







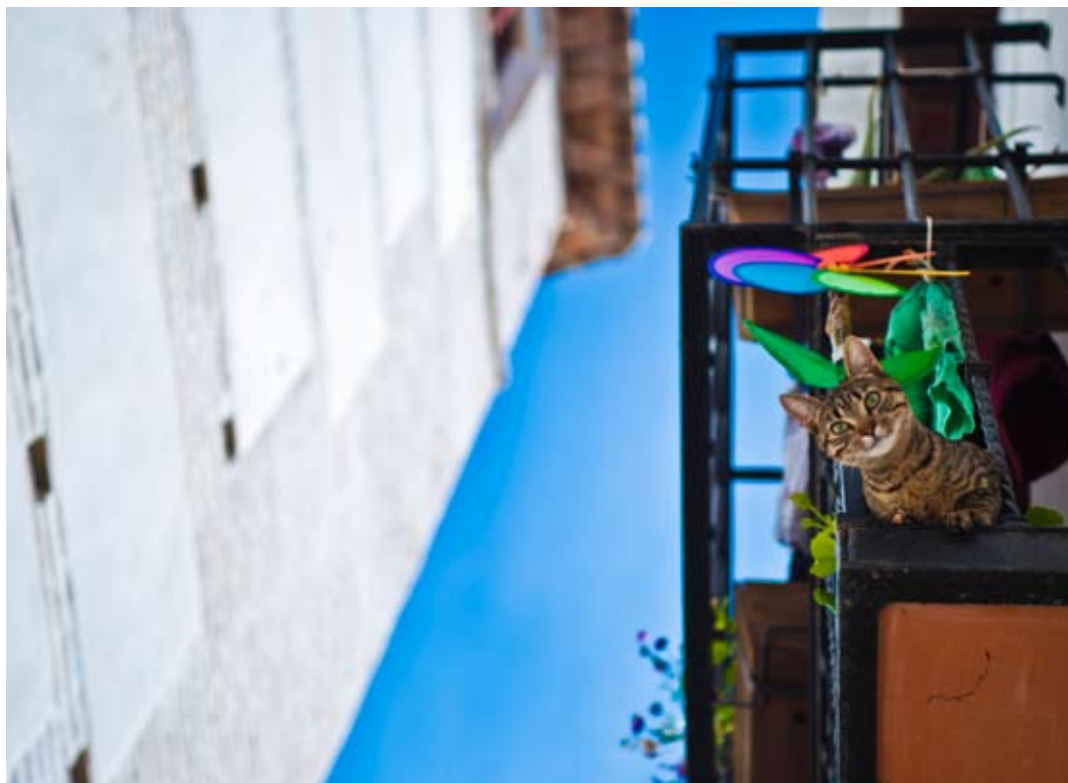
# 3

	Page
<b>Sustainability, Abengoa's Business Metric with a Postive Impact on Society</b>	<b>32</b>
<b>Advanced R&amp;D Management</b>	<b>34</b>
<b>R&amp;D Assessment</b>	<b>36</b>
<b>Milestones 2010</b>	<b>39</b>
<b>Areas of Improvement</b>	<b>39</b>
<b>Future Goals and Objectives</b>	<b>40</b>

Innovation  
is our  
commitment  
to the future

Innovation is the key driver of the global evolution towards a sustainable world offering high standards of well-being for peoples and nations. Innovation is a dynamic process that is conducted by utilizing all the resources available in the society of knowledge, science and technology.

Abengoa's commitment to innovation is tantamount to a commitment to sustainability. Innovation is the vehicle through which to generate groundbreaking solutions for sustainable development.

