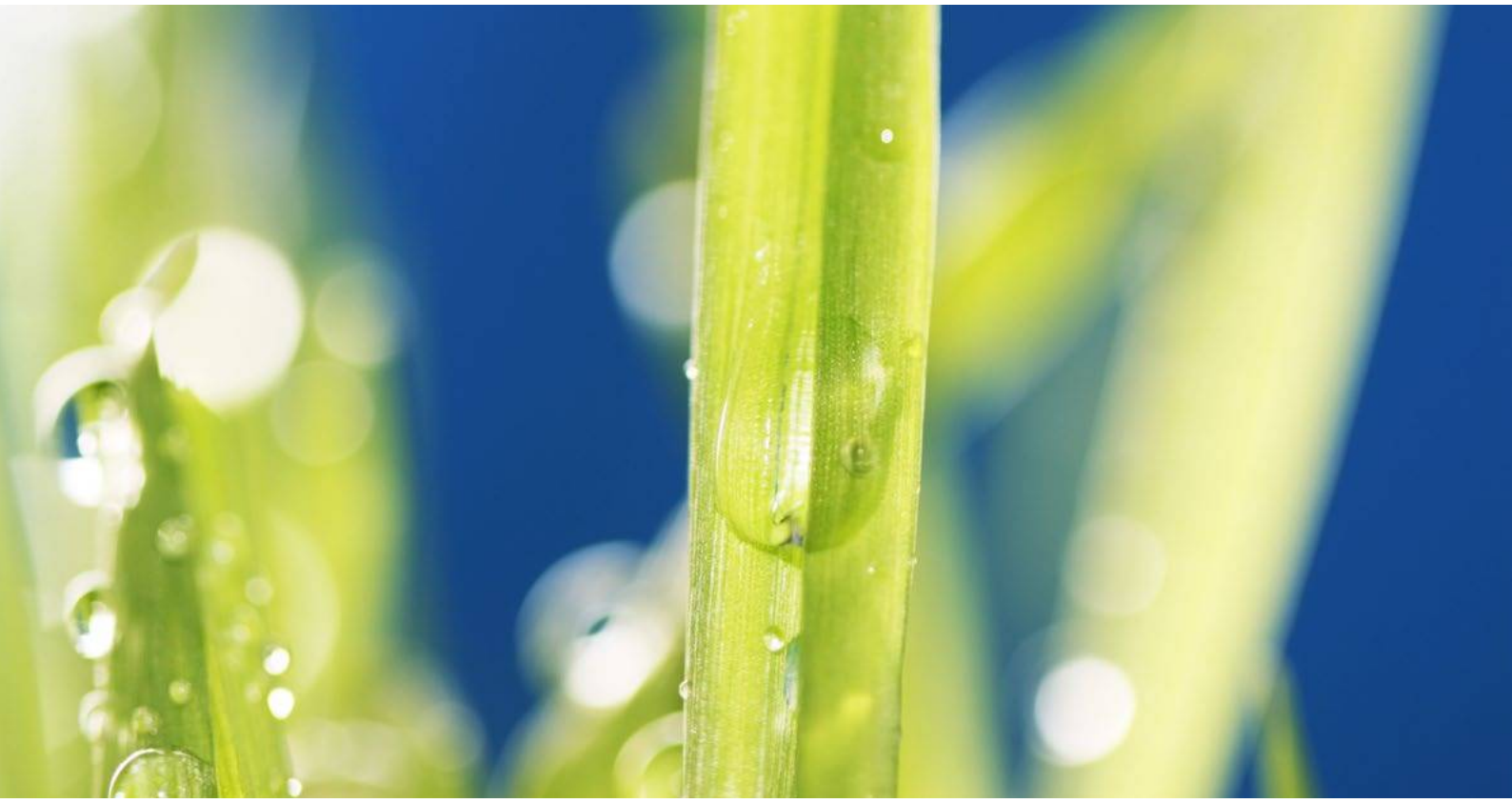

# 07
# Environment

_ Managing environmental impacts
_ Abengoa's main environmental indicators

# 07 Environment

The growth of the population, the new patterns of consumption and the climate change pose a serious threat to the environment. Consequently, Abengoa seeks to harvest **efficiency** in its **products and processes**, ensuring that the sustainability policy of its businesses coincide with sustainability in the execution, all within a framework of respect for the environment and for the preservation of the natural resources.

Thus, Abengoa continuously analyses the **risks and opportunities associated with climate change** to improve its management and to refocus its businesses and, for that purpose, it takes all the necessary measures to ensure the adaptation of its activities to the planned changes.

The aforementioned analysis shows the main risks and opportunities considered as follows:

| Risk | Opportunity |
|---|---|
| The current situation of regulatory uncertainty combined with the uncertainty of whether the Kyoto Protocol will continue to be honoured could cause a reduction in the capital designated to the fight against climate change, a risk that directly affects Abengoa's business strategy. | The awareness of the climate change could force some other countries to include changes in regulations poised to encourage the creation of an energy mix based on renewable energies, which would generate significant business opportunities for the company. |
| The promulgation of new legislative frameworks to strictly regulate emissions associated with business productions could punish organizations that fail to include emissions reduction in their management plans. Considering the magnitude of the climate change as a global problem for all and sundry, such behaviour may entail a direct negative repercussion on the company's reputation in terms of trust generated in its interests groups. | From 2008 onwards, Abengoa has taken exhaustive inventory of its Greenhouse Gas (GHG) Emissions which has enabled it to establish annual reduction plans. This approach will offer the company significant competitive advantage in adapting to changes in regulations of this nature. |
| The variation in the physical environmental conditions, like alterations in raining patterns, the rise in temperatures, the rise in sea level and the multiplication in natural catastrophes, can lead to water scarcity, cultivation decrease, the destruction of infrastructures and the bringing of ordinary business activities to a standstill in territories directly affected. | The climate change derivative consequences increases the value of the Abengoa technology and constant innovation policy in that it will permit the adaptation of the company's products and services to emerging needs. A clear example of such is the water desalination for supply to water-deprived arid areas. |

In 2011 Abengoa developed a methodology for analysing risks associated with climate change. Since then it has used the method to evaluate their impact on the businesses of the organization: water desalination, biofuel production, electricity generation, solar plants and transmission lines, among others.

