

Bioenergy

Abengoa Bioenergy is its holding company. The Business Unit is dedicated to the production and development of biofuels for transport, bioethanol and biodiesel, among others that utilize biomass (cereals, cellulosic biomass, and oleaginous seeds) as the raw material. The biofuels are utilized for ETBE production (gasoline additive), or for direct blending in gasoline or gas oil. Given that they are renewable energy sources, biofuels reduce CO₂ emissions and contribute to the security and diversification of the energy supply while reducing the dependency on fossil fuels utilized in the transport sector and helping towards compliance with the Kyoto Protocol.

Europe's largest bioethanol producer (157 million gallons production capacity) and one of the largest producers in the US (198 million gallons), and Brazil (35 million gallons), with a total of 390 million gallons production installed capacity.

From biomass... we produce ecologic biofuels,
renewable energy, and animal feed.



www.abengoabioenergy.com

2007 Summary

2007 has been a year of changes in all aspects, in global cereal markets, in the legislative scope, and in our business strategy and our new global vision. But also, we have been rewarded for our correct fulfillment of our activities, perseverance and commitment with the environment and sustainable practices that we carry out in all areas in our company.

In legislation it is worth pointing out the new Energy Bill approved by the US Congress in December. This law is highly beneficial for Abengoa Bioenergy, in a sense that it provides for dramatic increases in the objectives set for 2022 by this country's government, for the use of biofuels, additionally setting the guidelines for the expansion of a national pipeline distribution network. On the other side, the European Commission established its own objectives in the 2003/30/EC Directive that are being incorporated gradually by the different Member States. This new approaches adopted by the Administrations have as ultimate aim to obtain a low energy dependence on imported oil, and to reduce emissions of greenhouse effect gases to the atmosphere.

During 2007 our projects in Europe and USA have progressed as scheduled and the new plants in Lacq, France and Nebraska have started to produce bioethanol. Additionally, we have completed the expansion of our Bioetanol Galicia plant, in Spain, to a final installed production capacity of 52 million gallons per year. Our other projects in Illinois and Indiana, and UK and The Netherlands have also made significant progress, and we have started the construction of the plants in Illinois and The Netherlands. Finally, entering the Brazil market, after the acquisition of Dedini Agro, has contributed with two new bioethanol plants from sugar cane, with increase our global potential and our business opportunities.

Cereal, our main raw material in Europe and the US, has experienced a great increase of prices in all global markets. In Abengoa Bioenergy, we have been able to confront this scenario by successfully modifying the production processes in two of our facilities in Spain, in La Coruña and Cartagena, switching from wheat and barley to corn. On the other hand, Brazil uses sugar cane as practically the sole raw material.



We have started analyzing and optimizing our processes to obtain a greater yield in production.

In Abengoa Bioenergy we intend to establish a leadership position in the bioethanol industry and to remain one of the largest producers in the world. One of our main objectives is to develop leading edge processing technology for bioethanol production and co-products, carrying out the best and most efficient operating practices. This year, our efforts have been rewarded by obtaining R&D grants by both, the Spanish Government (I+DEA Project), and the US Government (DOE), for researching the complete bioethanol life cycle, raw materials production, and biotechnology; and for the design, construction, and operation of a commercial scale cellulosic bioethanol plant in the state of Kansas, USA, respectively.

On top of the numerous inherent environmental benefits of biofuels, our activities throughout the years have been carried out within a sustainability framework, always keeping our respect for the environment, human rights as one of our maxims. This has been reflected by the different awards and received during 2007, where it is worth pointing out the 2006-2007 Prince Phillip Award to Renewable Energies and Energy Efficiency; the recognition for the Greater St. Louis Top 50 award, presented by the St. Louis Regional Chamber and Growth Association (RCGA) in conjunction with Deloitte & Touche USA; and the Annual Product Stewardship Award, for the safe transportation of hazardous materials by rail BNSF Railway. Furthermore, we contribute to research and development with universities and R&D centers cooperating in several research projects.

Our Business

Abengoa Bioenergy remains as a leader in the development of New Technologies for the production of biofuels and the sustainability of raw materials, investing a great amount of resources in R&D. But also, our Trading activities position us as a services company which provides global solutions, with great marketing capabilities, and commodities management, based on our global production capacity and operational efficiency, which prove to be a strong foundation that provides reliability and critical mass, key for the optimum performance of our activities.

Our activities can be grouped in 4 major areas:

- Grain Origination
- Production
- Bioethanol and DGS Marketing
- New Technologies

The combination of Abengoa Bioenergy's international marketing and cellulosic bioethanol technology capacities and the local agricultural, production and marketing capacities will result in very significant synergies that will allow the attainment of important growth levels in the world's bioethanol market together with the technology that will allow the achieving of lower costs per gallon of bioethanol.

