



## 03. Management of capitals

### 03.5 Natural capital

<b>Targets for 2018</b>	<ul style="list-style-type: none"> <li>› Manage to reduce <b>environmental accidents to zero</b>.</li> <li>› <b>Maximise the efficiency</b> associated with the consumption of water and energy at facility or project level.</li> <li>› <b>Minimise the generation of waste</b> and enhance reuse.</li> </ul>
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The necessary evolution of society towards **a model of green growth of the economy** is, for Abengoa, not only an **intrinsic commitment to its strategy**, but an opportunity for the proper evolution and continuity of its business.

To date, socio-economic development has always been governed by the actions of ‘obtain, use, dispose’, which has contributed to the progressive deterioration of the natural environment, the pollution of seas and the air, the generation of waste and the increased scarcity of natural resources. However, this exacerbated pace of consumption has generated problems that go beyond the environment, affecting health and the economy worldwide.

Accordingly, **the need for a change in patterns of consumption and sustainable production** that serve to combat these effects and ensure long-term prosperity on a healthy planet is unquestionable. And it is in this aspect that the private sector plays a crucial role.

Abengoa is aware of this and therefore has an **environmental strategy and policy aimed at efficiency in the use of resources**, promoting a more sustainable economic system.

This commitment is implicit in the company’s strategy and forms an essential part of its sustainable management model, both at the level of products and services and at the processes level: offering customers innovative technological solutions for sustainable development in the sectors of Infrastructure, Energy and Water and promoting the efficient use of resources while minimising their impact on the environment.

## Centralized environmental management

Senior management has undertaken a sweeping review of the environmental management systems, the procedures and the resources used in order to optimise processes and maximise their performance. This has involved defining a **centralised management system, adapted to the aspects required for environmental control** and the introduction of common targets, which in addition to complying with prevailing legislation takes into consideration the expectations of stakeholders.

This centralisation has led to operational changes in management systems, culminating in the unification of functions and the introduction of operational procedures that apply in all company activities. With this, the company has introduced the necessary mechanisms to establish an overarching and homogeneous diagnosis of its environmental conduct in any activity or country.

Currently, **the centralised management system is undergoing external certification pursuant to the ISO 14001 standard**. This standard, therefore, means the company can guarantee that all legal, contractual and good practices in environmental management requirements are identified and controlled properly.

### Fundamental pillars of environmental management

#### Circular economy

Abengoa is committed to making the value of products, materials and resources have a longer useful life and remain in the circuit of the economy for as long as possible to minimise waste generation.

#### Climate change

The company works to align the goals of the Paris Agreement, focusing on the mitigation of emissions from the organisation’s activities in order not to exceed an temperature increase of two degrees centigrade compared to the pre-industrial era.

### Management indicators

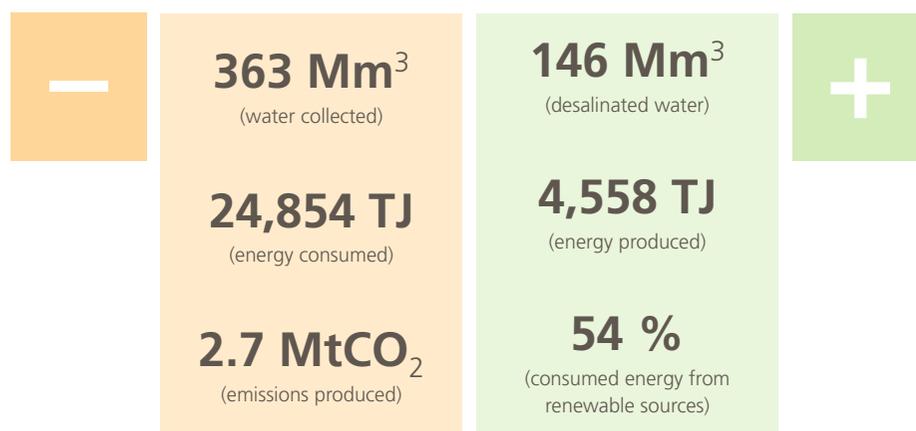
The crisis situation that the company has gone through has resulted in **the definition of an environmental management system focused on the aspects necessary for control and management** of Abengoa’s businesses, as well as the introduction of common goals, ensuring compliance with prevailing regulations.

