

06.3

Industrial production



Abengoa has created this line of business to group together its technology-heavy businesses, such as biofuels, industrial waste recycling, hydrogen technologies, ocean energy, energy crops and the development of solar technology. In these businesses, the company enjoys a strong position of leadership in the geographic markets where it operates.

	2012	2011	2010	Chg. 12-11 (%)
<b>Key figures - financial</b>				
Revenue (€ M)	2,798	2,855	2,250	-2.0 %
EBITDA (€ M)	215	273	345	-21.2 %
EBITDA margin (%)	7.7	9.6	15.3	-19.8 %
<b>Key figures - bioenergy</b>				
Installed capacity (ML)	3,175	3,175	3,140	0
Annual production (ML)	2,289	2,758	2,341	-17 %
<b>Key figures - recycling</b>				
Installed capacity (Mt)*	1.6	1.5	1.5	6.7
Waste managed (Mt)	2.2	2.2	2.2	3.8

\* Includes installed capacity in steel, aluminium and sulfur valorization businesses.

## Bioenergy

Abengoa's bioenergy business intends to cement its position of leadership in the biofuel sector while developing sustainable solutions for the transportation sector and bioproducts from biomass. The company is currently focused on developing technologies for producing second-generation biofuels from lignocellulosic biomass, especially bioethanol via enzymatic hydrolysis and gasification and catalytic synthesis of alcohols, and also on obtaining high value-added bioproducts.

New regulations in the United States and the European Union now require the biofuel industry to meet strict sustainability criteria. The regulations are intended to bring about a reduction in greenhouse gas emissions generated during the biofuel life cycle and also guarantee the origin of the feedstocks used to produce them.

In response to legal requirements, which govern both first and second-generation biofuels, Abengoa has implemented greenhouse gas (GHG) emission accounting and verification systems as well as feedstock certification systems to differentiate between biofuels that are sustainable and those that should be disregarded, as part of the ongoing fight against climate change.

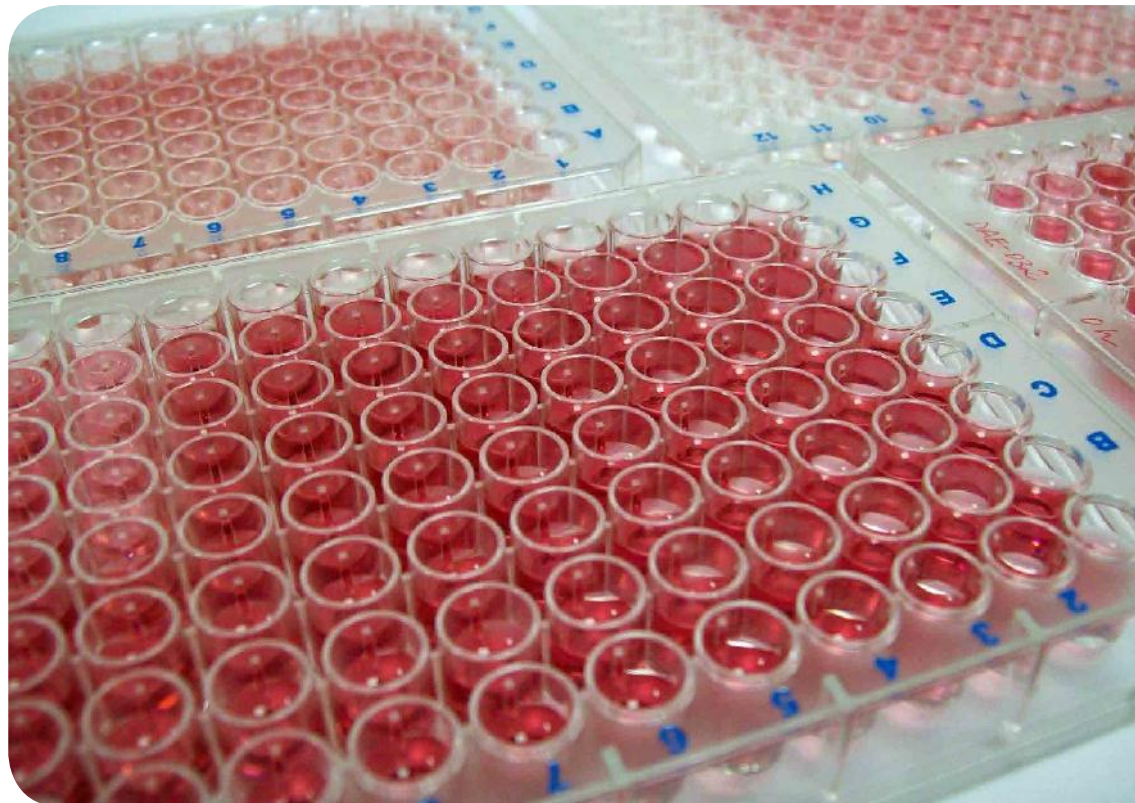
In relation to second-generation biofuels, the development of enzymatic hydrolysis technology has enabled us to convert agricultural waste, wood waste and other potential energy crops into ethanol, without upsetting the ecological balance or the food chain. At the same time, second-generation biofuels are very effective at cutting emissions in comparison to the fossil fuels they are replacing.