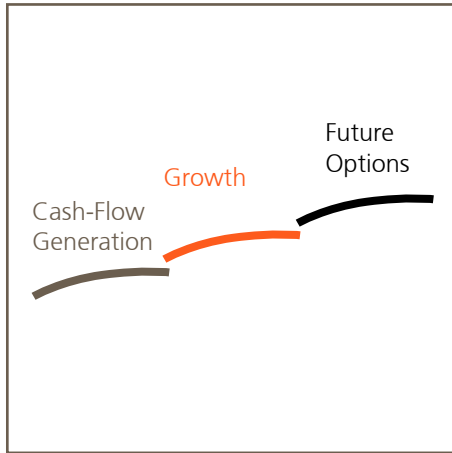


Photograph taken by José Alejandro Avilés Flores of Simosa IT for the II Sustainable Development Photography Competition

Ensuring technological development constitutes the cornerstone of Abengoa's growth, as well as the basis for meeting the company's main strategic objectives. To this end, Abengoa has adopted a system referred to as the **"innovation ecosystem"**, a system that fosters collaboration with universities, governmental agencies, public research institutions, technology centers and companies and pursues the creation of knowledge networks, with Abengoa acting as the propelling force. This is the only way to ensure that the company is in a position to generate the required know-how and provide answers and solutions to new challenges. This system of innovation includes demonstration plants, research and development facilities in different countries, and third-party collaboration.

Innovation is geared towards obtaining results and pursues three types of tangible goals: **Diversification**, achieved by developing new products and services; **differentiation** through improvement and **enhancement**; and adaptation of existing products and services to new demands and process improvement. Abengoa also pursues the intangible aim of acquiring essential competencies (know-how) and, above all, generating future options, aspects that are closely linked to value through expectations of growth and new business development.

Innovation management at Abengoa falls within the strategy of each individual company or business unit, and is framed in its three horizons, where one or more R&D+i programs geared towards developing new, or innovating existing products or processes, are defined. R&D+i programs are general in nature and linked to a particular line of strategic development. Envisaged for the long term, up to 30 years, they are carried out through partial 10-year programs and specific 3 to 4-year projects, which is where Abengoa executes its R&D+i.



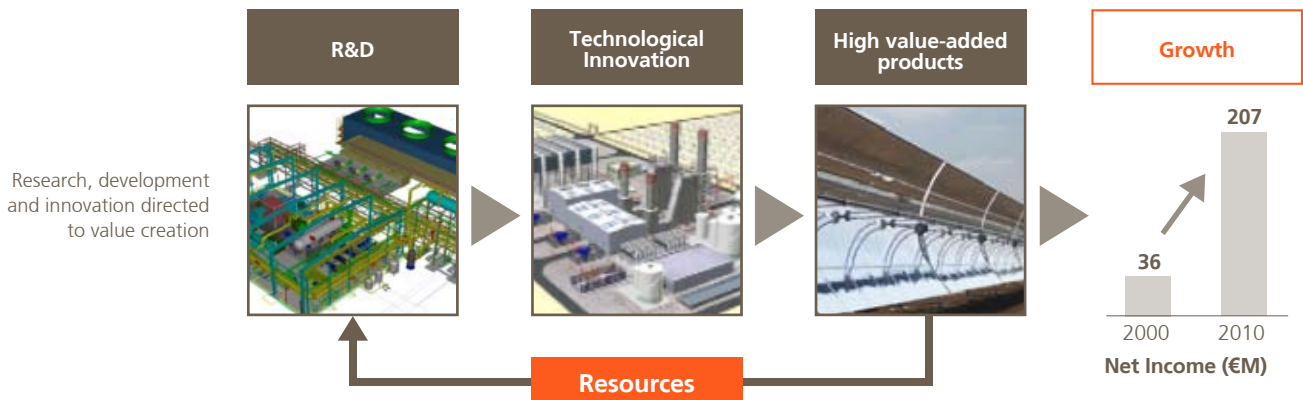
Alignment of R&D projects and programs with Abengoa strategy

The following illustrates the main programs conducted in the area of innovation in 2010 by the different **business units**:

Abengoa Solar	Abengoa Bioenergy	Environmental Services	Information Technologies	Industrial Engineering and Construction
Power tower central receiver	Enzymatic hydrolysis	Comprehensive water cycle	Smart Grid / Energy	CO <sub>2</sub> capture and use
Parabolic trough	Gasification and catalysis	Waste treatment and valorization	Environmental IT solutions	Energy efficiency/ energy storage
Storage	Algae		eHealth / Global Services	Ocean power
Photovoltaics	Sustainability		Homeland Security / Global Services	Hydrogen and fuel cells
	Final uses		eGovernment / Global Services	
	Enzymes		Smart Mobility / Transportation	
	Biorefinery			
	Raw materials			

R&D programs in place throughout the different Abengoa business units

At Abengoa most R&D+i investment involves applied research and development of technological innovation in the company's approach to fulfilling the strategic objectives of sustainability and creating new products.