Taking an average temperature rise of 2.4 °C as premise [1], the company was able to determine the specific risks associated with each technology, their consequences, the probability of occurrence and the mitigation measures that may have to be taken.

Note 1 Considerable increase in scenario B2 of the Special Report of Emissions Scenarios (SRES), from the Inter-Governmental Panel of Climate Change Experts (IPCC).

# 07 Environment

The main challenge that the organization faces is that of reducing the carbon footprint in the atmosphere through more efficient products and processes

## Managing environmental impacts

To achieve the goal of reducing the environmental footprint, it is necessary to put in place reliable systems that provide information on the impact of the organization's activities on the environment. For that, Abengoa has two specific tools that provide information on environmental impact given its inclusion in the **Integrated Sustainability Management System (ISMS)**. The tools in question are **the Environmental Management System (EMS)** and the **Greenhouse Gas (GHG) Management System**.

**GHG Management System**

In 2008 Abengoa developed a system that can measure GHG emissions linked to the organization's products and services. The results obtained are externally verified every year thus enabling the company to establish annual reduction goals and to label the products and services with its carbon footprint.

**Environmental Management Systems**

The defining of 11 factors (raw materials, energy, water, spillage or dumping, waste, emissions, biodiversity, transports, services and products, noise and smells) the Environmental Management System (EMS) provides information linked to the impact of the organization's activities on the environment, and enables reduction targets and improvement areas to be established.

92.92 % of Abengoa's companies have 2013 environmental management systems certificates

In that light, one of Abengoa's corporate requirements is to introduce environmental management systems in all its companies, in accordance with **ISO 14001 International Standard**, to prevent and mitigate negative environmental risks and impacts that an incorrect management may cause. 92.92 % [2] of Abengoa's companies have 2013 environmental management system certificates.

### Global Footprint

Abengoa has developed a method for calculating the **global footprint** of its projects to be able to measure and inform the market of the consumption of resources and the impacts derived from its activities, thus increasing its commitment to the Millennium Development Goals and to the sustainable development of communities.

Said method is based on the analysis of a series of indicators capable of **evaluating the impact that a project bore on its environmental, social and economic surroundings**, and which will at the same time be able to anticipate future impacts of projects of similar nature and establish improvement targets.

The Las Lomitas Transmission Lines in Argentina is one of the pilot projects to be executed under the global footprint work development framework. In addition, it was examined by Aenor in accordance with the ISO 14064 Standards, and awarded the Carbon Footprint certificate, thus joining the Comahue-Cuyo (Argentina) lines, the first of Abengoa's transmission lines to be awarded the certificate.

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Note 2 Percentage (%) based on sales volume.

# 07 Environment

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In 2013, Abengoa finalized its Internal Rules and Regulations which outline the tools and procedures necessary for calculating the global footprint of all the company's products and services, based on the following international standards:

- Guide G3.1 of Global Reporting Initiative (GRI).
- ISO 14001:2004 Environmental Management Systems. User requirements and guide.
- EMAS. Community Regulations on Eco-Management and Eco-Auditing.
- ISO 14064-1:2012 Greenhouse Gas Effect. Part 1: Specifications and Guidance, at organization level, for the quantification and declaration of GHG emissions and reductions. (ISO 14064-1:2006).
- ISO 50001:2011 Energy Management System. User requirements and guide.
- ISO 14067:2013 Carbon Footprint of Products.
- ISO 26000:2010 Social Responsibility Guide.
- SA8000 Social Responsibility 8000.
- Sustainability Assurance standards AA1000AS (2008).
- United Nations Global Compact
- OHSAS 18001:2007 Occupational Safety and Health Management System.

**Environmental Indicators**

**Water:** total water and recycled water consumption.
**Energy:** total energy and renewable energy consumption.
**Waste:** production and recovery.
**Materials:** total usage of materials and previously used materials.
**Greenhouse Gas:** emissions

**Socio-economic Indicators**

**Local purchases:** purchases made from local suppliers.
**Local employees:** employees from the country or region over the total of persons engaged in the project.
**Negative impacts on local communities:** actual or possible negative impacts mitigated.
**External social action:** investment in social action.
**Health and safety:** accidents in the project and the frequency index.

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# Abengoa's main environmental indicators

To calculate Abengoa's **environmental indicators**[3], we consolidated all of the data from all its work centres, the activities associated with them and all the projects managed by Abengoa.

## Raw material

The **optimization in the consumption of materials**, the reduction in the use of natural resources and the increase in the efficiency from the economic stand point, constitute a significant part of Abengoa's commitment to sustainability.

Below are the main materials used by the company, classified based on activities.

**Construction/Installation/Assembly Activities (t)**

| Material | 2013 | 2012 | 2011 |
|---|---|---|---|
| Cementing agents for construction (concrete, cement, plaster, etc.) | 659,317 | 657,855 (1) | 700,757 |
| Aggregates and natural stones | 563,471 | 883,085 | 994,204 |
| Iron metallic materials | 399,696 | 307,062 | 271,677 |
| Ceramic and glass materials | 23,538 | 76,758 | 165,184 |
| Non-iron metallic materials (aluminium) | 15,696 | 6,016 | 1,993 |
| Wood | 7,036 | 3,799 | 1,156 |
| Plastic | 5,182 | 2,699 | 8,101 |
| Materials of fossil origin | 5,011 | 7,829 | 15,256 |
| Non-renewable chemical and additive products | 4,687 | 1,038 | 819 |
| Non-iron metallic materials (others) | 3,949 | 6,427 | 47,725 |
| Renewable chemical and additive products | 3,665 | 228 | 109 |
| Non-iron metallic materials (copper) | 3,119 | 2,506 | 8,087 |
| Oils, greases and wax | 2,818 | 7,683 | 76 |
| Coating material (paints, varnish, etc.) | 2,404 | 3,144 | 10,081 |

(1) The 2012 data was modified following the detection of an error in the units.