Our Business Unit comprises the management of the following companies:

Abengoa Bioenergy, S. A.
Abengoa Bioenergy San Roque, S. A.
Abengoa Bioenergy Nuevas Tecnologías, S. A.
Abengoa Bioenergy Belgium, N. V. / S. A.
Abengoa Bioenergy Brazil
Abengoa Bioenergy Corporation
Abengoa Bioenergy Engineering & Construction, LLC
Abengoa Bioenergy Germany GmbH
Abengoa Bioenergy of Kansas, LLC
Abengoa Bioenergy of Illinois, LLC
Abengoa Bioenergy of Indiana, LLC
Abengoa Bioenergy of Nebraska, LLC
Abengoa Bioenergy Netherlands B. V.
Abengoa Bioenergy New Technologies, Inc.
Abengoa Bioenergy Trading B. V.
Abengoa Bioenergy Trading, LLC
Abengoa Bioenergy UK, Ltd



Abengoa Bioenergy U. S. Holding, Inc.
Abengoa Bioenergy France, S. A.
AB Bioenergy Hannover, GMBH
Biocarburantes de Castilla y León, S. A.
Bioener Energía, S. A.
Bioetanol Galicia, S. A.
Ecoagrícola, S. A.
Ecocarburantes Españoles, S. A.

Grain Origination

Acquiring grain as raw material (wheat, barley, and corn) for our plants, to produce bioethanol and DGS, is a crucial step for the successful outcome of our operations.

Throughout our history, we have accumulated a wide experience in different fields, both in large cereal purchases in the market, and second, in establishing contracts directly with the farmers, therefore ensuring the cereal supply to the business group plants. We also hold a great knowledge of the applicable legislation to operate within the EU and US Government.

Production

We produce our main product, bioethanol, in our facilities in Europe and the United States, and now also Brazil. From cereal grain (and sugar cane), by means of chemical processes and treatments, we obtain bioethanol to produce ETBE (a component of

all gasolines), or for direct blending with conventional gasolines to produce biofuels, mainly e85 (a blend of 15% gasoline, and 85% bioethanol). As a secondary product resulting from the production process of bioethanol, we obtain the so called DGS. This is a highly proteic compound resulting from the extraction of the starch from the cereal grain. It is an excellent nutritional complement as feedstock for cattle.

Currently we own 10 bioethanol and DGS production facilities throughout Europe, the United States, and Brazil, which give us a total installed production capacity of approximately 1,475 million gallons annually. Additionally, we have several others in project and under construction in Europe and the U.S.

Marketing of Bioetanol and DGS

In Abengoa Bioenergy we have corporate offices in key spots for bioethanol global trade, located in Rotterdam, The Netherlands, with direct access to the Europoort and exports, and in St. Louis, U.S.A., in the heart of the main area for cereal crops and cattle breed of the country, from where we assist the generated demand in the European and North-American bioethanol and DGS markets.

Markets’ fluctuations, the different political circumstances of the various geographical areas in which we operate, and other factors that have influence in our activities, either at originating raw materials, or in the production process of our products, are meticulously analyzed from a global point of view, in order to obtain a greater yield of our processes, within a sustainability scope, holding the respect for the environment, human rights, and the community as one of our maxims.

New Technologies

One of our main objectives In Abengoa Bioenergy it’s to become a leading innovator in the Bioenergy industry. Our mission is to develop leading edge processing technology for bioethanol production and co-products. In order to achieve this goal, we are continuously developing our production and optimization technologies, with the best and most efficient operating practices.

Our team of in-house engineers and scientists coordinated with other R&D centers, universities, and

industrial partners to develop innovative processes to increase bioethanol yield in dry mill facilities, improve DGS quality, develop new animal feed products, and develop lignocellulosic biomass technology for bioethanol and co-products production. As part of our business strategy ABNT will generate and capture intellectual property to license technology to third parties under facility management agreements.

The U.S. Department of Energy (DOE) has awarded Abengoa Bioenergy a financial assistance grant up to \$76 million to design, construct, and operate a first of a kind commercial facility to produce bioethanol from lignocellulosic biomass, in the state of Kansas, which proves the confidence the Government of this country has on our excellent ability to perform our activities, on our commitment to quality, and on sustainability, that we have been demonstrating in our other facilities in the past few years.



2007 Evolution

General Summary

The meaning of our work...

The substitution of fossil fuels by biofuels has several immediate advantages: first of all, it involves a diversification of energy sources; second, the energy dependence is reduced, with the corresponding commercial balance improvement. Additionally, the use of biofuels favors the development of rural areas, giving third world countries a great potential. Finally, it offers a significant reduction in greenhouse effect gases (GHG) emissions. Altogether, we are facing a phenomenon which greatly improves the planet’s environmental sustainability , thus the future for upcoming generations.

	2006	2007	% Growth 2006-2007
Europe	326	393	21%
USA	286	302	6%
Brazil	–	7,046	–
Total	612	7,741	1,165%
Abengoa Bioenergy Global Staff Growth 2007			

There are multiple greenhouse effect gases (GHG) sources, the most relevant ones can be found in fossil fuels combustion in transportation, in the generation of electricity employing fossil sources, and in the destruction of the rainforest. These gases emissions are related to the development associated to a traditional model based on fossil fuel combustion, and in little efficient consumption and production patterns, from an energy point of view. Keeping in mind that 25% of these emissions correspond to the transportation sector, the greater use of biofuels has special importance to reach the global emission reduction objectives that governments from main countries and legislating internationally, and that was unanimously expressed in the political intentions in the Global Convention for Climate Change (UN), celebrated in Brazil a few weeks ago.

