mg/kWh	0.079	0.079	0.167	0.317	0.171	116.5	-46.1
EN21 Net specific polluting load of radionuclides in waste waters discharged by plants								
Nuclear generation								
Tritium	kBq/kWh	3.36	2.55	2.57	3.14	4.16	23.8	32.5
EN22 Specific waste production								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	77	60.8	50.3	77.5	70	-9.1	-9.7
Oil flyash (thermal generation)	g/kWh net from fuel oil & gas-oil	0.065	0.067	0.078	0.11	0.114	75.4	3.6
Oil bottom ash (thermal generation)	g/kWh net from fuel oil & gas-oil	0.065	0.067	0.079	0.11	0.114	75.4	3.6
EN22 Specific waste production radioactive								
low- and medium-level								
liquid	mm^3/kWh net	0.072	0	0	0	0.021	-70.8	-
	mm^3/kWh	7.24	9.7	8.62	11.5	17.9	147.2	55.7
high-level								
solid	mg/kWh net	0	0	0.37	0.406	2.08	-	412.3
	mm^3/kWh	0	0.975	0.167	0.35	0.887	-	153.4
EN22 Low-, intermediate- and high-level radioactive waste stored inside plants								
liquid	% in volume of production since the start of operation	78.7	89.7	57.1	54.9	56.1	-28.7	2.2

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
solid	% in volume of production since the start of operation	21.5	69.9	27.1	25.1	25.9	20.5	3.2
EN22 **Waste recovery**								
Coal and brown-coal ash	% production	82.2	73.4	65.7	45.1	29.3	-64.4	-35
bottom ash	*% production*	*28.6*	*6.4*	*9.53*	*41.3*	*34*	*18.9*	*-17.7*
flyash	*% production*	*91.7*	*81.9*	*72.9*	*45.6*	*28.8*	*-68.6*	*-36.8*
Gypsum from desulfurization	% production	0.117	1.31	8.39	3.87	4.79	3,994	23.8
Other non-hazardous special waste								
electricity generation	% production	10	1.01	95.4	49.5	31.3	213	-36.8
electricity distribution	% production	5.17	6.35	27.3	100	89.0	1,621	-11
fuel storage & handling	% production	0	0	67.1	100	85.5	-	-14.5
Total	% production	6.63	3.4	41.2	86.1	67.4	9,966	-21.7
Total non-hazardous special waste								
electricity generation	% production	52.7	41.5	43.9	28.5	20.3	-61.7	-29.1
electricity distribution	% production	5.17	6.35	27.3	100	89.0	1,621	-11
fuel storage & handling	% production	0	0	67.1	100	85.5	-	-14.5
Total	% production	50.7	39.8	42.9	29.9	21.1	-58.4	-29.4
Oil flyash	% production	0	100	100	82.6	0	-	0
Other hazardous special waste								
electricity generation	% production	32.1	30.4	97.8	89.1	37.9	18.1	-57.5
electricity distribution	% production	28.3	90.1	95.3	100	54.2	91.5	-45.8
fuel storage & handling	% production	0	0	72.8	99.3	73.4	-	-26.1
Total	% production	29.4	52.2	95.8	92.9	49.0	66.7	-47.3
Total hazardous special waste								
electricity generation	% production	29.5	35.7	98.1	88.3	33.9	14.9	-61.6
electricity distribution	% production	28.3	90.1	95.3	100	85.3	201	-14.7
fuel storage & handling	% production	0	0	72.8	99.3	73.4	-	-26.1
Total	% production	28.6	53.7	96.8	92.1	45.0	57.3	-51.1
Total special waste								
electricity generation	% production	52.6	41.5	44.2	28.7	20.4	-61.4	-29.3
electricity distribution	% production	8.81	9.72	31.8	100	88.7	907	-11.3
fuel storage & handling	% production	0	0	67.5	100	85.4	-	-14.6
Total	% production	50.4	39.8	43.4	30.1	21.2	-57.9	-29.6
Mining & extracting activities								
Yield of the site (open-pit mine)	million m^3 of moved soil/ million t of extracted mineral	45.3	11.4	10.3	15.9	7.71	-83	-51.5
Percentage of extracted soil used to restore the area	%	0	0	1.15	2	na	-	-

Highlights of 2012

Total electricity generation was up by ~1.5 TWh owing, in particular, to higher nuclear generation (+~7%). The percentages of natural gas, fuel oil and gas oil in the fuel mix for thermal generation decreased in favor of a parallel increase in the share of coal (+~14% on 2011).

EN1 As regards expendables, the consumption of ammonia increased, while the one of limestone (used for flue-gas desulfurization) decreased: in 2012, the plants of Litoral de Almería, Puentes and Alcudia (using imported coal with a lower sulfur content) operated for a higher number of hours than the plants of Compostilla and Teruel (using domestic coal), thus requiring a lower amount of limestone than in 2011.

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).

The considerable change in renewable power generation assets in 2009 vs. 2008 is due to the transfer of some assets to Acciona in connection with the deal under which Acciona sold its stake in Endesa to Enel.

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) rose slightly (from ~36,208 to ~36,685 toe);
> biogases from landfills and waste water treatment systems fell from ~15,000 to ~6,000 toe.

Conversely, the use of fossil fuels in thermal generation recorded an increase on 2011, passing from 9,493 ktoe to 9,688 ktoe. In the fossil fuel mix, coal and fuel oil (almost exclusively LS) were up by ~7 and ~0.3 percentage points, respectively, to the expense of natural gas (-~3 percentage points), gas oil (-~1.5 percentage points) and brown coal (-~2.5 percentage points).

EN5 EN6 EN18 Enel Green Power España brought on line new wind farms with an overall capacity of over 40 MW:

> Acampo (province of Zaragoza, Aragon);
> Padul (province of Granada, Andalusia);
> Agreda (province of Soria, Castile and Leon).

EN16 EN20 Higher thermal generation from coal and brown coal caused specific emissions of all major pollutants into the atmosphere to go up; the only exception was NO_x, which slightly declined thanks to the installation of low-NO_x burners in some plants (see EN26).
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 2012, CO_2 emissions displaced by carbon-free generation amounted to some 30 million tonnes, of which 23 due to nuclear generation and 7 due to generation from renewables.

EN22 In 2012, the percentage of recovery of waste diminished owing, in particular, to the lower recovery of gypsum and ash from coal- and brown coal-fired generation; the decrease in ash recovery is to be ascribed to the crisis of demand in the building sector.

Specific production of liquid medium- and low-level radioactive waste had an upward trend in the past three years owing to plant maintenance and efficiency enhancements.
Specific production of solid high-level radioactive waste grew in 2012 owing mainly to the replacement of fuel rods and their temporary storage into the pools of the Spanish plants of Vandellós and Ascó (province of Tarragona, Catalonia), Almaraz (province of Cáceres, Extremadura) and Garoña.

EN23 Spills:

Spain	*Description*	*Impact and mitigation*
Besós 5 CCGT plant: Amount: **12 m^3**	Oil spill from the alternator coupled with the steam turbine	Clean-up and waste collection. Filtration and reuse of part of the spilled oil and management of the remaining part as hazardous waste.
Andalucía Occidental: Amount: **3 m^3**	Oil leakage after fire of one transformer in the Marismas substation: soil contamination.	Waste delivered to the hazardous waste storage site and managed by an authorized operator.
Vandellós II nuclear plant: Amount: **2.515 m^3**	4 spills: 1) spill of hydraulic oil (0.015 m^3) into the soil, owing to breakage of one of the components of a crane truck; 2) spill of gas oil (1 m^3) upon hydraulic tests; 3) spill of chlorine dioxide (1 m^3) upon unloading; 4) spill of antifoam agent (0.5 m^3).	Clean-up and rehabilitation of affected areas and collection of the spilled material by an authorized operator.
Distribución Andalucía Centro: Amount: **6 m^3**	Theft of copper with oil spill (substation near the thermal plant in the Málaga area).	Waste delivered to the hazardous waste storage site and managed by an authorized operator.
Ascó nuclear plant: Amount: **1,093 m^3**	**5 spills:** 2 spills of oil (0.015 and 0.02 m^3) into the ground of the conventional area of the nuclear plant and 3 spills (1, 0.05 and 0.08 m^3) of a chemical product into the collection tank of the conventional area of the nuclear plant.	Oil spills: clean-up and rehabilitation of affected areas and management of the collected material by an authorized operator. Spill of the chemical product: collection of the product, clean-up of the collection tank and management of the collected material by an authorized operator.

EN 26 Environmental enhancements.

Water

> Thermal plant of Puentes (province of Corunna, Galicia): feasibility study on reuse of waste waters from ash belt conveyors.

> CCGT plant of Puentes: optimized water consumption by carefully managing low-load operation; improved efficiency of cooling towers via water- and leak-proofing measures.

> Thermal plant of Litoral de Almería (province of Almería, Andalusia): reduced water consumption in unit 2 by better operating the pressure relief valves of the degassing unit.

> Thermal plant of Besós (province of Barcelona, Catalonia): reduced consumption of water from aqueducts by replacing it in part with desalinated sea water.

> Nuclear plant of Trillo (province of Guadalajara, Castile-La Mancha): 3% reduction of water abstracted from the Cifuentes river.

> Nuclear plant of Vandellós: sharp drop (-19%) of freshwater consumption in the emergency reactor cooling system by improving the use of chemical additives.

> Electricity distribution in Cataluña Centro: monthly monitoring and control of water consumption in substations.

Emissions

> Thermal plant of Puentes: implementation of a plan to replace equipment containing ozone-depleting gases; preliminary studies of adaptation to the Industrial Emissions Directive (IED) on industrial emissions from large combustion plants.

> CCGT plant of Puentes: optimization of NO_x emission levels.

> Thermal plant of Candelaria (Tenerife): entry into operation of low-NO_x burners in boiler 5.

> Diesel-fired thermal plant of Los Guinchos (La Palma): in units 6-11, installation of flue-gas concentration reducing devices.

- > Thermal plant of Jinámar (Gran Canaria): optimized use of magnesium oxide to keep ash pH above 3.5.
- > Nuclear plants of Almaraz and Trillo: replacement of equipment to abate emissions of hydrochlorofluorocarbons (HCFCs).
- > Electricity distribution in Andalucía Oriental: replacement of 3 vehicles with electric ones, with estimated savings of 8,040 kg CO_2/year; replacement of R22 gas in air-conditioning systems with non-ozone depleting gases in 11 units.
- > Electricity distribution in Cataluña Centro: monitoring and control of SF_6 (greenhouse gas) replenishments.
- > Thermal plant of Litoral de Almería: minimization of fugitive particulate emissions (caused, above all, by ash handling and transport) after extending the length of the belt conveyor for the transfer of ash from storage silos to the non-hazardous waste disposal site.
- > Thermal plant of Jinámar: purchase of a waste paper and cardboard compactor to curb emissions from non-hazardous waste management by 10% (lower number of trips/vehicles for waste paper transport).

Materials and Resources

- > Diesel-fired thermal plant of Punta Grande: reduction of the use of plastic bottles by 30%.
- > Thermal plant of Litoral de Almería: 100% reuse of waste waters from the drain of unit 2 boiler, by collecting them in appropriate tanks permitting the vaporization of ammonia (where present), the settlement of suspended solids and their possible recirculation in the desulfurizer.
- > Thermal plant of Besós: removal of hazardous insulating material and replacement with non-toxic one (asbestos-free ceramic fibers).
- > Diesel-fired thermal plant of Los Guinchos: lower consumption of paper by reducing the printing of maintenance requests.
- > Thermal plant of Barranco de Tirajana (Gran Canaria): lower consumption of ammonia by improving the dosing system and thus keeping optimum pH levels in the boiler and in the feedwater upon plant start-ups.
- > Thermal plant of Jinámar: reduction of consumption by plant auxiliaries (to below 6.8%) by improving the efficiency of compressors and feedwater pumps.

Waste

- > Diesel-fired thermal plant of Punta Grande: reduction of the use of plastic bottles by 30%.
- > Thermal plant of Puentes: waste minimization scheme; project to thicken sludges from waste water treatment; removal of asbestos components in cooling towers.
- > Thermal plant of San Roque (Cadiz, Andalusia): study on waste minimization.
- > Thermal plant of Foix (Barcelona, Catalonia): composting of 100% of grass clippings and shrub trimmings from the garden area of the plant.
- > Thermal plant of Barranco de Tirajana: reduction of packaging materials contaminated by hazardous substances below the limit specified by the integrated environmental permit and reduction of wood packaging materials.

Noise

- > Diesel-fired thermal plant of Punta Grande: abatement of noise from engines by 3 dBA.
- > Diesel-fired thermal plant of Los Guinchos: improvements to the noise abatement system and installation of a door in the fuel purification building.
- > Electricity distribution in Andalucía Occidental: replacement of 7 transformers with low-noise ones, installation of anti-vibration devices in 4 transformers, replacement of the ventilation system in 3 transformers.
- > Electricity distribution in Andalucía Centro: insulation of the roof of 5 switching stations, replacement of the forced-ventilation system in 4 stations and extension of the natural-ventilation system in one station by removing the forced-ventilation one.
- > Electricity distribution in Andalucía Oriental: replacement of 3 pieces of equipment, completion of 5 noise insulation jobs, installation of 3 anti-vibration systems, renovation of 8 ventilation systems.
- > Electricity distribution in Cataluña Centro: monitoring surveys in transforming stations and corrective measures in stations not complying with the applicable legislation.

Waste waters

> Diesel-fired thermal plant of Punta Grande: the new oily-water separator decreased the content of hydrocarbons in waste waters by 5 ppm.
> Combined-cycle thermal plant of Puentes: improved control of the transfer of final waste waters to the treatment system.
> Thermal plant of Litoral de Almería: construction of a new system to treat waste waters from the desulfurizer of unit 1. The system, which is currently being tested for subsequent entry into operation, will treat a double volume of water, thus cutting fluoride concentration in waste waters from the treatment system by an estimated 30% with respect to 2011; improved control of the parameters of discharged water by replacing the pumps extracting samples therefrom.
> Nuclear plant of Almaraz: upgrades of the cooling system made it possible to reduce the average temperature of the water released into the Arrocampo artificial basin by 1°C from its value in the 2005-2010 period (results will be reported in 2013); decrease of the average yearly amount of ammonia discharged into the Arrocampo basin by 50% from its value in the 2005-2010 period.
> Nuclear plant of Trillo: decrease of the average concentration of suspended solids in waste waters into the Tajo river (6.45 ppm in 2012 vs. 22.17 ppm in 2011) thanks to the operation of the UC2 system.
> Thermal plant of Puentes: study on collection of meteoric waters from the imported-coal storage site.

Soil

> Thermal plant of Litoral de Almería: surfacing of areas exposed to the risk of contamination from hydrocarbon spills.
> Electricity distribution in Cataluña Oriental: improvement of oil collection pits.
> Thermal plant of San Roque: in accordance with the general environmental plan, the following oil-spill prevention or mitigation objectives were achieved in 2012:
1. elimination of sulfuric acid storage;
2. elimination of gas oil from the tank supplying the gas turbine;
3. purchase of a container for storing chemical products.

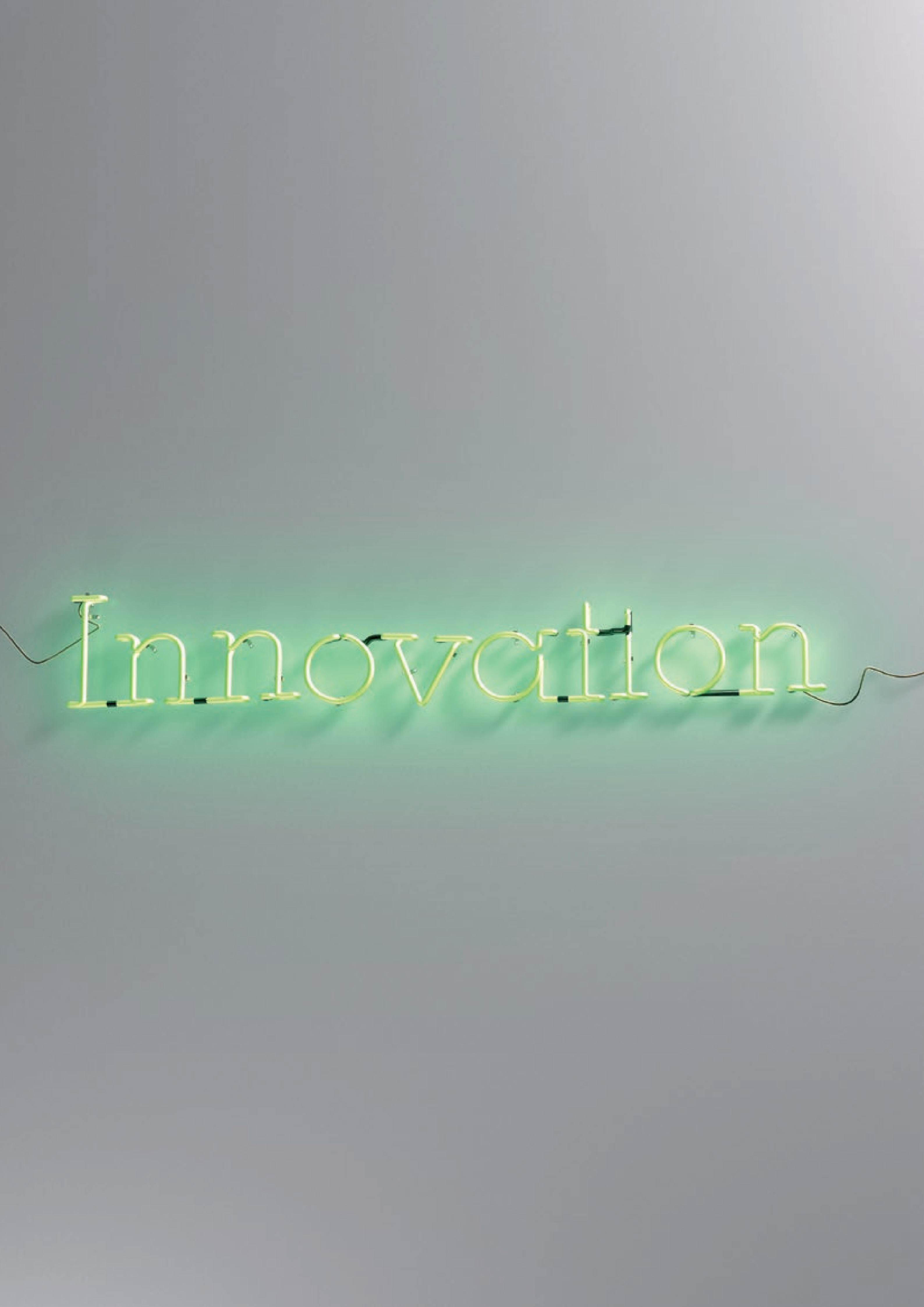
Landscape and biodiversity

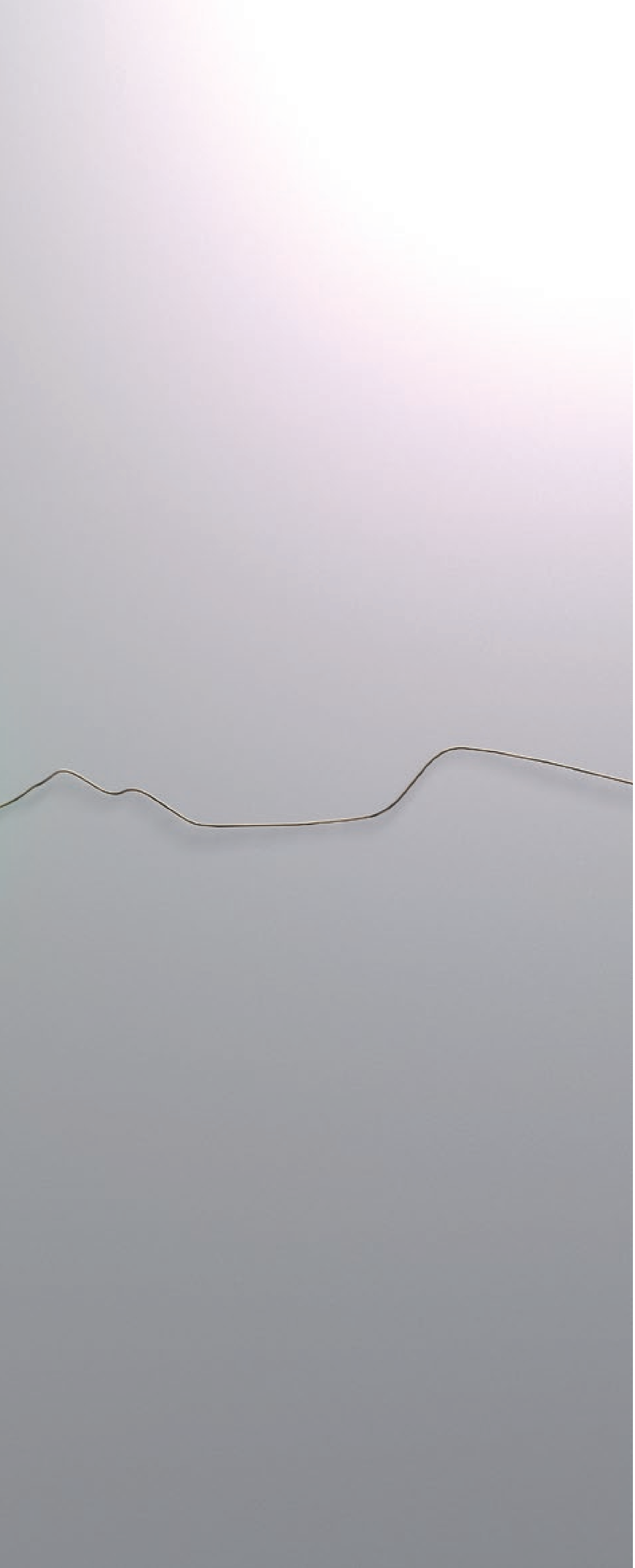
> Diesel-fired thermal plant of Los Guinchos: mitigation of visual impact by cleaning and painting chimney-stacks and renovating the facade of the warehouse and of other parts of the plant building.
> Electricity distribution in Andalucía Oriental: 41 nests for protected fauna were installed within the framework of the Torres-Luz project, supported by the University of Granada.

Other

> Nuclear plant of Vandellós II: yearly training of the personnel on environmental emergency procedures.

EN29 As regards land and landscape protection, insulated-cable power lines were up by about 0.4 percentage points, with obvious advantages in terms of visual impact and prevention of avian fauna electrocution (even in case of overhead cables).


Innovation

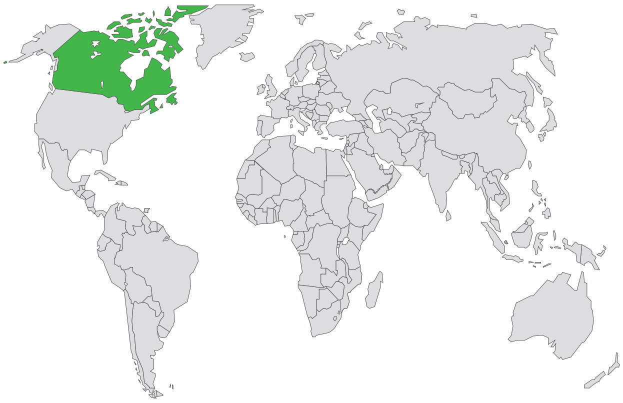


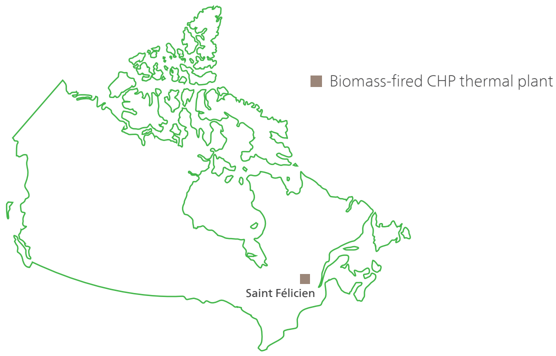
North America

Canada

Biomass-fired combined heat & power generation

Enel Green Power SpA





The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
1	21	175

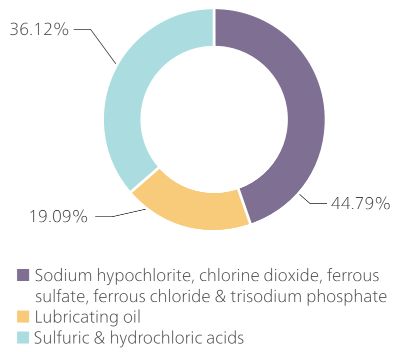
Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW	Useful thermal capacity 10^6 kcal/h
Steam (condensing)	**1**	**1**	**21**	**6**

Fuel consumption
Total: 71,185 toe
100% from biomass

Net electricity generation
Total: 175 million kWh

Expendables
Total: 19 t



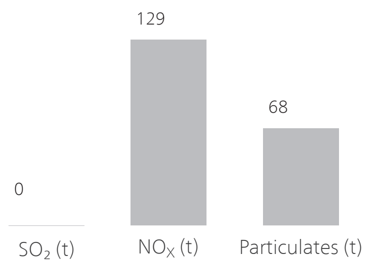
Useful heat output (combined with power generation)

32,620 million kcal
equal to 38 million kWh

Water for industrial uses

680,000 m^3
Abstraction from inland waters from aqueducts only

Emissions into the atmosphere



Avoided CO_2 emissions

113.58 t
Due to thermal generation from biomass

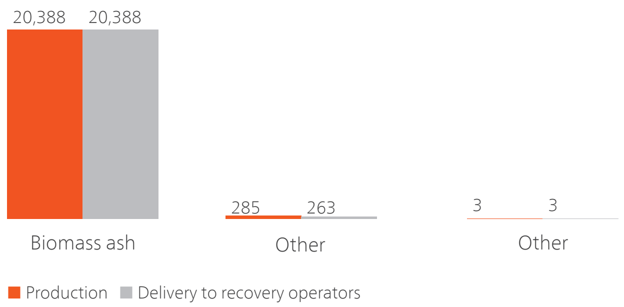
Emissions from the otherwise necessary fossil-fired thermal generation.