In the field of bioenergy, Abengoa's business mission centers on the following activities so as to reap the greatest returns for its stakeholders, industry and society at large:

- Fostering the sustainable development of the transportation fuel market while developing biochemical products through the use of renewable feedstocks and environmentally-friendly technologies that help curb carbon emissions while cushioning the environmental impact.
- Developing innovative technological solutions through continuous investment in R&D, leading to more efficient production processes, diversification of feedstocks and the manufacture of new products.
- Creating value for shareholders by focusing business on the creation of profitable and sustainable technological solutions.
- Promoting the personal and professional development of its employees through continuous training and setting up and overseeing customized development targets and plans.

In the field of biofuels, Abengoa is involved in the energy sector and in industrial production. It develops transport biofuels, bioethanol and biodiesel, among others, as well as chemical bioproducts that employ biomass (cereal grains, sugarcane, cellulosic biomass and oleaginous seeds) as feedstock. Biofuels are used to produce ETBE (a gasoline additive), or for direct blending with gasoline or diesel. Abengoa is also developing new biofuels (jet kerosene and biodiesel from sugars). The chemical bioproducts will be identical to those currently produced by the petrochemical industry in terms of functionality, but will be more sustainable and are intended for immediate replacement of existing products.

Laboratory enzyme trials



In the bioenergy sector, Abengoa boasts operations in five countries across three continents. It currently owns fourteen plants for producing bioethanol and other process-related co-products, along with a biodiesel production plant, distributed as follows:

- Europe: Spain, France and Holland.
- United States.
- Brazil.

These plants cater to the demands of global bioethanol markets from practically any corner of the world. Most sales are made in countries where the bioenergy is currently produced, although sales are also made in other countries and regions, including Germany, the United Kingdom, scandinavian countries and Italy.

Tokyo - ship exporting bioethanol from Europe



With a view to using new raw materials as sources of carbon, the company's efforts focus on enzymatic hydrolysis and catalysis processes.

Enzymatic hydrolysis technology is one of the core areas on which Abengoa is centering its technological development work. The main objective being pursued is to produce bioethanol from lignocellulosic inputs, chiefly different kinds of cereal straw and herbaceous crops.

In order to develop this technology further, Abengoa is constructing the first commercial biomass-to-bioethanol plant in Hugoton (Kansas, United States). The project has been made possible thanks to the company's knowledge of the processes involved and its years of experience in operating and resolving issues with the York pilot plant (United States) and the BCyl demonstration plant (Spain).

In the field of catalysis, the company is working on the technology needed to convert ethanol into high value-added products, such as butanol.

Biomass-to-ethanol demonstration plant in Babilafuente, Salamanca



Abengoa has developed a groundbreaking technology allowing for the catalytic production of n-biobutanol from the bioethanol produced at first-generation plants.

Abengoa is also involved in the Waste to Biofuels project. The aim of this project is to develop a one-stop solution for managing municipal solid waste (MSW). On the one hand, this will allow more waste fractions to be used by converting agricultural waste sugars into biofuels and energy, while on the other it will provide a more sustainable and efficient alternative to final disposal of waste at landfill sites.

### Projects by region and key achievements

Abengoa is Europe's leading biofuel producer (with a production capacity of 1,500 ML) and one of the main producers in the United States (1,440 ML) and Brazil (235 ML), with a grand total of 3,175 ML of installed production capacity distributed between 14 plants operating in five countries across three continents.

#### Europe

In relation to second-generation biofuels, Abengoa started up its BCyL biomass plant in 2009, the world's first commercial-scale demonstration plant, capable of producing ethanol from biomass continuously through enzymatic hydrolysis technology.

Ongoing operation of the plant has proved that the technology is technically and economically viable and has allowed the company to streamline and optimize the production process.

#### United States

The US Environmental Protection Agency (EPA) has authorized the North American subsidiary of Abengoa Bioenergía to produce E15 (15 % ethanol and 85 % gasoline), the new blend of fuel available for cars and trucks built from 2011 onward. The current US administration has set the objective of helping service station owners install 10,000 pumps for the new fuel over the coming five years.