Taking this into account, the company has defined several priority environmental aspects for control and management in all its activities:



However, the existence of this prioritisation does not exempt Abengoa's different businesses from managing any other environmental aspect which, without being critical for the company as a whole, is critical individually at project level.

## Main figures



## Energy and water

Energy efficiency, as well as the efficient use of natural resources, are nowadays the basic tenets for the functioning of an organization, serving as an engine of innovation and competitiveness to promote progress towards improving the quality of life for everybody.

However, there is still much to be done, and given that Abengoa is aware of this, it has focused its business on the development of energy infrastructures, generating renewable energy and transporting and distributing energy; contributing solutions to the integral water cycle through the desalination and treatment of water, as well as the construction of hydraulic infrastructures; and promoting new horizons of development and innovation in this field.

### Energy consumption 302-1

Direct energy consumed (GJ)	2017	2016	2015
Biofuels	47,837	25,677	63,410
Biomass	12,317,116	15,372,412	15,907,281
Oil derivatives	1,919,379	2,023,164	2,682,318
Natural Gas	8,555,514	12,662,200	32,108,747
Others	—	2,138	1,187
<b>Total</b>	<b>22,839,846</b>	<b>30,085,591</b>	<b>50,762,943</b>

Intermediate energy consumed (MWh)	2017	2016	2015
Electrical power	559,421	704,696	3,483,537
Thermal power	*	297,326	1,356,158
<b>Total</b>	<b>559,421</b>	<b>1,002,022</b>	<b>4,839,695</b>

\* The thermal energy supply was centralised in a single plant, Abengoa Bioenergy France, which has left the perimeter in 2017.

Energy consumption has been lower (-24 % in direct energy and -44 % in electricity).

In relation to direct energy, the main reason is the reduction in bioethanol production activity, caused by the divestment of plants in Europe and the United States, added to the decrease in the activity of the plants in Brazil.

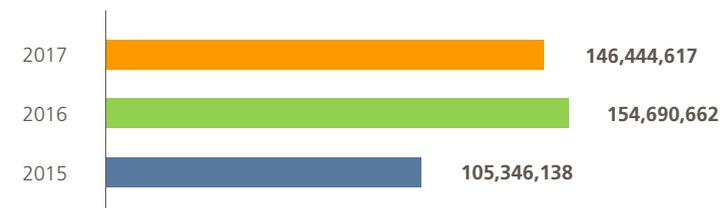
In terms of intermediate energy, the main reason is the production stoppage at one of the desalination plants, located in Accra (Ghana), caused by a natural disaster midway through the year that led to significant damage at the facility. [302-3](#)



### Water withdrawal [303-1](#)

	2017	2016	2015
River water	5,557,546	6,976,001	9,455,579
Seawater	356,538,188	336,653,375	221,199,378
Grid supply	451,581	1,256,693	3,336,161
Well water	312,011	369,382	4,378,293
Rainwater	4,542	4,611	3,665
Used water	26,231	41,972	3,854,598
<b>Total water collection (m<sup>3</sup>)</b>	<b>362,890,099</b>	<b>345,302,034</b>	<b>242,227,674</b>

### Desalinated water



The collection of seawater has increased compared to the previous year, due to the increased activity of the desalination plant in Almería (Spain). However, the decrease in activity of the desalination plant in Accra (Ghana) due to the damage caused by a natural disaster has caused the production of desalinated water in global terms to decrease by 5 %.

## Climate change

The fight against **climate change is one of the pillars of Abengoa's sustainability policies**, not only because of its impact on the environment but also because of its impact on the economy and society.

It is an undeniable reality that changes in the environment are altering weather patterns, increasing the frequency of extreme events (torrential rains, droughts, sudden rise and fall in temperatures). However, and in spite of everything, this situation is not yet irreversible, but it requires the work, effort and commitment of everybody: companies, governments, external agents and society as a whole.

In this regard, Abengoa is fully aware of its role in society and the environment, so it **focuses its activity on offering solutions aimed at reducing emissions and energy efficiency** not only in its final product but also throughout the entire supply chain.

In addition, the company has developed strategies for analysing risks associated with climate change in projects and facilities, especially in high-risk areas.