Special waste

Total production: **20,675 t**
Total delivery to recovery operators: **20,653 t**

Non-hazardous
Production: 20,673 t
Delivery to recovery operators: 20,651 t

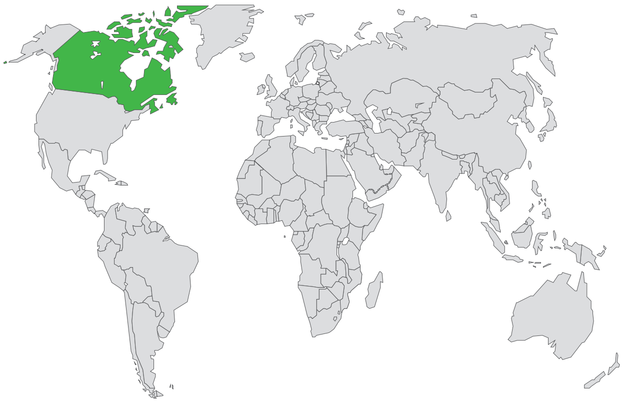
Hazardous
Production: 3 t
Delivery to recovery operators: 3 t

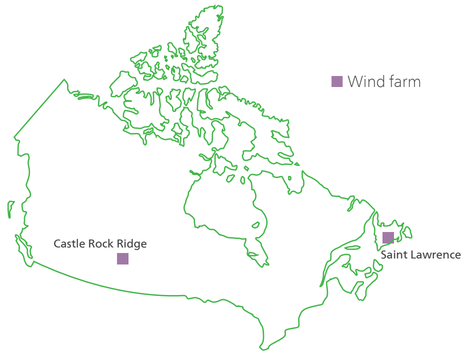


Canada

Wind power generation

Enel Green Power SpA





The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
2	103	219

Power installations

Power plants no.	Net maximum electrical capacity MW
2	**103**

Net maximum electrical capacity
Total: 103 MW

Net electricity generation
Total: 219 million kWh

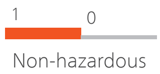
Equivalent yearly hours of utilization*

Wind: **2,124 hours**

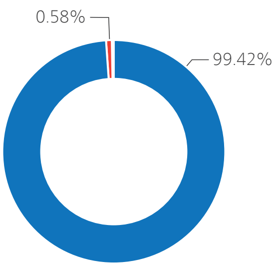
* Yearly generation/capacity ratio.

Special waste

Total production: **1 t**
Total delivery to recovery operators: **0 t**



Expendables
Total: 0.17 t



Avoided CO_2 emissions

Due to wind power generation: **142,049 t**

Emissions from the otherwise necessary fossil-fired thermal generation.

Environmental Results

Status data

		2008	2009	2010	2011	**2012**
Power-generating installations						
Power plants (wind)	no.	1	1	1	1	2
Net maximum electrical capacity (wind)	MW	27	27	27	27	103
Combined heat & power installations						
Power plants (thermal)	no.	1	1	1	1	1
Net maximum electrical capacity (thermal)	MW	21.4	21.4	21.4	21.4	21.4
Useful thermal capacity (thermal)	million kcal/h	5.78	5.78	5.68	5.68	5.68

Resources

		2008	2009	2010	2011	**2012**
EN1 EN3 **Biomass and waste**						
Thermal generation combined with heat generation						
Solid biomass	t	450,889	402,877	402,568	354,242	322,340
	toe	100,412	89,720	89,651	78,230	71,185
	TJ	4,204	3,756	3,754	3,275	2,980
EN8 **Water for industrial uses**						
From aqueducts	million m^3	0.638	0.621	0.765	0.706	0.68
for thermal generation combined with heat generation (CHP)	million m^3	0.638	0.621	0.765	0.706	0.68
EN1 **Expendables**						
Resins	t	0.3	0	0	0	0
Sodium hypochlorite	t	13.2	10.1	10.2	9.95	8.43
Sulfuric & hydrochloric acids	t	58.4	5.1	0	0	6.8
Lubricating oil	t	3.14	2.23	2.38	3.2	3.6
Dielectric oil	t	0	0	0.171	14.3	0.171
Total	**t**	**75**	**17.5**	**12.7**	**27.5**	**19**
for thermal generation combined with heat generation (CHP)	t	75	17.5	12.5	13.1	18.8
for wind generation	t	0	0	0.171	14.3	0.172

Processes and products

		2008	2009	2010	2011	**2012**
Electricity generation (net)						
From renewables	**million kWh**	**180**	**251**	**281**	**285**	**394**
biomass and biodegradable fraction of waste	million kWh	172	149	182	175	175
combined with heat generation	million kWh	172	149	182	175	175
wind	million kWh	7,82	102	99	110	219
Total	**million kWh**	**180**	**251**	**281**	**285**	**394**
simple	million kWh	7,82	102	99	110	219
combined with heat generation	million kWh	172	149	182	175	175
Useful heat output (combined with power generation)						
In thermal power plants (biomass)	**million kcal**	**30,149**	**23,042**	**32,524**	**29,117**	**32,620**
	million kWh	**35.1**	**26.8**	**37.8**	**33.9**	**37.9**

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 SO_2	thermal generation combined with heat generation	thousand t	0.009	0.002	0	0.011	0
	Total	**thousand t**	**0.009**	**0.002**	**0**	**0.011**	**0**
EN20 NO_x	thermal generation combined with heat generation	thousand t	0.048	0.087	0.076	0.145	0.129
	Total	**thousand t**	**0.048**	**0.087**	**0.076**	**0.145**	**0.129**
EN20 Particulates	thermal generation combined with heat generation	thousand t	0.029	0.04	0.032	0.016	0.068
	Total	**thousand t**	**0.029**	**0.04**	**0.032**	**0.016**	**0.068**
EN16 CO_2	Various activities	thousand t	0	0	0	0	0.01
	Total	**thousand t**	**0**	**0**	**0**	**0**	**0.01**
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**0**	**0**	**0**	**0**	**0.01**
EN18 **Avoided CO_2 emissions**							
Due to wind power generation		thousand t	0	72.9	70.7	78.5	142
Due to electricity generation from biomass		thousand t	0	107	130	125	114
Due to generation from renewables		**thousand t**	**0**	**179**	**200**	**203**	**256**
EN21 **Waste waters (discharged quantity)**	thermal generation combined with heat generation	million m^3	0.13	0.116	0.105	0.063	0
EN21 **Conventional polluting load in waste waters discharged by installations**							
Total nitrogen (expressed as N)	thermal generation combined with heat generation	kg	0	0	0	0	276
	in some plants with an overall capacity of	MW	0	0	0	0	21.4
Total phosphorus (expressed as P)	thermal generation combined with heat generation	kg	0	0	0	75	21.5
	in some plants with an overall capacity of	MW	0	0	0	21.4	21.4
COD	thermal generation combined with heat generation	kg	14,335	439	4,331	0	244
	in some plants with an overall capacity of	MW	21.4	21.4	21.4	0	21.4
BOD	thermal generation combined with heat generation	kg	5,717	1,109	4,178	0	1,378
	in some plants with an overall capacity of	MW	21.4	21.4	21.4	0	21.4
EN22 **Non-hazardous special waste**							
Biomass bottom ash	fossil-fired thermal generation (simple and CHP)						
production		t	12,350	14,129	10,100	7,070	3,966
delivery to recovery operators		t	12,350	14,129	10,100	7,070	3,966
Biomass flyash	fossil-fired thermal generation (simple and CHP)						
production		t	25,438	24,023	22,592	18,635	16,422
delivery to recovery operators		t	25,438	24,023	22,592	18,635	16,422

	Source		2008	2009	2010	2011	2012
Other							
production	electricity generation	t	0.005	0	191	181	285
delivery to recovery operators	electricity generation	t	0.005	0	50.7	55.5	263
Total							
production	**electricity generation**	**t**	**37,788**	**38,152**	**32,882**	**25,886**	**20,673**
delivery to recovery operators	**electricity generation**	**t**	**37,788**	**38,152**	**32,742**	**25,760**	**20,651**
EN22 **Hazardous special waste**							
production	electricity generation	t	0	0.408	3.57	3.17	2.93
	of which with PCBs						
	electricity generation	t	0	0.387	2.45	1.19	2.3
delivery to recovery operators	electricity generation	t	0	0.408	2.55	2.14	2.93
	of which with PCBs						
	electricity generation	t	0	0.387	2.45	1.19	2.3
EN22 **Total special waste**							
production	electricity generation	t	37,788	38,153	32,886	25,889	20,676
delivery to recovery operators	electricity generation	t	37,788	38,153	32,745	25,763	20,654

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Resource conservation and quality								
EN1 EN3 Net heat rate of thermal generation (CHP)	kcal/kWh	4,845	5,093	4,084	3,751	3,345	-31	-10.8
EN8 Net specific requirements of water for industrial uses for thermal generation (CHP)	liters/kWh	3.08	3.53	3.49	3.39	3.2	3.9	-5.6
Net specific consumption of water for industrial uses	liters/kWh	2.97	2.23	2.4	2.22	1.58	-46.8	-28.8
EN8 Coverage of requirements of water for industrial uses from aqueducts	% of requirements	100	100	100	100	100	0	0
Electricity generation from renewables								
thermal from biomass	% of total generation	95.7	59.4	64.7	61.4	44.4	-53.6	-27.7
wind	% of total generation	4.34	40.6	35.3	38.6	55.6	1,181.1	44
Total	**% of total generation**	**100**	**100**	**100**	**100**	**100**	**0**	**0**
EN20 SO_2 (thermal generation - CHP)	g/kWh thermal net	0.043	0.011	0	0.053	0	-100	0
EN20 NO_x (thermal generation - CHP)	g/kWh thermal net	0.232	0.494	0.346	0.695	0.606	161.2	-12.8
EN20 Particulates (thermal generation - simple and CHP)	g/kWh thermal net	0.14	0.227	0.146	0.077	0.32	128.6	315.6
EN20 SO_2 (total from thermal generation - simple and CHP)	g/kWh total net	0.042	0.007	0	0.035	0	-100	-100
EN20 NO_x (total from thermal generation - simple and CHP)	g/kWh total net	0.223	0.313	0.239	0.455	0.299	34.1	-34.3
EN20 Particulates (total from thermal generation - simple and CHP)	g/kWh total net	0.135	0.144	0.1	0.05	0.158	17	216
Net specific conventional polluting load of waste waters discharged by installations (thermal generation - CHP)								
Total nitrogen (expressed as N)	mg/kWh	0	0	0	0	1.3	-	-
Total phosphorus (expressed as P)	mg/kWh	0	0	0	0.36	0.101	-	-71.9
COD	mg/kWh	69.2	2.49	19.7	0	1.15	-98.3	-
BOD	mg/kWh	27.6	6.3	19	0	6.47	-76.6	-
EN22 **Waste recovery**								
Coal and brown-coal ash	% production	100	100	100	100	100	0	0
bottom ash	*% production*	*100*	*100*	*100*	*100*	*100*	*0*	*0*
flyash	*% production*	*100*	*100*	*100*	*100*	*100*	*0*	*0*
Other non-hazardous special waste electricity generation	% production	100	0	26.5	30.6	92.1	-7.9	201
Total non-hazardous special waste electricity generation	% production	100	100	99.6	99.5	99.9	0	0.5

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Other hazardous special waste electricity generation	% production	0	100	71.4	67.5	100	-	48.1
Total special waste electricity generation	% production	100	100	99.6	99.5	99.9	0	0.5

Highlights of 2012

In Canada, Enel operates through Enel Green Power (CHP thermal and wind power generation).

EN5 EN6 EN18 In 2012, total CO_2 emissions displaced by carbon-free generation amounted to more than 255,000 tonnes (of which over 135,000 by biomass-fired CHP thermal generation and 142,000 by wind power generation). This result was achieved thanks to the commissioning of the new wind farm (76.2 MW) of Castle Rock Ridge (Pincher Creek, Alberta), which made it possible to double wind power generation with respect to 2011.

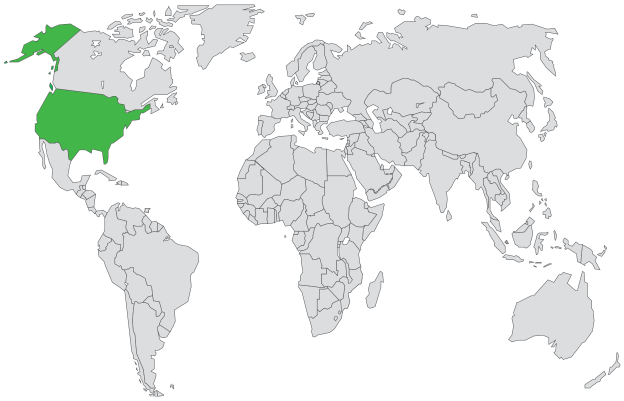
EN20 The erratic trends of total and specific emissions of NO_x and particulates may be attributed to the discontinuous monitoring of emissions and to the consequent results of the computation of annual mass quantities (obtained by multiplying the average concentrations by the annual flue-gas volumes). This inevitably involves inaccuracies that are due to fluctuating concentrations associated with the variable generating outputs of the plants.

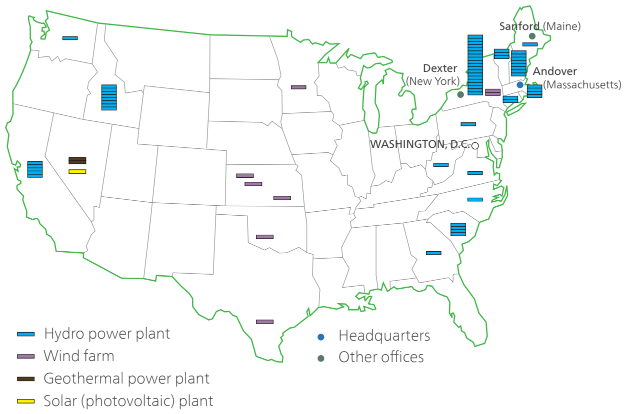
EN22 The recovery of hazardous and non-hazardous waste (entirely consisting of recoverable items, i.e. iron and aluminum) was close to 100%.

United States

Hydro, wind, geothermal and solar (photovoltaic) power generation

Enel Green Power SpA





The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
91	1,115	3,506

Power installations

HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	65	77	287
Pondage/reservoir	1	1	27
	66	**78**	**314**

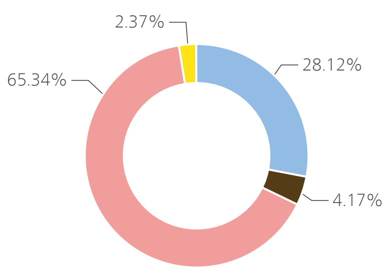
GEOTHERMAL	Power plants no.	Generating units no.	Net maximum electrical capacity MW
Binary cycle	**2**	**6**	**47**

WIND	Power plants no.	Net maximum electrical capacity MW
	22	**728**

SOLAR PHOTOVOLTAIC	Power plants no.	Net maximum electrical capacity MW
	1	**26**

Net maximum electrical capacity

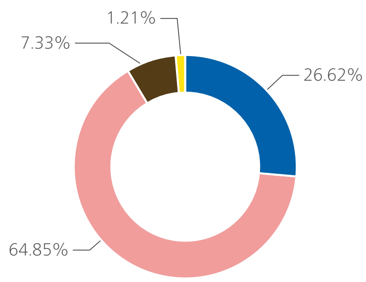
Total: 1,115 MW



Hydro
Geothermal
Wind
Solar (photovoltaic)

Net electricity generation

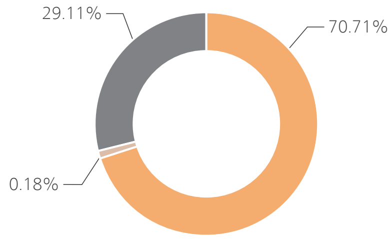
Total: 3,506 million kWh



Hydro from natural flows
Wind
Geothermal
Solar (photovoltaic)

Expendables

Total: 494.7 t



Lubricating oil
Dielectric oil
Other

Equivalent yearly hours of utilization*

5,527 geothermal

2,977 hydro

3,121 wind

1,604 solar photovoltaic

* Yearly generation/capacity ratio.

Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	666,633
Due to geothermal generation	183,638
Due to wind generation	1,624,194
Due to solar (photovoltaic) generation	30,259
Total	**2,504,724**

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

SF_6 - all types of generation (kg)	1
(t of CO_2 equivalent)	20
CO_2 (t)	74

Geothermal fluid

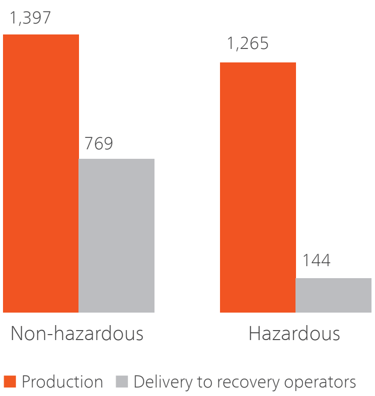
Total fluid extracted: **44,048,000 t**

Steam used for electricity generation: **44,048,000 t**

Geothermal fluid may not have or may have lost the thermodynamic properties that make it suitable for geothermal generation. In this case, the fluid is used for supply of heat, especially for greenhousing and district heating.

Special waste

Total production: **2,662 t**
Total delivery to recovery operators: **913 t**



Other data

Hydro

Alluvial sediments removed by mechanical equipment : **1.814 m^3** (of which reused locally: **1.814 m^3**)

Fish restocking campaigns

Quantity: **3**

Restocked fish: **862,038** individuals in addition to **11,508 kg**

Geothermal activities

New drilled wells: **2**

In-service wells: 32

for steam production: **15**

for reinjection: **17**

Wind and solar (photovoltaic) activities

Wind systems

Surface area occupied by platforms, service roads, buildings: **46 ha**

Solar (photovoltaic) systems

Surface area occupied by modules: **135 ha**

Total surface area affected by the installations: **150 ha**

Environmental Results

Status data

		2008	2009	2010	2011	**2012**
Power-generating installations						
Power plants	**no.**	**72**	**88**	**88**	**89**	**91**
hydro	no.	65	65	65	65	66
geothermal	no.	1	2	2	2	2
wind	no.	6	21	21	21	22
solar (photovoltaic)	no.	0	0	0	1	1
Net maximum electrical capacity	**MW**	**701**	**740**	**740**	**962**	**1,115**
hydro	MW	306	314	314	313	313
geothermal	MW	16	46.5	46.5	46.5	46.5
wind	MW	379	379	379	578	728
solar (photovoltaic)	MW	0	0	0	24	26.4
EN29 **Service & real-estate management**						
Vehicle fleet						
service vehicles	no.	na	na	na	na	104
special vehicles	no.	na	na	na	na	123
Gross real-estate surface area	thousand m^2	na	na	na	na	4.9

Resources

		2008	2009	2010	2011	**2012**
EN1 EN3 **Fossil fuels**						
Various activities	thousand toe	0.015	0	0	0	0
	TJ	0.628	0	0	0	0
EN1 EN3 **Geothermal fluid**						
Total fluid extracted	thousand t	9,199	29,597	45,473	43,922	44,048
Used for electricity generation	thousand t	9,199	29,597	45,473	43,922	44,048
EN8 **Water for industrial uses**						
From wells	million m^3	0	0.136	0	0	0
From aqueducts	million m^3	0	0.006	0	0	0
Total abstraction from inland waters (for geothermal drilling)	**million m^3**	**0**	**0.142**	**0**	**0**	**0**
EN1 **Expendables**						
Sulfuric & hydrochloric acids	t	0	22	0	0	0
Caustic soda	t	0	0.4	0	0	0
Bentonite	t	0	380	0	0	0
Barite	t	0	260	0	0	0
Geothermal cement	t	0	1,230	0	0	0
Lubricating oil	t	9.18	8.01	8.91	7.32	350
Dielectric oil	t	2.69	0	0.05	0.903	0.903
Other	t	0.217	0.115	2.59	0.022	144
Total	**t**	**12.1**	**1,901**	**11.6**	**8.24**	**495**
for hydro generation	t	11.1	7.47	10.6	8.24	10.6
for geothermal activities	t	1	1,892	0	0	0
for wind generation	t	0	0.653	1	0	484

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From renewables	million kWh	1,651	2,172	2,366	2,637	3,506
geothermal	million kWh	36.6	150	248	268	257
hydro from natural flows	million kWh	926	997	919	1,069	933
wind	million kWh	689	1,025	1,198	1,299	2,273
solar (photovoltaic)	million kWh	0	0	0	0	42.4
Geothermal drilling						
Extent	m	1,588	12,992	0	152	0

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN16 CO_2	Various activities	thousand t	0	0	0	0	0.074
EN16 SF_6	electricity generation	kg	0.005	1.46	1.45	0	0.9
		thousand t of CO_2 equivalent	0	0.033	0.033	0	0.02
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**0**	**0.033**	**0.033**	**0**	**0.095**
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	815	877	809	941	667
Due to geothermal generation		thousand t	32.2	132	218	236	184
Due to wind and solar (photovoltaic) generation		thousand t	606	902	1,054	1,143	1,654
Due to generation from renewables		**thousand t**	**1,453**	**1,911**	**2,082**	**2,320**	**2,505**
EN22 **Non-hazardous special waste**							
production	electricity generation & geothermal drilling	t	3	5.01	442	552	1,397
delivery to recovery operators	electricity generation & geothermal drilling	t	3	5.01	442	550	769
EN22 **Hazardous special waste**							
production	electricity generation & geothermal drilling	t	19.7	17.8	47.4	15.8	1,265
	of which with PCBs						
	electricity generation & geothermal drilling	t	19.1	10.7	44.1	12.5	136
delivery to recovery operators	electricity generation & geothermal drilling	t	12.4	18.2	44.2	10.2	144
	of which with PCBs						
	electricity generation & geothermal drilling	t	11.8	11.3	42.2	9.33	134
EN22 **Total special waste**							
production	electricity generation & geothermal drilling	t	22.7	22.9	490	568	2,662
delivery to recovery operators	electricity generation & geothermal drilling	t	15.4	23.2	487	560	913

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Resource conservation and quality								
EN1EN3 Net heat rate of geothermal generation	kcal/kWh	41,313	28,651	25,928	23,589	24,356	-41	3.3
Net specific consumption of water for industrial uses	liters/kWh	0	0.065	0	0	0	-	-
EN8 Coverage of requirements of water for industrial uses								
from wells	% of requirements	0	95.8	0	0	0	-	-
from aqueducts	% of requirements	0	4.23	0	0	0	-	-
Total from inland waters	**% of requirements**	**0**	**100**	**0**	**0**	**0**	**-**	**-**
EN1EN3 Geothermal steam for electricity generation	% of total geothermal fluid extracted	100	100	100	100	100	-	-
Electricity generation from renewables								
geothermal	% of total generation	2.21	6.9	10.5	10.2	7.33	231.7	-28.1
hydro from natural flows	% of total generation	56.1	45.9	38.9	40.5	26.6	-52.6	-34.3
wind and solar (photovoltaic)	% of total generation	41.7	47.2	50.6	49.3	66.1	58.5	34.1
Specific emissions into the atmosphere								
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.006	0.298	0.228	0	0.049	716.7	-
EN22 **Waste recovery**								
Other non-hazardous special waste electricity generation & geothermal drilling	% production	100	100	100	99.6	55.1	-44.9	-44.7
Other hazardous special waste electricity generation & geothermal drilling	% production	63.2	102	93.4	64.5	11.4	-82	-82.3
Total special waste electricity generation & geothermal drilling	% production	68.1	102	99.3	98.6	34.3	-49.6	-65.2

Highlights of 2012

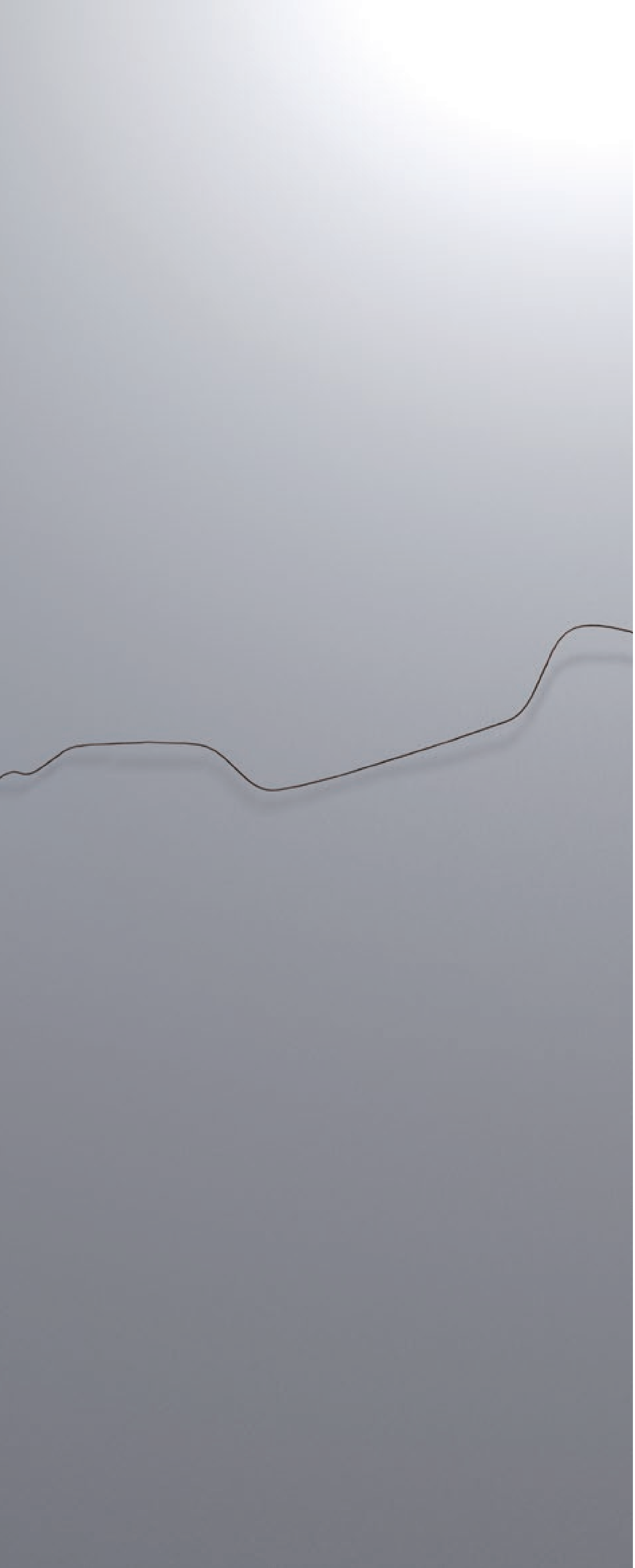
Total electricity generation from renewables was up by about 900 GWh (+33%) on 2011 thanks above all to the higher contribution of the wind source and, to a lesser extent, to the commissioning of the photovoltaic facility integrating the geothermal power plant of Stillwater (Oklahoma).

EN5 EN6 EN18 Enel Green Power North America increased its net maximum capacity by roughly 149 MW thanks to the entry into operation of the wind farm of Rocky Ridge (51% owned) in the counties of Kiowa and Washita (Oklahoma).

EN18 In 2012, CO_2 emissions displaced by carbon-free generation amounted to roughly 2.5 million tonnes (about 8% more than in 2011).

In the United States, Enel operates through Enel Green Power North America (hydro, geothermal, wind and solar photovoltaic power generation).

