

02

Innovative technology solutions
for sustainability



We base our growth on creating new technologies geared towards sustainability development

The **world's current growth model** is stretching the planet to breaking point. Dwindling natural resources, the increase in energy demand and changes in the chemical make-up of the atmosphere have all **triggered major environmental imbalances** and are jeopardizing the development of future generations.

Against this backdrop, we need to incorporate processes capable of lowering the mass consumption of raw materials and **non-renewable energies**, while also **expanding our research** into **new technologies** to foster the **efficient management of resources**, the consumption of **clean energy** and a reduction in atmospheric CO₂ emissions.



Abengoa bases its business model on the pursuit of **groundbreaking technological solutions geared towards sustainable development** in the **energy** and **environmental sectors**, generating electricity from the sun, producing biofuels, desalinating seawater and recycling industrial waste.

Company growth is rooted in the creation of **environmentally-friendly new technologies** that champion sustainable development as we seek out alternative renewable energies. Abengoa therefore invests heavily in **research, development and innovation** (R&D+i); expanding and enhancing new technologies that offer the greatest potential while developing, attracting and maintaining the **finest human talent**.

Our vision

Abengoa's **vision is to be a world reference in the development of innovative technology solutions for sustainability**, providing its stakeholders with long-term value through transparent management based on the principles of enterprise, social responsibility and rigor.

Abengoa values

Management at Abengoa is based on a set of values that govern the company's relations with all its companies:

Integrity: Abengoa favors honesty in all its actions, both within the company itself and the communities in which its presence is felt.

Legality: each action carried out by the company is compliant with applicable law so as to ensure legal security and reduce risks.

Professional rigor: involvement and commitment in all company activities are essential to the ongoing success of the organization.

Confidentiality: discretion and prudence govern each of Abengoa's relations with its stakeholders. This aspect is key to forging trust and improving dialog and relations between the company and its environment.

Quality: excellence is present in all the products and services that the company offers.

Business model and areas of activity

Abengoa focuses its business on three activity areas:

▪ Engineering and construction

With over seventy years of experience, this unit embraces the core business of engineering and construction in energy and water. Abengoa specializes in the performance of complex turnkey projects, including concentrating solar thermal plants, hybrid solar-gas plants, conventional power stations and biofuel facilities, hydro infrastructures, desalination plants and power transmission lines.

▪ Infrastructures under concession

Abengoa boasts an impressive portfolio of proprietary assets under concession, all generating income through long-term sale agreements, guaranteed purchase agreements (take or pay) and power purchase agreements. This business line encompasses the operation of electric power plants (solar, cogeneration and wind power), desalination facilities and transmission lines.

▪ Industrial production

Technology-reliant businesses such as biofuels, waste recycling, hydrogen, seapower, energy crops and the development of solar technology, all areas in which Abengoa enjoys a position of leadership throughout the markets in which it operates.

Management structure at Abengoa

	Engineering and construction	Infrastructures under concession	Industrial production
Abeinsa	x	x	
Abengoa Solar		x	x
Abengoa Bioenergy			x
Befesa			x
Abengoa Water		x	
Abengoa Seapower			x
Abengoa Hydrogen			x
Abengoa Energy Crops			x

Products and services to attain sustainability

The company's vision dictates that its businesses must be geared towards sustainability development, while also enabling it to reach a **position of international leadership** in its sector.

Based on these two premises, Abengoa business centers on: solar energy, engineering and construction of energy infrastructures, hydrogen, bioenergy, water infrastructures, metal recycling and waste treatment, wind power, energy crops and marine energy.

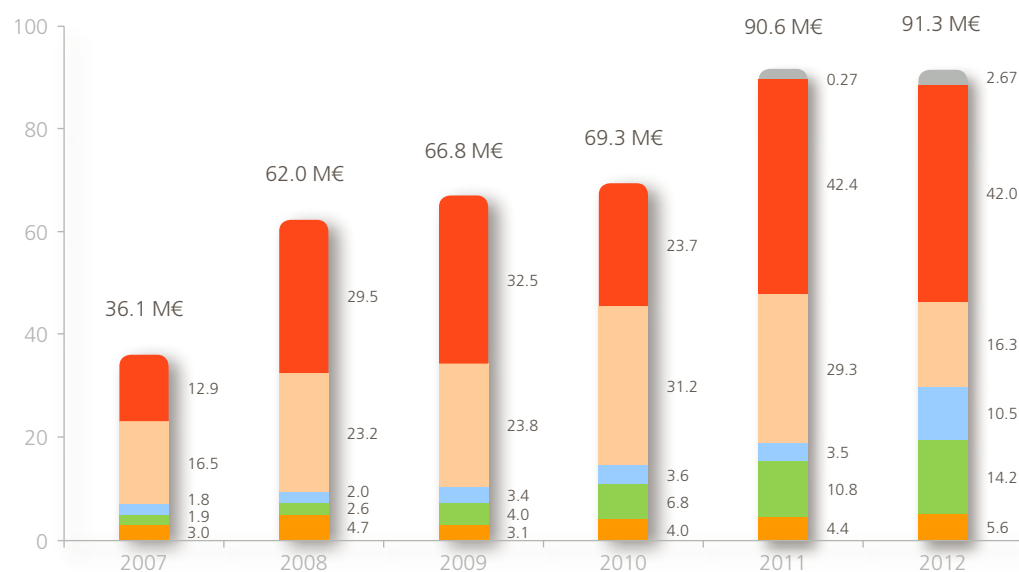
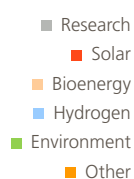
Investment in R&D+i stood at 91.3 M€ for 2012, up 0.6 % year-on-year