### The Keys to Innovation at Abengoa

Abengoa's focus on innovation entails a commitment to undertaking a set of measures, some of which are already in place while others are in the process of being implemented:

- A 10-year strategic plan that clearly identifies R&D activity and includes objectives for technological progress that are well defined in terms of materials and schedules and approached with three horizons in mind.
- Assessment of R&D in economic terms to enable monitoring of yield and traceability.
- Highly qualified R&D personnel with profiles in line with new demands. Mechanisms are devised to ensure the success of their incorporation and professional development.
- Substantial R&D budget increase, earmarking allocations for highly innovative projects.

## Sustainability, Abengoa's Business Metric with a Positive Impact on Society

Abengoa's efforts in the field of innovation and technological development are intended to serve sustainability in its three essential dimensions: Social, environmental, and economic.

Innovation is not an end in itself, but rather embraces the mission of gearing society towards a better world. It seeks to better our present socioeconomic system, which is neither sustainable nor serves everyone, and progress towards a model that will allow future generations to enjoy the same resources that are available to us today. **Innovation, therefore, constitutes a commitment to the future.**

Abengoa enjoys a position of international leadership in a significant number of key areas in the so-called **"green economy"**. Here, through its entire range of business units, Abengoa has embraced a firm commitment, by means of its innovation policy and strategy, to pursue sustainable use of resources and raw material spanning the entire lifecycle.

Abengoa concentrates its efforts on technological innovation in the field of renewable energy production. Promotion and implementation of these technologies are based on sources featuring low environmental impact and higher energy efficiency. This technological development equates to a reduction in greenhouse gas emissions, as well as decentralization with respect to conventional



energy sources, releasing and freeing nations from their dependency on energy and the geopolitical subordination imposed on them by those in possession of the energy sources, which are linked to today's causes of supply insecurity and scarcity.

The following are the key areas of sustainable development in which Abengoa exerts its leadership:

### Energy

In the **renewable energy** area, the company is conducting work in two major fields of production: Solar power and biofuels.

Abengoa is engaged in electrical power generation aimed at replacing conventional fuels with solar thermal and photovoltaic solar solutions, as well as developing technologies to enable energy storage.

In the concentrating **solar power (CSP)** segment, it should be noted that Abengoa owns the two largest existing commercial power towers in the world, and is developing several parabolic trough plants, including the world's largest currently under construction, located in the US state of Arizona. Abengoa is indisputably the leading global player in this field, a position gained also through significant cooperation with the solar platform in Almería, as well as the more general involvement of the Spanish Center for Energy, Environmental and Technological Research (CIEMAT).

Energy efficiency The company also produces first- and second-generation **biofuels** to substitute traditional fossil fuels. In relation to the use of biomass as an energy source, Abengoa has been conducting numerous R&D and demonstration projects, which can now be taken one step further and converted into commercial projects at enzymatic hydrolysis plants, biomass gasification facilities, and hybrid biomass and CSP plants.

Furthermore, Abengoa is heavily involved in the development of new hydrogen **generation systems** capable of harnessing renewable sources, and of second-generation fuel cells. The company is also introducing improvements to, developing smart grids with a view to **optimizing energy** consumption and grid manageability, and honing CO<sub>2</sub> **capture and storage** programs.



Second generation ethanol production plant in Salamanca, Abengoa Bioenergy

Abengoa's R&D investment totaled €92.6 M in 2010, up 3.2 % year-on-year and representing approximately 1.7 % of the company's revenue and an upward trend of 7.8 % in annual growth of this investment

**Environment**

Abengoa provides solutions for the entire **water** cycle and comprehensive **industrial waste** management, creating new water treatment and desalination plants, in addition to managing industrial waste valorization processes.