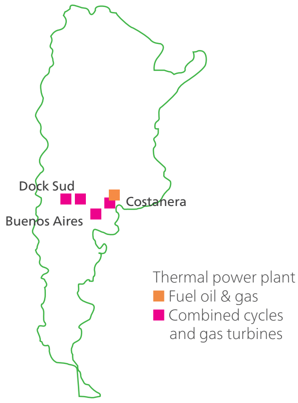

Sustainability



Latin America

Argentina

Thermal power generation Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
5	3,075	12,421

Power installations

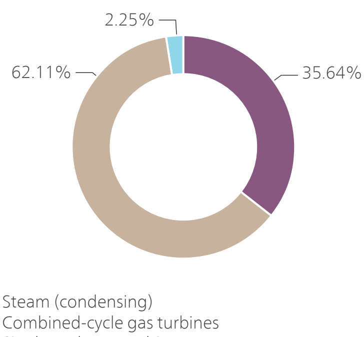
	Power plants no.	Units no.	Net maximum electrical capacity MW
Steam (condensing)	1	6	1,096
Combined-cycle gas turbines	3	8	1,910
Gas turbines	1	2	69
	5	**16**	**3,075**

Net electricity generation

Total: 12,421 million kWh

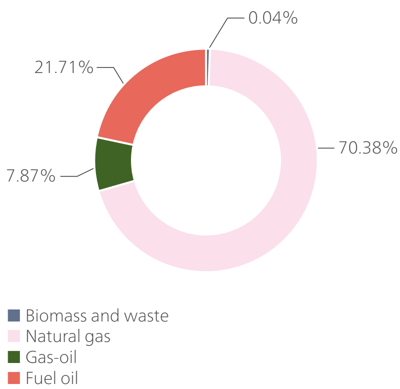
Net maximum electrical capacity

Total: 3,075 MW



Fuel consumption

Total: 2,377,421 t of oil-equivalent



Water for industrial uses

2,746,170 m^3

Abstraction from inland waters

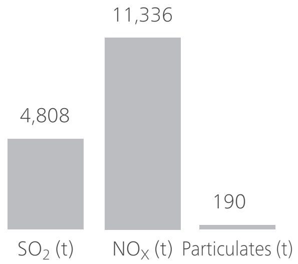
Waste waters

1,633,819 m^3

Discharged

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

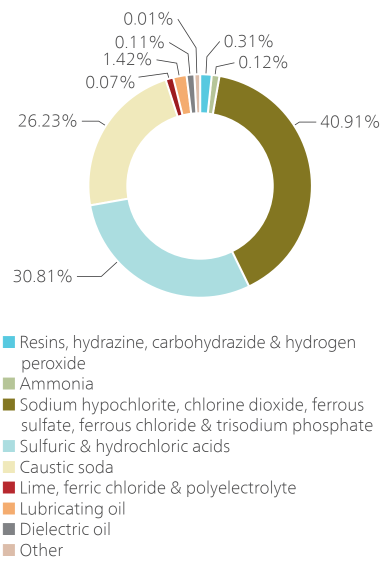
Emissions into the atmosphere



CO_2 (t)	6,171,209
from combustion	*6,171,209*
SF_6 (kg)	0.6
(t of CO_2 equivalent)	13.32
Total (t of CO_2 equivalent)	6,171,222

Expendables

Total: 6,354 t



Special waste

Total production: **70,230 t**

Total delivery to recovery operators: **17 t**

Non-hazardous

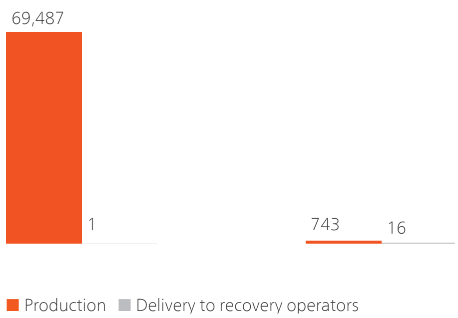
Production: 69,487 t

Delivery to recovery operators: 1 t

Hazardous

Production: 743 t

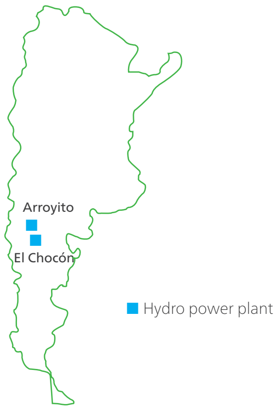
Delivery to recovery operators: 16 t



Argentina

Hydro power generation

Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
2	1,328	2,801

Power installations

	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Pondage/reservoir	**2**	**9**	**1,328**

Expendables

Total: 1.564 t

Avoided CO_2 emissions

Due to hydro generation from natural flows: **1,391,425 t**

Emissions from the otherwise necessary fossil-fired thermal generation.

Equivalent yearly hours of utilization*

Hydro: **2,109 hours**

* Yearly generation/capacity ratio. For Endesa generation is considered to refer to the entire year.

Special waste

Total production: **6 t**

Total delivery to recovery operators: **0 t**

Non-hazardous

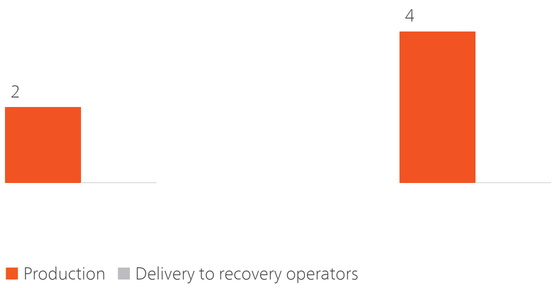
Production: 2 t

Delivery to recovery operators: 0 t

Hazardous

Production: 4 t

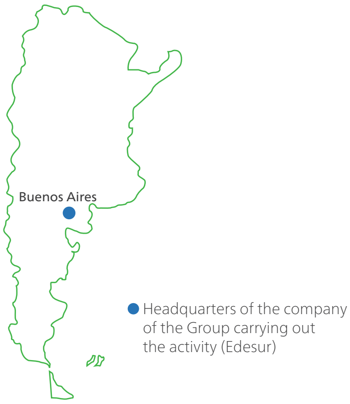
Delivery to recovery operators: 0 t



Argentina

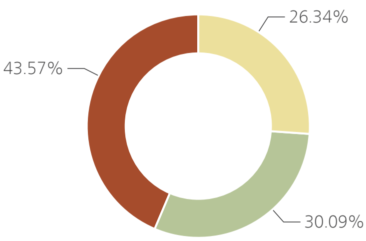
Electricity distribution

Endesa SA



The Numbers

Substations	Capacity (MVA)	Total lines (km)
23,369	17,388	24,526



Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	174	11,607
MV/LV	23,195	5,781
	23,369	**17,388**

LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	546	-	600	**1,146**
MV	3,207	122	4,044	**7,373**
LV	2,708	7,258	6,041	**16,007**
	6,461	**7,380**	**10,685**	**24,526**

The organization has an ISO 14001-certified environmental management system in place.

General data

Municipalities served: **13**

Surface area served: **3,309 km^2**

Customers connected to the grid: **2,390,165** (of which supplied by companies of the Group: **2,389,496**)

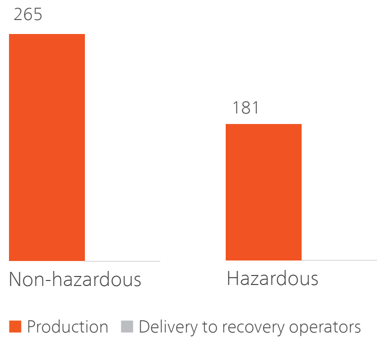
Resource consumption

Expendables: **1.8 t**

Special waste

Total production: **446 t**

Total delivery to recovery operators: **0 t**



Electricity

Total electricity distributed: **14,758 million kWh**

Own consumption for grid operation: **29 million kWh**

Emissions into the atmosphere

SF_6: **140 kg** (3,108 t of CO_2 equivalent)

CO_2: **815 t**

Total greenhouse gases: **3,923** t of CO_2 equivalent

Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants	no.	8	7	7	7	7
thermal	no.	6	5	5	5	5
hydro	no.	2	2	2	2	2
Net maximum electrical capacity	MW	3,032	4,403	4,403	4,403	4,403
thermal	MW	2,141	3,075	3,075	3,075	3,075
hydro	MW	890	1,328	1,328	1,328	1,328
Power lines (circuit-length)						
Total	km	16,124	24,256	24,417	24,470	24,526
high-voltage	km	779	1,162	1,162	1,139	1,146
medium-voltage	km	4,774	7,223	7,318	7,346	7,373
low-voltage	km	10,570	15,871	15,937	15,985	16,007
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	na	na	na	12	106
vehicles for both private and service use	no.	na	na	na	42	0
Gross real-estate surface area	thousand m^2	na	na	na	33.5	33.5

Resources

		2008	2009	2010	2011	2012
EN1 EN3 **Fossil fuels**						
Thermal generation						
fuel oil	thousand t	287	333	466	514	522
	thousand toe	284	328	458	500	516
LS	*thousand t*	*287*	*333*	*466*	*514*	*522*
	thousand toe	*284*	*328*	*458*	*500*	*516*
gas oil	thousand t	169	131	339	332	183
	thousand toe	174	133	346	339	187
natural gas	million m^3	1,391	2,208	2,044	2,157	1,997
	thousand toe	1,165	1,851	1,783	1,883	1,673
technologically captive use	*million m^3*	*1,120*	*1,771*	*1,696*	*1,685*	*1,724*
	thousand toe	*938*	*1,486*	*1,492*	*1,488*	*1,444*
of which in combined-cycle units	million m^3	1,093	1,753	1,696	1,681	1,715
	thousand toe	915	1,470	1,492	1,484	1,437
non-technologically captive use	*million m^3*	*271*	*437*	*348*	*472*	*274*
	thousand toe	*227*	*366*	*291*	*395*	*229*
Total	thousand toe	1,623	2,313	2,588	2,722	2,376
	TJ	67,961	96,834	108,350	113,948	99,499
Various activities	thousand toe	0	0	0	0.118	0.161
Grand total	thousand toe	1,623	2,313	2,588	2,722	2,377
	TJ	67,961	96,834	108,350	113,953	99,506
EN1 EN3 **Biomass and waste**						
Thermal generation						
Liquid biomass	t	0	0	0	0	1,031
	thousand toe	0	0	0	0	0.928
	TJ	0	0	0	0	38.9
EN4 **Primary electricity**						
Various activities	million kWh	0	0	0	3.81	3.58
EN8 **Water for industrial uses**						
From aqueducts	million m^3	1.57	2.68	2.83	2.66	2.75
Total abstraction from inland waters	million m^3	1.57	2.68	2.83	2.66	2.75

		2008	2009	2010	2011	**2012**
EN8 EN21 Open-cycle cooling water						
For thermal generation	million m^3	1,368	1,348	1,519	1,556	1,340
Total	**million m^3**	**1,368**	**1,348**	**1,519**	**1,556**	**1,340**
Water for non-industrial uses						
Real-estate & service management	million m^3	0	0	0	0.032	0.016
EN1 Expendables						
Resins	t	6.66	7.5	11.8	35.9	3.94
Hydrazine	t	12.4	13.4	16	15.5	15.8
Carbohydrazide	t	0.229	0	0	0	0
Ammonia	t	0.786	4.18	5.71	6.26	7.89
Sodium hypochlorite	t	1,652	2,781	1,823	2,842	2,597
Trisodium phosphate	t	1.67	3.5	2.57	3.63	2.39
Ferric chloride	t	2.29	2.54	4.04	5.01	4.39
Sulfuric & hydrochloric acids	t	1,202	1,886	2,015	2,085	1,958
Caustic soda	t	991	1,428	1,500	1,617	1,667
Lubricating oil	t	50.9	50.2	51.6	136	91.9
Dielectric oil	t	211	14.3	19.6	14.8	8.83
Printing paper	t	0	0	0	0.046	0.034
Other	t	1.48	0.52	0.418	0.619	0.62
Total	**t**	**4,132**	**6,191**	**5,450**	**6,762**	**6,358**
for thermal generation	t	4,129	6,187	5,447	6,759	6,354
for hydro generation	t	1.45	0.818	0	0.5	1.56
for electricity distribution	t	1.61	3	2.5	2.5	1.83
EN1 PCB survey						
Oil with PCBs > 500 ppm contained in equipment & transformers	t	na	31.5 (1)	0	0	0

(1) This figure is different from the one published in the Environmental Report 2010. The first year of reporting of this item was 2009 and it referred to oil containing PCBs > 500 ppm, recorded and decontaminated in previous years. However, it is reported here for the sake of completeness.

Processes and products

		2008	2009	2010	2011	**2012**
Electricity generation (net)						
From fossil fuels	**million kWh**	**8,321**	**12,024**	**13,016**	**13,556**	**12,421**
fuel oil & gas oil	million kWh	2,047	1,926	3,558	4,435	2,967
natural gas	million kWh	6,275	10,098	9,458	9,121	9,454
of which in combined-cycle units	*million kWh*	*5,378*	*8,695*	*8,468*	*8,431*	*8,609*
From renewables (hydro from natural flows)	**million kWh**	**1,300**	**3,782**	**2,975**	**2,404**	**2,801**
Total	**million kWh**	**9,622**	**15,806**	**15,991**	**15,960**	**15,222**
Electricity distribution						
Electricity distributed	million kWh	12,125	17,899	16,759	14,280	14,758
EN4 Electricity consumption for grid operation	million kWh	14.1	24.4	26.4	27.7	29

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	3.84	3.72	5.39	7.36	4.81
EN20 NO_x	thermal generation	thousand t	5.3	7.16	11.4	14	11.3
EN20 Particulates	thermal generation	thousand t	0.231	0.161	0.264	0.329	0.19
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	4,185	5,817	6,590	6,950	6,171
	various activities	thousand t	0	0	0	0.345	1.28
	Total	thousand t	4,185	5,817	6,590	6,951	6,172
EN16 SF_6	electricity generation	kg	0	0	0	0	0.6
	electricity distribution	kg	15.4	117	45.5	66.3	140
	Total	kg	15.4	117	45.5	66.3	141
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		**thousand t of CO_2 equivalent**	**4,186**	**5,820**	**6,591**	**6,952**	**6,176**
EN18 Avoided CO_2 emissions							
Due to hydro generation from natural flows		thousand t	654	1,830	1,507	1,233	1,391
EN21 Waste waters (discharged quantity)	thermal generation	million m^3	0.537	0.923	1.09	1.17	1.63
	Total electricity generation	million m^3	0.537	0.923	1.09	1.17	1.63
	Total	**million m^3**	**0.537**	**0.923**	**1.09**	**1.17**	**1.63**
EN21 Conventional polluting load in waste waters discharged by installations							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	0	169	229	175	135
	in some plants with an overall capacity of	MW	0	870	870	798	798
	Total electricity generation	kg	0	169	229	175	135
	Total	**kg**	**0**	**169**	**229**	**175**	**135**
Total nitrogen (expressed as N)	thermal generation	kg	0	536	726	954	310
	in some plants with an overall capacity of	MW	0	870	870	798	798
	Total electricity generation	kg	0	536	726	954	310
	Total	**kg**	**0**	**536**	**726**	**954**	**310**
Total phosphorus (expressed as P)	thermal generation	kg	0	117	118	284	229
	in some plants with an overall capacity of	MW	0	870	870	798	798
	Total electricity generation	kg	0	117	118	284	229
	Total	**kg**	**0**	**117**	**118**	**284**	**229**
COD	thermal generation	kg	0	9,000	44,550	38,635	74,428
	in some plants with an overall capacity of	MW	0	870	3,194	3,122	3,122
	Total electricity generation	kg	0	9,000	44,550	38,635	74,428
	Total	**kg**	**0**	**9,000**	**44,550**	**38,635**	**74,428**
BOD	thermal generation	kg	0	1,815	2,457	3,518	11,895
	in some plants with an overall capacity of	MW	0	870	870	798	798
	Total electricity generation	kg	0	1,815	2,457	3,518	11,895
	Total	**kg**	**0**	**1,815**	**2,457**	**3,518**	**11,895**
EN22 Non-hazardous special waste							
	production						
	electricity generation	t	670	834	1,552	34,037	69,489
	electricity distribution	t	1,401	213	146	406	265
	various activities	t	0	0	0	6.25	0
	Total	**t**	**2,071**	**1,048**	**1,699**	**34,449**	**69,754**
	delivery to recovery operators						
	electricity generation	t	1.12	2.15	2.33	641	1.06
	electricity distribution	t	763	103	106	406	0
	Total	**t**	**764**	**105**	**109**	**1,047**	**1.06**

	Source		2008	2009	2010	2011	2012
EN22 **Hazardous special waste**							
Oil flyash	thermal generation						
	production	t	0	0	0	0	26.4
Other							
production	electricity generation	t	679	300	329	1,019	721
	electricity distribution	t	537	220	63.6	244	181
	Total	**t**	**1,216**	**520**	**393**	**1,263**	**901**
	of which with PCBs						
	electricity generation	*t*	*35.9*	*49.6*	*62*	*48.8*	*90.7*
	electricity distribution	*t*	*316*	*194*	*56.4*	*198*	*181*
	Total	**t**	**352**	**243**	**118**	**247**	**271**
delivery to recovery operators	electricity generation	t	36.2	43.6	43.2	260	15.6
	electricity distribution	t	128	75	20.7	213	0
	Total	**t**	**164**	**119**	**63.9**	**473**	**15.6**
	of which with PCBs						
	electricity generation	*t*	*35.9*	*43.4*	*43*	*30.3*	*15.6*
	electricity distribution	*t*	*125*	*73*	*20.7*	*167*	*0*
	Total	***t***	***161***	***116***	***63.7***	***197***	***15.6***
Total							
production	electricity generation	t	679	300	329	1,019	747
	electricity distribution	t	537	220	63.6	244	181
	Total	**t**	**1,216**	**520**	**393**	**1,263**	**928**
delivery to recovery operators	electricity generation	t	36.2	43.6	43.2	260	15.6
	electricity distribution	t	128	75	20.7	213	0
	Total	**t**	**164**	**119**	**63.9**	**473**	**15.6**
EN22 **Total special waste**							
production	electricity generation	t	1,349	1,135	1,882	35,056	70,236
	electricity distribution	t	1,938	433	210	650	446
	various activities	t	0	0	0	6.25	0
	Total	**t**	**3,287**	**1,568**	**2,091**	**35,712**	**70,682**
delivery to recovery operators	electricity generation	t	37.3	45.8	45.5	901	16.6
	electricity distribution	t	891	178	127	618	0
	Total	**t**	**928**	**224**	**172**	**1,520**	**16.6**

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN29 Land								
LV cable lines								
overhead	% of entire LV grid	44.9	45.5	45.5	45.3	45.3	0.9	0
underground	% of entire LV grid	37.6	37.6	37.8	37.7	37.7	0.3	0
Total cable lines	**% of entire LV grid**	**82.5**	**83.2**	**83.2**	**83.1**	**83.1**	**0.7**	**0**
MV cable lines								
overhead	% of entire MV grid	1.37	1.69	1.68	1.66	1.66	21.2	0
underground	% of entire MV grid	54.2	54.5	54.7	54.8	54.8	1.1	0
Total cable lines	**% of entire MV grid**	**55.6**	**56.2**	**56.3**	**56.5**	**56.5**	**1.6**	**0**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	73.1	73.7	73.7	73.6	73.7	0.8	0.1
Resource conservation and quality								
EN1 EN3 Net heat rate of simple thermal generation	kcal/kWh	1,951	1,924	1,988	2,008	1,913	-1.9	-4.7
EN4 Electricity consumption for distribution grid operation	% electricity distributed	0.117	0.136	0.157	0.194	0.197	68.4	1.5
EN8 Net specific requirements of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	0.189	0.223	0.217	0.196	0.221	16.9	12.8
excluding contribution of as-is sea water	liters/kWh	0.189	0.223	0.217	0.196	0.221	16.9	12.8
Net specific consumption of water for industrial uses	liters/kWh	0.163	0.169	0.177	0.166	0.18	10.4	8.4
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**
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	17.5	14.2	17.7	18.4	21.7	24	17.9
gas oil	% of total fuel consumption	10.7	5.77	13.4	12.5	7.88	-26.4	-37
natural gas	% of total fuel consumption	71.8	80	68.9	69.2	70.4	-1.9	1.7
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	80.5	80.2	83.7	79	86.3	7.2	9.2
of which in combined-cycle units	*% of total natural gas consumption*	*78.6*	*79.4*	*83.7*	*78.8*	*85.9*	*9.3*	*9*
natural gas, non-technologically captive use	% of total natural gas consumption	19.5	19.8	16.3	21	13.7	-29.7	-34.8
Electricity generation from renewables								
hydro from natural flows	% total generation	13.5	23.9	18.6	15.1	18.4	36.3	21.9
Total	**% total generation**	**13.5**	**23.9**	**18.6**	**15.1**	**18.4**	**36.3**	**21.9**
Specific emissions into the atmosphere								
EN20 SO_2 (simple thermal generation)	g/kWh thermal net	0.462	0.309	0.414	0.543	0.387	-16.2	-28.7
EN20 NO_x (simple thermal generation)	g/kWh thermal net	0.636	0.596	0.879	1.04	0.913	43.6	-12.2
EN20 Particulates (simple thermal generation)	g/kWh thermal net	0.028	0.013	0.02	0.024	0.015	-46.4	-37.5
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	503	484	506	513	497	-1.2	-3.1
EN20 SO_2 (total from simple thermal generation)	g/kWh total net	0.399	0.235	0.337	0.461	0.316	-20.8	-31.5
EN20 NO_x (total from simple thermal generation)	g/kWh total net	0.55	0.453	0.715	0.879	0.745	35.5	-15.2
EN20 Particulates (total from simple thermal generation)	g/kWh total net	0.024	0.01	0.017	0.021	0.012	-50	-42.9
EN16 CO_2 (total from simple thermal generation)	g/kWh total net	435	368	412	435	405	-6.9	-6.9
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.2	0.729	0.344	0.497	1.15	475	131.4

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
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	0.044	0.045	0.034	0.035	-	2.9
Total nitrogen (expressed as N)	mg/kWh thermal net	0	0.139	0.143	0.185	0.079	-	-57.3
Total phosphorus (expressed as P)	mg/kWh thermal net	0	0.03	0.023	0.055	0.059	-	7.3
COD	mg/kWh thermal net	0	2.34	3.41	2.85	6.04	-	111.9
BOD	mg/kWh thermal net	0	0.471	0.485	0.684	3.04	-	344.4
EN22 **Specific waste production**								
Oil flyash (thermal generation)	g/kWh net from fuel oil & gas-oil	0	0	0	0	0.009	-	-
Oil bottom ash (thermal generation)	g/kWh net from fuel oil & gas-oil	0	0	0	0	0.009	-	-
EN22 **Waste recovery**								
Other non-hazardous special waste								
electricity generation	% of production	0.167	0.257	0.15	1.88	0.002	-98.8	-99.9
electricity distribution	% of production	54.5	48.3	72.6	100	0	-100	0
Total	**% of production**	**36.9**	**10**	**6.39**	**3.04**	**0.002**	**-100**	**-99.9**
Other hazardous special waste								
electricity generation	% of production	5.33	14.5	13.1	25.5	2.16	-59.5	-91.5
electricity distribution	% of production	23.8	34.1	32.6	87.1	0	-100	0
Total	**% of production**	**13.5**	**22.8**	**16.3**	**37.4**	**1.73**	**-87.2**	**-95.4**
Total special waste								
electricity generation	% of production	2.77	4.03	2.42	2.57	0.024	-99.1	-99.1
electricity distribution	% of production	46	41.1	60.5	95.2	0	-100	0
Total	**% of production**	**28.2**	**14.3**	**8.25**	**4.26**	**0.024**	**-99.9**	**-99.4**

Highlights of 2012

EN1 EN3 The fuel mix changed in favor of oil (+~3.4%) and natural gas (+~1.3%) to the expense of gas oil (-~4.7%). The contribution of renewables (hydro) in 2012 was up by approximately 400 GW, reaching more than 18% of total generation (over 3 percentage points more than in 2011). A small share of biomass entered the fuel mix (see EN26).
Higher generation by the more efficient gas-fired plants and higher weight of hydro in total generation gave rise to the following improvements.

EN16 Net specific emissions of CO_2, referred to total electricity generation, were down by 30 g/kWh (-6.9%).

EN20 Net specific emissions of macro-pollutants, referred to total electricity generation, were down by ~32% (SO_2), ~15% (NO_x) and ~43% (particulates).

In Argentina, Enel operates through Endesa (thermal and hydro power generation, electricity distribution and sale).

EN18 CO_2 emissions displaced by hydro generation were equal to approximately 1.4 million tonnes (about 13% more than in the previous year) thanks to higher generation from renewables.

EN19 Ozone-depleting substances:

Freon
Emission: **546 kg, equivalent to 436.8 kg of CFC11**, determined on the basis of gas replenishments in air conditioning systems.

EN22 The value of non-hazardous waste production in 2012 is affected by the higher amount of sludges removed by dredging. The high value of 2011 as against previous years is justified by the fact that this activity was not carried out prior to 2011.

EN26 Environmental enhancements.

Materials and resources

> Thermal plant of Costanera (Buenos Aires): installation of STEP and VACE systems for direct and indirect efficiency control, with a view to lowering the consumption of fuel per kWh generated.

Water

> Thermal plant of Costanera: installation of a new water demineralization system (rated output: 150 m^3/hour), which is very efficient in terms of consumption of reagents.

Emissions

> Buenos Aires thermal plant: a system injecting water into the combustion chamber was developed to hold down NO_x.

Waste waters

> Thermal plant of Costanera: retrofits of tubes, pipes and pumps made it possible to collect and thus better control all waste waters.

Noise

> Edesur - electricity distribution: particularly noisy high-voltage transformer fans were replaced.

> Thermal plant of Costanera: silencers are being installed to mitigate noise peaks in steam-turbine units.

Renewables

> Thermal plant of Costanera: experimental use of biodiesel (7%) began in 2012.

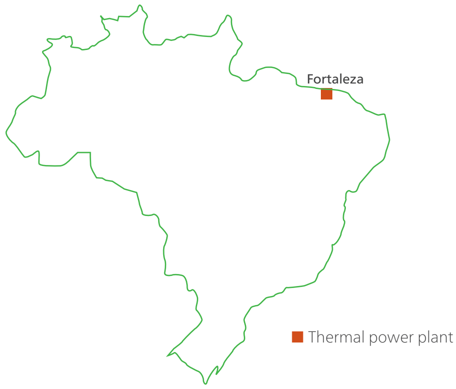
Other

> Edesur - electricity distribution: internal and external campaign to raise awareness of the need for saving energy and water and for improving waste management; participation in studies on the deployment of electric-car infrastructures.

Brazil

Thermal power generation

Endesa SA



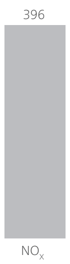
The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
1	317	1,454

Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Combined-cycle gas turbines	1	3	317
	1	**3**	**317**

Emissions into the atmosphere



Emissions into the atmosphere

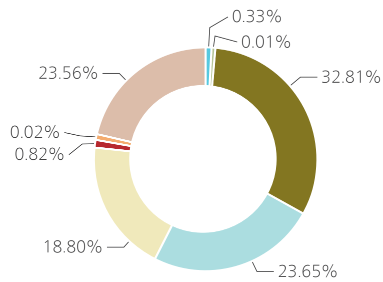
CO_2 (t)	490,520
from combustion	*490,520*
Total (t of CO_2 equivalent)	490,520

Fuel consumption

Total: 252,000 t of oil equivalent

Expendables

Total: 140.08 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

Net electricity generation

Total: 1,454 million kWh

Water for industrial uses

Total requirements: 1,878,790 m^3

Total abstraction from inland waters: 1,878,790 m^3

Waste waters

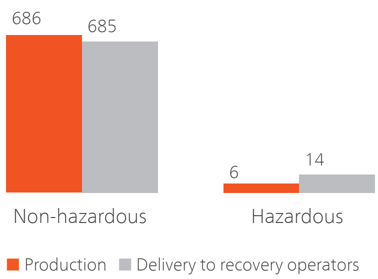
Discharged: 369,940 m^3

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

Special waste

Total production: **692 t**

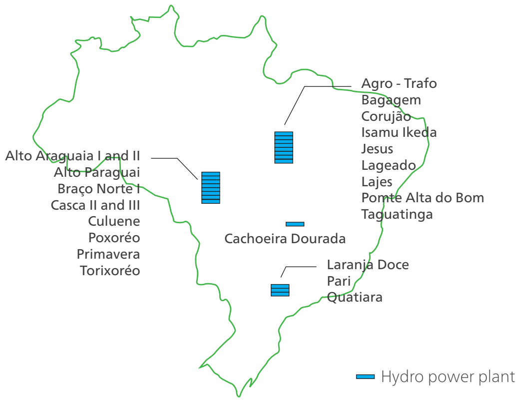
Total delivery to recovery operators: **699 t**



Brazil

Hydro power generation

Endesa SA
Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
21	748	4,234

Power installations

	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	**21**	**11**	**748**

All the power plants are ISO 14001-certified.