Night-time shot of the Abengoa Bioenergy of Indiana plant at Mount Vernon (United States)



### Brazil

The Brazilian National Development Bank has chosen Abengoa to develop second-generation ethanol and biobutanol from sugarcane biomass, utilizing both the straw and the bagasse. The company will be responsible for implementing the technology required to carry out the project and for carrying out the engineering work to construct a plant capable of producing 100 ML of second-generation ethanol a year.

Laboratory trials of new products



In 2012, Abengoa's bioenergy arm embarked on a far-reaching process to create value for its shareholders. The company has identified opportunities that will enable it shortly to diversify bioproducts further and manufacture compounds and biofuels with improved value-added, thus generating greater environmental benefits and rewards.

The main objectives for 2013 and successive years are to press on with the commercial development and implementation of new products, which will be used over the coming years as a sustainable and competitive replacement for a large part of existing oil-based products. The company also intends to develop new business lines to valorize existing assets and continue with its policy of conducting business in line with best practices in risk management and process efficiency, making sustainability its utmost priority.

### Recycling

Against an economic backdrop of financial instability in Spain and other European countries, Abengoa has managed to steer a steady path in its recycling business thanks to its well-diversified business activities and strong international presence.

The steel waste recycling business is currently the European market leader in the recycling of zinc waste, providing the steel industry with a high value-added environmental service.

Turning our attention to aluminum waste recycling, Abengoa has developed a one-stop recycling model that has made it a benchmark within the market and the company currently leads its European competitors in the treatment of salt slag.

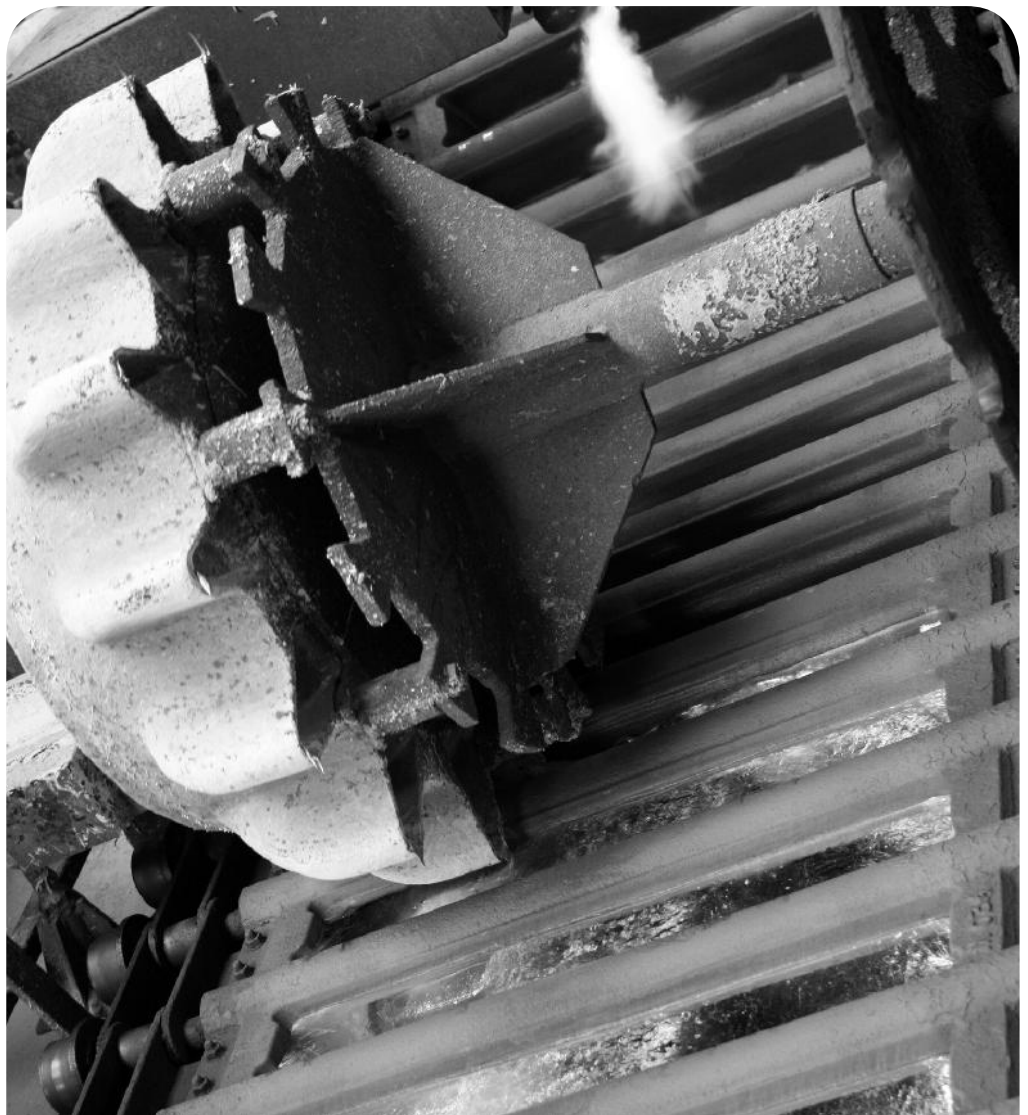
The industrial waste recycling business in Spain has been hit hard by shrinking waste generation brought on by the crisis.