GHG emissions (tCO <sub>2eq</sub> )	2017	2016	2015
Direct emissions	652,332	1,044,098	2,135,808
Indirect emissions (scope 2)	315,283	418,938	637,810
Other indirect emissions (scope 3)	589,825	2,306,639	4,075,808
<b>Total</b>	<b>1,557,440</b>	<b>3,769,675</b>	<b>6,849,426</b>

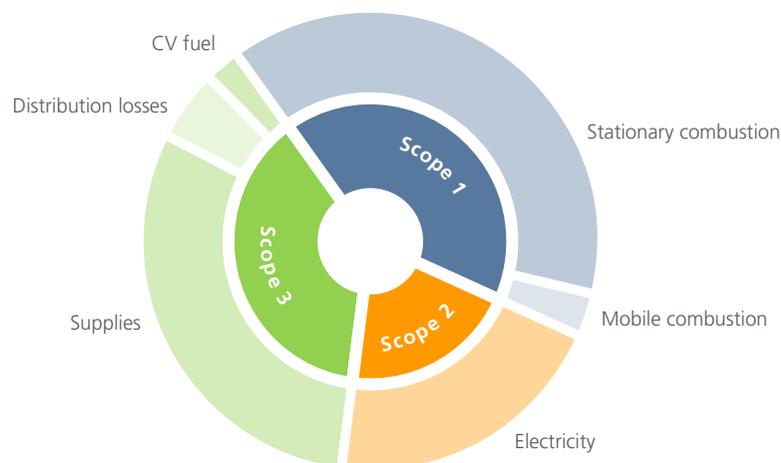
GHG emissions (tCO <sub>2eq</sub> )	2017	2016	2015
Direct emissions from biomass	1,103,015	2,025,292	3,289,005

305-1, 305-2, 305-3

### GHG Emissions of 2017

Fixed combustion	Mobile combustion	Electrical power	Supplies	Losses	CV fuel <sup>(1)</sup>
604,738	47,594	315,283	474,026	81,112	34,687

<sup>(1)</sup> CV fuel: Value chain of the fuels used in the generation of energy employed.



The emissions derived from the products and services provided by suppliers have been calculated using a methodology that takes advantage of the knowledge and experience that the company has gathered in this field over the last 10 years. An analysis of the life-cycle analysis and emission factors provided by suppliers in recent years has been carried out, selecting those of the highest quality and lowest range of uncertainty to obtain average emission factors for each family of materials. These emission factors have been applied to the supplies invoiced in 2017. 305-4

### Adaptation to climate change 201-02

Abengoa comprehensively analyses the vulnerability of the organisation's activities in the face of climate change. In this regard, and in order to protect the assets, the risks associated with climate change are incorporated into the general risk assessment, both globally and at project or facility level.

Abengoa is aligned with the **recommendations of the Task Force on Climate-related Financial Disclosure (TCFD)** of the Financial Stability Board (FSB). The organisation believes that alignment with international standards and awareness of financial risks and opportunities associated with climate change are an essential step towards improving transparency.

The most notable risks are associated with changes in the temperature and rainfall regimes. The possible consequences are detailed below, as well as the measures introduced to mitigate the risks: [201-2](#)