Equivalent yearly hours of utilization*

Hydro: **5,663 ore**

* Yearly generation/capacity ratio. For Endesa generation is considered to refer to the entire year.

Gas oil

Total consumption: **1 toe**

Expendables

Total: **14.06 t**

Net electricity generation

Total: **4,234 million kWh**

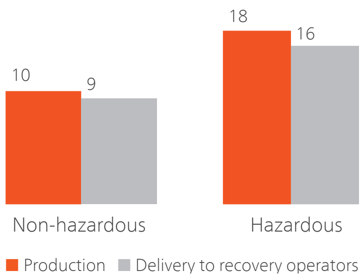
Avoided CO_2 emissions

Due to hydro generation from natural flows: **1,427,913 t**

Emissions from the otherwise necessary fossil-fired thermal generation.

Special waste

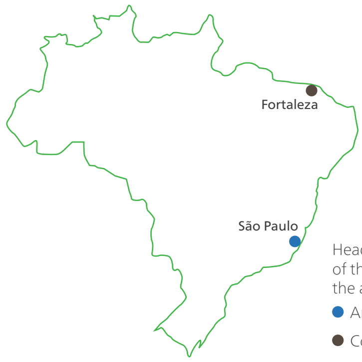
Total production: **29 t**
Total delivery to recovery operators: **25 t**



Brazil

Electricity distribution

Endesa SA



Headquarters of the companies of the Group which carry out the activity
- Ampla
- Coelce

The Numbers

Substations	Capacity (MVA)	Total lines (km)
242,050	14,307	189,468

Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	219	7,008
MV/LV	241,831	7,299
	242,050	**14,307**

LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	8,397	-	-	**8,397**
MV	113,506	1,693	54	**115,523**
LV	39,309.118	26,334.188	174.694	**65,818**
	161,212.118	**28,027.188**	**228.694**	**189,468**

The organization has an ISO 14001-certified environmental management system in place.

General data

Municipalities served: **250**

Surface area served: **32,763.83 km^2**

Customers connected to the grid: **5,971,287** (of which supplied by companies of the Group: **5,971,202**)

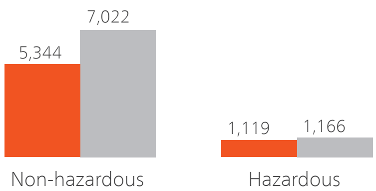
Resource consumption

Expendables: **832.8 t**

Special waste

Total production: **6,463 t**

Total delivery to recovery operators: **8,187 t**



Electricity

Total electricity distributed: **18,000 million kWh**

Own consumption for grid operation: **36 million kWh**

Emissions into the atmosphere

SF_6: **58.4 kg** (1,295 t of CO_2 equivalent)

CO_2: **18,173 t**

Total greenhouse gases: **19,468** t of CO_2 equivalent

Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants	**no.**	**22**	**22**	**22**	**22**	**22**
thermal	no.	1	1	1	1	1
hydro	no.	21	21	21	21	21
Net maximum electrical capacity	**MW**	**754**	**1,064**	**1,050**	**1,066**	**1,064**
thermal	MW	216	313	307	317	317
hydro	MW	539	752	743	749	748
Power lines (circuit-length)						
Total	**km**	**111,137**	**176,404**	**180,389**	**184,688**	**189,468**
high-voltage	km	4,410	8,081	8,120	8,273	8,397
medium-voltage	km	67,032	106,881	109,810	112,841	115,253
low-voltage	km	39,695	61,443	62,458	63,575	65,818
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	na	na	na	584	467
special vehicles	no.	na	na	na	na	2
vehicles for both private and service use	no.	na	na	na	na	425
Gross real-estate surface area	thousand m^2	na	na	na	38,462	38,462

Resources

		2008	2009	2010	2011	2012
EN1 EN3 **Fossil fuels**						
Thermal generation						
gas oil	thousand t	0.001	0.001	0	0	0
	thousand toe	0	0.001	0	0	0
natural gas	million m^3	11.7	108	344	218	293
	thousand toe	10.1	91.1	293	187	252
technologically captive use	*million m^3*	*11.7*	*108*	*344*	*218*	*293*
	thousand toe	*10.1*	*91.1*	*293*	*187*	*252*
of which in combined-cycle units	million m^3	11.7	108	344	218	293
	thousand toe	10.1	91.1	293	187	252
Total	**thousand toe**	**10.1**	**91.1**	**293**	**187**	**252**
	TJ	**422**	**3,814**	**12,280**	**7,839**	**10,551**
Real-estate & service management	thousand toe	0.001	0.001	0.002	1.35	1.66
Grand total	**thousand toe**	**10.1**	**91.1**	**293**	**189**	**254**
	TJ	**422**	**3,814**	**12,280**	**7,895**	**10,620**
EN4 **Primary electricity**						
Real-estate & service management	million kWh	na	na	na	21.6	27
EN8 **Water for industrial uses**						
From rivers (including meteoric waters from secondary rainfall)	million m^3	0.138	0.665	2.21	1.28	1.88
EN8 EN21 **Open-cycle cooling water**						
For thermal generation	million m^3	122	0	0	0	0
Water for non-industrial uses						
Real-estate & service management	million m^3	na	na	na	0.098	0.092
EN1 **Expendables**						
Resins	t	0	3.8	0	3.8	0.25
Hydrazine	t	0	0.232	0.237	0.108	0.2
Carbohydrazide	t	0	0.05	0.237	0.06	0.01
Ammonia	t	0	0.17	0.172	0.023	0.01
Sodium hypochlorite	t	27.5	16.1	40.8	21.4	29.2

		2008	2009	2010	2011	**2012**
Ferrous sulfate	t	0	0	11.2	8.04	16.6
Trisodium phosphate	t	0.05	0.292	0.547	0.236	0.19
Polyelectrolyte	t	0.166	0.26	1.01	0.669	1.15
Sulfuric & hydrochloric acids	t	23.6	17	21.5	18.4	33.1
Caustic soda	t	20.3	23.3	25.6	18.9	26.3
Lubricating oil	t	42.6	20.8	20.5	23.2	14.1
Dielectric oil	t	89.4	217	526	320	833
Printing paper	t	0	0	0	47.1	73.7
Other	t	3.16	2	41	22.6	33
Total	**t**	**207**	**301**	**689**	**485**	**1,061**
for thermal generation	t	72.1	61.5	141	93.3	140
for hydro generation	t	26.6	24	21.6	31.4	14.1
for electricity distribution	t	108	216	526	313	833
EN1 **PCB survey**						
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding oil)	t	na	na	48.5	340	67.5
Oil with PCBs >50 ppm and ≤ 500 ppm contained in equipment & transformers	t	na	na	7.16	13.2	24

Processes and products

		2008	2009	2010	2011	**2012**
Electricity generation (net)						
From fossil fuels	**million kWh**	**54.3**	**500**	**1,665**	**1,033**	**1,454**
fuel oil & gas oil	million kWh	0	0.002	0	0	0.002
natural gas	million kWh	54.3	500	1,665	1,033	1,454
of which in combined-cycle units	*million kWh*	*54.3*	*500*	*1,665*	*1,033*	*1,454*
From renewables	**million kWh**	**2,726**	**3,369**	**3,950**	**3,658**	**4,234**
hydro from natural flows	million kWh	2,726	3,369	3,950	3,658	4,234
Total	**million kWh**	**2,781**	**3,869**	**5,615**	**4,691**	**5,688**
simple	million kWh	2,781	3,869	5,615	4,691	5,688
Electricity distribution						
Electricity distributed	million kWh	13,413	17,254	18,777	16,797	18,000
EN4 Electricity consumption for grid operation	million kWh	na	11	34.6	34.6	36

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 NO_x	thermal generation	thousand t	0.011	0.192	0.19	0.233	0.396
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	18.9	177	563	358	491
	Total fossil-fired thermal generation	thousand t	18.9	177	563	358	491
	Total from thermal generation	thousand t	18.9	177	563	358	491
	various activities	thousand t	0.763	0	0.013	3.27	23.2
	Total	**thousand t**	**19.6**	**177**	**563**	**361**	**514**
EN16 SF_6	electricity generation	kg	0	4	6	0	1.1
	electricity distribution	kg	60.9	94.8	97.5	33.7	58.4
	Total	**kg**	**60.9**	**98.8**	**104**	**33.7**	**59.5**
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		**thousand t of CO_2 equivalent**	**21**	**179**	**565**	**362**	**515**
EN18 Avoided CO_2 emissions							
Due to hydro generation from natural flows		thousand t	947	1,193	1,336	1,266	1,428
Total		thousand t	947	1,193	1,336	1,266	1,428
EN21 Waste waters (discharged quantity)	thermal generation	million m^3	0.053	0.175	0.415	0.253	0.37
EN21 Conventional polluting load in waste waters discharged by installations							
Total nitrogen (expressed as N)	thermal generation	kg	na	75.3	373	179	333
	in some plants with an overall capacity of	MW	na	322	322	322	322
	Total electricity generation	kg	na	75.3	373	179	333
	Total	**kg**	na	**75.3**	**373**	**179**	**333**
COD	thermal generation	kg	na	68.8	43,763	20,660	272,582
	in some plants with an overall capacity of	MW	na	322	322	322	322
	Total electricity generation	kg	na	68.8	43,763	20,660	272,582
	Total	**kg**	na	**68.8**	**43,763**	**20,660**	**272,582**
BOD	thermal generation	kg	na	55.3	24,230	9,607	150,099
	in some plants with an overall capacity of	MW	na	322	322	322	322
	Total electricity generation	kg	na	55.3	24,230	9,607	150,099
	Total	**kg**	**na**	**55.3**	**24,230**	**9,607**	**150,099**
EN22 Non-hazardous special waste							
production	electricity generation	t	153	196	645	566	696
	electricity distribution	t	431	2,052	5,852	10,660	8,482
	various activities	t	0	0	0	0	2.6
	Total	**t**	**584**	**2,248**	**6,497**	**11,226**	**9,181**
delivery to recovery operators	electricity generation	t	6.47	114	6.32	49.3	694
	electricity distribution	t	318	2,700	5,629	5,252	11,837
	Total	**t**	**325**	**2,814**	**5,636**	**5,301**	**12,531**
EN22 Hazardous special waste							
production	electricity generation	t	33.3	9.21	20.5	37.5	24
	electricity distribution	t	173	619	1,111	150	19,680
	various activities	t	0	0	0	456	2.32
	Total	**t**	**207**	**629**	**1,132**	**643**	**19,706**
	of which with PCBs electricity generation	t	6.16	6.35	1.08	5.64	9.01
	electricity distribution	t	82.2	204	364	25.2	349
	various activities	t	0	0	0	0	0.88
	Total	**t**	**88.4**	**210**	**365**	**30.9**	**359**

	Source		2008	2009	2010	2011	2012
delivery to recovery operators	electricity generation	t	17.2	11.3	0.43	19.4	30.4
	electricity distribution	t	82.2	143	1,111	280	19,774
	Total	**t**	**99.4**	**155**	**1,112**	**299**	**19,805**
	of which with PCBs						
	electricity generation	t	6.16	2.92	0	5.64	7.15
	electricity distribution	t	82.2	3.86	364	25.2	348
	Total	**t**	**88.4**	**6.78**	**364**	**30.9**	**355**
EN22 Total special waste							
production	electricity generation	t	187	205	665	603	720
	electricity distribution	t	604	2,671	6,964	10,810	28,162
	various activities	t	0	0	0	456	4.92
	Total	**t**	**790**	**2,877**	**7,629**	**11,869**	**28,887**
delivery to recovery operators	electricity generation	t	23.7	125	6.75	68.7	725
	electricity distribution	t	400	2,844	6,741	5,532	31,611
	Total	**t**	**424**	**2,969**	**6,747**	**5,600**	**32,335**

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN29 Land								
LV cable lines								
overhead	% of entire LV grid	15.1	15.3	15.2	15	40	164.9	166.7
underground	% of entire LV grid	0.043	0.093	0.049	0.03	0.265	516.3	783.3
Total cable lines	**% of entire LV grid**	**15.2**	**15.4**	**15.2**	**15**	**40.3**	**165.1**	**168.7**
MV cable lines								
overhead	% of entire MV grid	0.965	0.951	0.941	0.05	1.47	52.3	2,840
underground	% of entire MV grid	0.052	0.055	0.056	0.005	0.047	-9.6	840
Total cable lines	**% of entire MV grid**	**1.02**	**1.01**	**0.997**	**0.055**	**1.52**	**49**	**2,663.6**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	6.04	6	5.91	5.19	14.9	146.7	187.1
Resource conservation and quality								
EN1 EN3 Net heat rate of thermal generation	kcal/kWh	1,855	1,823	1,762	1,812	1,733	-6.6	-4.4
EN4 Electricity consumption for distribution grid operation	% electricity distributed	0	0.064	0.184	0.206	0.2	-	-2.9
EN8 Net specific requirements of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	2.54	1.33	1.33	1.24	1.29	-49.2	4
excluding contribution of as-is sea water	liters/kWh	2.54	1.33	1.33	1.24	1.29	-49.2	4
Net specific consumption of water for industrial uses	liters/kWh	0.05	0.172	0.394	0.272	0.33	560	21.3
EN8 Coverage of requirements of water for industrial uses								
From rivers (including meteoric waters from secondary rainfall)	% of requirements	100	100	100	100	100	0	0
EN1 EN3 Fossil fuel consumption for thermal generation								
gas oil	% of total fuel consumption	0	0.001	0	0	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	% total generation	98	87.1	70.3	78	74.4	-24.1	-4.6
Specific emissions into the atmosphere								
EN20 NO_x (simple thermal generation)	g/kWh thermal net	0.203	0.384	0.114	0.225	0.272	34	20.9
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	347	354	338	346	337	-2.9	-2.6
EN20 NO_x (total from simple thermal generation)	g/kWh total net	0.004	0.05	0.034	0.05	0.07	1,650	40
EN16 CO_2 (total from simple thermal generation)	g/kWh total net	6.78	45.7	100	76.3	86.2	1,171.4	13
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	4.56	3.05	1.89	1.08	1.51	-66.9	39.8

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Net specific conventional polluting load of waste waters discharged by plants (thermal generation)								
Total nitrogen (expressed as N)	mg/kWh thermal net	na	0.151	0.218	0.172	0.228	na	32.6
COD	mg/kWh thermal net	na	0.138	25.6	19.8	186	na	839.4
BOD	mg/kWh thermal net	na	0.111	14.2	9.21	103	na	1,018.3
EN22 **Waste recovery**								
Other non-hazardous special waste								
electricity generation	% of production	4.23	58.1	0.98	8.72	99.7	2,264	1,047
electricity distribution	% of production	73.9	132	96.2	49.3	140	77.3	166
Total	**% of production**	**55.6**	**125**	**86.7**	**47.2**	**136**	**124.8**	**164.8**
Other hazardous special waste								
electricity generation	% of production	51.7	123	2.1	51.7	126	143.7	143.7
electricity distribution	% of production	47.5	23.1	100	187	104	119	-44.4
Total	**% of production**	**48.1**	**24.6**	**98.2**	**46.6**	**100**	**107.9**	**114.6**
Total special waste								
electricity generation	% of production	12.7	61	1.01	11.4	100	267.7	309.6
electricity distribution	% of production	66.3	106	96.8	51.2	112	68.9	118.8
Total	**% of production**	**53.6**	**103**	**88.4**	**47.2**	**112**	**103.4**	**130.9**

Highlights of 2012

In Brazil, Enel operates through Endesa (thermal and hydro power generation, electricity distribution and sale) and Enel Green Power (hydro power generation).

EN1 EN3 The net heat rate of thermal generation in 2012 was back in line with its value in 2010, testifying a more regular operation.
Overall generation was up by about 1 TWh (+~600 GWh by hydro plants and +~400 GWh by thermal plants).

EN5 EN6 EN18 Through its Enel Brasil Participações subsidiary, Enel Green Power commenced the construction of three wind farms in the State of Bahia.
The new Cristal, Primavera and São Judas plants, all located in the same area of the State of Bahia, will have a total installed capacity of about 90 MW.

EN16 Owing to the better heat rate, net specific emissions of CO_2 from thermal generation, referred to total electricity generation, were down by 9 g/kWh (-~2.6%).

EN20 A temporarily inefficient combustion process followed combustion-chamber maintenance jobs. This fact worsened net specific emissions of NO_x (+~21%).

EN18 CO_2 displaced by electricity generation from renewables amounted to roughly 1.4 million tonnes.

EN19 Ozone-depleting substances:

HCFCs
Emission: **214.53 kg, equivalent to 10.7 kg of CFC11**.

R22

Emission: 146 kg, equivalent to 8 kg of CFC11.

Freon

Emission: 367.5 kg, equivalent to 294 kg of CFC11.

All emissions are determined on the basis of gas replenishments in air conditioning systems. The electricity distribution companies Ampla and Coelce launched a program of replacement of low-efficiency refrigerators and other household appliances, with a view to eliminating emissions of ozone-depleting substances at customers' premises.

EN23 Spills

1.5 m^3 of oil spilled from the Itamaratí substation (Petrópolis, State of Rio de Janeiro) owing to a fire of two voltage regulators. The rehabilitation process was completed in accordance with the applicable environmental management system. Rehabilitation works produced about 38 t of waste items (oil-contaminated earth, rocks and absorbent material), which were delivered to an authorized operator. Before and during intervals in the process, the area affected by the oil spill was covered with insulation blankets to prevent soil contamination upon rainfall.

EN29 Increased percentage of insulated cables in LV lines (from 15% to 40% in 2012).

EN26 Environmental enhancements.

Materials and Resources

> Cachoeira Dourada hydro plant (State of Goias): constant maintenance to prevent oil spills and leaks; control of consumption of dielectric oil and lubricant.

> Fortaleza thermal plant (State of Ceara): under the environmental management system, a study was initiated to define criteria for environmentally sustainable goods and services to be included in purchase orders and, consequently, to induce suppliers' compliance with such criteria.

> Ampla: energy-saving awareness campaign in installation sites and offices.

> Enel Green Power: in construction sites, use of minerals (gravel, sand, etc.) with environmental certification.

Water

> Electricity generation and distribution (Ampla): under the environmental management systems, awareness campaigns were conducted with a view to cutting water consumption in various processes, installation sites and offices.

> Cachoeira Dourada hydro plant: program of optimization of water consumption by reducing, among others, turbined water.

> Fortaleza thermal plant: awareness campaigns to reduce water consumption and losses.

Emissions

> Electricity distribution (Ampla and Coelce): every year, exhaust gases from transport vehicles are measured and vehicles not complying with the applicable limits are overhauled. The companies also check emissions generated by suppliers and keep the greenhouse-gas inventory updated: SF_6-containing equipment is weekly inspected for leaks so as to prevent releases into the atmosphere.

> Cachoeira Dourada hydro plant: program to eliminate SF_6 leaks; promotion of the use of ethanol in the vehicles used.

> Fortaleza thermal plant: on-line monitoring of pollutant concentrations in flue gases; recorded values were always compliant with those prescribed by the legislation in force.

Waste waters

> Cachoeira Dourada hydro plant: monitoring of the quality of waste waters (mostly from plumbing systems) and their treatment.

> Fortaleza thermal plant: monitoring and complete characterization of waste waters; the recorded values of the main pollution parameters were always compliant with those mandated by law.

> Ampla: construction of oil collection pits and trenches in some substations.

> Enel Green Power: purchase of systems to treat waste waters from hydro plants.

Renewables

> Through its Enel Brasil Participações subsidiary, Enel Green Power commenced the construction of three wind farms in the State of Bahia.

> The new Cristal, Primavera and São Judas plants, all located in the same area of the State of Bahia, will have a total installed capacity of about 90 MW.

Noise

> Electricity distribution (Ampla and Coelce): substation-noise monitoring surveys are carried out at least once in the period of validity of the environmental permit; results confirmed compliance with the applicable limits.

> Electricity generation: checking of compliance of all power plants with the applicable limits.

Waste

> Ecoelce project: the project follows up an investigation conducted on 184 low-income communities in the metropolitan area of Fortaleza. The investigation revealed: dumping of most of the garbage into the environment; high levels of insolvency in bill payment and thefts of electricity; consequent inefficient and wasteful use of electricity. To redress the situation while safeguarding the environment, Coelce put in place a scheme encouraging customers to return recyclable municipal waste in exchange for discounts on electricity bills. Customers joining the scheme receive a card to be presented whenever they bring their waste to one of the special collection centers; here, through an appropriate information system, assistants record the delivered waste

and the customer's credit (determined on the basis of the current value of the delivered materials) on the card and issue a receipt. At the end of the electricity invoicing period, Coelce issues an already discounted bill or a credit memo to the customer.

> Cachoeira Dourada hydro plant: under the waste management program, hazardous waste items are delivered to companies specializing in their treatment and final disposal.
> Fortaleza thermal plant: separate collection and management of hazardous waste.
> Ampla: construction of sites for storage of separately-collected waste near some substations.
> Enel Green Power: construction of adequate sites for temporary storage of waste in hydro power plant areas.

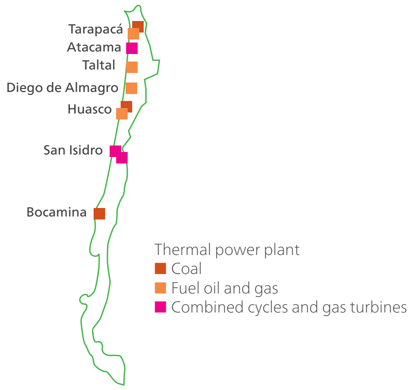
Other

> Enel Green Power: revamping of tanks for storage of chemicals in hydro plant sites.
> Smart City: inauguration of the monitoring, research and control center of *Cidade Inteligente Búzios*, the first smart city in Latin America.
> *Cidade Inteligente Búzios* is a strategic three-year project with a planned investment of over € 15 million. The project is expected to apply the most advanced smart technologies developed by the Enel Group: remote management systems, efficient public lighting, grid automation, efficient buildings and electric mobility. These solutions are bound to revolutionize the power distribution grid of Búzios through smart meters (enabling time-of-use rates) and an automatic monitoring & control system (ensuring the quality of electricity supply and the integration of renewables into the grid). In Búzios, the Enel Group is introducing Archilede LED systems (developed by Enel Sole) for high-efficiency street lighting, while the incentives associated with the Eco-Ampla program, as previously pointed out, allow customers to get discounts on their bills if they participate in waste recycling.

Chile

Thermal power generation

Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
11	2,371	8,820

Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Steam (condensing)	3	3	537
Combined-cycle gas turbines	3	10	1,316
Single-cycle gas turbines	5	9	518
	11	**22**	**2,371**

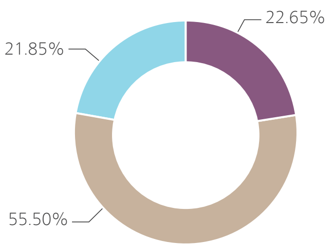
All the power plants (excluding Bocamina II power plant) are ISO 14001-certified.

Net electricity generation

Total: 8,820 million kWh

Net maximum electrical capacity

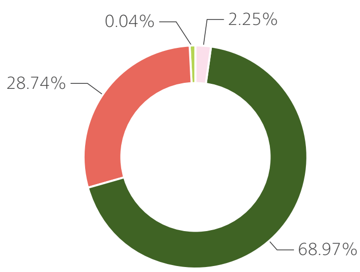
Total: 2,371 MW



- Steam (condensing)
- Combined-cycle gas turbines
- Single-cycle gas turbines

Fuel consumption

Total: 1,711,794 t of oil-equivalent



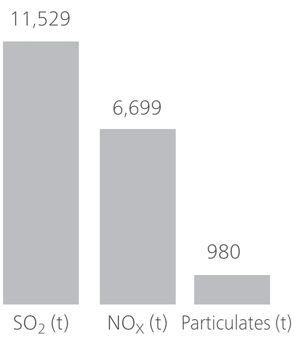
- Gas-oil
- Natural gas
- Coal
- Fuel oil

Waste waters

1,996,347 m^3

Discharged

Emissions into the atmosphere



Special waste

Total production: **92,898 t**

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

Non-hazardous

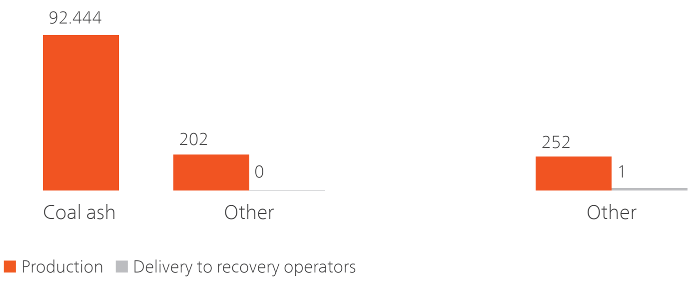
Production: 92,646 t

Delivery to recovery operators: 0 t

Hazardous

Production: 252 t

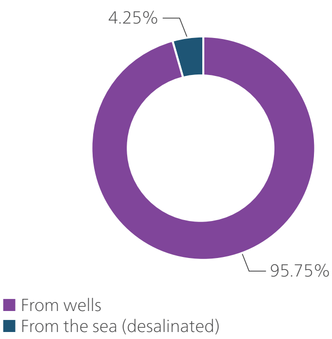
Delivery to recovery operators: 1 t



Water for industrial uses

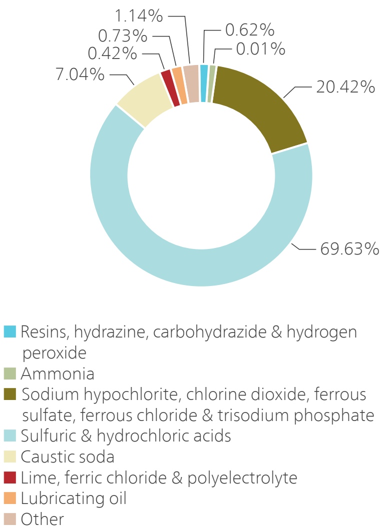
Total requirements: 6,146,260 m^3

Total abstraction from inland waters: 5,884,900 m^3



Expendables

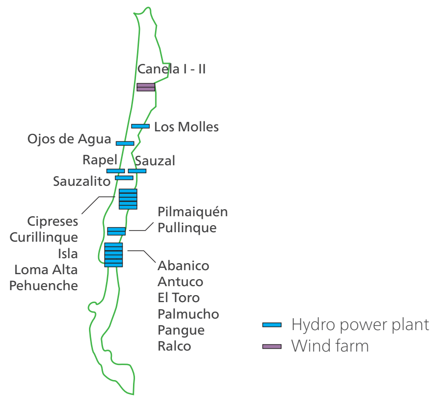
Total: 1,291.69 t



Chile

Hydro and wind power generation

Endesa SA
Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
20	3,626	11,786

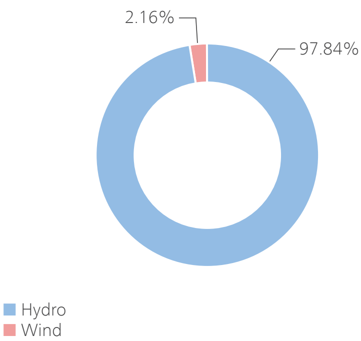
Power installations

HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	11	21	854
Pondage/reservoir	7	19	2,694
	18	**40**	**3,548**

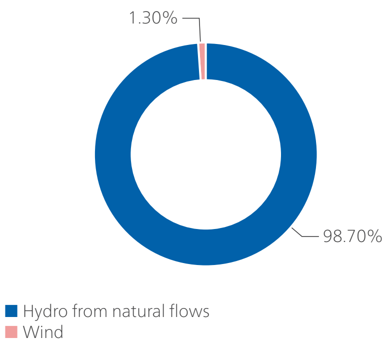
WIND	Power plants no.	Net maximum electrical capacity MW
	2	**78**

The hydro and wind power plants are ISO 14001-certified.