**Distribution/Dealer/Storage (t) activities**

| Material | 2013 | 2012 | 2011 |
|---|---|---|---|
| Renewable chemical and additive products | 152,531 | – | – |
| Iron metallic materials | 5,460 | 6,872 | 9,082 |
| Plastic | 786 | 806 | 5,368 |
| Non-iron metallic materials (copper) | 745 | 480 | 16,550 |
| Wood | 533 | 1,357 | 1,420 |
| Non-iron metallic materials (aluminium) | 333 | 341 | 140 |

Note 3 All indicators were calculated using the specific measurement and calculation protocol for the purpose of homogenizing the application criteria.

# 07 Environment

**Production/manufacturing processes (t)**

| Material | 2013 | 2012 | 2011 |
|---|---|---|---|
| Plant raw material (cereals, vegetable oils, biomass, etc.) | 4,248,304 | 4,683,644 | 10,649,176 |
| Non-renewable chemical and additive products | 137,803 | 150,886 | 1,215,007 |
| Animal raw material | 78,319 | 77,466 | 74,822 |
| Iron metallic materials | 31,758 | 58,420 | 422,566 |
| Ceramic and glass materials | 30,895 | – | – |
| Renewable chemical and additive products | 18,370 | 15,679 | 24,103 |
| Minerals for industrial uses, chemicals, fertilizers, heat-resistant, melting and pigments | 7,774 | 17,289 | 10,419 |
| Materials of fossil origin | 6,008 | 1,891 | 9,134 |
| Aggregates and natural stones | 1,906 | 91 | 5,527 |
| Coating material (paints, varnish, etc.) | 1,175 | – | – |
| Non-iron metallic materials (zinc) | 1,159 | 4,202 | 2,117 |
| Cementing agents for construction (concrete, cement, plaster, etc.) | 485 | 203 | 14,811 |
| Copper | 280 | 123 | 173 |
| Wood | 136 | 92 | – |
| Non-iron metallic materials (others) | 133 | 502 | 1,846 |
| Oils and grease | 113 | 189 | 398 |

The variation n the use of some raw materials in construction-related activities is determined by the number of projects, their type and current execution phase.

For example, the inclusion of three plants of the solar business group (builder of mirrors for solar plants) into Abengoa's consolidation perimeter is the motivating factor behind the reporting of glass, ceramic and coating materials, in the activity, for the first time, —Production/Manufacturing Processes.

The drop in minerals in this activity is due to a change in information reporting criteria.

In its quest for new renewable energy sources, in 2013 Abengoa opened an urban solid waste recycling plant to produce ethanol using W2B[4] technology. The plant has so far consumed 928 t of waste.

Abengoa also analysed the recovered material consumption ratio, which contributes to the reduction in the demand for virgin material and the total cost of the processes. In 2013, 2 % of the materials used were recovered.

## Energy

The growing energy demand forces the search for **new solutions to forestall the exhaustion of resources while reducing environmental impacts**.

That is why Abengoa promotes facilities that convert renewable sources of energy into electricity and biofuels, laying transmission lines that support the electric systems and encourages responsible consumption based on autonomy, in the diversification of energy and the introduction of efficiency measures that expands the processes and activities of the company.

Note 4 For more information see the chapter "Innovative technology solutions for sustainability" or see the Activities Report (Volume I of Abengoa's 2013 Annual Report).

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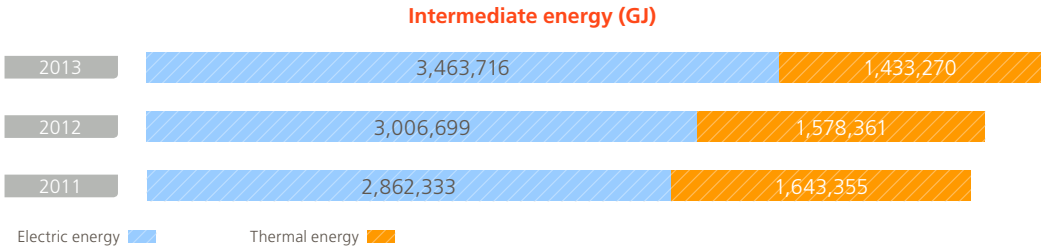
Below is a detail of **direct energy consumption** linked to Abengoa's production and construction processes, classified by fuel type.

| Energy (GJ) | 2013 | 2012 | 2011 |
|---|---|---|---|
| Natural Gas | 55,074,305 | 38,872,639 | 34,599,479 |
| Biomass | 15,269,801 | 14,639,966 | 9,327,640 |
| Crude oil derivatives | 2,168,933 | 2,362,480 | 3,947,290 |
| Biofuels | 74,499 | 267,961 | 733,974 |
| Others | 1,096 | 1,319 | 19,268 |
| **Energy total** | **72,588,634** | **56,144,365** | **48,627,651** |

Also, the facilities, work centres and projects directly executed by Abengoa consume intermediate energy in the form of electricity and thermal energy based on the graph below.




In keeping with its commitment to clean technologies, Abengoa's **consumption of electricity from renewable energies** reached **21 %** in 2013.