Risk	Consequences for the company	Management
Increase in temperatures	<ul style="list-style-type: none"> <li>› Malfunction due to expansion of structures.</li> <li>› Increase of the cost of capital in the transmission lines, due to the need to apply higher voltage to the conductor.</li> <li>› Alteration in the production of effective power of the combined-cycle plants and gas plants, due to the decrease of the mass flow in the turbine by decreasing air density.</li> <li>› Alteration to the conditions of input water at desalination plants, causing increases in the consumption of chemical products and increasing the likelihood of contaminating the process due to the growth of algae and molluscs within the facilities.</li> </ul>	<ul style="list-style-type: none"> <li>› Improvement of the environmental impact evaluation of projects, including potential alterations due to temperature changes, and introducing measures that mitigate the effects.</li> </ul>
Variations in the rainfall regime	<ul style="list-style-type: none"> <li>› Reduction of the availability of processing water through lower rainfall in certain geographies.</li> <li>› Alteration in the salinity and pH of the input water in desalination processes and at generation plants, having repercussions on the performance and involving a greater use of chemical products.</li> <li>› Also, corrosion problems could appear and the useful life of the main components would be reduced.</li> <li>› An extreme increase in rainfall could lead to noncompliance with the completion of construction projects, as well as damage to operating facilities, which could imply the interruption of the service.</li> <li>› The absence of rainfall could lead to the appearance of fires, having the same implications of noncompliance in the completion of construction projects and damage to the facilities in operation.</li> </ul>	<ul style="list-style-type: none"> <li>› Improvement of the environmental impact evaluation of projects, including potential alterations due to temperature changes, and introducing measures that mitigate the effects.</li> <li>› Insurance policies to cover exposure to weather phenomena. Our insurance programme protects all our facilities against physical damage and loss of profits due to these extraordinary risks.</li> </ul>
Rising sea level	<ul style="list-style-type: none"> <li>› Changes in the desalination activity of seawater, causing an increase in operating costs due to the implementation of protection measures to prevent flooding.</li> </ul>	<ul style="list-style-type: none"> <li>› Consideration of the potential rising sea level in the design of desalination plants. The Abengoa plants in operation were built at a safe height above the sea to prevent risks from rising sea level.</li> </ul>
Emergence of political measures that restrict actions that contribute to accelerating climate change or political measures that promote adaptation to climate change	<ul style="list-style-type: none"> <li>› Some examples include the introduction of carbon pricing mechanisms, the reduction of GHG emissions, the use of less emissive energy, the adoption of energy efficiency measures and the promotion of more sustainable practices in the use of land.</li> </ul>	<ul style="list-style-type: none"> <li>› Establishment of an emissions management system with an accounting system in all scopes. This allows the company to establish targets and mitigation and efficiency initiatives.</li> <li>› Introduction of a mechanism for calculating internal carbon prices, to align these with the emerging climate regulation as a result of the Paris Agreement and with the evolution of the business itself.</li> </ul>

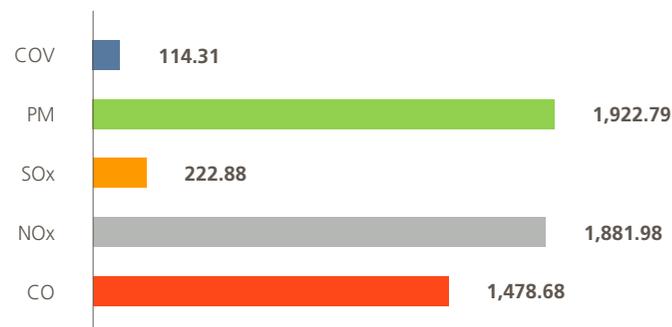
Risk	Consequences for the company	Management
Uncertainty about the future of the Paris Agreement	<ul style="list-style-type: none"> <li>› The current framework of uncertainty surrounding the Paris Agreement following the withdrawal of the United States could have a significant impact on the investments of financial and technical resources in renewable energy projects, especially in developing countries, and may affect our renewable energy infrastructure construction activity.</li> </ul>	<ul style="list-style-type: none"> <li>› Participation in conferences and webinars of Caring for Climate (C4C) and the Spanish office of climate change.</li> <li>› Monitoring and analysis of documents and news related to the evolution of the Paris Agreement, as well as tracking national and international policies in this regard.</li> </ul>
Reputation	<ul style="list-style-type: none"> <li>› The fight against climate change is currently one of the main concerns worldwide. The absence of a strategy to combat climate change could have a negative impact on a company's reputation with regard to its stakeholders and, especially, its clients.</li> </ul>	<ul style="list-style-type: none"> <li>› Communication and dissemination of Abengoa's climate change strategy, as well as all the initiatives carried out, in the Integrated Report and on the website.</li> <li>› Collaboration in initiatives of the Nazca platform of the United Nations Framework Convention on Climate Change.</li> </ul>

Likewise, the evaluation of risks enables the organisation to identify new business opportunities associated to climate change: for example, the increase of business in renewable energies, if there is a toughening up of regulations governing fossil fuels; increased demand for water caused by the potential rise in temperatures or greater number of sunlight hours through decreased rainfall.

#### Carbon Pricing 102-13

Abengoa is currently in the process of redefining its methodology for calculating the internal price of carbon, with the aim of incorporating it as an additional criterion in the evaluation of risks associated with new construction projects. This price is called the "shadow price", which the company will use to quantify the risk of generating emissions in new projects, promoting the decarbonisation of new investments.