Abengoa's mission is to provide technologically groundbreaking solutions in the recycling of industrial waste, thus contributing towards a more sustainable world. The company also aspires to become an international market leader in the recycling and management of industrial waste across its different lines of business.

This unflinching commitment is reflected in its lines of business:

- Galvanization and steel waste recycling: Recycling of common electric arc furnace steel dust. Recycling of stainless steel dust. Valorization of zinc waste produced from the galvanization process.
- Aluminum, salt slag and SPL recycling.

Aluminum pig



- Industrial waste management:
  - Spain
    - Full management of hazardous and non-hazardous industrial waste.
    - Industrial cleaning.
    - Soil management and decontamination.
    - Manufacture of low-density polyethylene pellets by recycling the film used for greenhouse coverings.
    - Collection, transportation and disposal of transformers, condensers and PCB-contaminated (polychlorinated biphenyl) materials.
    - Recovery and valorization of residual sulfur from the petrochemical industry for energy uses.

Industrial waste management facilities at Nerva (Spain)



- Latin America
  - Transport, inertization, final disposal and incineration of industrial waste.
  - Physicochemical treatment of aqueous waste.
  - Recovery and distillation of solvents.
  - On-site industrial cleaning.
- Waste to Biofuels (W2B)
  - Using organic material and plastics taken from municipal solid waste to produce bioethanol and biodiesel, respectively.

Abengoa currently has a strong international presence, carrying out its industrial waste recycling business at more than thirty facilities across twelve countries.

Abengoa manages, through the business units described below, over 2.2 Mt of waste, using more than 1.3 Mt of this in the production of new materials through recycling processes.



### Steel and galvanization waste recycling business

Over the course of 2012, the company treated more than 532,684 t of common steel dust in Europe and Turkey and over 123,618 t of stainless steel dust, recovering the material to create high-value metals such as nickel and chrome.

Aerial view of Abengoa facilities at Duisburg (Germany)



From this volume the company obtained more than 188,314 t of Waelz oxide, very much on par with the amount produced in 2011. In tandem, the stainless steel dust recycling plants produced more than 61,882 t of nickel, chrome and other alloys, 56.6 % up on the figure for 2011.

The steel waste recycling division witnessed numerous milestones over the course of the year. In May 2012, the company's Waelz oxide leaching plant at Gravelines (France) entered into operation. The facility has been designed with a nominal treatment capacity of 100,000 t/year, enough to meet the future leaching needs for the Waelz oxide produced by plants in Germany and France.

Unveiling of the new Waelz oxide leaching plant at Gravelines (France)



In July 2012, Abengoa signed a commitment agreement with the Investment Support and Promotion Agency of the Turkish Ministry of the Presidency (ISPAT) to invest \$120 M through a joint venture with the Canadian firm Silvermet Inc., the aim being to construct two new steel dust recycling plants in the regions of Adana and Izmir (Turkey), each to have a treatment capacity of 110,000 t.

Waelz furnace at Abengoa facilities in Iskenderun (Turkey)



As part of this growth strategy, an agreement was reached in September 2012 to acquire 55 % of the South Korean company Hankook R&M Co. Ltd. (HRM), which specializes in steel dust recycling. The company is constructing a plant in the city of Gyeongju, in the south-east of the country, with sufficient capacity to treat 110,000 t of steel dust produced by the main steel mills operating in the region. The new plant, which is scheduled to commence operations in the first quarter of 2013, will be operated by Abengoa and will feature technology developed and patented by Abengoa.

Lastly, and to better exploit existing synergies, August 2012 witnessed the administrative merging of the Befesa Zinc Amorebieta and Befesa Zinc Sondika plants, with the name of the resulting company becoming Befesa Zinc Óxido, S. A.