Within this scenario, Abengoa Bioenergy is committed to sustainability through the development of new technologies for biofuel production from biomass, in a first phase by the cereal/lignocellulosic biomass hybrid concept, and in a second phase by means of autonomous plants that will generate bioethanol, electricity, and other energy forms and co-products exclusively from cellulosic and/or lignocellulosic raw materials.

What has occurred in our operations markets...

High prices and fluctuations have been constant in the commodities markets during 2007. The growth in energy and soft commodities consumption from emerging economies (India, China, oil producing countries, such as Russia, Iran, Mexico...), the inability of producing countries to increase production, in particular the OPEP, the geopolitical instability, and the American dollar weakness have caused the WTI barrel to reach \$100 per barrel in the futures markets.



At the same time, cereal markets have suffered from the consumption pressure exerted by emerging countries and the poor harvests in producing countries such as Ukraine, Russia or Australia, which has in general pushed prices to historical records. Despite the increase in the demand for bioethanol in Europe, we have seen a slump in the prices of bioethanol mainly as a result of the low price of sugar, and these prices have only recovered right at the end of the year. In the United States, a new Energy Bill has been approved in a scenario of over-capacity and has contributed to a more than 40% hike in the price of bioethanol in only three months.

In the United States and the legislative arena, following the enactment of the Energy Bill, we can say that a new era in terms of energy is born, an era focused on diminishing energy dependence on foreign sources and improving energy efficiency. The new Energy Bill is extraordinarily favorable to Abengoa Bioenergy's sustainability strategy, as it combines a conventional corn-based bioethanol production market that will have to double at least in the next 5 years to 15 billion gallons a year at the same time as it also provides a market for at least another 21 billion gallons a year for the production of bioethanol from renewable materials to improve the life cycle of basic petrol by at least 40%, thus giving a total target market of 36 billion gallons for an obligatory minimum blend by 2022. The scale of the market, the implicit growth compared with current levels (multiplied by five) and the time-window defined (a 15-year horizon) allow us to put forward an investment scenario for the sector that will in all likelihood make it possible to achieve the ambitious goals and challenges defined by the US Congress and the Senate.

Similarly, as this process has been closely monitored by other countries or organizations such as the European Union, it is foreseeable that future legislation will be enacted in line with that currently adopted in the United States, which clearly establishes the principles governing the current industry and, at the same time, boosts the development of new technologies allowing the extensive use of biofuels sustainably. In this scenario and thanks to its enhancement potential, bioethanol takes on particular significance over other equally renewable sources. In Europe, several countries have adopted new legislation at the local level to introduce obligatory minimum targets and the introduction of mixture targets of up to 10% by 2020 are expected to be approved in the course of the coming year, in line with the political will expressed by the Council of the European Union in 2007. The Union is also expected to approve a sustainability policy aimed at improving efficiency and life-cycle management that will definitely trigger major investments in new technologies in the same way as has happened in the United States.

In Brazil, the revolution of making the country self-sufficient in energy terms has begun to bear fruit: all new cars sold and registered in Brazil are now flexible vehicles able to run on 100% bioethanol. The domestic demand for bioethanol is rising dramatically and is expected to remain at high levels for the next 10 years until fossil gasoline is almost entirely replaced in the energy pool (nowadays, bioethanol represents over 40% of the petrol consumed in Brazil). Therefore, the industry is facing a tremendous challenge in terms of the domestic market, and a very important challenge also in the export markets with the opening-up of the US and EU markets and the growing demand for fuel from South-East Asia.

What we have done and what we are doing ...

In this scenario of the struggle against Climate Change and our urge to improve the sustainability of our model, we continue to generate environmentally-friendly growth options aimed at improving the life-cycle model of our products/processes. The company continues to invest huge amounts of resources in its programs for the development of new technologies for producing bioethanol from biomass, a program started over 10 years ago and the basis of all our business strategy.



In this development of our hybrid model (cereal-sugar cane/cellulose biomass), we have this year succeeded in achieving several major milestones that have encouraged us to continue with our program: one important milestone has been the recent announcement of the successful production of bioethanol from lignocellulosic biomass in our technological program at the pilot plant for the conversion of lignocellulosic biomass built for the purpose in York, Nebraska, in collaboration with the US Department of Energy (DOE). In addition, we have signed a new co-operation agreement with the US Department of Energy, in the amount of \$38 million, for the design and development of what will be the world's first commercial-scale plant for bioethanol production from cellulosic biomass. This biomass facility will process 700 tons of biomass a day to produce 44 million liters of bioethanol a year, as well as other forms of renewable energy in the form of steam and electricity. The biomass facility will also have a conventional bioethanol plant next door to produce 330 million liters from cereals, which will allow both installations to enjoy the synergies of a combined capacity of over 400 million liters. This is the hybrid concept mentioned above and strategically pursued by the company to deploy its latest technology at its existing first-generation plants on three continents. Furthermore, the company also announced the signing of a 35 M€ development agreement with the Spanish Government as part of the Cenit Program to advance in the technology for producing bioethanol by biomass gasification and catalytic synthesis as well as in the exploration of new energy crops and enzyme mixtures for the production of second-generation bioethanol.