Translating this electricity consumption into the renewable primary sources employed in its generation, according to the data obtained from the International Energy Agency (IEA), it happens that the highest consumption is from hydro energy, followed by wind and then biomass.

| Indirect consumption of energy based on renewable primary sources (GJ) | 2013 | 2012 | 2011 |
|---|---|---|---|
| Hydroelectricity | 411,230 | 343,350 | 318,411 |
| Wind | 292,041 | 202,462 | 158,752 |
| Biomass | 284,429 | 169,112 | 158,513 |
| Photovoltaic | 43,292 | 27,148 | 20,008 |
| Thermosolar | 7,434 | 341 | 357 |
| Geothermal | 6,177 | 5,622 | 6,388 |
| Tidal Energy | 177 | 169 | 176 |
| **Total** | **1,044,780** | **748,204** | **662,605** |

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| Indirect consumption of energy based on non-renewable primary sources (GJ) | 2013 | 2012 | 2011 |
|---|---|---|---|
| Coal | 3,723,228 | 3,135,980 | 3,141,071 |
| Nuclear | 2,274,715 | 1,922,191 | 1,870,339 |
| Gas | 1,942,555 | 1,835,860 | 1,650,157 |
| Fuel Oil | 284,852 | 330,911 | 272,120 |
| Waste | 19,067 | 16,493 | 14,940 |
| **Total** | **8,244,417** | **7,241,435** | **6,948,627** |

Abengoa is not only an energy consumer, A great part of its activities is devoted to the production of renewable energies to help reduce the environmental impact that the growing energy demand is generating. In 2013 its **energy production amounted to 84,920,498 GJ**, broken down as follows:

| Type of energy | Production (GJ) |
|---|---|
| Biofuels | 50,446,231 |
| Electric | 21,232,968 |
| Thermal | 13,232,529 |
| Biomass | 8,770 |

21 % of the electric energy that we produce is from solar

21 % of the electric energy produced came from solar.

Another fundamental pillar in the implementation of Abengoa's policies and the attainment of its sustainability targets is the introduction of measures that help to reduce energy consumption with regards to the increase in the company's activities. Thus, in 2013 the company implemented various initiatives aimed at improving energy efficiency, among which are:

- Introduction of an energy efficiency management system based on ISO 50001 Standards. This system was certified by an external party at the bioethanol plant in A Coruña (Spain).
- Modification of the biofuel distillery facilities in Salamanca (Spain) to improve the utilization of residual heat.
- Improvements Abengoa's main offices in Buenos Aires (Argentina), which included procurement of energy-saving printers, movement sensors and energy saving lighting systems.

## The first platform for recharging electric vehicles with renewable energy

In 2013 the Industrial Engineering and Construction affiliate developed a platform for managing energy and recharging electric vehicles with energy from renewable origins, at their facilities in Torrecuéllar, Seville. The project was financed by the Centre for the Development of Industrial Technology (CDTI) and it is the first project of the affiliate in this field for which it used its own technology. The electric vehicles used in the project are being used as shuttles between Abengoa's work centres in Seville, Torrecuéllar and Campus Palmas Altas, which amounts to a significant reduction in GHG emissions. (+ info)

# 07 Environment

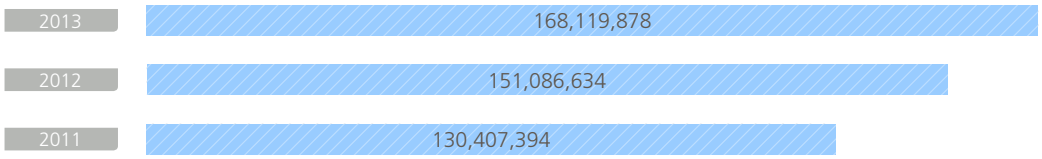
## Water

Captures of any water system may affect the environment due to water table lowering, the reduction in the volume of water available for consumption, or may cause any other alteration of the ecosystem's equilibrium. Such changes cause severe consequences, both economic as well as social.

Abengoa **identifies the origins of its water** captures and up till now it has not detected any source that is included in the Ramsar list of Wetlands, which may be considered especially sensitive or that the volume of its annual consumption amounts to more than 5 %.

As its priority, Abengoa's sustainability policy establishes the **rational use of resources**, the prevention and **reduction of repercussions on the environment**. Therefore, regarding water resources, the targets sort, in addition to monitoring the origin, are to minimize the usage, reuse for activities in which potability is not important and the capture of alternatives to that used by the human consumption supply networks.

**Water capture for desalination processes ($m^3$)**




**Water capture for production processes other than desalination ($m^3$)**

| Sources of capture | 2013 | 2012 | 2011 |
|---|---|---|---|
| River water | 10,607,839 | 11,440,519 | 9,219,477 |
| Network water | 6,735,505 | 2,873,279 | 7,533,507 |
| Well water | 4,134,126 | 4,738,624 | 5,118,672 |
| Rain water | 236,675 | – | 275 |
| Wastewater | 52,939 | – | 744 |

The increase in grid water withdrawal with respect to the previous year is mainly attributed to the operational start-up in 2013 of a cogeneration plant in Mexico.

Below are the water captures in 2013 for processes other than the preceding, like refrigeration, watering, sanitation, etc.

**Water capture for other uses ($m^3$)**

| Sources of capture | 2013 | 2012 | 2011 |
|---|---|---|---|
| Sea water | 2,855,773 | 2,679,256 | 2,918,258 |
| Well water | 1,744,592 | 1,278,544 | 322,309 |
| Rain water | 1,654,061 | 180,746 | 18,420 |
| River water | 683,761 | 910,686 | 166,187 |
| Network water | 497,791 | 544,422 | 347,194 |

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In 2013 Abengoa generated 50,078,135 $m^3$ of potable water.

Reused water amounted to 9 % of the total volume captured by Abengoa.

Like in energy consumption, **Abengoa** is not only a water consumer but also a **generator of potable water in geographical areas that suffer its scarcity**. In 2013 the company generated **50,078,135 $m^3$ of potable water**.

## Spillage and Dumping

Abengoa is well aware of the fact that a good environmental management requires the correct treatment of effluents or waste process water in its facilities in order to **minimize the impact on the environment**.

Thus, in companies in which the state of the water used is negatively altered due to the activities carried out, such water is subject to adequate treatment before being dumped into public water channels or sewer networks. Every dumping is therefore authorized and monitored by the competent entities to ensure its conformity.