Construction work is set to start in 2013 on two steel dust recycling facilities in Turkey. The new steel dust recycling plant in South Korea will also be completed in 2013.

### Aluminum, salt slag and SPL waste recycling

The company carries out the one-stop collection, transportation and recovery of aluminum waste and scrap, producing and selling secondary aluminum alloys and helping in particular to lower CO<sub>2</sub> emissions.

Aluminum bars



Abengoa has the capacity to treat 160,000 t/year of aluminum waste at two plants and 630,000 t/year of salt slag and SPL at five different plants.

The technology division specializes in the design, construction, assembly and start-up of plants and facilities for the aluminum industry. Its flagship products include automated lines for producing 5-25 kg aluminum ingots, casting wheels, rotary ovens, coolers and equipment for treating slag.

Within the aluminum, salt slag and SPL recycling business, the main highlight in 2012 was the closure of the aluminum alloy manufacturing section at the Valladolid plant and the resulting migration of production to the Erandio and Les Franqueses production centers, the aim being to make further gains in both efficiency and production.

### Industrial waste recycling

#### Spain

Within this line of business, Abengoa carries out mechanical and chemical cleaning work, catalyzer and exchanger extraction, management of industrial waste (hazardous and non-hazardous), physicochemical treatment and inertization and stabilization treatments, as well as soil management and decontamination.

On-site cleaning of heat exchangers



The sulfur valorization business processed 58,941 t of sulfur over the year, producing 177,520 t of sulfuric acid.

In the plastics recycling business, Abengoa manufactures low-density polyethylene pellets by recycling the film used to cover greenhouses.

The company has been busy within the industrial waste recycling business in Spain, with highlights including the preoperational cleaning of the Solacor, Solaben and Helios solar power plants in Spain and the Shams-1 solar power plant in Abu Dhabi.

In addition, the new sulfur valorization plant at the Port of Bilbao was unveiled on October 17. The facility has the capacity to treat 120,000 t of sulfur to produce 350,000 t of sulfuric acid and oleum, enough to generate roughly 90,000 MWh of associated electricity each year. This new plant makes huge environmental inroads across the board, as it features highly efficient state-of-the-art technologies, many considered best available techniques according to BREF reference documents.

### Latin America

In Argentina, the incineration business unit reported an 100 % year-on-year gain in the number of tons treated, while final waste disposal witnessed an increase of 4 %.

In Chile, the company managed 17,553 t of waste at its facilities in Sierra Gorda, 120 km from Antofagasta.

In Peru, 30,540 t of industrial waste were treated over the course of 2012.

Last but not least, waste treated in Mexico during 2012 amounted to 14,211 t.

### Waste to Biofuels (W2B)

W2B technology involves obtaining energy from municipal solid waste (MSW) through fermentation and enzymatic hydrolysis treatment. This solution is not restricted to the treatment of the organic fraction of MSW, but also embraces all the other components, including those that can and those that cannot be recycled, along with other plastics, through the use of pyrolysis technologies to obtain biodiesel and energy valorization approaches to generate steam and electrical power.

### Solar power

Since its inception, Abengoa's solar business has acquired a wealth of experience along the different stages of the value chain within the solar thermal business and, by extension, within the industrial production segment.

PS20 heliostat field



Abengoa market leadership should enable us to offer the most competitive prices for solar power generation via our projects, while helping us to monetize investments in R&D+i by harnessing the growth of third-party businesses.

Abengoa's solar business focuses its industrial production activity on:

- Marketing and supplying key components for our plants and third-party facilities. This is the case, for example, with our parabolic troughs, our troughs for industrial applications, our mirrors for parabolic trough and power tower plants, and our modules and systems for high concentration photovoltaic applications.
- Designing new solar thermal and photovoltaic components and technologies and defining future marketing strategies.
- Developing and honing operation and maintenance equipment.

Developing new technologies and components, which can be applied to the company's own plants and also sold to third parties, is one of the segments in which Abengoa's solar business is basing the future growth of the business.

Thanks to its status as the world's leading company in terms of concentrating solar power in operation, Abengoa has built up a wealth of knowledge in plant operation and maintenance, enabling it to make groundbreaking improvements to plant design and operating methods. These advances, coupled with its heavy commitment to R&D+i, have made Abengoa a unique company capable of offering new tried and tested technological components that are highly efficient and competitive. The company is also able to generate added value by selling its "expert knowledge" on to third parties.