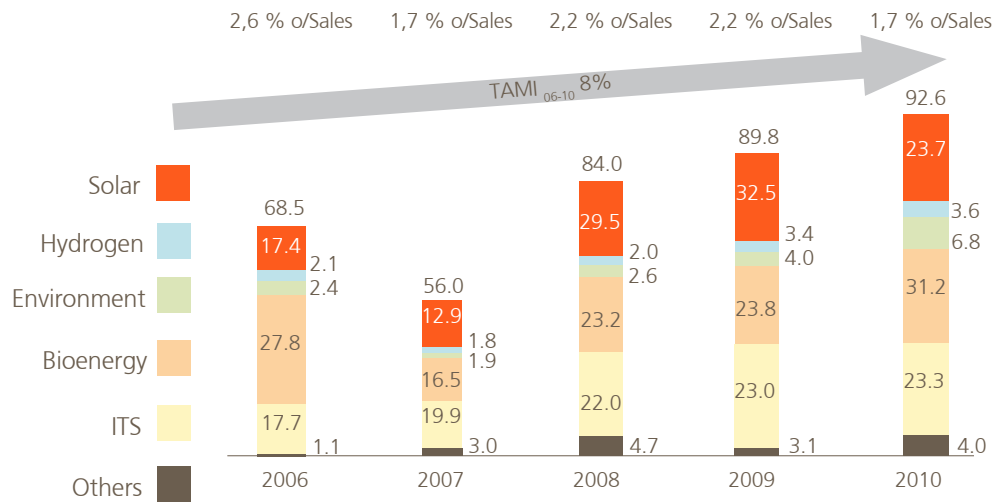
The company is also engaged in developing highly competitive and sustainable agricultural solutions, where information is at a premium. In this particular field, the company provides technological services to the North American agricultural sector, the world's largest.

**Advanced R&D Management**

At Abengoa, most **R&D+i investment** involves applied research and development of technological innovation in the company's approach to fulfilling the strategic objectives of sustainability and new product creation.

Abengoa's R&D investment totaled €92.6 M in 2010, up 3.2 % year-on-year and representing approximately 1.7 % of the company's revenue and an upward trend of 8 % in annual growth of this investment (CAGR<sub>06-10</sub> 8 %).

The following table reflects changes in R&D investment by business area over recent years at Abengoa.



R&D investment data for 2010

In recent years, Abengoa has been driving forward initiatives aimed at constructing a framework in which research, development and innovation move forward in a coordinated fashion. Thus, the **Stage-Gate methodology-based** tool put in practice in 2009 was further consolidated in 2010. This tool ensures that R&D projects are managed within a common framework of excellence, and are also aligned with Abengoa's strategic objectives. This methodology outlines the chief steps to be taken when preparing and developing an R&D-categorized project within the project portfolio of the Abengoa business units. The aim is to obtain the most standardized focus possible for R&D projects through the utilization of a common methodology to define processes, while maximizing the value that the R&D projects add to Abengoa businesses and minimizing the risks involved.



Another initiative undertaken in 2010 was the development of a **system of innovation indicators** aimed at decision-making and monitoring of R&D activities. Setting up these indicators adheres to the basic principle of “what cannot be measured cannot be improved”, with the aim being to evaluate both tangible and intangible aspects of innovation. Its purpose is to create a quantified framework of reference for R&D+i measurement and analysis at Abengoa. It is also intended for dissemination and use as a tool to improve innovation management and decision-making processes.

Three indicators were quantified in 2010:

- **The R&D personnel indicator**, which encompasses all personnel directly employed in this area, as well as people who provide services directly related to R&D activities, including: Directors, administrative staff and office personnel. The basic unit utilized for this indicator is “full-time equivalent staff over the course of one year” (FTE) according to the Spanish National Statistics Institute (Instituto Nacional de Estadística).
- **Number of patents** applied for each year.
- **R&D investment**, which is defined as all annual gross R&D expenditure, including internal current and capital expenditure according to the Frascati manual regarding the group’s total revenue.