Innovation for sustainability development

During **2012**, Abengoa continued to **develop new technologies** with a view to generating new lines of business, while also improving upon existing technologies. It remains committed to **R&D+i** as the ideal vehicle for accomplishing this and generating considerable value-added in its products and processes.

R&D+i investment in 2012 amounted to **91.3 M€**, up 0.6 % year-on-year and accounting for approximately 1.17 % of its revenues, thus positioning annual growth of R&D+i investment at 20 % with respect to 2007 levels.

Abengoa remains committed to R&D+i, ramping up its investment year after year.



R&D indicators	Chg. 12-11 (%)	2012	2011	2010
Patents sought (cumulative)	33	203	153 ⁽¹⁾	113 ⁽¹⁾
R&D staff	10	747	682	563
Number of doctorate holders	39	50	36	22
Investment drive (%)	(11)	1.17	1.31	1.43

(1) Data on patents applied for in 2010 and 2011 have been modified due to a change in the method used to calculate the total number of patents applied for in one of the business divisions.

R&D+i at Abengoa is directly aligned with the company's strategy and is therefore constantly reviewed and updated. The **main tools** the company relies on for its **R&D+i management** include:

- **Assessment of R&D+i:** A key tool enabling the company to analyze and evaluate the different projects it undertakes through economic projections. It therefore allows us to ascertain the scope and possibilities of a given project, not only from a technological standpoint, but also from a strategic and market-oriented perspective, thus contributing value and mitigating associated risks when reaching project-related decisions.

Decision-making criteria
in order to assess R&D+i.



- Stage-gate **methodology** to monitor and track R&D projects.
- Abengoa's Patents and Technology Watch Office (PTWO).

These mechanisms enable Abengoa to improve decision-making processes as they allow projects to be tailored when needs arise.

To 2012, we filed for 203 patents, of which 77 were awarded

Patents and Technology Watch Office (PTWO)

Abengoa set up its **Patents and Technology Watch Office (PTWO)** in 2012 with the aim of creating a body tasked with protecting the company's industrial property and analyzing technological information related to patents.

Abengoa centralizes the following tasks through the PTWO:

- Analyzing the patentability of own inventions.
- Preparing patent applications.
- Technological oversight and patent maps.
- International extension of patent coverage.
- Analyzing operational freedom and detecting public domain technologies.
- Analyzing patent infringement risk.

Once the potential of an invention has been determined at Abengoa, this is reported to the OPVT in order to conduct joint analysis of the invention's patentability and strategic interest.

To 2012, the company filed for 203 patents, of which 77 were awarded.

Abengoa Research has changed the way private companies approach research

Abengoa Research

Abengoa Research (AR), founded in 2010, marks a **turning point** in the way private enterprises approach **research as AR is a benchmark center in technological research**. Although its main objectives are akin to those of a research center, they are also aligned with the company's own strategy.

AR is also faced with the challenge of generating knowledge to enable continuous improvements to be made to technologies, thus allowing it to maintain its competitive edge as a company while increasing its international leadership.

The human team at Abengoa Research brings together highly-qualified researchers specializing in a range of different scientific fields:

- Solid mechanics and structures.
- Fluid mechanics.
- Materials and nanotechnology.
- Thermal engineering.
- Chemical process engineering.
- Electrical engineering and biotechnology.

Water R&D+i center.
Photograph taken by
Juan Rayos.



In addition, Abengoa Research **collaborates strategically** with **prominent research groups** belonging to public, private and public-private universities and research centers, both domestic and international. We would single out in this regard the creation of the **Loyola-Abengoa Research (LAR) research center** in collaboration with the **Foundation of Universidad Loyola Andalucía**, bringing together researchers from both institutions.

Abengoa Research is committed to **training highly-qualified individuals** in the scientific and technical areas associated with Abengoa's different business. With this in mind, the company **recruited** twenty **doctorate students in 2012** to form part of its ranks.

In the coming two years, Abengoa expects to recruit a further ten students per year with the aim of training the next generation of researchers, who also offer the value-added of having earned their doctorate with renowned researchers working within a top-tier business environment.

Main projects in 2012

Waste recycling

Abengoa undertook various waste recycling projects in 2012, enabling it to cement its position in **Turkey and South Korea**.