Significant milestones in industrial production for 2012 included:

- **E2. New generation of parabolic trough structure.**  
During 2012, Abengoa developed a new generation of parabolic trough, called E2.2, a major advance on the first generation of E2, which was in turn preceded by the ASTRO trough. This new generation features design improvements that allow for a more efficient installation and improved operational performance.  
The E2 trough is made up of between ten and twelve modules measuring twelve meters in length with approximately six meters of aperture area. The structure comprises tubular steel bars arranged into triangles, enabling it to resist the force generated by the wind blowing against the mirrors. This new design allows the force applied from the weight of the trough to pass through the structure's center of gravity, meaning that no internal torque is generated other than that produced by normal wind action.
- **ASUP 140. Development of a new generation of heliostat.**  
As a result of the ongoing drive to lower power generating costs, 2012 saw Abengoa unveil the new ASUP 140 heliostat. This model, based on the SL120 heliostat, offers a series of innovative features that combine to lower the costs of a solar field by approximately 30 %. In addition to these cost savings, the new design provides complete protection against rust and wear and improved mechanical resistance. Moreover, the hydraulic tracking system provides unrivalled precision and reliability, coupled with average annual availability of over 99 %. The new heliostat has been designed to use a new concept of facet, which combines a 2 mm sheet of glass with a foam support. The result is a solar field with reflectivity levels of over 95 %. The ASUP 140 has been validated through an exhaustive process that included wind tunnel testing, structural and optical trials and prototype field operation at the Solúcar Solar Platform. The new heliostat will be installed commercially at the Khi Solar 1 plant, our first 50 MW facility to employ superheated steam power tower technology in South Africa.

ASUP 140 heliostat



- **Condor.** New portable reflectometer for solar field characterization.  
The Condor is a groundbreaking device developed by Abengoa to measure reflectivity, offering operators a highly reliable means of characterizing reflectivity at solar fields. Covering six different wave lengths, the Condor is able to characterize all the states that a mirror can experience at a solar thermal power plant, while offering similar levels of precision along the entire reflectancy range. The Condor also offers excellent outdoor performance under very hot conditions with high levels of solar irradiation. Reliable and proper solar field characterization can help optimize cleaning work and, therefore, increase the plant's power generation.  
The company sold more than twenty Condor devices in 2012 and also staged a number of training sessions on how to use the equipment at the different solar platforms.

Condor reflectometer



- **Cleaning truck.**  
Abengoa and a specialist partner have continued to hone the design of the parabolic trough mirror cleaning vehicle. The truck has helped to streamline solar field maintenance work, while also shortening working shifts and reducing water consumption and the number of operators needed to carry out the maintenance work. This has brought about a marked increase in the performance of the solar field by reducing the resources needed to operate it.  
The main features of the vehicle include two cleaning arms, each controllable independently and with a 180 ° operating range, thus enabling the operators to clean the entire reflective surface. Over 2012, Abengoa worked through its industrial partner on selling the vehicle to both the company's own plants and third-party plants, with over ten units supplied to different facilities.

Parabolic trough cleaning truck



- High concentration photovoltaic technology (HCPV).  
Abengoa has developed a new generation of high concentration photovoltaic technology that is proving enormously more efficient and much cheaper to install than its predecessor. This new photovoltaic technology offers a range of advantages, of which we would highlight:
  - The silicon has been replaced with a combination of semiconductors to increase cell efficiency by over 40 % and enhance cell performance under extreme climatic conditions.
  - High associated efficiency of over 30 % per module.

Abengoa has already conducted tests confirming the efficiency of the technology by installing three pilot plants at Puertollano with a combined total of 300 kW, meaning the technology is now optimally positioned for a marketing drive over the coming years.

New generation  
HCPV tracker



Included below are the key industrial production figures for 2012:

- The company supplied over 1,300,000 parabolic trough mirrors over the course of 2012, both within Spain -to plants operating at the Extremadura Solar Platform- and abroad -to the Solana and Mojave plants currently under construction in the United States, and to the Aguas Prietas facility in Mexico, as well as to other companies such as Lanco and Abhijeet in India.
- The company supplied more than 2,000 parabolic troughs of the different models currently on sale, including ASTRO and E2, to the plants operating at the Extremadura Solar Platform, to Aguas Prietas in Mexico, and to the Solana and Mojave plants in the United States.

E2 trough in place at the  
Solana solar field



The company supplied facilities in Chile, Brazil, Canada and the United States with parabolic troughs for industrial applications, totaling over 10 MW. Abengoa Solar, with the collaboration of Abengoa Chile, has designed, engineered and supplied parabolic troughs for the world's largest industrial solar steam complex and the first commercial solar thermal facility in Latin America. The plant is located in Antofagasta, Chile, and has a thermal capacity of 10 MW. Abengoa has also supplied troughs for a hot water installation on the premises of Kraft Foods in Brazil; for a small demonstration plant at Red River College of Applied Arts, Science and Technology in Winnipeg, Canada, with the plant up and running since July; and for two small 40 kW facilities at the premises of Cummins Power Generation in both Fridley and Shoreview, Minnesota.