The table below shows the amount of discharges and dumping releases during the activities of Abengoa.

| Dumping and Releases ($m^3$) | 2013 | 2012 | 2011 |
|---|---|---|---|
| Discharge into surface water masses | 96,379,204 | 79,902,159 | 72,349,892 |
| Provide to third parties for re-use | 81,946,987 | 76,381,089 | 63,360,318 |
| Discharges into sewer networks or external treatment facilities. | 877,762 | 885,529 | 286,538 |
| Discharges onto land through infiltration | 213,913 | 99,500 | 5,325 |
| Discharges into the environment – vapour (t) | 2,259,249 | 825,158 | 1,305,017 |
| Provided to third parties – vapour (t) | 37,408 | 54,283 | 61,125 |

The rise in discharges through infiltration into land with regards to previous year was because the four thermosolar platforms in Spain functioned all year round in 2013 while in 2012 they only started functioning during the second half.

Along these lines, one of the initiatives aimed at improving control over water discharges into the atmosphere was introduced at the biofuel plant in Salamanca (Spain), and involves cleaning the final segment of the dumping line to eliminate solid organic material that may be was also cleaned to enable clear observation.

On the aspect of spillages, and even though Abengoa makes every systematic efforts to prevent it, in 2013, according to the company's information channels, a total of 133 spillages occurred, and the cost of reparation amounted to € 81,243. At any rate, spillages were not significant, and in most cases, the environment and the atmosphere were not affected.

Among the measures put in place to combat spillages and to prevent leakages, the thermosolar platform in Extremadura (Spain) implemented an initiative that entailed replacing nitrogen with helium as the gas used to inert steam or thermal oil (HTF) loops and circuits. Thanks to the smallness in the size of helium molecule, this measure is aimed at improving leakage identification at circuit edges before the performance of the final test loops with HFT.

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## Waste

Abengoa gears the management of its daily activities towards **minimizing the generation of waste**, making recycling and reuse a priority over other options and recovered energy over dumping. Generated waste monitoring enables the evaluation of reduction and improvement of efficiency in production processes.

Below are the most significant wastes that Abengoa produced in its activities based on the final destination, separated by whether hazardous or not.

| Non-hazardous waste (t) | 2013 | 2012 | 2011 |
|---|---|---|---|
| Landfill | 124,901 | 392,631 | 301,122 |
| Recycled | 96,235 | 74,862 | 54,387 |
| Reused | 2,644 | – | – |
| Biological disposal | 2,083 | – | – |
| Recovered material | 1,921 | 1,570 | 3,136 |
| Dumping | 1,393 | 2,614 | 19,194 |
| Physical-chemical disposal | 1,149 | 5,449 | 1,590 |
| Recovered energy | 199 | 2,461 | 1,260 |
| Others | 10,318 | 3,316 | – |

In 2013 non-hazardous waste generation went down by more than 50 % with regards to 2012. This decrease occurred primarily as the result of a change in criteria applied to assessment of these wastes given that a significant quantity thereof are currently valorized and are not considered wastes.

| Hazardous waste (t) | 2013 | 2012 | 2011 |
|---|---|---|---|
| Landfill | 11,536 | 137 | 85 |
| Physical-chemical disposal | 3,168 | 3,835 | 2,569 |
| Reused | 578 | – | – |
| Recovered energy | 556 | 677 | 669 |
| Recycled | 429 | 657 | 2,853 |
| Dumping | 129 | 916 | 382 |
| Incineration without energy recovery | 71 | 89 | 41 |
| Others | 17,088 | 1,022 | – |

On the other hand, the value of generating the most significant hazardous waste has risen. This is mainly on new projects that have entered the execution phase, new plants that have commenced operations (such as Solana, in the US), the creation of new companies that have begun to report their environmental data (for example, the three mirror manufacturing plants) and improvements made in identifying environmental data at newly created plants.

Inappropriately transporting hazardous wastes, especially to countries that lack national regulations and infrastructures for treating them, may be dangerous to both human as well as to environmental health. Abengoa therefore ensures that this activity is performed by authorized handlers and it investigates the destination of its waste. The table below shows the main highlights associated with the transporting of hazardous waste.

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| Transporting of Hazardous Waste (t) | 2013 | 2012 | 2011 |
|---|---|---|---|
| National waste exit | 456 | 899 | 440 |
| National waste entry | 7 | – | – |

## Emissions

In-depth knowledge of emissions enables Abengoa **to establish reduction targets and assess the progress of its reduction measures**.

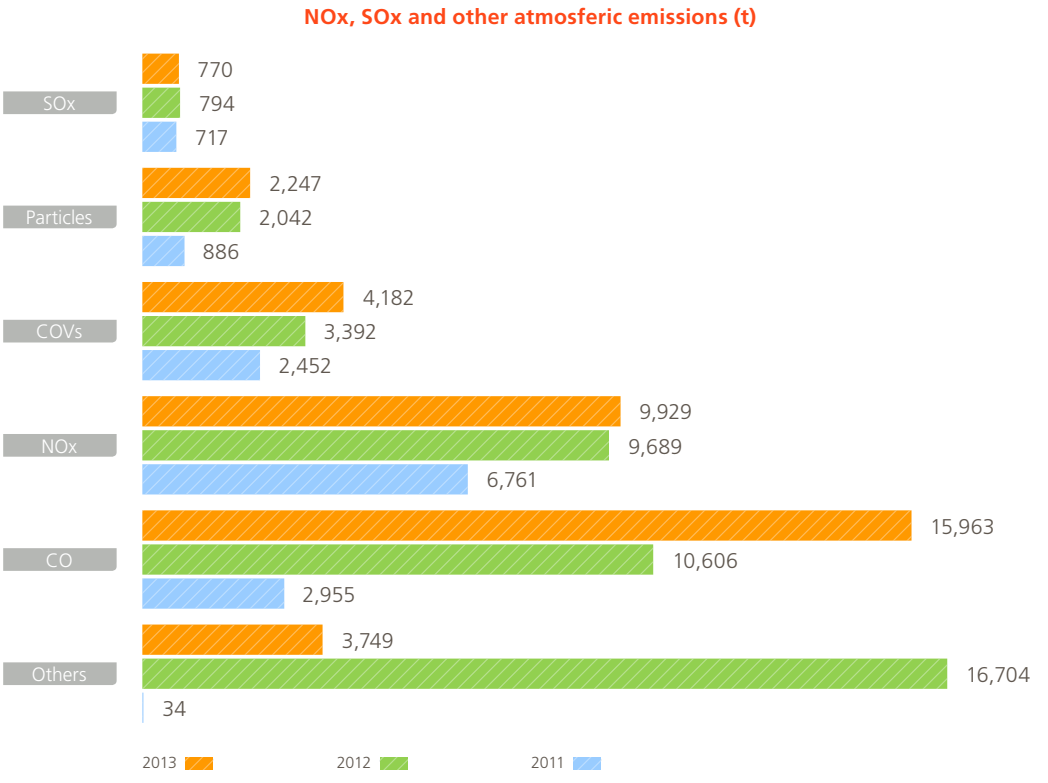
### Emissions of NOx, SOx, CO, COVs, particles and substances that destroy the ozone layer