The table below shows the evolution of the R&D indicators in recent years at Abengoa.

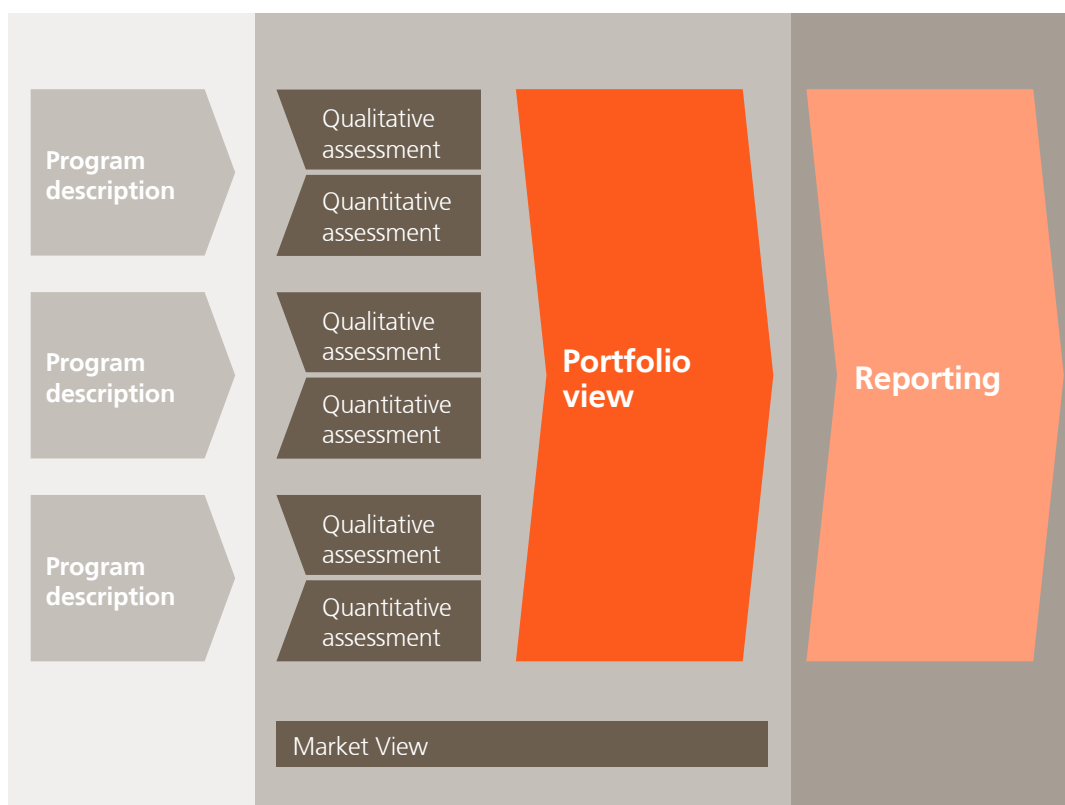
Indicators	Unit	2010	2009	2008
R&D investment	[% R&D investment / revenue]	2.2	2.2	2.2
R&D staff	[FTE]	620	600	580
Patents applied for	[N°]	45	30	17

Beginning in 2011, a new indicator, referred to as **innovation effort**, will be added in order to measure R&D assessment in relation to R&D investment effort.

## R&D Assessment

In 2010, a further step forward was taken in designing a process for R&D assessment that quantifies, in economic terms, Abengoa's **innovation "assets"**.

This new process enables traceability of R&D investment from source to implementation in commercial processes, measuring the enhancements afforded by research in terms of the profitability and efficiency of Abengoa processes linked to technological innovation. This R&D activation proves essential in prioritizing functions in the decision-making process involved in the realm of innovation to reflect corporate strategy.



Methodology for R&D+i assessment at Abengoa

Implementation of a common assessment methodology is envisaged as a unifying component of Abengoa's R&D strategy. The goal proposed consists of putting this procedure into practice in the different business units and subsequent monitoring of the evolution of the different programs.

An appropriate R&D investment monitoring system will ultimately enable better decision-making with a view to the future.