Industrial parabolic trough



Turning our attention to operation and maintenance equipment, Abengoa supplied roughly 20 Condor reflectometers to different plants within Spain and abroad, while also carrying out a technology transfer to the Spanish National Center for Renewable Energies (CENER) and another to the National Renewable Energy Laboratory (NREL) in the United States. Ten mirror cleaning vehicles were also sold to various parabolic trough plants.

In addition, Abengoa supplied the final four trackers to complete the installation of sixteen high concentration photovoltaic trackers at the Spanish Institute for Concentration Photovoltaics Systems (ISFOC), while also supplying trackers for pilot plants in Asia, the Middle East and South America.

Our progress made with proprietary technology has also enabled us to continue cutting generation costs and to monetize our investments in R&D+i through technology transfers to third parties for the construction of solar power plants. We are confident that this line of business will continue to generate significant revenue for the company over the coming years on the back of our proactive management of our technologies portfolio, which already features a number of new developments, coupled with a solid industrial protection strategy.

Last but not least, the company has reached a total of 743 MW in operation, a figure that will continue to grow over 2013 following the operational start-up of some of the 910 MW currently under construction. For this reason, streamlining the operation and maintenance of our plants is key to the success of the solar power business.

Since 2007, when our first commercial plant, PS10, was commissioned, and thanks to the steady start-up over the years of new solar power plants, embracing both power tower and parabolic trough technologies, we have been able to gradually optimize both plant start-up and operation and maintenance, responding well to what has become a very demanding process. Abengoa has implemented a standardized plant operation monitoring system, allowing us to track changes in key plant operating figures and carry out benchmarking. The company has also been harnessing synergies, enabling us to group plants together at solar platforms, or as part of large-scale international complexes. With the goal being continuous improvement and to learn from past experiences, Abengoa has rolled out training programs in O&M and on how to capitalize experience so that our operators can tackle the operation and maintenance of new plants with greater likelihood of success.



Abengoa will remain committed to innovation in 2013, specifically in those technologies flagged as key, with a view to keeping ahead of its competitors, while also lowering costs and making its technologies more efficient. It also intends to channel much of its resources into expanding its portfolio of components by seeking out new technological partners and strategic alliances with leading companies and institutions, shaping marketing strategies for its current portfolio of technologies and in development, and securing protection for its intellectual property, thus helping to ensure the ongoing technological and commercial leadership of Abengoa.

### Hydrogen, energy crops and ocean energy

#### Hydrogen

Due to the financial crisis, many nations and governments have recently lowered their short-term projections for the hydrogen economy. That said, the number of emerging applications and niche markets related to hydrogen and fuel cells is on the up.

For as long as interest remains in the hydrogen economy and with the aim of providing sustainable methods for producing and utilizing this clean fuel, Abengoa has also centered its attention on these niche markets, offering solutions in sectors such as transport, mobile applications and cogeneration through the use of high-temperature fuel cells. It is therefore already focusing on seeking out markets for these technologies.

Abengoa has been able to take part in hydrogen projects in Spain, Holland and other European countries, collaborating with both domestic and international partners.

Our growth strategy rests on a number of cornerstones, such as: investing in research and development on the path to new technologies, forging strategic alliances with benchmark technological partners and agreements with suppliers to develop applications jointly, and performing projects in collaboration with our customers, thus enabling them to incorporate hydrogen and fuel cells into their products as soon as possible.

Abengoa's work in the hydrogen sector centers primarily on two key areas:

- Producing renewable hydrogen via technologies such as biofuel reforming, integrating renewable energy sources with electrolyzers, and utilizing thermochemical combined cycles with high-temperature solar thermal energy.
- Using hydrogen in fuel cells featuring different technologies, as well as in engines and hydrogen turbines.

Among the main projects for clients, we would highlight the developments made to the air-independent propulsion (AIP) system of the S-80 submarine, which the Spanish shipyard Navantia is developing for the Spanish Navy. Among the company's self-funded R&D projects, we would single out Procyon, which was started in 2012 with the aim of developing a 300 kV stationary cogeneration plant employing high-temperature fuel cells (molten carbonates), which will be built at Campus Palmas Altas, Abengoa's headquarters in Seville.