Turkey

The company has invested 120 M\$ in two new steel dust recycling plants in Istanbul, which will be designed and operated with secure and sustainable technology. Each facility has sufficient capacity to treat 110,000 t of steel dust and combined can produce over 80,000 t of Waelz oxide. The plants will create roughly **130 direct jobs and more than 200 indirect jobs**. [[+ info](#)]

South Korea

Abengoa has acquired a 55 % stake in the South Korean company Hankook R&M, which is engaged in steel waste recycling and is valued at 60 M€. The new resulting plant will be able to recycle 110,000 t/year of steel, raising Abengoa's recycling capacity in 2013 to 750,000 t/year. In addition to the obvious benefits of investing in the local economy of Gyeongju, it is estimated that the project will generate **60 new direct jobs and over 100 indirect jobs in the area**. [[+ info](#)]

Waste to Biofuels (W2B)

Abengoa is developing a one-stop waste management solution intended for large towns and cities through *Waste to Biofuels*, a business unit tasked with the management of municipal solid waste (MSW) to produce fuel fractions and diesel and the recycling of materials by combining hydrolysis- and fermentation-based treatments for organic matter. This will allow Abengoa to provide a solution to the steady increase in this kind of waste, while also generating new sources of energy.

The company is currently building a pilot plant, which will become operational in 2013.

Solar

It is an undisputed fact that electricity consumption is set to continue over the coming years due largely to increasing demand from emerging countries. **Fossil fuels** offer limited production capacity and must therefore be **replaced gradually with renewable sources**, the costs of which could prove competitive with those of traditional sources by 2020. In this regard, Abengoa is developing a new generation of concentrating solar thermal plants that promise significant increases in efficiency and possibilities of gas hybridization.

Spain

In 2012, Abengoa started up two pilot plants, CRS Sales and Solugás, at the world's largest solar R&D+i center, located on the Solúcar complex at Sanlúcar la Mayor, Seville (Spain).

CRS Molten Salts

The start-up of this pilot plant will enable us to validate the functioning of solar receivers with molten salts as the heat-bearing fluid, together with the viability and efficiency of generating superheated steam from this fluid via a steam generator.

CRS molten salt pilot plant located at the Solúcar complex. Seville (Spain).



Solugás

In 2012, Abengoa commissioned its pilot power tower plant to demonstrate hybrid solar-gas power technology, which will help boost efficiency and competitiveness.

The project was financed by Framework Programme 7th of the European Commission, with project partners being the German Aerospace Center (DLR to use its German acronym), Turbomach, GEO Technika Cieplna and New Energy Algeria (NEAL).



Solugás pilot plant,
Seville, (Spain).

Also in 2012 the El Carpio, Solar Extremadura and Solar Castilla-La Mancha complexes came online.

United States

In Arizona, the Solana plant, featuring parabolic trough technology, is currently in the start-up phase, as scheduled, and the facility is expected to enter into operation at some time in 2013.

South Africa

The company has been selected by the South African Department of Energy to construct the country's first two concentrating solar thermal plants, part of the South African government's plan to meet its objective of obtaining up to 17,800 MW of renewable power by 2030 while reducing its reliance on oil and natural gas.

Global presence

Abengoa, with head offices in Seville, Spain, is present in over 70 countries on **five different continents** through its 600-plus subsidiary and investee companies, facilities and offices.



Awards and acknowledgements

Innovation

- **Award for the most innovative company**, granted by Cambio Financiero as an accolade for the company's value and enterprise in the corporate and financial realm.

Management

- **Winner of the Sustainable Biofuels Award** for the second time in recognition of the company's business management in developing biofuels.
- **Norfolk Southern Railroad Chemical Safety Award** for having dispatched without incident over 1,000 freight cars containing hazardous material regulated federally through the Norfolk Southern rail network.
- Recognition for the fourth year in a row as a **Top 50 company** of the St. Louis area by the regional Chamber of Commerce, which singles out the best companies operating in and around St. Louis.
- **ESADE Aptíssimi Award** under the category of best corporate legal consultancy team for 2012 in recognition of the company's track record in the professional, academic and business aspects of business law.
- **Special Company Award**, granted by the magazine Capital, in Seville, in recognition of initiatives, companies and businessmen and women that help to raise the exposure of Seville.

Sustainability

- International **CSP Today 2012 Award** for the best solar thermal engineering company.
- Recognition by the Secretary of the Environment of São Paulo, Brazil, who awarded Abengoa the **Green Ethanol** prize for its commitment to environmental protection.
- Prize awarded by the **Spanish Comisión Autónoma de Seguridad e Higiene en el Trabajo** de la Industria Química y Afines (COASHIQ) for the company's success at reducing occupational accidents.
- Award at the Spanish edition of the **European Business Awards for the Environment** in recognition of the company's business management for sustainable development.

Social development

- Distinction at the **I Manuel Sales y Ferré Awards** by the Seville Atheneum in recognition of the company's track record and cultural contribution to the city of Seville.