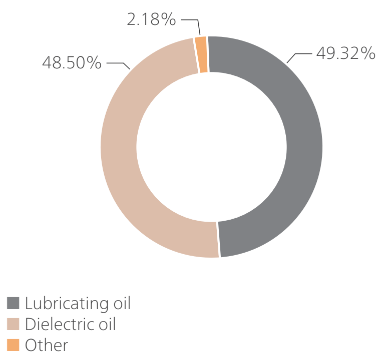
Net maximum electrical capacity
Total: 3,626.35 MW



Net electricity generation
Total: 11,785.61 million kWh



Expendables
Total: 39.05 t



Equivalent yearly hours of utilization*

3,278 hydro

1,963 wind

* Yearly generation/capacity ratio

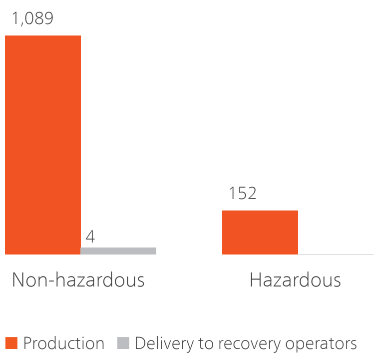
Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	6,355,453
Due to wind generation	83,839
Total	**6,439,292**

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.

Special waste

Total production: **1,241 t**
Total delivery to recovery operators: **4 t**



Chile

Electricity distribution

Endesa SA

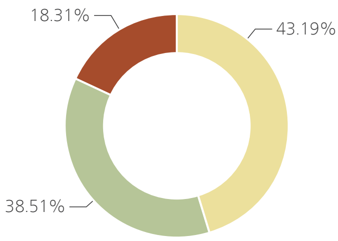
● Headquarters of the company of the Group which carries out the activity (Chilectra)

The Numbers

Substations
22,264

Capacity (MVA)
11,370

Total lines (km)
16,081



Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	51	7,418
MV/LV	22,210	3,922
MV/MV	3	30
	22,264	**11,370**

LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV (> 40 kVolt)	345	-	11	**356**
MV (1÷30 kVolt)	2,801	1,282	987	**5,070**
LV (380 Volt)	3,799	4,910	1,946	**10,655**
	6,945	**6,192**	**2,944**	**16,081**

The organization has an ISO 14001-certified environmental management system in place.

General data

Municipalities served: **33**

Surface area served: **2,118 km²**

Customers connected to the grid: **1,658,241** (of which supplied by companies of the Group: **1,658,238**)

Emissions into the atmosphere

SF_6: **14.5 kg (321 t of CO_2 equivalent)**

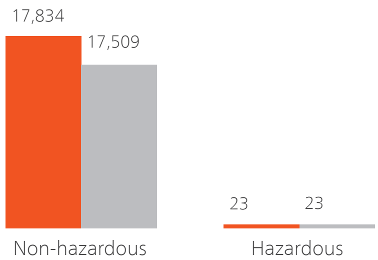
Electricity

Total electricity distributed: **12,484.89 million kWh**

Own consumption for grid operation: **12 million kWh**

Special waste

Total production: **17,856 t**
Total delivery to recovery operators: **17,532 t**



Environmental Results

Status data

		2008	2009	2010	2011	**2012**
Power-generating installations						
Power plants	no.	13	30	30	30	31
thermal	no.	10	10	10	10	11
hydro	no.	2	18	18	18	18
wind	no.	1	2	2	2	2
Net maximum electrical capacity	MW	3,632	5,461	5,679	5,647	5,997
thermal	MW	1,210	1,850	2,067	2,021	2,371
hydro	MW	2,410	3,534	3,535	3,548	3,548
wind	MW	12.2	77.2	77	78	78.2
Power lines (circuit-length)						
Total	km	10,049	15,155	15,155	15,824	16,081
high-voltage	km	238	355	355	355	356
medium-voltage	km	3,202	4,828	4,828	4,993	5,070
low-voltage	km	6,610	9,972	9,972	10,476	10,655
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	na	na	8	324	319
special vehicles	no.	na	na	2	2	9
vehicles for both private and service use	no.	na	na	3	9	90
Gross real-estate surface area	thousand m^2	na	na	0.388	51.1	50.6

Resources

		2008	2009	2010	2011	**2012**
EN1 EN3 **Fossil fuels**						
Thermal generation						
fuel oil	thousand t	42.6	11.2	0.09	0.696	3.31
	thousand toe	39.8	10.9	0.089	0.691	0.744
MS	*thousand t*	*0*	*0.004*	*0*	*0*	*0*
	thousand toe	*0*	*0.004*	*0*	*0*	*0*
LS	*thousand t*	*42.6*	*9.69*	*0*	*0*	*0*
	thousand toe	*39.8*	*9.4*	*0*	*0*	*0*
VLS	*thousand t*	*0*	*1.51*	*0.09*	*0.696*	*3.31*
	thousand toe	*0*	*1.5*	*0.089*	*0.691*	*0.744*
gas oil	thousand t	615	650	196	62.5	35.8
	thousand toe	560	674	199	60.7	38.4
natural gas	million m^3	140	366	1,192	1,320	1,386
	thousand toe	115	360	1,015	1,126	1,181
technologically captive use	*million m^3*	*140*	*366*	*1,192*	*1,320*	*1,386*
	thousand toe	*115*	*360*	*1,015*	*1,126*	*1,181*
of which in combined-cycle units	million m^3	121	288	1,098	1,240	1,127
	thousand toe	99	297	935	1,054	943
non-technologically captive use	*million m^3*	*0*	*0*	*0*	*0.079*	*0*
	thousand toe	*0*	*0*	*0.042*	*0.09*	*0*
coal	thousand t	510	756	476	718	823
	thousand toe	293	434	287	429	492
Total	thousand toe	1,007	1,479	1,501	1,616	1,712
	TJ	42,163	61,935	62,863	67,672	71,669
Various activities	thousand toe	0	0.002	0.027	0.529	0.792
Grand total	thousand toe	1,007	1,479	1,501	1,617	1,713
	TJ	42,163	61,935	62,864	67,694	71,703
EN4 **Primary electricity**						
Real-estate & service management	million kWh	na	na	0.142	17.5	15
EN8 **Water for industrial uses**						
From wells	million m^3	3.01	2.64	6.29	6.45	5.89
From aqueducts	million m^3	0	3.84	0	0	0
Total abstraction from inland waters	million m^3	3.01	6.48	6.29	6.45	5.89
From the sea (desalinated)	million m^3	0.373	0.587	0.598	0.543	0.261

		2008	2009	2010	2011	2012
EN10 From waste waters (used inside plants)	million m^3	0	0	0	0.14	0
Total requirement	**million m^3**	**3.39**	**7.07**	**6.89**	**7.14**	**6.15**
EN8 EN21 **Open-cycle cooling water**						
For thermal generation	million m^3	327	557	408	520	440
Water for non-industrial uses						
Real-estate & service management	million m^3	na	na	0.717	0.132	0.063
EN1 **Expendables**						
Resins	t	3.89	0.208	0	0	0
Hydrazine	t	5.56	3.31	7.65	8.13	7.98
Ammonia	t	1.81	0.827	0.474	0.328	0.165
Sodium hypochlorite	t	287	301	227	198	206
Ferrous sulfate	t	42	65.1	10.5	47.9	56.3
Trisodium phosphate	t	1.37	1.65	1.15	1.35	1.14
Lime	t	0.778	3.64	1.86	1.53	0.067
Ferric chloride	t	15.4	10.4	9.19	6.96	5.13
Polyelectrolyte	t	0.304	0.678	0.636	0.395	0.199
Sulfuric & hydrochloric acids	t	499	596	858	966	899
Caustic soda	t	212	253	110	108	90.9
Lubricating oil	t	10.7	27.7	69	30.9	28.6
Dielectric oil	t	3.49	357	11.9	60	43.6
Printing paper	t	0	0	0.412	2.35	0.417
Other	t	22.4	7.23	24.5	19.6	15.6
Total	**t**	**1,105**	**1,626**	**1,333**	**1,452**	**1,356**
for thermal generation	t	1,095	1,260	1,279	1,369	1,292
for hydro generation	t	9.7	365	47.4	50.9	38.9
for wind generation	t	0	0.465	3.77	0.612	0.199
for electricity distribution	t	1.17	0	2.18	29	24.7
EN1 **PCB survey**						
Equipment & transformers with PCBs > 500 ppm (excluding oil)	t	0	0.06	0	0.06	0.06
Oil with PCBs > 500 ppm contained in equipment & transformers	t	0	0	0.06	0	0
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding oil)	t	0	5.79	3.72	0	0
Oil with PCBs > 50 ppm and ≤ 500 ppm contained in equipment & transformers	t	0	5.21	1.48	0	0

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From fossil fuels	**million kWh**	**4,997**	**7,297**	**8,146**	**8,674**	**8,820**
fuel oil & gas oil	million kWh	3,114	3,282	1,034	224	103
natural gas	million kWh	687	2,189	5,890	6,630	6,381
of which in combined-cycle units	*million kWh*	*619*	*2,016*	*5,603*	*6,386*	*5,842*
coal	million kWh	1,196	1,826	1,221	1,820	2,337
From renewables	**million kWh**	**9,712**	**15,332**	**13,227**	**12,476**	**11,786**
hydro from natural flows	million kWh	9,691	15,275	13,084	12,344	11,632
wind	million kWh	20.4	57	143	132	153
Hydro from pumped storage	**million kWh**	**0**	**2.26**	**0**	**0**	**0**
Total	**million kWh**	**14,708**	**22,632**	**21,373**	**21,150**	**20,606**
Electricity distribution						
Electricity distributed	million kWh	8,937	12,585	13,098	11,958	12,485
EN4 Electricity consumption for grid operation	million kWh	0	12	7.86	11.6	12

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	10.5	10.9	7.36	9.85	11.5
EN20 NO_x	thermal generation	thousand t	7.49	8.45	6.57	6.93	6.7
EN20 Particulates	thermal generation	thousand t	0.531	1.14	1.32	1.58	0.98
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	3,595	4,663	4,128	4,599	4,819
	various activities	thousand t	0.395	0	0.144	1.6	2.46
	Total	**thousand t**	**3,596**	**4,663**	**4,128**	**4,600**	**4,822**
EN16 SF_6	electricity generation	kg	0	0	10.5	0	0.38
	electricity distribution	kg	0.335	6.7	113	13	14.5
	Total	**kg**	**0.335**	**6.7**	**124**	**13**	**14.8**
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		thousand t of CO_2 equivalent	3,596	4,663	4,131	4,601	4,822
EN18 Avoided CO_2 emissions							
Due to hydro generation from natural flows		thousand t	6,973	9,761	6,631	6,544	6,355
Due to wind and solar generation		thousand t	14.7	36.4	72.4	69.9	83.8
Due to generation from renewables		thousand t	6,988	9,798	6,704	6,614	6,439
Total		**thousand t**	**6,988**	**9,798**	**6,704**	**6,614**	**6,439**
EN21 Waste waters (discharged quantity)	thermal generation	million m^3	0.98	1.49	2.71	2.6	2
EN21 Conventional polluting load in waste waters discharged by installations							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	0	2,968	8,123	0	0
	in some plants with an overall capacity of	MW	0	128	128	0	0
Total nitrogen (expressed as N)	thermal generation	kg	0	266	0	0	0
	in some plants with an overall capacity of	MW	0	399	0	0	0
Total phosphorus (expressed as P)	thermal generation	kg	0	476	0	56	17.3
	in some plants with an overall capacity of	MW	0	399	0	390	781
BOD	thermal generation	kg	0	6,085	0	0	0
	in some plants with an overall capacity of	MW	0	399	0	0	0
EN22 Non-hazardous special waste							
Coal bottom ash	thermal generation production	t	0	14,550	5,688	13,584	13,896
Coal flyash	thermal generation production	t	70,501	66,665	44,120	69,668	78,548
Other production	electricity generation	t	356	935	1,271	1,275	1,291
	electricity distribution	t	49	36,098	3,618	36,615	17,834
	various activities	t	0	0	0	0.443	0
	Total	**t**	**405**	**37,033**	**4,889**	**37,890**	**19,125**
delivery to recovery operators	electricity generation	t	2.74	56.5	84.3	25.7	4.05
	electricity distribution	t	14.1	12,415	848	36,762	17,509
	Total	**t**	**16.9**	**12,472**	**933**	**36,788**	**17,513**
Total production	**electricity generation**	**t**	**70,857**	**82,150**	**51,079**	**84,527**	**93,735**
	electricity distribution	**t**	**49**	**36,098**	**3,618**	**36,615**	**17,834**
	various activities	**t**	**0**	**0**	**0**	**0.443**	**0**
	Total	**t**	**70,906**	**118,248**	**54,697**	**121,142**	**111,566**
delivery to recovery operators	**electricity generation**	**t**	**2.74**	**56.5**	**84.3**	**25.7**	**4.05**
	electricity distribution	**t**	**14.1**	**12,415**	**848**	**36,762**	**17,509**
	Total	**t**	**16.9**	**12,472**	**933**	**36,788**	**17,513**

	Source		2008	2009	2010	2011	2012
EN22 Hazardous special waste							
production	electricity generation	t	375	400	426	386	404
	electricity distribution	t	106	138	26.1	27.5	22.7
	various activities	t	0	0	0.02	1.04	0.659
	Total	**t**	**481**	**538**	**452**	**415**	**427**
	of which with PCBs						
	electricity generation	*t*	*63.1*	*135*	*112*	*157*	*74.9*
	electricity distribution	*t*	*4.56*	*5.63*	*8.71*	*6.33*	*3.56*
	Total	**t**	**67.7**	**140**	**120**	**163**	**78.5**
delivery to recovery operators	electricity generation	t	65.7	16.3	305	91.3	0.813
	electricity distribution	t	6.34	6.71	0	26.2	22.7
	Total	t	72	23	305	118	23.5
	of which with PCBs						
	electricity generation	*t*	*62*	*0.384*	*98.2*	*91.3*	*0*
	electricity distribution	*t*	*2.39*	*0.8*	*0*	*11.8*	*3.56*
	Total	**t**	**64.4**	**1.18**	**98.2**	**103**	**3.56**
EN22 Total special waste							
production	electricity generation	t	71,232	82,550	51,505	84,914	94,139
	electricity distribution	t	155	36,236	3,644	36,642	17,856
	various activities	t	0	0	0.02	1.48	0.659
	Total	**t**	**71,387**	**118,785**	**55,150**	**121,557**	**111,996**
delivery to recovery operators	electricity generation	t	68.4	72.8	389	117	4.86
	electricity distribution	t	20.5	12,422	848	36,788	17,532
	Total	**t**	**88.9**	**12,495**	**1,237**	**36,905**	**17,537**

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN29 Land								
LV cable lines								
overhead	% of entire LV grid	41.1	43	39	43.9	46.1	12.2	5
underground	% of entire LV grid	17.4	18	17.6	18	18.3	5.2	1.7
Total cable lines	% of entire LV grid	58.5	61	56.5	61.9	64.3	9.9	3.9
MV cable lines								
overhead	% of entire MV grid	18	19.1	21.9	24	25.3	40.6	5.4
underground	% of entire MV grid	18.3	20.1	18.5	18.9	19.5	6.6	3.2
Total cable lines	% of entire MV grid	36.3	39.2	40.3	43	44.8	23.4	4.2
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	50.1	52.7	50.1	54.6	56.8	13.4	4
Resource conservation and quality								
EN1 EN3 Net heat rate of thermal generation	kcal/kWh	2,016	2,027	1,843	1,863	1,941	-3.7	4.2
EN4 Electricity consumption for distribution grid operation	% electricity distributed	0	0.095	0.06	0.097	0.096	-	-1
EN8 Net specific requirements of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	0.678	0.968	0.845	0.823	0.697	2.8	-15.3
excluding contribution of as-is sea water	liters/kWh	0.678	0.968	0.845	0.823	0.697	2.8	-15.3
Net specific consumption of water for industrial uses	liters/kWh	0.23	0.312	0.322	0.337	0.298	29.6	-11.6
EN8 Coverage of requirements of water for industrial uses								
from wells	% of requirements	89	37.3	91.3	90.4	95.8	7.6	6
from aqueducts	% of requirements	0	54.4	0	0	0	-	-
Total from inland waters	**% of requirements**	**89**	**91.7**	**91.3**	**90.4**	**95.8**	**7.6**	**6**
from the sea (desalinated)	% of requirements	11	8.31	8.69	7.61	4.25	-61.4	-44.2
EN10 from waste waters (used inside plants)	% of requirements	0	0	0	1.96	0	-	-

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN1 EN3 Fossil fuel consumption for thermal generation								
fuel oil	% of total fuel consumption	3.95	0.737	0.006	0.043	0.043	-98.9	0
gas oil	% of total fuel consumption	55.6	45.6	13.2	3.75	2.25	-96	-40
natural gas	% of total fuel consumption	11.4	24.4	67.6	69.7	69	505.3	-1
coal	% of total fuel consumption	29.1	29.3	19.1	26.5	28.7	-1.4	8.3
MS fuel oil	% of total fuel oil consumption	0	0.037	0	0	0	-	-
LS fuel oil	% of total fuel oil consumption	100	86.2	0	0	0	-100	-
VLS fuel oil	% of total fuel oil consumption	0	13.7	100	100	100	-	-
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*	*86.4*	*82.3*	*92*	*93.6*	*79.9*	*-7.5*	*-14.6*
natural gas, non-technologically captive use	% of total natural gas consumption	0	0	0.004	0.008	0	-	0
Electricity generation from renewables								
hydro from natural flows	% total generation	65.9	67.5	61.2	58.4	56.5	-14.3	-3.3
wind	% total generation	0.139	0.252	0.669	0.624	0.745	436	19.4
Total	**% total generation**	**66**	**67.7**	**61.9**	**59**	**57.2**	**-13.3**	**-3.1**
Specific emissions into the atmosphere								
EN20 SO_2 (simple thermal generation)	g/kWh thermal net	2.09	1.49	0.904	1.14	1.31	-37.3	14.9
EN20 NO_x (simple thermal generation)	g/kWh thermal net	1.5	1.16	0.807	0.799	0.76	-49.3	-4.9
EN20 Particulates (simple thermal generation)	g/kWh thermal net	0.106	0.156	0.162	0.182	0.111	4.7	-39
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	720	639	507	530	546	-24.2	3
EN20 SO_2 (total from simple thermal generation)	g/kWh total net	0.71	0.481	0.344	0.466	0.56	-21.1	20.2
EN20 NO_x (total from simple thermal generation)	g/kWh total net	0.509	0.373	0.307	0.328	0.325	-36.1	-0.9
EN20 Particulates (total from simple thermal generation)	g/kWh total net	0.036	0.05	0.062	0.075	0.048	33.3	-36
EN16 CO_2 (total from simple thermal generation)	g/kWh total net	244	206	193	217	234	-4.1	7.8
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0.009	0.037	0.155	0.197	0.26	2,788.9	32
EN21 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	3.23	40	0	0	-	-
Total nitrogen (expressed as N)	mg/kWh thermal net	0	0.148	0	0	0	-	-
Total phosphorus (expressed as P)	mg/kWh thermal net	0	0.265	0	0.054	0.057	0	5.6
BOD	mg/kWh thermal net	0	3.38	0	0	0	-	-
EN22 Specific waste production								
Coal ash (thermal generation)	g/kWh net from coal	59	44.5	40.8	45.7	39.6	-32.9	-13.3
EN22 Waste recovery								
Other non-hazardous special waste								
electricity generation	% of production	0.77	6.04	6.63	2.02	0.3	-61	-85
electricity distribution	% of production	28.9	34.4	23.4	100	98	239.1	-2
Total	**% of production**	**4.17**	**33.7**	**19.1**	**97.1**	**91.6**	**20.97**	**-5.7**
Other hazardous special waste								
electricity generation	% of production	17.5	4.08	71.6	23.6	0.2	-98.9	-99.2
electricity distribution	% of production	5.98	4.88	0	95.2	100	1,572.2	5
Total	**% of production**	**15**	**4.28**	**67.4**	**28.3**	**5.5**	**-63.3**	**-80.6**
Total special waste								
electricity generation	% of production	0.096	0.088	0.756	0.138	0.005	-94.8	-96.4
electricity distribution	% of production	13.2	34.3	23.3	100	98.2	644	-1.8
Total	**% of production**	**0.125**	**10.5**	**2.24**	**30.4**	**15.7**	**124.6**	**48.4**

Highlights of 2012

In Chile, Enel operates through Endesa (thermal, wind and hydro power generation, electricity distribution and sale) and Enel Green Power (hydro power generation).

In 2012, fossil-fired thermal generation was up by ~0.2 TWh (+~1.7%), whereas hydro generation was down by ~0.7 TWh, shifting the generating mix towards thermal, in particular coal-fired generation (+~500 GWh on 2011).

EN1 EN3 The fuel mix became even more unbalanced towards coal (+~1.2 percentage points), to the expense of natural gas (-~0.7 percentage points) and gas oil (-~1.5 percentage points).

EN1 EN3 EN5 The net heat rate of simple thermal generation rose slightly (+4%).

EN5 EN6 EN18 Number of power installations and total net capacity reflect the entry into operation of the Bocamina II thermal power plant (350 MW) in 2012.

EN8 Net specific requirements of water for industrial uses in thermal generation were down by about 15%.

Higher reliance on coal caused specific emissions to change as follows.

EN16 Net specific emissions of CO_2 from thermal generation, referred to total electricity generation, were up by 16 g/kWh (+~3%).

EN20 Net specific emissions of SO_2 were up by ~0.2 g/kWh (+~15%).

Conversely, emissions of NO_x were down by ~0.04 g/kWh (-~5%) thanks to better control of the combustion process after boiler retrofits (Tarapacá thermal plant). Emissions of particulates were down by ~0.07 g/kWh (-~39%) owing above all to the installation of the WAHLCO abatement system in the Tarapacá plant (see EN26).

EN18 CO_2 emissions displaced by electricity generation from renewables amounted to roughly 6.4 million tonnes, in line with their 2011 value.

EN19 Ozone-depleting substances:

R22

Emission: **154 kg, corresponding to 8.5 kg of CFC11 eq.** (determined on the basis of gas replenishments in air conditioning systems).

EN23

Chile	*Description*	*Impact and mitigation*
Hydro plant of Pangue: Amount: 1.4 m^3	Oil spill from the hydraulic-machine hall during drainage of accidentally accumulated meteoric waters and of condensates. The oil, flowing along the drainage duct, reached the river.	Installation of a waste water settling tank (capacity: 3 m^3) at the end of the drainage duct and of check valves on the lateral drains of the hydraulic-machine hall.
Chilectra Amount: 0.6 m^3	Oil spills in various substations.	Where necessary, application of emergency procedures in accordance with the applicable environmental management system.
Hydro plant of Pehuenche: Amount: 2.2 m^3	Oil leak due to breakage of the oil batching system of unit 2. The oil, flowing along the discharge duct, reached the Río Maule.	Partial recovery of the spilled oil.

EN26 Environmental enhancements.

Water

> Thermal plant of San Isidro - Crystal Lagoons project: construction of a closed-cycle cooling system based on the dissipation of heat in artificial lagoons, to which water is returned after cooling the plant.

Emissions

- The gas-turbine units of San Isidro, San Isidro II and Quintero were equipped with a demineralized water injection system to abate NO_x during combustion.
- Bocamina coal-fired plant: installation of desulfurizers is under way.
- Thermal power plants: isokinetic sampling of SO_2, NO_x, particulates and CO_2 to check compliance with the emission limits prescribed by the various environmental permits.
- Tarapacá thermal plant: installation of a WAHLCO system to abate particulates and, indirectly, also NO_X. The system injects sulfur trioxide and ammonia into burnt gases to improve the conductivity of particulates and, consequently, their attraction by electrostatic-precipitator plates (via the electrical field generated between them).
- Offices: progressive replacement of R22 gas, present in various air conditioning systems, with another non-ozone depleting gas.

Waste waters

- Thermal plants: monthly monitoring of the temperature and pH of waters returned to the recipient water body after being used for cooling.

Noise

- Thermal plants: periodical monitoring of noise emissions to check their compliance with the limits mandated by law.

- Chilectra - electricity distribution: continuing of noise monitoring surveys in distribution substations.

Waste

- Chilectra - electricity distribution: a campaign is being implemented to recover and externally recycle the waste produced by the company and by its customers. The waste is delivered to the charities participating in the project, then brought to the "*Centro de Educación Ambiental Ecochilectra*" and then sold to recovery operators. By delivering their waste to the charities, customers get discounts (proportional to the amount of waste delivered) on their electricity bills.

Renewables

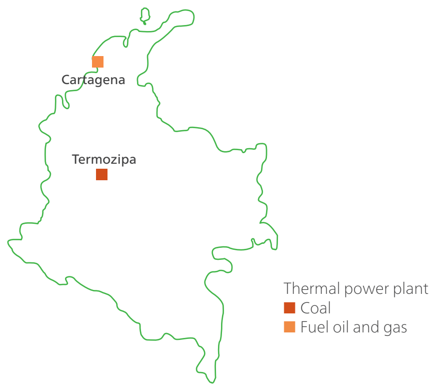
- Enel Green Power commenced the construction of its wind farm of Valle de Los Vientos (2nd Antofagasta region).
  The new wind farm will consist of 45 wind turbines (each of 2 MW) with a total installed capacity of roughly 90 MW. The planned investment amounts to about US$ 140 million.
- Moreover, Enel Green Power planned the construction of the geothermal plant of Cerro Pabellón (50 MW) in the Atacama desert; this will be the first geothermal plant to be built in Latin America.