2007 has also been a year of consolidation and organic growth. In United States, we successfully started operations in August at the plant in Ravenna, Nebraska. This is Abengoa Bioenergy's largest facility with a production capacity of 335 million liters and uses approximately 1 million tons of cereal. Furthermore, we have kicked off the construction work for two new bioethanol plants in the United States with an overall capacity of 670 million liters following the successful raising of finance on the American market.



In Europe, we have completed the works to expand our cereal plant in Galicia (BG) up to a capacity of 150 million liters. During 2007, we have continued to build our cereal facility in France which is scheduled to start operating in 2008, although some operations have already started using wine-based alcohol. Construction work has also continued at the Biodiesel Plant in San Roque with capacity to produce 200,000 tons a year starting from raw vegetable oils that will come on-line at the end of 2008 and, finally, building work has started in Holland and the United Kingdom for what will be Europe's two largest bioethanol production facilities with a capacity of 480 million liters a year each.

On top of these projects developed organically, we have to add our penetration into the Brazilian market through the purchase of Dedini Agro, one of Brazil's largest companies in the cultivation and processing of sugar cane and in the production of bioethanol and sugar. It also has two production plants in the state of São Paulo that currently operate at a level of production costs that are among the most competitive in Brazil and the world, thanks to their excellent location, the expertise of their personnel and the direct control over a considerable part of the croplands through long-term contracts.

In conclusion, our leading position vis-à-vis the technological challenges needed to be successful in the second generation of biofuels, the thrust in favor of sustainability adopted by society world-wide, our geographical diversity with a presence in United States, Europe and Brazil, and the advanced technology of our facilities that gives us the flexibility to process different raw materials at our production plants, all allow us to maintain our unique position with regard to the challenges we feel the world energy market will pose in the transport sector in the years to come.

Evolution by Activities

The different activities in which our business is involved, have traditionally been developed in Spain, Europe, and the US. After the acquisition of the Brazilian company, Dedini Agro, we have gained a strategic position in the world's main production and consumption market of bioethanol for transportation. Hence, becoming the sole company in the world established in all three major bioethanol global markets. Furthermore, we are analyzing other possibilities in other continents.

Grain Origination

In 2007 the global cereal sector has been affected by the tremendous rise of grain prices compared to those of the previous year, despite a record increase in production.

This drastic rise has been caused mainly by the following factors:



- Growing influence of financial investors in cereal future markets.
- Great demand increase in emerging countries with great consumption capacity, such as China and India.
- Drastic global grain stocks reduction, creating a sense of supply problems.
- Significant increase in the cost of transports due to increasing oil prices.

Even in this relatively adverse scenario, our subsidiaries in charge of acquiring raw materials for our plants were able to supply over 800,000 tons of grain Europe (wheat, barley, and corn), and 51 million bushels (corn) in the United States, within the free market, and by means of the Energy Crops and Set-aside Lands programs promoted by governments.

Production

Europe

The main milestones achieved by our operations during 2007 in Europe have been of various types, such as the expansion of some of our existing facilities, the launching of several new projects and, above all, the successful switch over of raw materials to be processed due to the fluctuations in the grain markets.

We have successfully completed the expansion of the installed production capacity in our Bioetanol Galicia facilities, located in La Coruña, Spain, by 16%, reaching a total of 52 million gallons annually.

During 2007 we have seen our first European plant outside the Spanish borders produce bioethanol. The Abengoa Bioenergy France wine-alcohol plant, located in Lacq, France, started its operations in the month of February, producing 13 million gallons using this raw material. Within the same facilities, we have continued the construction of the cereal plant, which is estimated to start operating during 2008, which will finally sum up to a total installed production capacity of 67 million gallons per year.

Our European activities will increase significantly with 2 new projects launched in 2007. The construction of 2 bioetanol plants in the Europoort, in Rotterdam, The Netherlands, and in Stallingborough, United Kingdom, each with a final installed production capacity of 127 million gallons of bioethanol per year, that together with the new plant in France, and the 3 currently operating in Spain will reinforce Abengoa Bioenergy's leadership as Europe's largest bioethanol producer, and one of the largest in the world.

2007 has been a year of rapid increase of grain prices, mainly wheat and barley, our main raw materials in Europe, affecting, therefore, our operations. In our continuous effort to improve our operations within a sustainability scope, we have worked to develop the necessary technologies that would enable us to switch over of raw materials in 2 plants in Spain, in La Coruña and Cartagena. The switch process concluded successfully, and now both plants operate using corn, instead of the original wheat and barley.