## Central Receiver and Tower Technology

Development of central receiver and tower technology constitutes Abengoa's chief differentiating value with respect to the company's competitors.

Commitment to **power towers and heliostats**, with a clear focus on pursuing higher efficiencies, particularly in the solar plant component, is recognized worldwide as a hallmark of Abengoa Solar.



There are currently three steam-equipped power towers in operation. Two of these are commercial towers: **PS10**, in operation since mid-2007 and capable of generating up to 11 MW; and **PS20**, which went into operation in mid-2009, generating up to 20 MW. The third plant is Eureka, an R&D+i project in operation since mid-2009.

The aim of the **Eureka project** is to address the new challenges in tower technology, which, following start-up of PS20, has unquestionably proven its reliability. This second-generation power tower has managed to reach higher temperatures to produce superheated steam, thereby enhancing the global efficiency of the steam cycle. The plant is made up of 35 heliostats and a 50 m tower housing the experimental superheating receiver. Plant power output capacity totals 3 MW thermal.

The results obtained through the Eureka project in 2010 led Abengoa to carry out conceptual, basic and detail engineering to render a 50 MW plant that is significantly more efficient and manageable than the commercial plants currently in operation.

In conjunction with operation and assessment of Eureka and the other commercial plants, software is being developed to simulate solar receiver performance within the framework of the Cent Consolidada project, and research is similarly being conducted on new materials and coatings for superheated saturated steam receivers and new receiver design.

In the tower technology field, R&D pursuits center not only on steam technology; two new projects, initiated in 2009, are focused on two very different fluids: Molten salts and air.

The CRS salt project, co-financed by the Spanish Center for Industrial Technological Development (Centro para el Desarrollo Tecnológico Industrial, or CDTI), involves the engineering and construction of a power tower receiver prototype in which the heat-bearing fluid is a blend of molten salts. The aim is to study the technical and economic viability of a plant employing this technology on a larger scale.

The Solugás project, co-financed by the European Union's Seventh Framework Programme for research and technological development, which began life in 2008, seeks to demonstrate tower operation at a higher temperature, employing air as the heat-bearing fluid, and a gas cycle instead of a steam cycle.

## Bioenergy Sustainability Standard

The Renewable Energy Directive (RED) **sets down sustainability guidelines for biofuel production** that will be mandatory beginning in December 2010. This framework for sustainability makes it compulsory for economic operators to:

- Ensure that their raw material input production areas are not located in **protected areas**.
- Report **savings in greenhouse** gas (GHG) emissions above the predetermined thresholds.
- Facilitate **traceability of the information** associated with the biofuel from the raw material of origin through a Mass Balance System.



Abengoa wishes to underscore the importance of the initiatives being pursued in recent years in the realm of sustainability, through the development and implementation of a voluntary scheme with which to demonstrate fulfillment of the RED sustainability requirements in the company's European biofuel production and distribution operations.



The so-called RED **Bioenergy Sustainability Assurance Scheme** (hereinafter, the RBSA) has therefore become a powerful tool for yielding flexibility in fulfilling RED requirements, as once the directive has been approved by the European Commission (EC), all member states must recognize a biofuel produced in accordance with this standard regardless of how it is worked into domestic law.

The RBSA Standard establishes requirements for compliance with RED specifications throughout the industrial chain, from agricultural production through to the end consumer, within a global geographical sphere.

Among other innovative aspects, the standard includes two specific advancements aimed at facilitating supplier operations through the development of:

- Technological systems for computing GHG emissions, particularly for agricultural operations, based on values averaged geographically.
- Sustainability maps, which enable given regions to qualify as being sustainable under the RED.

The RBSA Standard is currently in the process of being evaluated by the EC, with procedures and key systems set forth under the standard already in place throughout Abengoa Bioenergy's European companies.