Other

- Quintero thermal plant: greening of the area around the plant to mitigate its visual impact.
- Continuing of the program of asbestos removal in all installations.
- Chilectra: the company rolled out the first smart recharge system for electric vehicles in Latin America, based on Enel's Electric Mobility Management System (EMMS) technology. Specialists from Enel Distribuzione supervised the installation of the system and supported Chilectra's personnel (February 2012). Five Public Stations and one Home Station were put into operation. All the recharge stations are equipped with georeferencing systems for on-line monitoring customers' EV recharge.
  This project marks the beginning of an innovative model of electric mobility also in Latin America: each customer will receive a card associated with a contract; the card will give access to both Public and Home Stations and identify the customer for subsequent invoicing of electricity usage.

Colombia

Thermal power generation Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
2	411	601.6

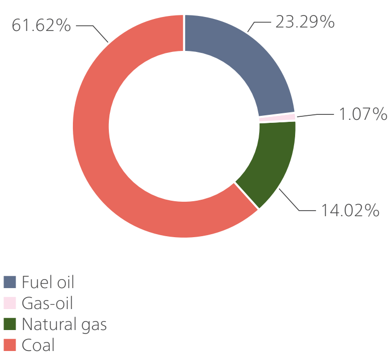
Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Steam (condensing)	**2**	**7**	**411**

The thermal power plants of Cartagena and Termozipa are both ISO 14001-certified.

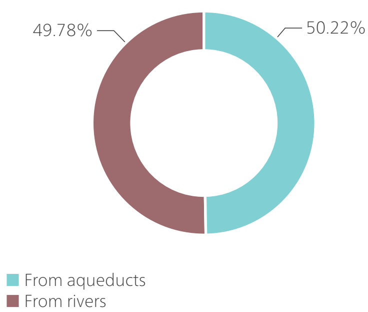
Fuel consumption

Total: 189,646 t of oil-equivalent



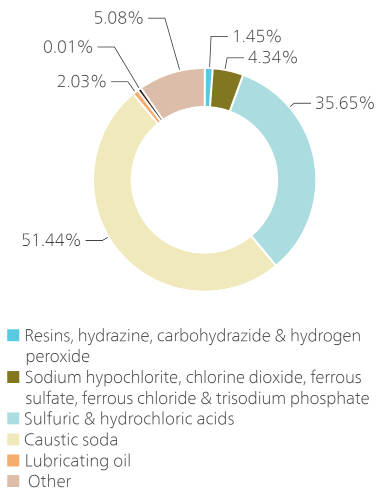
Water for industrial uses

Total requirements: 157,390 m^3
Total abstraction from inland waters: 157,390 m^3



Expendables

Total: 322.55 t



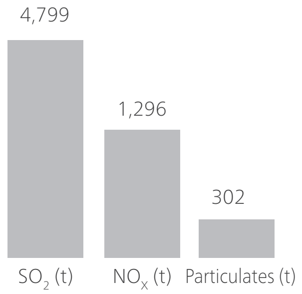
Waste waters

28,135 m^3

Discharged

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

Emissions into the atmosphere

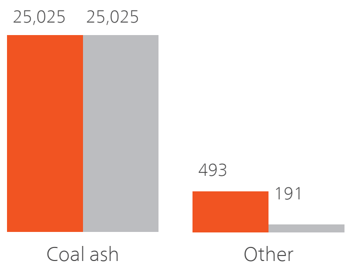


CO_2: **568,270 t**

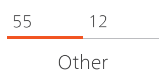
Special waste

Total production: **25,573 t**
Total delivery to recovery operators: **203 t**

Non-hazardous
Production: 25,518 t
Delivery to recovery operators: 25,216 t



Hazardous
Production: 55 t
Delivery to recovery operators: 12 t

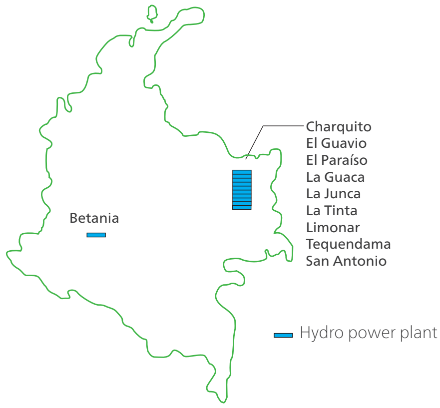


Production Delivery to recovery operators

Colombia

Hydro power generation

Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
11	2,455	12,692

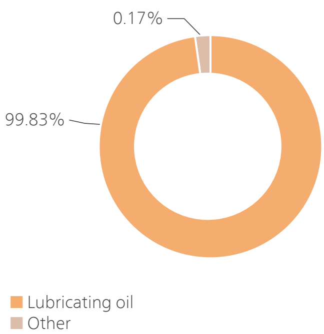
Power installations

	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Run-of-river	8	13	712
Pondage/reservoir	2	10	1,743
Pure/mixed pumped storage	1	0	0
	11	**23**	**2,455**

All the power plants are ISO 14001-certified.

Expendables

Total: 12.97 t



Equivalent yearly hours of utilization*

Hydro: **5,170 hours**

* Yearly generation/capacity ratio. For Endesa generation is considered to refer to the entire year.

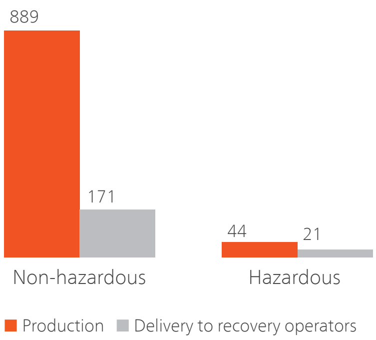
Avoided CO_2 emissions (t)

Due to hydro generation from natural flows	11,989,107

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.

Special waste

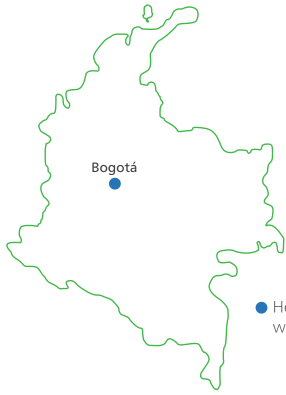
Total production: **933 t**
Total delivery to recovery operators: **193 t**



Colombia

Electricity distribution

Endesa SA



● Headquarters of the company of the Group which carries out the activity (Codensa)

The Numbers

Substations	Capacity (MVA)	Total lines (km)
66,011	16,339	57,365

Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	57	7,663
MV/LV	65,896	8,306
MV/MV	58	370
	66,011	**16,339**

LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	1,282	-	-	**1,282**
MV	19,105.594	511.481	3,652.925	**23,270**
LV	16,395.075	13,415.027	3,002.898	**32,813**
	36,782.669	**13,926.508**	**6,655.823**	**57,365**

The organization has an ISO 14001-certified environmental management system in place,

General data

Municipalities served: **103**

Surface area served: **14,087 km²**

Customers connected to the grid: **2,668,102** (of which supplied by companies of the Group: **2,660,877**)

Electricity

Total electricity distributed: **8,192.9 million kWh**

Own consumption for grid operation: **11.73 million kWh**

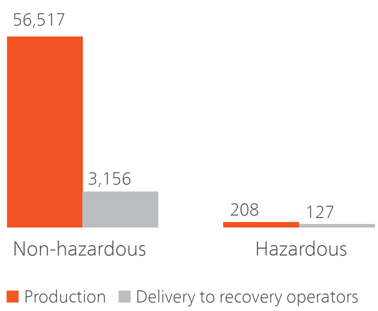
Emissions into the atmosphere

SF_6: **181.4 kg** (4,028 t of CO_2 equivalent)

Special waste

Total production: **56,726 t**

Total delivery to recovery operators: **3,282 t**



Environmental Results

Status data

		2008	2009	2010	2011	**2012**
Power-generating installations						
Power plants	no.	10	11	12	12	13
thermal	no.	2	2	2	2	2
hydro	no.	8	9	10	10	11
Net maximum electrical capacity	MW	1,941	2,847	2,866	2,866	2,866
thermal	MW	297	411	411	411	411
hydro	MW	1,644	2,436	2,455	2,455	2,455
Power lines (circuit-length)						
Total	km	27,987	42,322	51,988	53,341	57,365
high-voltage	km	823	1,240	1,275	1,281	1,282
medium-voltage	km	12,349	18,881	22,692	23,000	23,270
low-voltage	km	14,815	22,201	28,021	29,060	32,813
EN29 **Real-estate & service management**						
Gross real-estate surface area	thousand m^2	na	na	na	13	16

Resources

		2008	2009	2010	2011	**2012**
EN1 EN3 **Fossil fuels**						
Thermal generation						
fuel oil	thousand t	2.57	7.33	28.8	34.4	46
	thousand toe	2.39	7.39	30	33	44.2
MS	*thousand t*	*2.28*	*7.33*	*21.2*	*34.4*	*46*
	thousand toe	*2.17*	*7.39*	*22.1*	*33*	*44.2*
LS	*thousand t*	*0.29*	*0*	*7.6*	*0*	*0*
	thousand toe	*0.223*	*0*	*7.91*	*0*	*0*
gas oil	thousand t	3.08	2.81	2.26	2.74	1.97
	thousand toe	2.85	3.08	2.3	2.81	2.04
natural gas	million m^3	5.58	76.2	73.6	43.3	28.7
	thousand toe	4.46	60.9	58.7	34.6	26.6
non-technologically captive use	*million m^3*	*5.58*	*76.2*	*73.6*	*43.3*	*28.7*
	thousand toe	*4.46*	*60.9*	*58.7*	*34.6*	*26.6*
coal	thousand t	198	428	406	135	201
	thousand toe	120	260	236	78.2	117
Total	**thousand toe**	**130**	**332**	**327**	**149**	**190**
	TJ	**5,448**	**13,884**	**13,683**	**6,219**	**7,940**
Grand total	**thousand toe**	**130**	**332**	**327**	**149**	**190**
	TJ	**5,448**	**13,884**	**13,683**	**6,219**	**7,940**
EN4 **Electricity**						
Real-estate & service management	million kWh	na	na	na	1.3	1.25
EN8 **Water for industrial uses**						
From rivers (including meteoric waters from secondary rainfall)	million m^3	0.093	0.338	0.14	0.096	0.078
From aqueducts	million m^3	0.039	0.097	0.116	0.075	0.079
Total abstraction from inland waters	**million m^3**	**0.132**	**0.435**	**0.256**	**0.171**	**0.157**
for thermal generation	million m^3	0.132	0.435	0.256	0.171	0.157
EN8 EN21 **Open-cycle cooling water**						
For thermal generation	million m^3	87.4	210	205	128	146
Water for non-industrial uses						
Real-estate & service management	million m^3	na	na	na	0.752	0.005

		2008	2009	2010	2011	2012
EN1 Expendables						
Hydrazine	t	0.952	2.89	4.69	4.4	4.69
Sodium hypochlorite	t	4.5	10	7.11	14.2	14
Ferrous sulfate	t	0.168	0	0	0	0
Trisodium phosphate	t	0.27	0.034	0.05	0	0.034
Sulfuric & hydrochloric acids	t	58.5	103	120	108	115
Caustic soda	t	27.4	158	172	170	166
Lubricating oil	t	9.5	19.3	12.7	17.8	19.5
Dielectric oil	t	44.9	1.18	25	23	5.49
Printing paper	t	0	0	0	0	9.3
Other	t	5,762	10.6	12.5	30.7	16.4
Total	**t**	**5,908**	**306**	**355**	**368**	**350**
for thermal generation	t	5,856	299	321	330	323
for hydro generation	t	7.6	6.8	8.32	15.2	13
for electricity distribution	t	44.9	0	25	23	5.46
EN1 PCB survey						
Equipment & transformers with PCBs > 500 ppm (excluding oil)	t	na	33	35.6	35.6	36.5
Oil with PCBs > 500 ppm contained in equipment & transformers	t	na	0	0.74	0.74	0.94
Equipment & transformers with PCBs > 50 ppm and ≤ 500 ppm (excluding oil)	t	na	54.5	36	36	37.8
Oil with PCBs > 50 ppm and ≤ 500 ppm contained in equipment & transformers	t	na	46	1.21	1.21	1.21

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From fossil fuels	**million kWh**	**337**	**973**	**1,030**	**470**	**602**
fuel oil & gas oil	million kWh	14.8	31.7	87.7	154	131
natural gas	million kWh	14.1	202	158	52.1	72
coal	million kWh	308	740	784	264	398
From renewables	**million kWh**	**8,316**	**11,701**	**10,253**	**11,620**	**12,692**
hydro from natural flows	million kWh	8,316	11,701	10,253	11,620	12,692
Total	**million kWh**	**8,653**	**12,674**	**11,283**	**12,090**	**13,294**
simple	million kWh	8,653	12,674	11,283	12,090	13,294
Electricity consumption for pumping	million kWh	0.07	96.6	99.2	0	96.5
Available generation	million kWh	8,653	12,577	11,184	12,090	13,197
Electricity distribution						
Electricity distributed	million kWh	7,927	4,418	12,141	8,041	8,193
EN4 Electricity consumption for grid operation	million kWh	3.79	7	9.37	128	11.7

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	4.39	8.51	9.19	3.48	4.8
EN20 NO_x	thermal generation	thousand t	0.404	2.39	5.23	2.02	1.3
EN20 Particulates	thermal generation	thousand t	0.859	1.69	1.93	0.613	0.302
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	472	1,124	944	425	568
EN16 SF_6	electricity generation	kg	0	0	12.5	605	269
	electricity distribution	kg	139	83	115	182	181
	Total	**kg**	**139**	**83**	**127**	**787**	**451**
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		thousand t of CO_2	475	1,126	947	443	579
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	11,646	13,513	9,394	10,496	11,989
EN21 **Waste waters (discharged quantity)**	thermal generation	million m^3	0.034	0.087	0.049	0.03	0.028
EN21 **Conventional polluting load in waste waters discharged by installations**							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg	0	0	0	6.21	6.82
	in some plants with an overall capacity of	MW	0	0	0	208	208
Total nitrogen (expressed as N)	thermal generation	kg	0	2.62	762	510	317
	in some plants with an overall capacity of	MW	0	208	208	208	208
Total phosphorus (expressed as P)	thermal generation	kg	0	0.04	11.8	158	25.3
	in some plants with an overall capacity of	MW	0	208	208	208	208
COD	thermal generation	kg	0	1,622	9,860	1,634	8,559
	in some plants with an overall capacity of	MW	0	444	236	444	444
BOD	thermal generation	kg	0	885	30,973	139	885
	in some plants with an overall capacity of	MW	0	444	444	444	444
EN22 **Non-hazardous special waste**							
Coal bottom ash	thermal generation						
	production	t	60,459	53,055	57,352	17,703	25,025
	delivery to recovery operators	t	0	0	0	46,506	25,025
Other production	electricity generation	t	427	277	1,512	1,412	1,382
	electricity distribution	t	1,910	34,279	50,594	73,786	56,517
	Total	**t**	**2,337**	**34,556**	**52,106**	**75,198**	**57,899**
delivery to recovery operators	electricity generation	t	1.79	59.3	383	591	363
	electricity distribution	t	1,453	4,396	1,597	3,360	3,156
	Total	**t**	**1,455**	**4,456**	**1,980**	**3,951**	**3,518**
Total production	electricity generation	t	60,886	53,333	58,864	19,114	26,407
	electricity distribution	t	1,910	34,279	50,594	73,786	56,517
	Total	**t**	**62,796**	**87,612**	**109,458**	**92,900**	**82,924**
delivery to recovery operators	electricity generation	t	1.79	59.3	383	47,097	25,387
	electricity distribution	t	1,453	4,396	1,597	3,360	3,156
	Total	**t**	**1,455**	**4,456**	**1,980**	**50,457**	**28,543**

	Source		2008	2009	2010	2011	2012
EN22 Hazardous special waste							
Oil flyash	thermal generation						
	production	t	0	0	0.506	2.26	0
Other							
production	electricity generation	t	30.3	84.3	86.2	53.1	99.4
	electricity distribution	t	115	220	233	303	208
	various activities	t	0	0	0	0.03	0
	Total	**t**	**145**	**304**	**319**	**356**	**308**
	of which with PCBs						
	electricity generation	*t*	*22.8*	*55.2*	*27.8*	*17.6*	*25.9*
	electricity distribution	*t*	*91.9*	*170*	*120*	*188*	*167*
	Total	***t***	***115***	***225***	***148***	***206***	***193***
delivery to recovery operators	electricity generation	t	27.3	26.7	43.3	26.4	33.5
	electricity distribution	t	101	216	123	192	127
	Total	**t**	**128**	**243**	**166**	**219**	**160**
	of which with PCBs						
	electricity generation	*t*	*26.6*	*22.3*	*27.8*	*12.5*	*25.7*
	electricity distribution	*t*	*91.9*	*170*	*120*	*188*	*124*
	Total	***t***	***118***	***192***	***148***	***201***	***149***
Total							
production	**electricity generation**	**t**	**30.3**	**84.3**	**86.7**	**55.4**	**99.4**
	electricity distribution	**t**	**115**	**220**	**233**	**303**	**208**
	various activities	**t**	**0**	**0**	**0**	**0.03**	**0**
	Total	t	145	304	320	358	308
delivery to recovery operators	**electricity generation**	**t**	**27.3**	**26.7**	**43.3**	**26.4**	**33.5**
	electricity distribution	**t**	**101**	**216**	**123**	**192**	**127**
	Total	t	128	243	166	219	160
EN22 Total special waste							
production	electricity generation	t	60,916	53,417	58,951	19,169	26,506
	electricity distribution	t	2,024	34,499	50,827	74,089	56,726
	various activities	t	0	0	0	0.03	0
	Total	**t**	**62,941**	**87,916**	**109,778**	**93,259**	**83,231**
delivery to recovery operators	electricity generation	t	29.1	86	426	47,123	25,421
	electricity distribution	t	1,554	4,613	1,720	3,552	3,282
	Total	**t**	**1,583**	**4,699**	**2,146**	**50,676**	**28,703**

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN29 Land								
LV cable lines								
overhead	% of entire LV grid	2.86	3.31	3.3	3	40.9	1,330.1	1,263.3
underground	% of entire LV grid	3.02	3.11	3.36	4	9.15	203	128.8
Total cable lines	**% of entire LV grid**	**5.88**	**6.42**	**6.66**	**7**	**50**	**750.3**	**614.3**
MV cable lines								
overhead	% of entire MV grid	0.869	0.879	0.876	1	2.2	153.2	120
underground	% of entire MV grid	14.7	14.8	15.1	15	15.7	6.8	4.7
Total cable lines	**% of entire MV grid**	**15.6**	**15.7**	**16**	**16**	**17.9**	**14.7**	**11.9**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	10	10.4	10.6	10.7	35.9	259	235.5
Resource conservation and quality								
EN1 EN3 Net heat rate of thermal generation	kcal/kWh	3,862	3,407	3,172	3,160	3,152	-18.4	-0.3
EN4 Electricity consumption for distribution grid operation	% electricity distributed	0.048	0.158	0.077	1.59	0.143	197.9	-91
EN8 Net specific requirements of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	0.392	0.447	0.249	0.364	0.261	-33.4	-28.3
excluding contribution of as-is sea water	liters/kWh	0.392	0.447	0.249	0.364	0.261	-33.4	-28.3
Net specific consumption of water for industrial uses	liters/kWh	0.015	0.034	0.023	0.014	0.012	-20	-14.3

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN8 Coverage of requirements of water for industrial uses								
From rivers (including meteoric waters from secondary rainfall)	% of requirements	70.5	77.7	54.7	56.1	49.7	-29.5	-11.4
from aqueducts	% of requirements	29.5	22.3	45.3	43.9	50.3	70.5	14.6
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	1.84	2.23	9.17	22.2	23.3	1,166.3	5
gas oil	% of total fuel consumption	2.19	0.928	0.705	1.89	1.07	-51.1	-43.4
natural gas	% of total fuel consumption	3.43	18.4	18	23.3	14	308.2	-39.9
coal	% of total fuel consumption	92.5	78.5	72.2	52.6	61.6	-33.4	17.1
MS fuel oil	% of total fuel oil consumption	90.7	100	73.6	100	100	10.3	0
LS fuel oil	% of total fuel oil consumption	9.32	0	26.4	0	0	-100	-
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	% total generation	96.1	92.3	90.9	96.1	95.5	-0.6	-0.6
Specific emissions into the atmosphere								
EN20 SO_2 (simple thermal generation)	g/kWh thermal net	13	8.74	8.92	7.4	7.98	-38.6	7.8
EN20 NO_x (simple thermal generation)	g/kWh thermal net	1.2	2.46	5.07	4.3	2.15	79.2	-50
EN20 Particulates (simple thermal generation)	g/kWh thermal net	2.55	1.73	1.87	1.3	0.502	-80.3	-61.4
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	1,400	1,155	916	903	945	-32.5	4.7
EN20 SO_2 (total from simple thermal generation)	g/kWh total net	0.507	0.671	0.814	0.288	0.361	-28.8	25.3
EN20 NO_x (total from simple thermal generation)	g/kWh total net	0.047	0.189	0.463	0.167	0.097	106.4	-41.9
EN20 Particulates (total from simple thermal generation)	g/kWh total net	0.099	0.133	0.171	0.051	0.023	-76.8	-54.9
EN16 CO_2 (total from simple thermal generation)	g/kWh total net	54.5	88.7	83.7	35.1	42.7	-21.7	21.7
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	4.6	0.297	0.46	2.76	1.58	-65.7	-42.8
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	0	0	0.031	0.034	-	9.7
Total nitrogen (expressed as N)	mg/kWh thermal net	0	0.012	3.18	2.57	1.59	-	-38.1
Total phosphorus (expressed as P)	mg/kWh thermal net	0	0	0.049	0.795	0.127	-	-84
COD	mg/kWh thermal net	0	1.67	12.5	3.54	14.4	-	306.8
BOD	mg/kWh thermal net	0	0.909	30	0.3	1.49	-	396.7
Net specific conventional polluting load of waste waters discharged by plants								
EN22 **Specific waste production**								
Coal and brown-coal ash (thermal generation)	g/kWh net from coal and brown coal	196	71.7	73.1	67.1	62.8	-68	-6.4
Oil flyash (thermal generation)	g/kWh net from fuel oil & gas-oil	0	0	0.006	0.015	0	-	0
Oil bottom ash (thermal generation)	g/kWh net from fuel oil & gas-oil	0	0	0.006	0.015	0	-	0
EN22 **Waste recovery**								
Coal ash	% of production	0	0	0	263	100	-	-62
Other non-hazardous special waste								
electricity generation	% of production	0.419	21.4	25.3	41.9	26.2	61.53	-37.5
electricity distribution	% of production	76.1	12.8	3.16	4.55	5.58	-92.7	22.6
Total	**% of production**	**62.3**	**12.9**	**3.8**	**5.25**	**6.07**	**-90.3**	**-15.6**
Total non-hazardous special waste								
electricity generation	% of production	0.003	0.111	0.651	246	96.1	3,203,233	-60.9
electricity distribution	% of production	76.1	12.8	3.16	4.55	5.58	-92.7	22.6
Total	**% of production**	**2.32**	**5.09**	**1.81**	**54.3**	**34.4**	**13.83**	**-36.6**

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Other hazardous special waste								
electricity generation	% of production	90.1	31.7	50.2	49.7	33.7	-62.6	-32.2
electricity distribution	% of production	87.7	98.3	52.8	63.5	60.7	-30.8	-4.4
Total	**% of production**	**88.2**	**79.9**	**52.1**	**61.5**	**52**	**-41**	**-15.4**
Total hazardous special waste								
electricity generation	% of production	90.1	31.7	49.9	47.7	33.7	-62.6	-29.4
electricity distribution	% of production	87.7	98.3	52.8	63.5	60.7	-30.8	-4.4
Total	**% of production**	**88.2**	**79.9**	**52**	**61.1**	**52**	**-41**	**-14.9**
Total special waste								
electricity generation	% of production	0.048	0.161	0.723	246	95.9	199,692	-61
electricity distribution	% of production	76.8	13.4	3.38	4.8	5.79	-92.5	20.6
Total	**% of production**	**2.52**	**5.35**	**1.96**	**54.3**	**34.5**	**12.69**	**-36.5**

Highlights of 2012

In Colombia, Enel operates through Endesa (thermal and hydro power generation, electricity distribution and sale).

Fossil-fired thermal generation in 2012 was up by ~130 GWh, whereas hydro generation continued to grow by ~1.1 TWh.

EN1 EN3 With respect to 2012, the fuel mix changed in favor of coal (+~9 percentage points) and fuel oil (+~1 percentage point), to the expense of natural gas (-~9 percentage points). The already small share of gas oil continued to drop (-~0.9 percentage points).

EN1 EN3 EN5 The net heat rate of simple thermal generation continued to fall, albeit slightly (-0.3% on 2011).

EN8 Net specific requirements of water for industrial uses in thermal generation were down by roughly 28% (from 0.36 to 0.26 l/kWh) on 2011.

EN16 Owing to the higher share of coal in the fuel mix, net specific emissions of CO_2 in thermal generation were up by ~40 g/kWh (+~4%).

EN20 For the same reason, net specific emissions of SO_2 were up by ~8%, whilst emissions of NO_x and particulates dropped by ~50% and ~80%, respectively, thanks to the efficiency improvement of unit 3 of the Termozipa thermal plant – department of Cundinamarca – (see EN26) and to its consequent better operation.

EN18 CO_2 emissions displaced by electricity generation from renewables amounted to approximately 12 million tonnes (roughly 14% more than a year earlier) thanks to higher hydro generation.

EN22 Waste recovery in 2012 reached 34.5%. In the five-year period, the amount of ash delivered to recovery operators has a discontinuous pattern, reflecting the amount of ash produced and stored in the plant site in previous years, but recovered only in 2011. In 2012, all the ash produced was recovered.

EN19 Ozone-depleting substances:

HCFCs

Emission: **268 kg, equivalent to 13.4 kg of CFC11**, determined on the basis of gas replenishments in air conditioning systems.

EN26 Environmental enhancements.

Materials

> Codensa - electricity distribution: the company ensures that all materials and resources used originate from production sites authorized by the competent environmental authority.

Water

> Codensa - electricity distribution: continuing of the water-saving scheme in administrative offices through appropriate awareness actions.

> Power plants: employees' awareness & training courses on efficient water use. In 2012, water consumption was down by 14% per employee.

> El Guavio hydro plant (department of Cundinamarca): adoption of a system to collect rainwater to be used in offices.

Emissions

> Codensa - electricity distribution: continuing of the SF_6 monitoring scheme.

> Termozipa thermal plant: improvement of the efficiency of electrostatic precipitators with a consequent sharp decrease in particulates with respect to 2011.

Noise

> Codensa - electricity distribution: adequate response to complaints by customers and the general population about noise emitted by installations by applying corrective measures as needed.