Abengoa Bioenergy has been awarded the 2006-2007 Prince Phillip Award to Renewable Energies and Energy Efficiency. These awards give recognition to those Spanish companies that achieve business excellence and have proven to be outstanding in their trajectories. Among our objectives is to achieve leadership in technology and capacity of bioethanol production world-wide, to provide an alternative sustainable energy source for the transport sector. By our activities, not only do we strengthen the energy sector, but also we seek for the improvement of the environment and we contribute to the creation of new opportunities for sustainable rural development by stimulating energy crops and the creation of agro-industries, thus contributing to the maintaining of jobs and income in rural areas



Europe Operations Results 2007

	Ecocarburantes Españoles	Bioetanol Galicia	Biocarburantes de Castilla y León	Abengoa Bioenergy France	Total
Bioethanol (m³)	115,394.0	146,747.4	84,655.7	27,944.8	374,741.9
DGS (t)	122,489.1	113,538.0	100,261.9	–	336,289.0
Exported electricity (MWh)	146,000.3	165,672.8	122,446.2	–	434,119.3

United States

As well as in Europe, we have made a great effort in North America to expand our activities through the Midwestern states (Kansas, Illinois, Indiana, Nebraska), and reinforce and improve the quality of the processes in our 3 existing plants. Additionally, we have undergone tasks of improving our employees' qualification and training at all company levels.

In July our new plant in Ravenna, Nebraska, our biggest plant to date, started operating, with an installed production capacity of 88 million gallons of bioethanol per year, using corn as raw material. This plant is designed to recycle all waters of the processes, which at the end are treated and reverted back for reutilization, thus consuming less water, and obtaining a minimal pollution, and therefore, a minimal environmental impact.

During the past year we have started the construction of 2 new plants, similar to the one in Nebraska, of 88 million gallons each, in the states on Indiana and Illinois, which will reinforce Abengoa Bioenergy's position in the US bioethanol market as one of the country's largest producers.

We have undergone continuous improvements and developments in our existing facilities. Such is the case of our plant in York, Nebraska, where in October we celebrated the Grand Opening and first production of cellulosic bioethanol, in order to progressively eliminate the use of grain as raw material, one of our main goals in the long run, that will prove the bioethanol industry as one of most sustainable and environmentally friendly.



In the Colwich plant, Kansas, we celebration the 25 years of bioethanol production from this facility, one of the oldest continually operating dry mill bioethanol facilities in the country, using corn as raw material.

As in the past few years, we have continued the development of a strategy towards the potential of our employees, a key basis of our activities. We have collaborated and participated with local colleges to develop training partnerships, focused towards our industry and the world of renewable energies. Also, we have continued implementation of internal competency, development and compensation programs at all company levels that strengthen and protect key employee base.



United States Operations Results 2007

	ABC Colwich	ABC Portales	ABC York	Abengoa Bioenergy of Nebraska	Total
Bioethanol (m³)	92,565.0	83,344.0	212,270.0	135,642.0	523,821.0
DGS (t)	77,619.0	67,732.0	163,178.0	98,361.0	406,890.0



Brazil

Brazil is one of the world's major bioethanol markets with an annual production of 4,625 million gallons (2006). The consumption of bioethanol is expected to continue to grow strongly thanks to the success of the fuel flexible vehicles that represent 90% of the number of vehicles sold in Brazil and that allow the use of gasoline or bioethanol without distinction.

In September Abengoa Bioenergy has closed the acquisition of 100 percent of the capital of Dedini Agro, one of the largest bioethanol and sugar companies in the Brazilian market, and has assumed control of its operations. Dedini Agro owns two production facilities in the state of São Paulo, currently operating with highly competitive production costs not only in Brazil but also in the rest of the world, thanks to the excellent location of the plants, the experience of their workers, and the fact that they have direct control of a significant part of the crop lands through long-term contracts.

The facilities are located in the cities of Pirassununga and Sao Joao de Boavista with sugar cane milling capacities of 3.4 and 2.3 million tons/year respectively. The company cultivates nearly 100,000 hectares to process this quantity of cane. Dedini Agro foresees a production of 537,700 tons of sugar and 35 million gallons of bioethanol in the sugar cane harvest season of 2007/2008.

With this acquisition, Abengoa Bioenergy becomes the only company in the world to be present in the world's three major bioethanol markets: the United States, Brazil and Europe. Following the integration of Dedini Agro, Abengoa Bioenergy expects to attain significant increases in production at the existing facilities in Brazil, develop at least one new facility, and achieve more effective international marketing of the bioethanol produced in Brazil thanks to Abengoa Bioenergy's existing trade networks. Furthermore, Abengoa Bioenergy will be able to apply the cellulosic bioethanol technology it is developing to the sugar cane husks to achieve a medium-term increase in production and more efficient cost reduction.

Marketing of Bioethanol and DGS **Bioethanol Europe**

In 2003, the EU Directive 2003/30/EC came into effect, currently implemented in the legislation of most of the Member States, whose objective is "to promote the use of biofuels for transportation as a substitute of diesel and gasoline". Its basic aims were:

- The Member States will establish indicative national objectives of marketing and commercialization of biofuels. As reference values for this objectives the directive set 2% by 2005, and 5.75% by 2010, calculated over the energy contents of all gasoline and diesel commercialized in the transportation markets and the end of the specified years.
- Biofuels can be used in its pure state, blended with gasoline and diesel (5% limit in biodiesel and bioethanol), or in derived products.