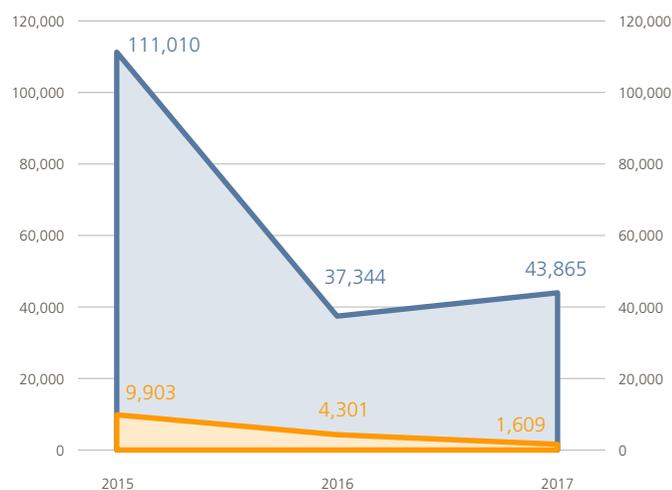
#### Other pollutant emissions (t)



## Abengoa and the circular economy

**Waste management** has become **one of the main challenges** for humanity today, due to its environmental, economic and social repercussions. There can be no question, therefore, on the **need for a change in patterns of consumption and sustainable production** that serve to combat these effects and ensure prosperous and sustainable development of the planet.

In this regard, the company has relaunched its activity introducing action procedures and **protocols to help make more efficient use of natural resources and minimise waste**, as these are not only about a decisive costs and competitiveness factor, but also contributes to the long-term preservation of natural resources.



	2017	2016	2015
■ Non-hazardous (t)	43,865	37,344	111,010
■ Hazardous (t)	1,609	4,301	9,903

The increase in non-hazardous waste is mainly due to the start-up of the construction project of the Waad Al Shamal hybrid plant in Saudi Arabia, which has generated a large amount of sludge.

Type of waste management (t)	2017	2016	2015
Reutilisation	689	3,735	19,940
Recycling	3,891	6,855	26,679
Composting	3 <sup>(1)</sup>	2,033	2,035
Recovery	561	516	970
Incineration	46	150	410
Landfill	37,844	23,560	18,464
Permanent storage	548	619	34,600
Others	1,890	4,178	17,816
<b>Total</b>	<b>45,474</b>	<b>41,646</b>	<b>120,914</b>

<sup>(1)</sup> The decrease in waste targeted at composting is due to the withdrawal from Abengoa's perimeter of the bio-ethanol plants Biocarburantes Castilla y León and Bioetanol Galicia, the main contributors to this figure.

306-2

### Campus Palmas Altas

#### Efficient office:

In 2015, the Building Council of the United States (USGBC) awarded Abengoa the **LEED** (Leadership in Energy & Environmental Design) Platinum certification, granted to its **Campus Palmas Altas headquarters** in Seville (Spain). This certification is further proof of Abengoa's commitment to developing measures and initiatives that contribute to improving efficiency in the performance of its activity.

LEED is a system of voluntary certification of sustainable buildings that is based on the incorporation of systems that contribute to energy efficiency, the use of alternative energies, the improvement of the internal environmental quality, the efficiency of water consumption, the sustainable development of the free spaces of the plot or the selection of materials.

#### Sustainable mobility:

Abengoa continues to promote the **Sustainable Mobility Office**, located at its headquarters at Campus Palmas Altas. This provides employees with **more comfortable, safer and sustainable travel options** from the city to the workplace, replacing the private vehicle option. With this office, Abengoa not only helps to improve the movement of workers to the workplace, but also to ensure that these trips are in harmony with the environment.

Among other initiatives, Abengoa offers its workers a shuttle service with which it is possible to travel from anywhere in Seville to Campus Palmas Altas. Also noteworthy is the location of a footbridge built by Abengoa that crosses the SE-30 and which connects Campus Palmas Altas with the metropolitan area, allowing the passage of pedestrians and cyclists, as well as the use of the public buses of Tussam and the Consortium of Metropolitan Transport of Seville.