Abengoa performs a follow-up on the emissions of substances that may destroy the ozone layer. The amount registered for such kinds of substances was 2.47 t in 2013.

| Substances that reduce the ozone Layer (t) | 2013 | 2012 | 2011 |
|---|---|---|---|
| Ozone layer-depleting substances | 2.47 | 1.38 | 1.29 |

The increase in the amount of emissions of substances that reduce the ozone layer for 2013 is related to a change in the method of reporting.

Below is a detail of emissions registered for NOx, SOx, CO, COVs and particles based on weight.



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In 2013, according to Abengoa's information channels, there were no entries of incidents relating to the emissions of these kinds of substances into the atmosphere.

## Inventory of Green House Gas Effect

In 2008 Abengoa created its **GHG Inventory** which is managed using an internal tool integrated into the Integrated Sustainability Management System (ISMS). At present, the level of maturity of the GHG emissions management system has enabled the company to lay out **plans for reducing the emissions** and to develop the **labelling of emissions** of products and services [5].

Abengoa's emissions management system is externally verified in accordance with the ISO 14064 Standard and the information below is consistent with the quantitative information included in the GHG Emissions Report for 2013 which was verified by Aenor.

### Scope 1 emissions

Below is a detail of GHG emissions derived from own sources or sources controlled by Abengoa, broken down by source type, distinguishing between those associated with biomass and those associated with other production processes.

| Generic emissions ($tCO_2eq$) | | Biomass emissions ($tCO_2eq$) | |
|---|---|---|---|
| Mobile combustion | 97,144 | Mobile combustion | 2,338 |
| Fixed combustion | 3,260,710 | Fixed combustion | 1,404,388 |
| Fugitive | 15,391 | Fugitive | 0 |
| Processes | 17,368 | Processes | 1,592,944 |
| **Total** | **3,390,613** | **Total** | **2,999,670** |

**Scope 1 emissions broken down by GHG type**

| Scope 1-$CO_2$ (1) emissions | Total emissions ($tCO_2eq$) |
|---|---|
| Mobile combustion | 98,461 |
| Fixed combustion | 4,461,465 |
| Fugitive | 9,446 |
| Processes | 1,592,944 |
| **Total** | **6,162,316** |

(1) The data include emissions from biomass.

| Scope 1-$CH_4$ emissions | Total emissions ($tCO_2eq$) |
|---|---|
| Mobile combustion | 118 |
| Fixed combustion | 76,132 |
| Fugitive | 2,222 |
| Processes | 0 |
| **Total** | **78,472** |

Note 5 For more information on labelling of $CO_2$ see the chapter on "Customers".

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| Scope 1-$N_2O$ emissions | Total emissions ($tCO_2eq$) |
|---|---|
| Mobile combustion | 903 |
| Fixed combustion | 127,501 |
| Processes | 17,368 |
| **Total** | **145,772** |

| Scope 1-HFC emissions | Total emissions ($tCO_2eq$) |
|---|---|
| Fugitive | 2,851 |
| **Total** | **2,851** |

| Scope 1-$SF_6$ emissions | Total emissions ($tCO_2eq$) |
|---|---|
| Fugitive | 873 |
| **Total** | **873** |

No PFC or $NF_3$ emissions sources were identified.

## Scope 2 emissions

Electricity and thermal energy emissions generated by other companies and acquired and consumed by Abengoa through out its entire activities.

| Scope 2- GHG emissions | Total emissions ($tCO_2eq$) |
|---|---|
| Electric energy consumption | 485,490 |
| Thermal energy consumption | 107,904 |
| **Total** | **593,394** |

## Scope 3 emissions

Indirect emissions that are consequence of the company's activities, but that emanate from sources that are not of the company itself or that are not under its control.

| Scope 3- GHG emissions | Total emissions ($tCO_2eq$) |
|---|---|
| Acquired supplies | 3,919,638 |
| Work-related travels | 27,668 |
| Work-related travels | 17,748 |
| Loses in electric energy distribution | 69,341 |
| Value chain of fuels consumed in acquired energy | 114,540 |
| **Total** | **4,149,935** |

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## GHG Emissions by Activity Segment

Given that Abengoa structures its business around three activity areas —Industrial production, Concession Infrastructure and Engineering and Construction—, emissions data are presented for each of these segments in each of the three scopes, for the 2013 financial year:

| | Engineering and construction | Concession-type infrastructure | Industrial Production | Total |
|---|---|---|---|---|
| **Scope 1** | 52,454 | 1,760,265 | 1,577,895 | 3,390,614 |
| **Scope 2** | 32,018 | 44,800 | 516,576 | 593,394 |
| **Scope 3** | 1,391,227 | 264,333 | 2,494,374 | 4,149,935 |
| **Total** | **1,475,699** | **2,069,398** | **4,588,845** | **8,133,943** |

Expressed in $tCO_2eq$.