In the same way, the EU Directive 2003/96/EC authorized the Member States to establish exemptions, or a reduced type, of the fossil fuels special tax, applicable to biofuels, which is currently in force in several countries. The European Commission has verified that the 2% 2005 objective has only been reached by Sweden and Germany, and that the 2010 objective will hardly be accomplished.

The European Commission considers that the indicative objectives and the fiscal incentives, on their own, were not enough to achieve the biofuels commercialization goals established by the directive. Several Member States, France, Italia, Austria, The Netherlands, Germany, Slovenia, and the Check Republic, have already approved legislation whose mandates include biofuels and gas and diesel. The United Kingdom, Spain, and Poland are currently incorporating such legislations in 2007 and 2008. However, in some of these countries, this mandate has meant the elimination of the fiscal incentives.

During 2007, by means of our commercialization activities, national - and internationally, and our experience acquired throughout the years in this type of business, we have become one of the main bioethanol managers and suppliers in the continent. We have successfully distributed approximately 120 million gallons of bioethanol in Europe.

Most of the commercialized bioethanol comes from our plants in Spain and Europe, but additionally, we have obtained 13 million gallons from third party producers, which increases our supply capacity, gives us control over the bioethanol business at continental level, and grants a clear international renown of our company's potential.

Additionally, besides bioethanol trading, during 2007 we have worked in the development of a distribution network for e85 (85% bioethanol, 15% gasoline) in Europe, mainly in Spain and The Netherlands. This network is a key step for bioethanol expansion and, although still in its early stages, it will soon become a reality in most areas, providing biofuels to the final consumer throughout the Spanish and European geography.



Bioethanol United States

The American bioethanol market has been affected by 2 key factors in the industry, the price increase in raw materials (corn), and the increase in bioethanol supply in the market.

Advancing in our trading strategy, and along with our practices in Europe, we have signed cooperation agreements with third party bioethanol and DGS producers, which contribute to a bigger business volume, and a greater reaction capacity.

The growth rate of bioethanol demand has not been able to keep up with production expansion for a number of reasons. Regulatory issues have prevented much of the Southeast from blending bioethanol. Issues relating to vapor pressure and volatility that cause bioethanol blends to violate state EPA regulations are slowly being waived and states such as Florida and Georgia are now just beginning to blend bioethanol.

Other limitations on the growth of bioethanol demand in discretionary blending markets are



related to logistical issues. The oil/gasoline industry has historically been serviced by pipeline, truck, and barge. On the other hand, bioethanol is transported by railcar, from its origin in the central plains of the US, to destinations nationwide. The expansion of bioethanol is therefore directly linked to the expansion of its logistical infrastructure.

In 2007 we have operated and marketed over 132 million gallons of bioethanol, of which 53 million came from third party producers under long-term agreements. Additionally, we have Signed Third Party Marketing agreements for bioethanol, in the form of e85, and for distillers grains with different North American companies.

The new Energy Independence and Security Law of 2007 passed on December provides for dramatic increases in vehicle fuel economy standards and in the usage of renewable fuels from both traditional grain starch feed stocks, and from advanced feed stocks such as cellulose.

For the second time in just two years the United States' Congress passed groundbreaking energy legislation that requires historic increases in renewable fuel usage as well as in vehicle efficiency standards. The new law increases the Renewable Fuel Standard (RFS) for 2008 from the 5.4 billion gallons, which were required under the existing RFS, to 9 billion gallons, and increases total program requirements from 7.5 billion gallons annually to 36 billion gallons by 2022. Importantly, nearly two-thirds (21 billion gallons) of this 36 billion gallon total will come from advanced biofuels such as cellulosic bioethanol.

This new law results in a great perspective of our business for the upcoming years. It's extremely supportive of our long stated goal to make commercial scale cellulosic bioethanol production a reality. It moves bioethanol beyond just a blending component in gasoline and elevates it to a fuel in and of itself. The law will provide market incentives to rapidly bring cellulosic bioethanol production to commercialization, insuring that a market exists for bioethanol produced from facilities using cellulosic technologies, and it will further Congress' stated goal to lessen U.S. dependence on imported energy.

DGS Europe

2007 has been a year of high prices in all cereals, also soy, a basis for calculating the price for DGS. Therefore one could think of high price sales opportunities. However, having closed operations before hand has rendered relatively lower prices, since most operations were already closed by the end of the year, when soy prices were at their peak.

During this year we have accumulated sales for over 345,000 tons of our main co-product, DGS, which is increasingly being accepted as feedstock for cattle.



DGS United States

DGS Sales and Marketing volumes in the US have increased substantially in the past year and continue to provide strong contribution to company revenues. Distiller's grains production in the US has increased over 75% from 2006 to 2007. We have actually increased production at rates higher than the industry average topping an 80% annualized increase. Inclusion rates in feed rations, both domestically and internationally in all animal species has increased significantly as nutritional value and sustainability of quality supply continue to redefine the animal feed landscape. Abengoa Bioenergy is a leader in quality control and customer service, participating in numerous university feeding trials and serving on various committees within the industry.

In 2007 we have closed sales for over 425,000 tons of DGS, and we have notoriously increased our logistics and trading activities with third party producers, and consumers.