Fuel cell and hydrogen facility at Campus Palmas Altas (Seville)



### Energy crops

The potential growth of the Uruguayan market remains huge for both Forestry Services and Biomass Trading, with the country boasting a booming forestry sector with growth in both plantations and industry.

On the international stage, we have focused on biomass for producing electrical power, an area in which we have detected major opportunities to expand further as a global biomass supplier.

Biomass (Uruguay)



Our vision is to become the global market leader in the sustainable production and sale of biomass, offering groundbreaking industrial solutions and creating value for our shareholders, customers and employees.

At present the main drive within the country has taken the form of new investments in the cellulose production area (Montes del Plata) and new biomass-to-energy generation projects, providing a further boost to both lines of business.

In the international arena, the need to replace fossil fuels, coupled with changes in the energy matrices of countries dependant on fuel imports, is opening the door to new energy sources, such as biomass obtained from energy crop plantations.

In Uruguay, the company has managed to cement its position of leadership in its two areas of business (Forestry Services and Biomass Trading) and has also established a foothold in the MdP cellulose plant through a goods yard operation agreement, a new area of business offering huge potential.

Internationally, we have generated heavy interest in our projects from some of the leading European electric utilities that consume pellets, and we are confident that a MoU will be signed with at least two of these as the first step towards long-term biomass supply agreements.

Although we have a long haul ahead of us, short-term growth projections look promising.

Forestry services:

- Harvest and extraction.
- Biomass logistics: loading, transport and goods yard operations.

Biomass production and trading worldwide:

- Energy crop plantations.
- Performance of industrial biomass processing projects.
- Biomass trading.

Within this constantly growing market, Abengoa has consolidated its two local forestry business lines and expects growth and profits to gather pace over the coming years.

Looking ahead, the outlook is very bright in these new areas and the company now intends to focus its efforts on capitalizing opportunities to benefit Abengoa as a whole.

### Ocean energy

The electrical power generation potential of the oceans is huge, calculated at 93,100 TWh/year, and the International Energy Agency predicts that installed capacity in 2035 will reach 19 GW worldwide.

The current challenge facing the industry is getting past the pilot / demonstration phase. Once this has been achieved, we must make swift progress along the learning curve during commercial operation on the path to generating electricity at costs that prove competitive with those of conventional energy sources and more mature renewable sources, such as wind and solar power.

The main target markets for Abengoa's ocean energy business are those offering the best quality wave energy resources. The United Kingdom currently leads the way in ocean energy. As well as having one of the planet's best wave power resources, it also offers at present the best tariff conditions for expanding the industry. Australia could also be an interesting proposition for staging the first demonstration plants.

Also in the picture are niche markets, such as oil & gas platforms, and other unique applications, such as port signaling buoys, scientific marine instrumentation, offshore aquaculture, etc. The use of water desalination devices is another interesting option.

Abengoa's overriding objective in the field of ocean energy is to cover the entire value chain (technology, promotion, financing, engineering, construction, operation and maintenance) at ocean power parks harnessing the hydrokinetic resource (waves and current).

Abengoa aims to set itself up as an international benchmark for both technology and EPC within the marine energy sector.

Abengoa's ocean energy division operates out of Spain, but already has a presence -directly or through alliances or agreements with partners- in the United Kingdom, Ireland and the United States.

The company boasts a young and highly dynamic team with considerable experience in other areas of the company. Furthermore, in 2012 Abengoa Seapower recruited a number of specialists to further strengthen its human capital.

2013 will be a key year in setting up and shaping this new business at Abengoa. As well as filling out the initial human team, the company will lay the foundations, through technological / strategic projects and alliances, for:

- Developing a proprietary technology.
- Collaborating on an advanced wave technology concept.
- Acquiring capacities in managing offshore projects.
- Engaging in engineering projects.
- Developing a pipeline of company-specific projects through initial prospection work.

New business line  
specializing in marine  
energy



We would highlight the following milestones:

- Development of a collaborative venture with the Irish company Wavebob Ltd. in order to research, develop and market wave power generation systems.
- Conducting work within Nautimus, the first initiative for engineering, procurement and construction (EPC) services to support the development and implementation of wave power and marine current projects alongside the Swedish electrical utility Vattenfall and the British engineering firm Babcock.

Ocean energy business is currently structured into four different activities:

- R&D, developing technology through a host of different programs and alliances, such as the Tecoagua, Genera and Ecoboya projects with public entities and private companies.
- Engineering, in which the company is developing the expertise and know-how required to tackle EPC projects for ocean energy parks and other related offshore ventures in the near future.
- Development, in which we intend to develop our parks of tomorrow.
- Business development, in which we analyze markets and pick out opportunities, helping to develop industry on an international scale.