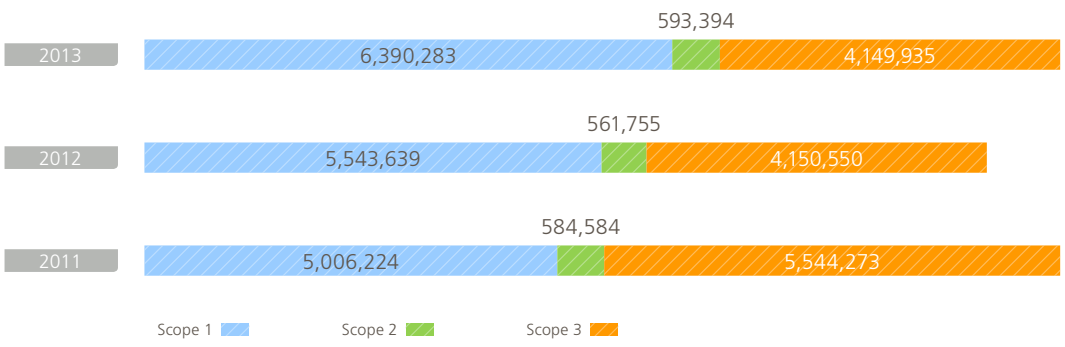
In addition, biomass emissions are as follows:

| | Engineering and construction | Concession-type infrastructure | Industrial Production | Total |
|---|---|---|---|---|
| **Biomass Combustion** | 729 | 2 | 1,405,995 | 1,406,726 |
| **The rest of the sources of biomass** | 0 | 0 | 1,592,944 | 1,592,944 |
| **Biomass Total** | **729** | **2** | **2,998,939** | **2,999,670** |

Expressed in $tCO_2eq$.

## Record of GHG emissions

Expressed in $tCO_2eq$.



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## Reduction of GHG emissions

Abengoa promotes the annual design of **emissions reduction plans** for all the companies within the organization. Since 2013, These reduction plans have been optimized and executed as directed actions, based on the requirements of ISO 14064-1.

Below are the most important initiatives undertaken in 2013:

- **Optimization of the system for capturing $CO_2$** generated during the process of producing bioethanol. The company captured 76,200 $tCO_2eq$ at the bioethanol plant in Rotterdam (the Netherlands) and 29,485 $tCO_2eq$ at the bioethanol plant in France for subsequent sale thereof to ther companies.
- Reduction of 1.58 % in sugar cane pulp humidity during the bioethanol production process at São João (Brazil). This humidity reduction marks **an increase in energy generation capacity** because much more steam is produced for each ton of sugar cane pulp used. The total reduction attained in 2013 was 9,341 $tCO_2eq$.
- **Improving the performance of the combined-cycle plant** in Hassi-Rmel (Algeria) in order to increase the energy delivered while maintaining the plant's gas consumption at normal operating levels. This effort lowered specific consumption and prevented the generation of 45,340 $tCO_2eq$.
- **Fitting of electric lines** to power one of the offices of R&D and innovation company in Sanlúcar la Mayor (Seville, Spain). This measure prevented the emission of 1.703 $tCO_2eq$.

The correct evaluation of the progress of GHG emissions requires that the variations in the activities of the company be taken into consideration in the analysis. Thus, Abengoa evaluates the management of emissions using a formula that yields GHG emissions variations in theory for one year in comparison to the previous:

$$\frac{\text{2012 Emissions}}{\text{2012 Activity parameter}} \times \text{2013 Activity parameter} - \text{2013 Emissions} = \text{Emissions reduced}$$

The first step to analysing it is to determine the parameter of activity that best defines the company's endeavours. Once said parameter is identified the calculations must be based on the following steps:

1. Compare the 2012 emissions with the activity parameter data established at the close of the 2012 financial year, and obtain a ration of emissions/parameter for 2012.
2. Then extrapolate the situation of 2012 to that of 2013 and obtain the GHG emissions that the company would have obtained in theory if its activity had not varied from one year to another.
3. Once that is done, compare the supposed 2013 emissions with the actual emissions of said year and obtain the supposed variations (increase or decrease) in emissions for one year as regards another.

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The theoretical reduction is more than 818.700 $tCO_2eq$

The heterogeneous nature of the organization's businesses led Abengoa to select sales as an activity parameter performed in all operations. The use of the aforementioned formula shows that the 2013 **reduction obtained in theory** in comparison to that of 2012 reaches **818,754 $tCO_2eq$**.

| GHG/sales emissions ($tCO_2eq/k€$) | 2013 | 2012 |
|---|---|---|
| Engineering and construction | 0.31 | 0.27 |
| Infrastructures under concession | 3.69 | 3.20 |
| Industrial production | 3.74 | 3.74 |
| **Total** | **1.51** | **1.62** |

| GHG/staff emissions ($tCO_2eq$/persons) | 2013 | 2012 |
|---|---|---|
| Engineering and construction | 75.91 | 57.40 |
| Infrastructures under concession | 4,105.95 | 4,180.02 |
| Industrial production | 1,582.44 | 1,305.44 |
| **Total** | **449.88** | **428.67** |

| GHG/Ebitda emissions ($tCO_2eq/M€$) | 2013 | 2012 |
|---|---|---|
| Engineering and construction | 1,833.27 | 1,610.15 |
| Infrastructures under concession | 6,506.63 | 5,385.98 |
| Industrial production | 31,405.74 | 87,737.89 |
| **Total** | **8,156.49** | **10,811.57** |

## Biodiversity management

In the execution of its activities, Abengoa **encourages biodiversity conservation** through the management, prevention and restoration in order to minimize the impact that its activities may bear on the environment. This includes from reforestation plans to strategies focused on the protection of flora and fauna species or to the imparting of trainings to prevent forest fires.

In line with the above, Abengoa performs environmental impact studies and tasks that entail monitoring of activities carried out in terrains adjacent to or within protected areas, identifying species affected and assessing the impacts derived thereof.

Abengoa owns companies in Brazil, France, Poland, South Africa and Spain, located in the surroundings of protected areas. Nevertheless, according to the information reported in 2013 in the information channels, none of them bear any high impact on the ecosystems.

Among the most significant are projects involving solar construction in South Africa by one of the engineering and construction affiliates, which affect a protected area of 675 hectares, and electrical power transmission line construction projects in Brazil, which affect a protected area of 537.38 hectares.