Production Plants

Europe

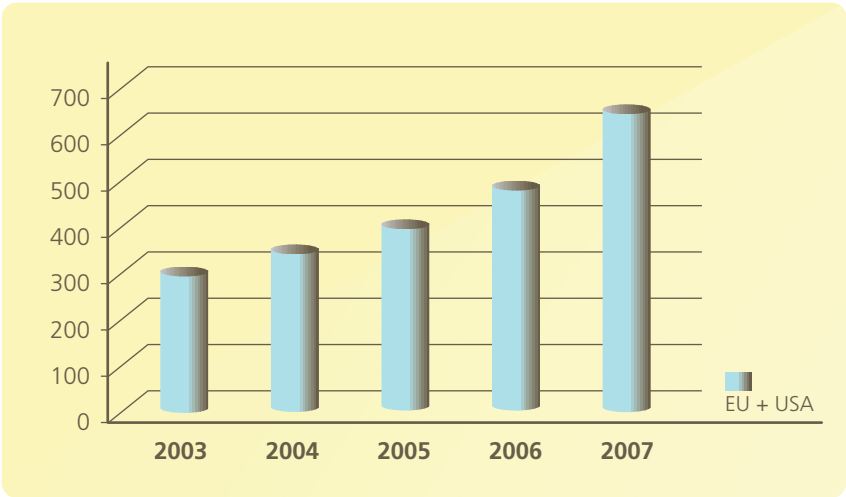
Ecocarburantes Españoles

- Began operating in the year 2000.
- Property of Abengoa Bioenergy (95%) and IDAE (5%).
- Annual installed production capacity of 40 million gallons of bioethanol
- Annual installed production capacity of 110,000 tons of DGS.
- 300,000 tons of cereal consumption annually.

Ecocarburantes Españoles, S.A. is the owning company of the bioethanol production plant in Valle de Escombreras, in Cartagena, Murcia, Spain. This company is owned 95% by Abengoa Bioenergy, S.A., and 5% by the Instituto para la Diversificación y Ahorro Energético IDAE (Institute for the Diversification and Energy Saving).

Most of the CO₂ produced in the process of transformation from cereal to bioethanol is sold to third party facilities, located close to the plant, preventing such companies from producing their own carbon dioxide, obtaining greater yield from bioethanol production, and reducing emissions to the atmosphere.

Accumulated Sales Growth (in M€) of Bioethanol, DGS and Electricity





Additionally, electricity is generated during the process which powers the whole plant and the excess is reverted to the national electricity network.

Bioethanol Galicia

- Began operating in the year 2002.
- Property of Abengoa Bioenergy (90%) and XesGalicia (10%).
- Annual installed production capacity of 52 million gallons of bioethanol
- Annual installed production capacity of 120,000 tons of DGS.
- 340,000 tons of cereal consumption annually.

Additionally, during 2007 we have incorporated the new Bioethanol Galicia Novas Tecnoloxías. This company has a main objective of promoting renewable energies in Galicia, developing advanced technologies for producing biofuels and electricity using lignocellulosic biomass.

The excess in electricity generated during bioethanol production, considerably higher than the plants own consumption, is returned back to the national electricity network, with the corresponding profit.

Biocarburantes de Castilla y León

- Began operating in the year 2006.
- Property of Abengoa Bioenergy (50%) and Ebro Puleva (50%).
- Annual installed production capacity of 53 million gallons of bioethanol
- Annual installed production capacity of 120,000 tons of DGS.
- 585,000 tons of cereal consumption annually.

The plant, property of Biocarburantes de Castilla y León, S.A. in Babilafuente, Salamanca, Spain, with an annual bioethanol production capacity of 53 million gallons, of which 1.5 million will be obtained from the conversion of cereal biomass in bioethanol by the means of a new technology under development by Abengoa Bioenergy New Technologies.

This plant will be the first of its kind around the world with the possibility of producing bioethanol from biomass, in particular from cereal straw, with the technology of Enzymatic Hydrolysis.

As with the other Spanish plants, and according to the applicable legislation, the generated electricity that is not used in the bioethanol production process is reverted to the electricity network.

Abengoa Bioenergy France

- Phase 1 began operating with wine alcohol in second half 2007
- Phase 2 to start operating with grain in 2008
- Property of Abengoa Bioenergy (64%) and Oceol (36%).
- Annual installed production capacity of 66 million gallons of bioethanol
- Annual installed production capacity of 145,000 tons of DGS.
- 500,000 tons of grain consumption annually.
- 13 million gallons of wine alcohol consumption annually.

Abengoa Bioenergy France is the company owner of the bioethanol production plant in France (first in Europe outside the Spanish borders), owned 64% by Abengoa Bioenergy, and 36% by Océol, grouping of the main regional agricultural corporations and industries

This plant is located in the Petro-Chemical complex in Lacq, Pyrénées Atlantiques, France, and will use corn and other lower quality plant alcohols. The total projected production capacity is 66 million gallons of bioethanol per year, 53 million using corn as raw material, and 13 million using lower quality alcohols.