Waste

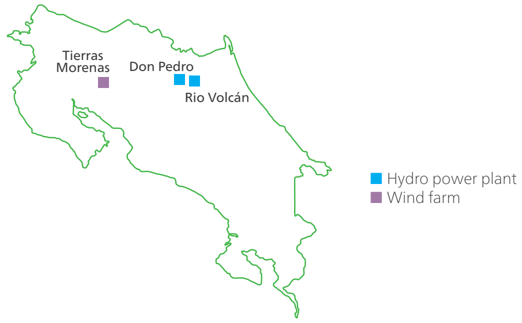
> Codensa - electricity distribution: careful management of waste, from production to disposal/final recovery. Waste oils containing PCBs are exported to Finland for incineration. To comply with commitments under the Stockholm Convention, the company is investigating technologies to decontaminate PCB-containing equipment in the plant site, thus avoiding the export of waste oils and related transport risks.

> El Guavio hydro plant: composting of organic waste produced.

Costa Rica

Hydro and wind power generation

Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
3	55	188.55

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

All the power plants are ISO 14001-certified.

Other data

Hydro generation

Emptied reservoirs

Quantity: **2**

Alluvial sediments removed by flushing them out through bottom outlets: **25,017 m^3**

Alluvial sediments removed by mechanical equipment: **21,900 m^3** (of which reused locally: **21,879 m^3**)

Equivalent yearly hours of utilization*

Hydro: **3,075 hours**

Wind: **3,701 hours**

* Yearly generation/capacity ratio.

Avoided CO_2 emissions

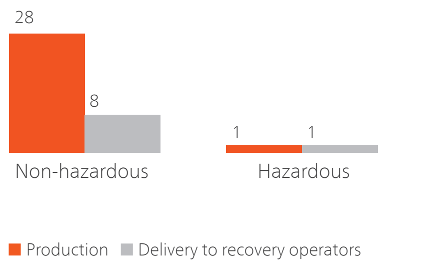
Due to hydro generation from natural flows	68,515
Due to wind generation	43,963
Total	**112,478**

Emissions from the otherwise necessary fossil-fired thermal generation.

Special waste

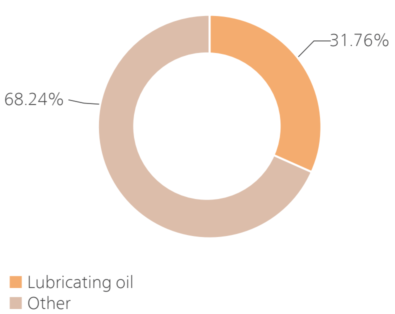
Total production: **30 t**

Total delivery to recovery operators: **10 t**



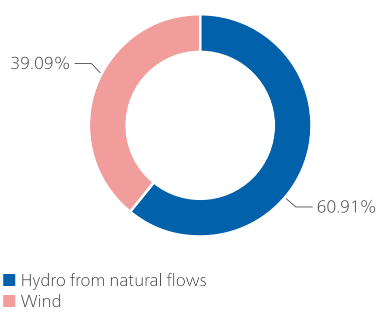
Expendables

Total: 1.61 t



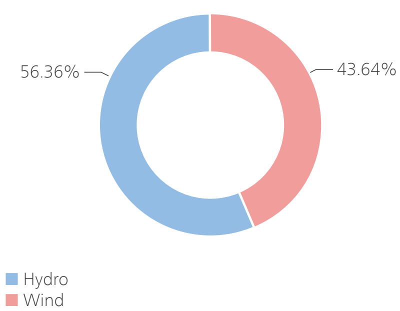
Net electricity generation

Total: 188.55 million kWh



Net maximum electrical capacity

Total: 55 MW



Environmental Results

Status data

		2008	2009	2010	2011	2012
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.	na	na	20	12	12
special vehicles	no.	na	na	1	1	1
Gross real-estate surface area	thousand m^2	na	na	0.8	0.8	0.8

Resources

		2008	2009	2010	2011	2012
EN1 EN3 **Fossil fuels**						
Real-estate management	thousand toe	na	na	na	0.034	0.042
	TJ	na	na	na	1.42	1.76
EN4 **Electricity**						
Real-estate management	million kWh	na	na	0.277	0.014	30.2
Water for non-industrial uses						
Real-estate management	million m^3	na	na	na	na	0.088
EN1 **Expendables**						
Lubricating oil	t	0.337	0.229	1.38	1.96	0.51
Other	t	0	0	0	1.07	1.1
Total	t	0.337	0.229	1.38	3.03	1.61
for hydro generation	t	0.156	0.119	0.922	2.05	1.52
for wind generation	t	0.181	0.11	0.46	0.983	0.091

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From renewables	million kWh	181	191	199	170	189
hydro from natural flows	million kWh	134	116	142	114	115
wind	million kWh	47.4	75.1	57.1	56.6	73.7

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN16 CO_2	various activities	thousand t	na	na	na	0.105	0.13
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	81.9	71.2	79	63.1	68.5
Due to wind generation		thousand t	29	46	31.7	31.4	44
Due to generation from renewables		**thousand t**	**111**	**117**	**111**	**94.6**	**112**
EN22 **Non-hazardous special waste**							
production	electricity generation	t	40.7	108	114	1,325	28.3
	various activities	t	0	0	0.01	0.1	0.1
	Total	**t**	**40.7**	**108**	**114**	**1,325**	**28.4**
delivery to recovery operators	electricity generation	t	0	4.48	3.61	1,229	8.31
	Total	**t**	**0**	**4.48**	**3.61**	**1,229**	**8.31**
EN22 **Hazardous special waste**							
production	electricity generation	t	700	0.664	0.001	6.84	1.39
	Total	**t**	**700**	**0.664**	**0.001**	**6.84**	**1.39**
	of which with PCBs						
	electricity generation	t	0	0	0	1.5	0.529
	Total	**t**	**0**	**0**	**0**	**1.5**	**0.529**
delivery to recovery operators	electricity generation	t	0	0.664	0.001	6.84	1.36
	Total	**t**	**0**	**0.664**	**0.001**	**6.84**	**1.36**
	of which with PCBs						
	electricity generation	t	0	0	0	1.5	0.529
	Total	**t**	**0**	**0**	**0**	**1.5**	**0.529**
EN22 **Total special waste**							
production	electricity generation	t	741	109	114	1,331	29.7
	various activities	t	0	0	0.01	0.1	0.1
	Total	**t**	**741**	**109**	**114**	**1,332**	**29.8**
delivery to recovery operators	electricity generation	t	0	5.15	3.62	1,236	9.67

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Electricity generation from renewables								
hydro from natural flows	% total generation	73.8	60.7	71.3	66.7	60.9	-17.5	-8.7
wind	% total generation	26.2	39.3	28.7	33.3	39.1	49.2	17.4
EN22 **Waste recovery**								
Other non-hazardous special waste electricity generation	% of production	0	4.15	3.18	92.8	29.3	-	-68.4
Other hazardous special waste electricity generation	% of production	0	100	100	100	97.9	-	-2.1
Total special waste electricity generation	% of production	0	4.73	3.18	92.8	32.5	-	-65

Highlights of 2012

Enel operates in Costa Rica through Enel Green Power (hydro and wind power generation).

Total generation was up by ~18 GWh due almost exclusively to higher wind power generation.

EN18 CO_2 emissions displaced by electricity generation from renewables amounted to about 112,000 tonnes (roughly 19% more than in 2011 thanks to the increase of wind power generation).

EN26 Environmental enhancements.

Materials and resources

> All power plants: verification of all hazardous chemicals held in the plant sites and of the presence of related safety forms.

Landscape and biodiversity

> Hydro power plants: under the environmental program, the areas to be reforested will be extended and possible arrangements with institutions will be assessed.
> Movasa wind farm (Tierras Morenas, province of Guanacaste): 50 metal cones will be installed on power line towers to prevent animals from climbing them; verification of the budget and of service contracts with a view to creating animal underpasses beneath transmission lines.

Waste

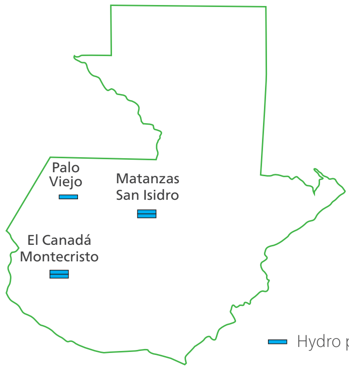
> Hydro power plants: the environmental program involves coordination with the San Miguel recycling initiative and collection of recyclable waste every 15 days.

Other

> All power plants: acquisition of the integrated OHSAS 18001 and ISO 14001 certification.

Guatemala

Hydro power generation Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
5	164	581.84

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**

Net maximum electrical capacity

Total: 163.71 MW

Net electricity generation

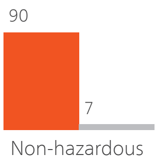
Total: 581.84 million kWh

Gas oil

Total consumption: **5 toe**

Special waste

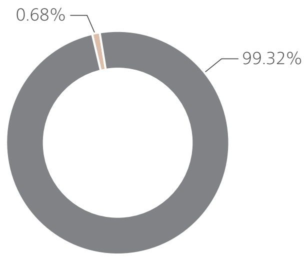
Total production: **90 t**
Total delivery to recovery operators: **7 t**



Production Delivery to recovery operators

Expendables

Total: 1.48 t



Lubricating oil
Dielectric oil

Equivalent yearly hours of utilization*

Hydro: **3,554 hours**

* Yearly generation/capacity ratio.

Avoided CO_2 emissions

Due to hydro generation from natural flows: **277,986 t**

Emissions from the otherwise necessary fossil-fired thermal generation.

Other data

Hydro generation

Emptied reservoirs

Quantity: **5**

Alluvial sediments removed by flushing them out through bottom outlets: **500 m^3**

Alluvial sediments removed by mechanical equipment: **94,625 m^3** (of which reused locally: **94,625 m^3**)

Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants (hydro)	**no.**	**4**	**4**	**4**	**4**	**5**
Net maximum electrical capacity (hydro)	**MW**	**75.7**	**76.5**	**76.5**	**76.5**	**164**
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	na	na	na	10	22
special vehicles	no.	na	na	na	3	7
vehicles for both private and service use	no.	na	na	8	8	9
Gross real-estate surface area	thousand m^2	na	na	0.7	0.7	0.7

Resources

		2008	2009	2010	2011	2012
EN1 EN3 **Fossil fuels**						
Real-estate management	thousand toe	0.004	0.001	0.014	0.051	0.043
	TJ	0.167	0.042	0.586	2.14	1.8
EN4 **Electricity**						
Real-estate management	million kWh	na	na	0.047	3.71	4.51
Water for non-industrial uses						
Real-estate management	million m^3	na	na	na	0.001	0.001
EN1 **Expendables**						
Lubricating oil	t	1.49	1.1	0.677	0.361	1.47
Dielectric oil	t	8.64	0	8.5	0.02	0.01
Printing paper	t	na	na	2.48	3.05	3.57
Other	t	0.131	0	0	0	0
Total (for hydro generation)	**t**	**10.3**	**1.1**	**11.7**	**3.43**	**5.05**

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From renewables (hydro from natural flows)	**million kWh**	**343**	**287**	**354**	**356**	**582**

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN16 CO_2	various activities	thousand t	0.011	na	0.022	0.136	0.138
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	210	176	197	198	278
EN22 **Non-hazardous special waste**							
production	electricity generation	t	135	48.2	342	175	89.6
	various activities	t	0	0	0.014	0.016	0
	Total	**t**	**135**	**48.2**	**342**	**175**	**89.6**
delivery to recovery operators	electricity generation	t	24.5	25.2	24.1	17.6	7.43
	Total	**t**	**24.5**	**25.2**	**24.1**	**17.6**	**7.43**
EN22 **Hazardous special waste**							
production	electricity generation	t	0.24	0.895	0.071	0.128	0.031
	Total	**t**	**0.24**	**0.895**	**0.071**	**0.128**	**0.031**
	of which with PCBs						
	electricity generation	*t*	*0.206*	*0.825*	*0.001*	*0*	*0*
	Total	***t***	***0.206***	***0.825***	***0.001***	***0***	***0***
delivery to recovery operators	electricity generation	t	0.017	0	0.02	0.04	0.031
	Total	**t**	**0.017**	**0**	**0.02**	**0.04**	**0.031**
EN22 **Total special waste**							
production	electricity generation	t	135	49.1	342	175	89.6
	various activities	t	0	0	0.014	0.016	0
	Total	**t**	**135**	**49.1**	**342**	**175**	**89.6**
delivery to recovery operators	electricity generation	t	24.5	25.2	24.1	17.6	7.46
	Total	**t**	**24.5**	**25.2**	**24.1**	**17.6**	**7.46**

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Electricity generation from renewables								
hydro from natural flows	% total generation	100	100	100	100	100	0	0
EN22 **Waste recovery**								
Other non-hazardous special waste electricity generation	% of production	18.2	52.4	7.05	10.1	8.29	-54.5	-17.9
Other hazardous special waste electricity generation	% of production	7.08	0	28.2	31.3	100	1,312.4	219.5
Total special waste								
electricity generation	% of production	18.1	51.5	7.05	10.1	8.32	-54	-17.6

Highlights of 2012

Total net hydro generation was up by ~225 GW thank to increase of hydro generation.

EN5 EN6 EN18 In 2012, Enel Green Power commissioned a new 87-MW hydro plant - Palo Viejo (department of Quiche).

EN18 CO_2 emissions displaced by electricity generation from renewables were equal to about 278,000 tonnes.

EN19 Ozone-depleting substances:

R22

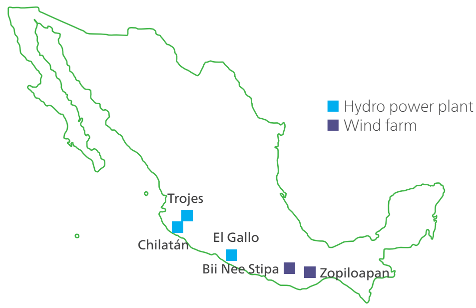
Emission: **16.6 kg**, measured on the basis of gas replenishments in the air conditioning system and **equivalent to 0.91 kg of CFC11**.

Enel operates in Guatemala through Enel Green Power (hydro power generation).

Mexico

Hydro power generation

Enel Green Power SpA



The Numbers

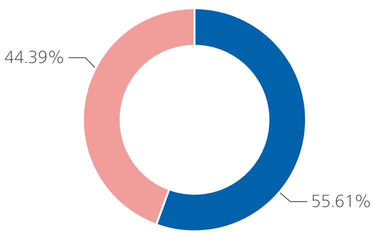
Power plants	Net capacity (MW)	Generation (million kWh)
5	197	364.5

Power installations

HYDRO	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Pondage/reservoir	3	3	53
	3	**3**	**53**

WIND	Power plants no.	Net maximum electrical capacity MW
	2	**144**

Net electricity generation
Total: 364.45 million kWh



Avoided CO_2 emissions

Due to hydro generation from natural flows: **100,732 t**

Due to wind generation: **80,421 t**

Emissions from the otherwise necessary fossil-fired thermal generation.

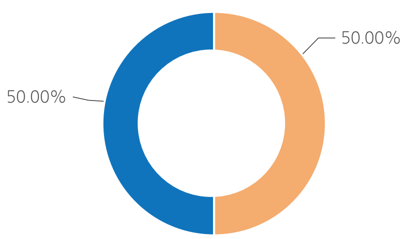
Equivalent yearly hours of utilization*

Wind: **1,124 hours**

Hydro: **3,860 hours**

* Yearly generation/capacity ratio.

Expendables
Total: 7 t



Environmental Results

Status data

		2008	2009	2010	2011	**2012**
Power-generating installations						
Power plants	no.	3	3	3	3	4
hydro	no.	3	3	3	3	3
wind	no.	0	0	0	0	2
Net maximum electrical capacity	MW	52.5	52.4	52.5	52.5	197
hydro	MW	52.5	52.4	52.5	52.5	52.5
wind	MW	0	0	0	0	144
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	na	na	na	24	20
vehicles for both private and service use	no.	na	na	na	5	0
Gross real-estate surface area	thousand m^2	na	na	na	0.592	0.015

Resources

		2008	2009	2010	2011	**2012**
EN1 EN3 **Fossil fuels**						
Various activities	thousand toe	na	na	na	0.08	0.034
	TJ	na	na	na	3.35	1.42
EN4 **Electricity**						
Various activities	million kWh	na	na	na	0.481	53
EN1 **Expendables**						
Lubricating oil	t	0.424	0.541	1.01	1.09	3.5
Dielectric oil	t	0.006	0	0	0	3.5
Printing paper	t	na	na	na	0.269	0.15
Other	t	0	0.006	0	0	0
Total	**t**	**0.43**	**0.547**	**1.01**	**1.36**	**7.15**
for hydro generation	t	0.43	0.547	1.01	1.09	6
for wind generation	t	0	0	0	0	1

Processes and products

		2008	2009	2010	2011	**2012**
Electricity generation (net)						
From renewables	**million kWh**	**235**	**178**	**277**	**231**	**364**
hydro from natural flows	million kWh	235	178	277	231	203
wind	million kWh	0	0	0	0	162

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN16 CO_2	various activities	thousand t	0	0	0	0.234	0.104
EN18 Avoided CO_2 emissions							
Due to hydro generation from natural flows		thousand t	144	109	154	128	101
Due to wind generation		thousand t	0	0	0	0	80.4
Due to generation from renewables		thousand t	144	109	154	128	181
EN22 Non-hazardous special waste							
production	electricity generation	t	0.165	0	1.22	1.75	na
	Total	**t**	**0.165**	**0**	**1.22**	**1.75**	**na**
delivery to recovery operators	electricity generation	t	0.107	0.002	1.19	1.91	na
	Total	**t**	**0.107**	**0.002**	**1.19**	**1.91**	**na**
EN22 Hazardous special waste							
production	electricity generation	t	0.596	0	0.931	0.078	na
	various activities	t	0	0	0	0.001	na
	Total	**t**	**0.596**	**0**	**0.931**	**0.079**	**na**
	of which with PCBs						
	electricity generation	*t*	*0.402*	*0*	*0.883*	*0*	*na*
	Total	***t***	***0.402***	***0***	***0.883***	***0***	***na***
delivery to recovery operators	electricity generation	t	0.507	0	0.158	0	na
	Total	**t**	**0.507**	**0**	**0.158**	**0**	**na**
	of which with PCBs						
	electricity generation	*t*	*0.339*	*0*	*0.158*	*0*	*na*
	Total	***t***	***0.339***	***0***	***0.158***	***0***	***na***
EN22 Total special waste							
production	electricity generation	t	0.761	0	2.15	1.83	na
	various activities	t	0	0	0	0.001	na
	Total	**t**	**0.761**	**0**	**2.15**	**1.83**	**na**
delivery to recovery operators	electricity generation	t	0.614	0.002	1.35	1.91	na
	Total	**t**	**0.614**	**0.002**	**1.35**	**1.91**	**na**

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Electricity generation from renewables								
hydro from natural flows	% total generation	100	100	100	100	55.6	-44.4	-44.4
wind	% total generation	0	0	0	0	44.4	-	-
Total	**% total generation**	**100**	**100**	**100**	**100**	**100**	**0**	**0**
EN22 Waste recovery								
Other non-hazardous special waste electricity generation	% of production	64.8	0	97.5	109	na	na	na
Other hazardous special waste electricity generation	% of production	85.1	0	17	0	na	-100	na
Total special waste electricity generation	% of production	80.7	0	62.7	105	na	na	na

Highlights of 2012

Total electricity generation was up by about 56% on 2011 thanks to the coming on line of two new wind farms.

EN5 EN6 EN18 In 2012, Enel Green Power commissioned the wind farms of Bii Nee Stipa II (74 MW) and of Zopiloapan (70 MW), both in the State of Oaxaca.

EN18 CO_2 emissions displaced by electricity generation from renewables amounted to approximately 181,000 tonnes, roughly 41% more than in the previous year.

EN26 Environmental enhancements.

Waste

> Preparation of a procedure for hazardous waste management; the procedure will become operational after receiving the green light from the local authority.

> Under the environmental program: materials removed from the trashracks of hydro power plant intake structures are recycled and recovered, where feasible, or adequately stored for subsequent disposal; appropriate management of possible spills of hazardous substances.

Water

> Yearly monitoring of water quality in all the plant sites.

Enel operates in Mexico through Enel Green Power (hydro and wind power generation).

Waste waters

> Under the environmental program, waste water management is optimized to prevent pollution of surface water and groundwater.

Renewables

> Enel Green Power won a public tender (Sureste I - Phase II, launched by the national power company) to build a 102-MW wind farm.

Noise

> Noise emissions are monitored and, where necessary, adequately mitigated.

Other

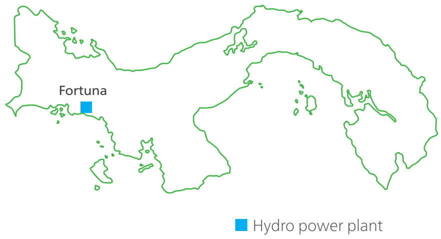
> Under the national legislation, studies on fire risks are being conducted in the sites of Enel Green Power's three hydro power plants.

> Personnel awareness & training courses on environmental themes.

Panama

Hydro power generation

Enel Green Power SpA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
1	300	1,666

Power installations

	Power plants no.	Head installations no.	Net maximum electrical capacity MW
Pondage/reservoir	**1**	**1**	**300**

The Fortuna power plant is ISO 14001-certified.

Net maximum electrical capacity

Total: 300 MW

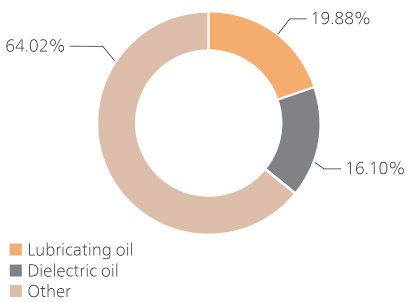
Equivalent yearly hours of utilization*

Hydro: **5,554 hours**

* Yearly generation/capacity ratio.

Expendables

Total: 16.4 t



Net electricity generation

Total: 1,666.27 million kWh

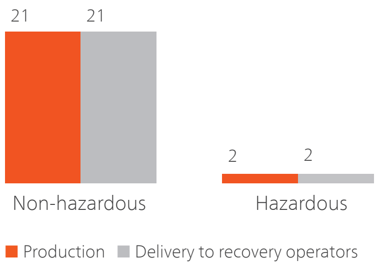
Avoided CO_2 emissions

Due to hydro generation from natural flows: **1,136,046 t**

Emissions from the otherwise necessary fossil-fired thermal generation.

Special waste

Total production: **23 t**
Total delivery to recovery operators: **23 t**



Environmental Results

Status data

		2008	2009	2010	2011	**2012**
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.	na	na	47	46	46

Resources

		2008	2009	2010	2011	**2012**
EN1 EN3 **Fossil fuels**						
Real-estate management	thousand toe	0.001	na	0.109	0.121	0.121
	TJ	0.042	na	4.56	5.07	5.07
Water for non-industrial uses						
Real-estate management	million m^3	na	na	0.01	0.013	0.013
EN1 **Expendables**						
Lubricating oil	t	8.86	4.07	3.87	3.26	3.26
Dielectric oil	t	0	0	0	2.64	2.64
Other	t	0	0	0	8.32	10.5
Total	**t**	**8.86**	**4.07**	**3.87**	**14.2**	**16.4**

Processes and products

		2008	2009	2010	2011	**2012**
Electricity generation (net)						
From renewables (hydro from natural flows)	**million kWh**	**1,754**	**1,792**	**1,793**	**1,543**	**1,666**

Emissions

	Source		2008	2009	2010	2011	**2012**
Emissions into the atmosphere							
EN16 CO_2	real-estate management	thousand t	0.002	na	0.336	0.37	0.465
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	1,075	1,098	996	857	1,136
EN22 **Non-hazardous special waste**							
production	electricity generation	t	0	10.4	47.3	53.1	20.6
	real-estate management	t	0	0	0.754	0.645	1.69
	Total	**t**	**0**	**10.4**	**48**	**53.7**	**22.3**
delivery to recovery operators	electricity generation	t	0	8.75	31.7	32.6	20.6
	Total	**t**	**0**	**8.75**	**31.7**	**32.6**	**20.6**
EN22 **Hazardous special waste**							
production	electricity generation	t	12	0	4.81	4.4	2.35
	real-estate management	t	0	0	4.14	4.25	1.8
	Total	**t**	**12**	**0**	**8.95**	**8.65**	**4.15**
	of which with PCBs						
	electricity generation	t	0	0	2.64	2.35	2.35
delivery to recovery operators	electricity generation	t	12	0	4.81	4.4	2.35
	of which with PCBs						
	electricity generation	t	0	0	2.64	2.35	2.35

	Source		2008	2009	2010	2011	2012
EN22 **Total special waste**							
production	electricity generation	t	12	10.4	52.1	57.5	23
	real-estate management	t	0	0	4.89	4.89	3.49
	Total	t	12	10.4	57	62.4	26.5
delivery to recovery operators	electricity generation	t	12	8.75	36.5	37	23

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
Electricity generation from renewables								
hydro from natural flows	% total generation	100	100	100	100	100	0	0
EN22 **Waste recovery**								
Other non-hazardous special waste								
electricity generation	% of production	0	84.1	67	61.4	100	-	62.9
Other hazardous special waste								
electricity generation	% of production	100	0	100	100	100	0	0
Total special waste								
electricity generation	% of production	100	84.1	70.1	64.4	100	0	55.3

Highlights of 2012

Enel operates in Panama through Enel Green Power (hydro power generation).

Total hydro generation was up by 8% on 2011.

EN18 CO_2 emissions displaced by electricity generation from renewables amounted to about 1.1 million tonnes, roughly 33% more than in 2011.

EN22 The few items of waste produced and their limited amounts cause strong fluctuations in their production and recovery values from one year to the other. However, in 2012, waste recovery remained stable at high levels (100%).

Peru

Thermal power generation

Endesa SA

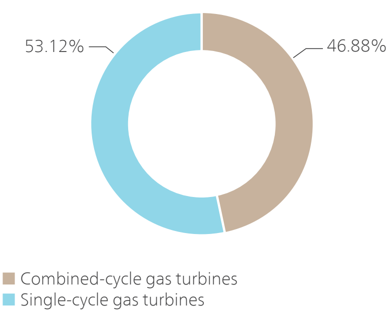
The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
3	1,009	4,632

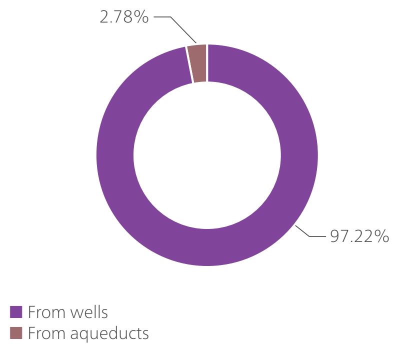
Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Combined-cycle gas turbines	1	3	473
Single-cycle gas turbines	2	6	536
	3	**9**	**1,009**

Net maximum electrical capacity
Total: 1,009 MW



Water for industrial uses
Total requirements: 3,204,250 m^3
Total abstraction from inland waters: 3,204,250 m^3



Waste waters

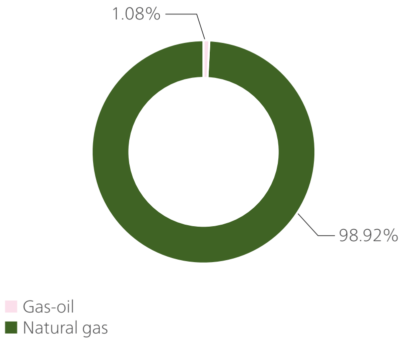
1,385,355 m^3

Discharged

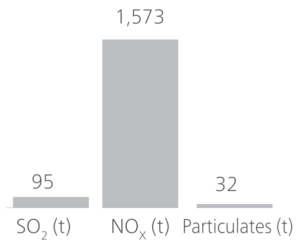
Waste waters include those meteoric waters that are susceptible to pollution and are therefore fed to treatment systems before being discharged or used.