## Milestones 2010

- The **Eureka project** yielded higher performance and lower generating costs over saturated steam towers.
- New **management systems** devised to ensure compliance with biofuel sustainability requirements.
- The **largest second-generation demonstration biofuel** project got underway in the town of Babilafuente, Salamanca (Spain).
- Significant progress made in engineering other third-generation central receiver **plant concepts** with a view to **beginning pilot plant construction** in 2011.
- Validation of thermal **storage capability in concentrating solar plants**. This technology enables plants to generate electricity when there is a lack of sunlight, thus increasing supply efficiency and security.
- Ongoing work on a new **high-concentration photovoltaic** module, rendering significantly higher efficiencies at a lower cost by concentrating sunlight by 800 times.
- Innovative **photovoltaic technology** was developed at the Seville **R&D center** in the area of new materials and thin film.
- An experimental tool enabled **energy production cost** analysis for a variety of technologies and configurations.
- **New enzymes** developed to break down cellulose.
- **CO<sub>2</sub> capture technology** enriched through **microalgae** production. A project was also rolled out to spur on development of energy crops.
- Geographically distributed **critical infrastructures** managed effectively and efficiently through **software systems**.
- Advanced **high-precision information services** developed to improve on decision-making processes in customer operations and supply chain systems.

## Areas of Improvement

Abengoa's commitment to innovation necessarily includes a process of **ongoing improvement**. Therefore, the R&D assessment process was implemented throughout the company's business

units in 2010 as a vehicle for ensuring an intensive and dynamic process of innovation. As the creation of value as a product of innovation is key to securing favorable evolution in the different areas of business, it must be measured and managed. R&D assessment is a crucial step forward towards ensuring continuous knowledge of what is being done and the benefits reaped, thereby helping to improve decision-making processes.

## Future Goals and Objectives

The key challenges for innovation at Abengoa will be met through **Abengoa Research**, a new Abengoa subsidiary pursuing cutting-edge innovative R&D in the fields of energy and the environment. This affiliate will boast a multidisciplinary team of world-renowned researchers, whose primary objective is to generate and apply new knowledge upon which to base Abengoa's future growth. To cite a specific example, Abengoa Research will unveil a program focusing on ocean power and technologies with a view to supporting their development and implementation as a new renewable energy source.

In the field of **second-generation fuels**, where Abengoa is a global leader thanks to its York plant in Nebraska and its Babilafuente plant in Salamanca, the subsidiary company Abengoa Bioenergy New Technologies was chosen to design, build and operate the US Department of Energy's (DOE) large-scale demonstration biorefinery, with proceeds from the subsidy partially funding the project. The biorefinery will be annexed to a starch-based ethanol plant, part of a hybrid complex in Hugton, Kansas (USA).

The biorefinery will have a minimum 700 t/day conversion capacity and will feature two industrial processes: Enzymatic Hydrolysis (EH) and Gasification. The EH process will convert biomass (400 t/day) into ethanol, lignin and livestock feed, while the gasification section will convert 300 t/day of biomass into syngas, which will be burned to generate steam. The steam will then be used internally at the biomass plant, with the surplus being sold to the adjacent starch plant.



Abengoa intends to construct a **technological R&D** facility, where applied research will be conducted to explore new materials, photovoltaic cells, prototypes and thin film technologies. The knowledge generated will help Abengoa Solar create competitive proprietary technologies, enabling it to draw up future plans for industrialization.

Over the course of 2011, the company intends to roll out research programs in collaboration with Spanish and European universities and R&D centers. Work will essentially focus on areas such as oxycombustion for cleaner thermal plants, mineral CO<sub>2</sub> binding for the cement industry, and energy management systems utilizing different types of batteries to integrate renewable energies into the grid.

Objectives in the **water** segment are as follows: To position the company as a leader in desalination; to be technologically competitive in potabilization, urban and industrial wastewater treatment and reutilization; and to consolidate leadership in hydraulic infrastructure and in water resource management models and systems.

As far as **aluminum waste recycling** is concerned, R&D activities seek to enhance performance in recovering raw materials and aluminum waste, optimize operational processes and product quality, in addition to developing new and better technologies contributing to sustainable development.

The area of **global industrial waste management** seeks to develop new technologies to increase the number of treatable waste types, and also to keep up with the continuous changes in environmental law and regulation and with the increasing diversification towards new environment-oriented markets.