In both cases, protection measures have been introduced for the protected areas. The South African situation will include efforts to delimit and restrict access to said areas. The brazilian projects also implemented biodiversity conservation-related initiatives, like sowing in and maintaining the affected areas for environmental restoration, an endeavour that meant an investment of € 80,217.

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Likewise, one of the engineering and construction affiliates in Mexico is involved in some environment-related actions in the construction of the Centro Morelos (Mexico) combined-cycle plant, in which it follows-up on the fauna relocation program introduced last year, especially regarding the endemic species in the Predio area of the Plant, covering a surface area of 45.64 hectares.

And, finally, worth highlighting are the biodiversity protection activities undertaken at the bioethanol plant in Indiana (US), where a range of initiatives amounting to € 103,849, have been implemented to preserve forest areas.

As part of the strategies and actions introduced and planned for managing the impacts being borne on the biodiversity, as reported by the information channels of Abengoa, those of the electricity energy transmission lines construction project of Abengoa Brazil should be highlighted. To identify possible environmental impacts and adopt measures that may enable their prevention and mitigation, these initiatives entail preparing inventories and studies of what are affected in fauna populations and in environmental monitoring programs for the follow-up and control of the fauna and flora, an investment that has cost € 910,746.

Albeit on a much smaller scale at two of the Extremadura Solar Complex plants (Spain) have also introduced initiatives involving reforestation programs and perimeter fencing to protect vegetation.

Also worthy of mention is the topsoil initiative implemented at the Khi Solar One plant (South Africa), consisting of the transformation of organic vegetable waste through a natural process, recovering and utilizing the waste to regenerate soil affected by the project.

## Products, services and transportation

Environmental impacts derived from **utilization and end of useful life of products and services** have today acquired importance that is equal to or greater than impacts derived from the production phase, something that is becoming an even greater environmental challenge by the day.

Their nature and type has not enabled the identification of initiatives for mitigating the environmental impacts of the products and services sold and placed on the market which are recovered at the end of their useful life, and neither has specific measures been introduced to reduce the possible impacts of these products and services.

Nevertheless, regarding the recovery of products and packages placed on the market, in 2013 the company recovered 36 t of plastic packaging used in marketing the sugar produced by the cogeneration plant in São Luiz (Brazil).

In 2013 Abengoa's information systems did not identify any significant impacts derived from the transportation of products and other goods and materials used for the activities of the organization or for the transporting of its personnel.

Regarding the latter aspect, a series of actions were taken to ensure the reduction of emissions in 2013:

- Sensitization campaigns to promote the use of public transports to and from work centres.
- Bus shuttle services for employees of specific work centres with significant amount of workers.
- Meetings held using the tool know as *Gotomeeting*.
- Efficient driving courses.
- Use of the vehicle-sharing system or *Carpooling*.

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## Noises

Acoustic pollution is the excess noise that alters the normal environmental conditions of a specific area. If not properly controlled, this kind of pollution can cause severe damage to the life quality of people.

In 2013, according to information registered in the information channels of Abengoa, no incidents occurred and no initiatives were started in noise-related matters.

## Odours

The concept of odour or smell pollution has acquired special importance over the past years. Not being a risk to the health of the population, this kind of pollution generates discomfort that may influence the life quality of people.

In 2013, the following initiatives were developed in the field of smells:

- The bioethanol plant in A Coruña (Spain) concluded a study of smells that began in 2012 which was aimed at determining odours and their distribution throughout the plant. The initial phases entailed the study of the emission points, performing olfactometric sampling and analysis, and the final phase involved the odour dispersion simulation.
- The cogeneration plant in Jaén (Spain) installed an ultrafiltration system at the exit of its treatment plant to improve the quality of the water channelled to the cooling towers and, thereby reducing unpleasant odors.
- Series of complaints were filed in relation to the emission of smells at the bioethanol plant in Rotterdam (the Netherlands) in 2013. Although the levels were not significant, a regenerative thermal oxidizer was installed to eliminate the odours. The company also implemented communication campaigns with the local media to inform surrounding communities on the operational start-up of the facility. The two initiatives amounted to an investment of € 3.4 M.


Photograph taken by Bernabé Lugo Puerto, for the fifth edition of the photography competition on sustainable development.

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## Environmental expenses and investments

The evaluation of the expenses derived from environmental mitigation and protection permits Abengoa to **evaluate the efficiency** of its environmental initiatives and to better **focus its environmental investments**.

Below is a breakdown of the 2013 environmental expenses and investments.

| Environmental expenses and investments (€) | 2013 | 2012 | 2011 |
|---|---|---|---|
| Emissions treatment | 5,504,071 | 870,211 | 111,593 |
| Personnel for activities generated from environmental management | 4,514,496 | 1,766,565 | 1,312,679 |
| Waste treatment and elimination | 2,931,231 | 2,827,050 | 2,192,465 |
| Environmental management external services | 1,627,498 | 1,603,582 | 817,979 |
| Environmental responsibility insurance | 1,180,448 | 520,646 | 384,446 |
| Amortization of specific equipments, maintenance, materials and services necessary for its functioning | 226,215 | 211,814 | 106,617 |
| Costs of installing cleaner technologies | 186,376 | 3,483,150 | 4,086 |
| External certification of management systems | 150,225 | 153,079 | 164,463 |
| Expenses for the purchase and use of emissions certificates | 147,392 | 456,504 | 2,025,632 |
| Costs of correction, cleaning and decontamination | 69,402 | 225,686 | 99,157 |
| Personnel employed in training and education | 63,215 | 49,394 | 34,287 |
| Environmental Training | 54,965 | 68,130 | 69,600 |
| Research and development | 12,000 | 74,650 | 942,541 |
| Other costs of environmental management | 8,934,067 | 11,418,698 | 3,853,569 |

Investing in the development of initiatives and projects for environmental protection is Abengoa's priority. This is proven by the fact that though there are reductions in some items motivated by the state of some of the projects, the investments continue with regards to last year.

In 2013 a fine of € 11,500 was imposed on the company in relation to the reporting of $CO_2$ emissions at the bioethanol plant in Rotterdam (the Netherlands).