Fuel consumption

Total: 986,284 t of oil-equivalent



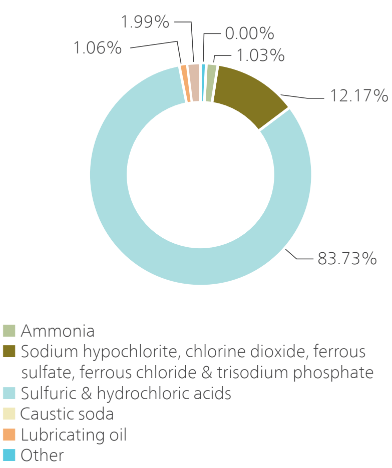
Emissions into the atmosphere



CO_2: **1,952,932 t**

Expendables

Total: 23 t



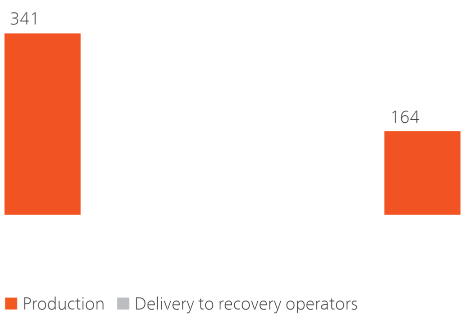
Special waste

Total production: **505 t**

Total delivery to recovery operators: **0 t**

Non-hazardous
Production: 341 t
Delivery to recovery operators: 0 t

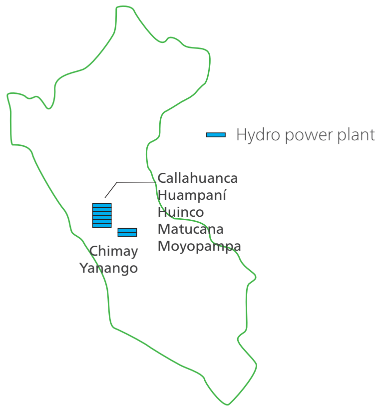
Hazardous
Production: 164 t
Delivery to recovery operators: 0 t



Peru

Hydro power generation

Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
7	739	4,599

Equivalent yearly hours of utilization*

Hydro: **6,225 hours**

* Yearly generation/capacity ratio.

Expendables

Total: 6 t

100% lubricating oil

Avoided CO_2 emissions

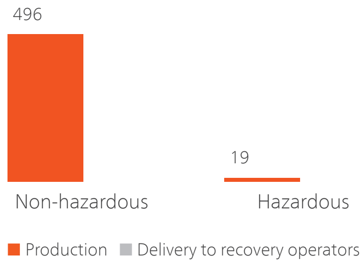
Due to hydro generation from natural flows: **1,939,093 t**

Emissions from the otherwise necessary fossil-fired thermal generation.

Special waste

Total production: **515 t**

Total delivery to recovery operators: **0 t**



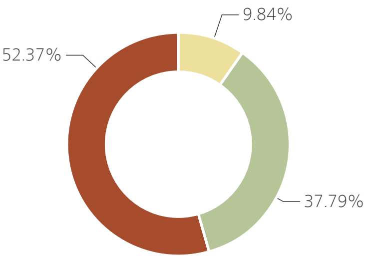
Peru

Electricity distribution

Endesa SA

The Numbers

Substations	Capacity (MVA)	Total lines (km)
8,949	3,175	25,266



Power installations

SUBSTATIONS	no.	Installed transforming capacity MVA
HV/MV	28	1,630
MV/LV	8,918	1,519
MV/MV	3	26
	8,949	**3,175**

LINES (length in km)	Overhead bare conductors	Overhead cables	Underground cables	Total
HV	421	-	50	**471**
MV	2,066	-	1,998	**4,064**
LV	0	9,547	11,184	**20,731**
	2,487	**9,547**	**13,232**	**25,266**

General data

Municipalities served: **57**

Surface area served: **1,517 km²**

Customers connected to the grid: **1,173,547**

(of which supplied by companies of the Group: **1,173,533**)

Resource consumption

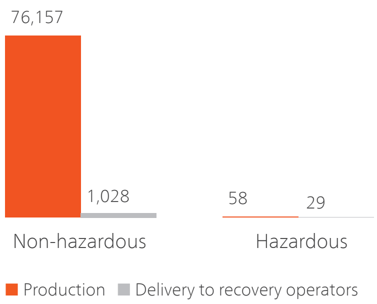
Expendables: **2.7 t**

Gas oil: **0.7 toe**

Special waste

Total production: **76,215 t**

Total delivery to recovery operators: **1,056**



Electricity

Total electricity distributed: **6,289 million kWh**

Own consumption for grid operation: **11 million kWh**

Emissions into the atmosphere

SF_6: **5 kg** (111 t of CO_2 equivalent)

CO_2: **2 t**

Total greenhouse gases: **113 t of CO_2 equivalent**

Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants	no.	10	10	10	10	10
thermal	no.	2	3	3	3	3
hydro	no.	8	7	7	7	7
Net maximum electrical capacity	MW	1,071	1,774	1,775	1,774	1,748
thermal	MW	572	1,037	1,037	1,035	1,009
hydro	MW	499	737	739	739	739
Power lines (circuit-length)						
Total	km	14,723	22,741	23,378	24,144	25,266
high-voltage	km	285	436	449	464	471
medium-voltage	km	2,333	3,597	3,694	3,854	4,064
low-voltage	km	12,104	18,708	19,234	19,826	20,731
EN29 **Real-estate & service management**						
Vehicle fleet						
service vehicles	no.	na	na	na	28	20
special vehicles	no.	na	na	na	2	2
Gross real-estate surface area	thousand m^2	na	na	na	na	17.8

Resources

		2008	2009	2010	2011	2012
EN1 EN3 Fossil fuels						
Thermal generation						
gas oil	thousand t	20	4.81	0.417	0.712	9.66
	thousand toe	20.6	4.73	0.461	0.733	10.7
natural gas	million m^3	701	942	1,106	1,219	1,099
	thousand toe	613	822	961	1.060	976
technologically captive use	*million m^3*	*701*	*942*	*1,085*	*1,196*	*1,083*
	thousand toe	*613*	*822*	*942*	*1,040*	*962*
of which in combined-cycle units	million m^3	454	609	596	595	504
	thousand toe	397	534	520	519	460
non-technologically captive use	*million m^3*	*0*	*0*	*21*	*22.7*	*15.8*
	thousand toe	*0*	*0*	*18.3*	*19.8*	*13.7*
Total	thousand toe	634	827	961	1,061	986
	TJ	26,536	34,614	40,236	44,416	41,290
Real-estate & service management	thousand toe	0	0	0	0.04	0.034
Grand total	thousand toe	634	827	961	1,061	986
	TJ	26,536	34,614	40,236	44,418	41,292
EN4 **Electricity**						
Real-estate & service management	million kWh	na	na	na	4.08	3.91
EN8 **Water for industrial uses**						
From wells	million m^3	2.23	3.3	2.98	3.36	3.12
From aqueducts	million m^3	0	0.072	0.041	0.05	0.089
Total abstraction from inland waters	million m^3	2.23	3.38	3.02	3.41	3.2
for thermal generation	million m^3	2.23	3.38	3.02	3.41	3.2
Water for non-industrial uses						
Real-estate & service management	million m^3	na	na	na	0.011	0.017
EN1 **Expendables**						
Hydrazine	t	0.198	0.22	0.23	0.12	0.035
Ammonia	t	4.94	6.37	7.09	6.37	7.3
Sodium hypochlorite	t	42.3	90.6	82.9	83.8	85.9
Sulfuric & hydrochloric acids	t	455	665	588	685	591
Caustic soda	t	2.29	10.5	3.57	5.93	7.49
Lubricating oil	t	8.75	17	191	18.3	20
Dielectric oil	t	1.11	1.33	2.5	3.5	2.67

		2008	2009	2010	2011	2012
Printing paper	t	na	na	na	0.009	21.8
Other	t	3.45	21.4	17.1	14.1	17.3
Total	**t**	**519**	**812**	**892**	**817**	**754**
for thermal generation	t	516	804	878	810	723
for hydro generation	t	1.62	7.21	9.27	2.72	5.96
for electricity distribution	t	0.925	1.33	4.5	3.5	2.67

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From fossil fuels	**million kWh**	**3,078**	**4,164**	**4,728**	**5,225**	**4,632**
fuel oil & gas oil	million kWh	87.7	15.9	2.17	2.86	25.9
natural gas	million kWh	2,991	4,148	4,726	5,223	4,606
of which in combined-cycle units	million kWh	2,242	3,179	3,040	2,153	2,805
From renewables	**million kWh**	**2,809**	**4,564**	**4,405**	**4,615**	**4,599**
hydro from natural flows	million kWh	2,809	4,564	4,405	4,615	4,599
Total	**million kWh**	**5,887**	**8,728**	**9,133**	**9,840**	**9,231**
simple	million kWh	5,887	8,728	9,133	9,840	9,231
Electricity distribution						
Electricity distributed	million kWh	4,090	5,716	6,126	6,017	6,289
EN4 Electricity consumption for grid operation	million kWh	5.81	10	9.76	9.91	11

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t	0.136	0.096	0.073	0.016	0.095
EN20 NO_x	thermal generation	thousand t	1.88	2.48	2.18	1.93	1.57
EN20 Particulates	thermal generation	thousand t	0.069	0.087	0.104	0.042	0.032
EN16 CO_2	fossil-fired thermal generation (from combustion)	thousand t	1,473	1,671	1,959	2,125	1,953
	various activities	thousand t	0.056	na	0.086	0.102	0.099
EN16 SF_6	electricity distribution	kg	na	5.5	51.5	23	5
		thousand t of CO_2 equivalent	na	0.125	1.17	0.524	0.114
EN16 **Total greenhouse gases (CO_2, SF_6, CH_4)**		**thousand t of CO_2 equivalent**	**1,473**	**1,671**	**1,960**	**2,125**	**1,953**
EN18 **Avoided CO_2 emissions**							
Due to hydro generation from natural flows		thousand t	1,343	1,832	1,825	1,876	1,939
EN21 **Waste waters (discharged quantity)**	thermal generation	million m^3	0.065	0.039	0.083	1.56	1.39
EN22 **Non-hazardous special waste**							
production	electricity generation	t	164	798	731	734	836
	electricity distribution	t	307	2,489	35,305	44,971	76,157
	Total	**t**	**471**	**3,287**	**36,036**	**45,704**	**76,993**
delivery to recovery operators	electricity generation	t	0.02	0.762	21	18.4	0
	electricity distribution	t	291	555	1,364	633	1,028
	Total	**t**	**291**	**556**	**1,385**	**652**	**1,028**
EN22 **Hazardous special waste**							
production	electricity generation	t	72.3	217	377	359	183
	electricity distribution	t	7.35	17.8	25.1	15.3	57.7
	various activities	t	0	0	0	4.58	0.499
	Total	**t**	**79.7**	**235**	**402**	**379**	**241**
	of which with PCBs						
	electricity generation	*t*	*12.3*	*5.57*	*54.6*	*4.13*	*6.88*
	electricity distribution	*t*	*2.73*	*2.91*	*5.26*	*3.46*	*32*
	various activities	*t*	*0*	*0*	*0*	*1.23*	*0*
	Total	*t*	*15.1*	*8.48*	*59.8*	*8.82*	*38.9*

	Source		2008	2009	2010	2011	2012
delivery to recovery operators	electricity generation	t	12.4	76.5	1.86	260	0
	electricity distribution	t	2.73	2.91	5.21	0	28.6
	Total	**t**	**15.2**	**79.4**	**7.07**	**260**	**28.6**
	of which with PCBs						
	electricity generation	*t*	*12.3*	*5.06*	*1.86*	*4.13*	*0*
	electricity distribution	*t*	*2.73*	*2.91*	*5*	*0*	*28.6*
	Total	***t***	***15.1***	***7.97***	***6.86***	***4.13***	***28.6***
EN22 **Total special waste**							
production	electricity generation	t	236	1,015	1,108	1,093	1,019
	electricity distribution	t	314	2,507	35,330	44,986	76,215
	various activities	t	0	0	0	4.58	0.579
	Total	**t**	**550**	**3,522**	**36,438**	**46,084**	**77,234**
delivery to recovery operators	electricity generation	t	12.4	77.3	22.9	278	0
	electricity distribution	t	294	558	1,369	633	1,056
	Total	**t**	**306**	**635**	**1,392**	**912**	**1,056**

Indicators

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN29 **Land**								
LV cable lines								
overhead	% of entire LV grid	41.9	42.6	43.2	44.2	46.1	10	4.3
underground	% of entire LV grid	58.1	57.4	56.8	55.8	53.9	-7.2	-3.4
Total cable lines	**% of entire LV grid**	**100**	**100**	**100**	**100**	**100**	**0**	**0**
MV cable lines								
overhead	% of entire MV grid	1.86	1.86	1.81	0	0	-100	na
underground	% of entire MV grid	46.7	47.5	47.1	48.7	49.2	5.4	1
Total cable lines	**% of entire MV grid**	**48.6**	**49.4**	**48.9**	**48.7**	**49.2**	**1.2**	**1**
Overhead and underground cables in HV+MV+LV distribution lines	% of total distribution grid	90	90.2	90.2	90	90.2	0.2	0.2
Resource conservation and quality								
EN1EN3 Net heat rate of thermal generation	kcal/kWh	2,059	1,986	2,033	2,030	2,129	3.4	4.9
EN4 Consumption of electricity for distribution grid operation	% electricity distributed	0.142	0.175	0.159	0.165	0.175	23.2	6.1
EN8 Net specific requirements of water for industrial uses in thermal generation								
including contribution of as-is sea water	liters/kWh	0.725	0.811	0.638	0.653	0.692	-4.6	6
excluding contribution of as-is sea water	liters/kWh	0.725	0.811	0.638	0.653	0.692	-4.6	6
Net specific consumption of water for industrial uses	liters/kWh	0.379	0.387	0.33	0.347	0.347	-8.4	0
EN8 **Coverage of requirements of water for industrial uses**								
from wells	% of requirements	100	97.9	98.6	98.5	97.2	-2.8	-1.3
from aqueducts	% of requirements	0	2.13	1.36	1.47	2.78	-	89.1
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	3.25	0.572	0.048	0.069	1.08	-66.8	1,465.2
natural gas	% of total fuel consumption	96.8	99.4	100	99.9	98.9	2.2	-1
natural gas, technologically captive use	% of total natural gas consumption	100	100	98.1	98.1	98.6	-1.4	0.5
of which in combined-cycle units	% of total natural gas consumption	64.7	64.9	54.1	49	47.2	-27	-3.7
natural gas, non-technologically captive use	% of total natural gas consumption	0	0	1.9	1.87	1.4	-	-25.1
Electricity generation from renewables								
hydro from natural flows	% total generation	47.7	52.3	48.2	46.9	49.8	4.4	6.2
Specific emissions into the atmosphere								
EN20 SO_2 (simple thermal generation)	g/kWh thermal net	0.044	0.023	0.015	0.003	0.021	-52.3	600
EN20 NO_x (simple thermal generation)	g/kWh thermal net	0.609	0.597	0.461	0.369	0.34	-44.2	-7.9
EN20 Particulates (simple thermal generation)	g/kWh thermal net	0.022	0.021	0.022	0.008	0.007	-68.2	-12.5
EN16 CO_2 (simple thermal generation)	g/kWh thermal net	478	401	414	407	422	-11.7	3.7

		2008	2009	2010	2011	2012	% ('12-'08)/'08	% ('12-'11)/'11
EN20 SO_2 (total from simple thermal generation)	g/kWh total net	0.023	0.011	0.008	0.002	0.01	-56.5	400
EN20 NO_x (total from simple thermal generation)	g/kWh total net	0.319	0.285	0.239	0.196	0.17	-46.7	-13.3
EN20 Particulates (total from simple thermal generation)	g/kWh total net	0.012	0.01	0.011	0.004	0.003	-75	-25
EN16 CO_2 (total from simple thermal generation)	g/kWh total net	250	191	214	216	212	-15.2	-1.9
EN16 SF_6 (electric activities)	% of SF_6 in equipment or in stock	0	0.297	2.39	1.45	0.289	0	-80.1
EN22 Waste recovery								
Non-hazardous special waste								
electricity generation	% of production	0.012	0.095	2.88	2.51	0	-100	0
electricity distribution	% of production	94.7	22.3	3.86	1.41	1.35	-98.6	-4.3
Total	**% of production**	**61.8**	**16.9**	**3.84**	**1.43**	**1.34**	**-97.9**	**-7.7**
Hazardous special waste								
electricity generation	% of production	17.2	35.3	0.492	72.3	0	-100	0
electricity distribution	% of production	37.1	16.4	20.8	0	49.5	33.4	-
Total	**% of production**	**19**	**33.9**	**1.76**	**68.5**	**11.9**	**-37.4**	**-82.6**
Total special waste								
electricity generation	% of production	5.27	7.62	2.07	25.5	0	-100	-100
electricity distribution	% of production	93.4	22.3	3.87	1.41	1.39	-98.5	-1.4
Total	**% of production**	**55.6**	**18**	**3.82**	**1.98**	**1.37**	**-97.6**	**-31.8**

Highlights of 2012

Enel operates in Peru through Endesa (hydro and thermal power generation, electricity distribution and sale).

Overall generation was down by ~600 GWh owing to lower fossil-fired thermal generation.

EN1 EN3 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 simple thermal generation stood practically steady.

EN8 Net specific consumption of water for industrial uses in thermal generation remained unaltered with respect to 2011.

EN16 The slight worsening of the load factor of various thermal plants caused net specific emissions of CO_2 from thermal generation to mount slightly (from 407 to 422 g/kWh, i.e. +~3.7%).

EN20 Net specific emissions of NO_X and particulates were practically in line with those of 2011; those of SO_2, which were already very low, were negatively affected by the higher consumption of gas oil by diesel-fired units.

EN18 CO_2 emissions displaced by electricity generation from renewables amounted to approximately 1.9 million tonnes, slightly above last year's value.

EN19 Ozone-depleting substances:

R22

Emission: **99 kg**, measured on the basis of gas replenishments in the air conditioning system (Malacas thermal plant - Talara) and **equivalent to 5.4 kg of CFC11**.

EN26 Environmental enhancements.

Materials and resources

- Edelnor: LV and MV power line towers are repaired instead of being replaced; this choice avoids the construction of new towers and saves water and non-renewable resources (water, aggregates, concrete and iron); public-lighting lamp posts are recycled, thus saving on their purchase; dielectric oil is treated and regenerated.

Emissions

- Edegel: calculation of the carbon footprint in 2012.

Water

- Electricity distribution (Edelnor): awareness & training courses on reduction of consumption of water, paper and energy.
- Santa Rosa thermal plant (Lima): works were carried out for recovery of waste waters to be used for irrigation.

Waste waters

- Edelnor: prevention of pollution via quarterly monitoring of the quality of waste waters from mini-hydro plants.
- Santa Rosa thermal plant: approval of the environmental management plan regarding releases into the local river.

Waste

- Electricity distribution (Edelnor): 330 analyses of transformers were conducted to detect PCBs. No PCBs were identified.

Noise

- Ventanilla thermal plant (west of Lima): installation of a noise barrier in the area bordering with the communities of Santa Rosa I and II was completed.

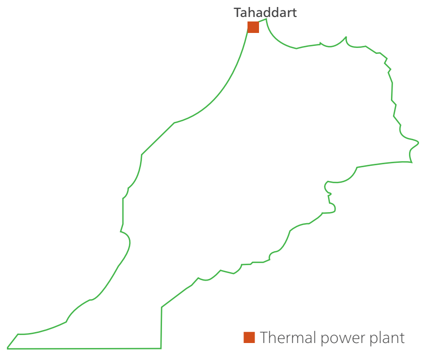

people

Africa

Morocco

Thermal power generation

Endesa SA



The Numbers

Power plants	Net capacity (MW)	Generation (million kWh)
1	123	906

Power installations

	Power plants no.	Units no.	Net maximum electrical capacity MW
Combined-cycle gas turbines	**1**	**1**	**123**

Waste waters

1,945,215 m^3

discharged

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

Fuel consumption

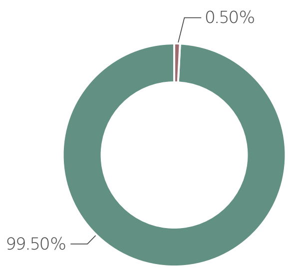
Total: **139,930 t** of oil equivalent

(100% natural gas)

Water for industrial uses

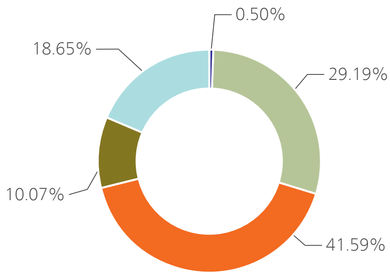
Total requirements: 2,701,210 m^3

Total abstraction from inland waters: 12,830 m^3

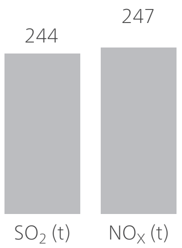


Expendables

Total: 13 t



Emissions into the atmosphere



CO_2: **361,000 t**

Environmental Results

Status data

		2008	2009	2010	2011	2012
Power-generating installations						
Power plants (thermal)	no.			1	1	1
Net maximum electrical capacity	MW			123	123	123

Resources

		2008	2009	2010	2011	2012
EN1 EN3 Fossil fuels						
Thermal generation						
natural gas	million m^3			119	123	157
	thousand toe			107	110	140
	TJ			4,465	4,585	5,859
EN8 Water for industrial uses						
From aqueducts	million m^3			0.019	0.019	0.013
Total abstraction from inland waters	million m^3			0.019	0.019	0.013
From the sea (as - is)	million m^3			0.194	0.194	2.69
Total requirement	million m^3			0.213	0.213	2.7
EN1 Expendables						
Resins	t			0.016	0	0
Hydrazine	t			0.096	0.006	0.064
Ammonia	t			0.64	0.96	1.28
Sodium hypochlorite	t			41.9	17.3	2.37
Trisodium phosphate	t			0.06	0	0
Sulfuric & hydrochloric acids	t			2.24	1.6	3.71
Caustic soda	t			2.24	2.56	0
Other	t			7.68	11.5	5.29
Total	t			54.9	33.9	12.7

Processes and products

		2008	2009	2010	2011	2012
Electricity generation (net)						
From fossil fuels (natural gas)	million kWh			689	745	906

Emissions

	Source		2008	2009	2010	2011	2012
Emissions into the atmosphere							
EN20 SO_2	thermal generation	thousand t			0.191	0.191	0.244
EN20 NO_x	thermal generation	thousand t			0.034	0.034	0.247
EN16 CO_2	thermal generation	thousand t			267	274	361
EN16 Total greenhouse gases (CO_2, SF_6, CH_4)		t of CO_2 equivalent			267	274	361
EN21 **Waste waters (discharged quantity)**	thermal generation	million m^3			0.007	0.016	1.95

	Source		2008	2009	2010	2011	2012
EN21 Conventional polluting load in waste waters discharged by installations							
Metals and compounds (expressed as metal equivalents)	thermal generation	kg			4,187	4,999	na
	in some plants with an overall capacity of	MW			371	123	na
EN22 Non-hazardous special waste							
production	electricity generation	t			16	26.2	na
delivery to recovery operators	electricity generation	t			0	6.53	na
EN22 Hazardous special waste							
production	electricity generation	t			0.506	3.77	na
delivery to recovery operators	electricity generation	t			0	3.77	na
EN22 Total special waste							
production	electricity generation	t			16.5	30	na
delivery to recovery operators	electricity generation	t			0	10.3	na

Indicators

		2008	2009	2010	2011	2012	% ('12-'11)/'11
Resource conservation and quality							
EN1 EN3 Net heat rate of thermal generation	kcal/kWh			1,547	1,469	1,545	5.2
EN8 Net specific requirements of water for industrial uses in thermal generation							
including contribution of as-is sea water	liters/kWh			0.309	0.286	2.98	942
excluding contribution of as-is sea water	liters/kWh			0.028	0.025	0.014	-44
EN8 Coverage of requirements of water for industrial uses							
from aqueducts	% of requirements			8.92	8.92	0.481	-94.6
Total from inland waters	**% of requirements**			**8.92**	**8.92**	**0.481**	**-94.6**
from the sea (as-is)	% of requirements			91.1	91.1	99.5	9.2
EN1 EN3 Fossil fuel consumption for thermal generation							
natural gas	% of total fuel consumption			100	100	100	0
natural gas, technologically captive use	% of total natural gas consumption			100	100	100	0
of which in combined-cycle units	*% of total natural gas consumption*			*100*	*100*	*100*	*0*
Specific emissions into the atmosphere							
EN20 SO_2 (thermal generation)	g/kWh thermal net			0.277	0.256	0.269	5.1
EN20 NO_x (thermal generation)	g/kWh thermal net			0.049	0.046	0.273	493.5
EN16 CO_2 (thermal generation)	g/kWh thermal net			387	367	398	8.4
Net specific conventional polluting load of waste waters discharged by plants (thermal generation)							
Metals and compounds (expressed as metal equivalents)	mg/kWh thermal net			1.94	6.71	na	na
EN22 Waste recovery							
Non-hazardous special waste							
electricity generation	% of production			0	24.9	na	na
Hazardous special waste							
electricity generation	% of production			0	100	na	na
Total hazardous special waste							
electricity generation	% of production			0	100	na	na
Total special waste							
electricity generation	% of production			0	34.4	na	na

Highlights of 2012

In 2012, generation in the CCGT plant (the only one owned in the country) was up by about 150 GWh.

Enel operates in Morocco through Endesa (thermal power generation).

EN1 EN3 EN5 The net heat rate of thermal generation was down by 5% thanks to a better distribution of the generating output.

EN8 Brackish water abstracted from the Tahaddart estuary accounted for 99.5% of total water consumption. Net specific consumption of water was higher than last year, because its value in 2011 did not include the brackish water used for make-up of the closed-cycle cooling system.

EN26 Environmental enhancements.

Water

> Use of waste waters from the demineralized-water treatment system for irrigation.

Materials and resources

> Paper saving (less printing) through employees' awareness actions.

Waste

> Improved identification, segregation and management of waste items in storage areas by labeling them with appropriate tags and purchasing equipment for their preliminary treatment (shredder of vegetable waste, presses for plastics, paper, cardboard and aluminum).

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