United States

Abengoa Bioenergy Corporation - Colwich

- Acquired in 2001
- Owned 100% by Abengoa Bioenergy Corporation
- 25 million gallons of bioethanol production capacity annually
- 78,500 tons of DGS production capacity per year
- 9.5 million bushels of corn and sorghum combination consumption per year

This site is one of three USA operations owned 100% by Abengoa Bioenergy Corporation. The plant is running at 100% of capacity, and continues to prove excellent efficiency and consistent operations. The output capacity is 25 million gallons of production annually, via continuous cook and batch fermentation process. More than 50% of the CO₂ produced is captured and refined by an on-site customer. The plant employs 48 highly trained professionals.

This facility is one of the oldest dry-milling bioethanol projects in the USA, with 25 years of continuous operations. None of the Distiller's Grains is dried in the process, with 100% of this by-product sold in its natural state. Both corn and sorghum grains can be processed simultaneously and 50% of the energy requirement is provided from recovered methane gas supplied by a local municipal solid waste landfill.



Abengoa Bioenergy Corporation - Portales

- Acquired in 2001
- Owned 100% by Abengoa Bioenergy Corporation
- 30 million gallons of bioethanol production capacity annually
- 83,500 tons of DGS production capacity per year
- 10 million bushels of sorghum consumption per year

The facility was expanded in 2006, doubling the production output using continuous cook and batch fermentation processing with two separate distillation and dehydration operations. None of the Distiller's Grains is dried in the process, with 100% of this by-product sold in its natural state. Both corn and sorghum grains can be processed simultaneously. The production capacity is 30 million gallons of bioethanol annually, and the plant employs 48 highly trained professionals.

Abengoa Bioenergy Corporation York

- Acquired in 2001
- Owned 100% by Abengoa Bioenergy Corp
- 56 million gallons of bioethanol production capacity annually
- 167,000 tons of DGS production capacity per year
- 20 million bushels of corn consumption per year

The plant is running at 100% of capacity, and continues to prove excellent efficiency and consistent operations. More than 50% of the CO₂ produced is captured and refined by an on-site customer. The facility provides utility and logistical support to the adjacent ABNT biomass pilot plant. The plant capacity is 56 million gallons of production annually, via continuous cook and batch fermentation process, and currently employs 58 highly trained professionals.

Abengoa Bioenergy of Nebraska

- Owned 100% by Abengoa Bioenergy
- Operations Start-up year 2007.
- 88 million gallons of bioethanol installed production capacity annually
- 240,000 tons of DGS production capacity per year
- 32 million bushels of corn consumption per year

Abengoa Bioenergy of Nebraska, LLC is operating in Ravenna, Nebraska (USA). This company is owned 100% by Abengoa Bioenergy. The plant has been constructed starting in 2005 and commissioned in July 2007. Operations are running at 100% of design with annual production capacity of 88 million gallons via continuous fermentation. The plant employs 60 highly trained professionals. The facility is Abengoa Bioenergy's largest operation and the first in the USA using the continuous fermentation technology. The project includes a double loop rail track providing for loading and simultaneous shipping of 2.7 million gallons in 95-car unit trains.

This plant is designed to recycle all waters from the processes, which at the end are treated and reverted back for reutilization, thus consuming less water, and achieving minimal pollution, and therefore, minimal environmental impact.



Brazil

Abengoa Bioenergia Brazil - Pirassununga

- Acquired in 2007
- Owned 100% by Abengoa Bioenergy
- 21 million gallons of bioethanol production capacity per year
- 3.2 million tons of sugar production capacity per year
- 3.4 million tons of sugar cane consumption annually

Abengoa Bioenergia Brazil - São João da Boavista

- Acquired in 2007
- Owned 100% by Abengoa Bioenergy
- 15 million gallons of bioethanol production capacity per year
- 2.1 million tons of sugar production capacity per year
- 2.3 million tons of sugar cane consumption annually

The current process of producing bioethanol from sugar cane returns the so called "bagazo", which is the remaining plant residue from the cane once the sugar has been extracted. We are undertaking research to identify the most profitable method to produce electricity using this residue to power the plants and the excess turned over to the electricity grid.

New Projects

Europe

Abengoa Bioenergy Netherlands

- 100% owned by Abengoa Bioenergy S.A.
- Operations to start in Q4 2009
- 127 million gallons bioethanol per year production capacity
- 1.2 million ton cereal consumption per year
- 360,000 tons DGS production annually
- 400,000 tons CO₂ fluid and gas supplied to industry and regional greenhouses

Abengoa Bioenergy Netherlands B.V. has started construction activities for the Rotterdam-Europoort facility in September 2007. The 127 million gallons per year facility starts operations in Q4 2009. The plant is being built by Abener, a fully owned subsidiary of Abengoa S.A. that has already constructed several bioethanol plants. AB Netherlands will employ directly around 75 employees.

Abengoa Bioenergy UK

- Owned 100% by Abengoa Bioenergy
- Operations to start in 2010
- 127 million gallons bioethanol per year production capacity
- 380,000 tons of DGS production capacity per year
- 1.1 million tons cereal consumption annually

The Abengoa Bioenergy UK plant has entered the detailed design and development phase to deliver an installed plant capacity of 127 million gallons of bioethanol. The plant will be installed at Stallingborough on the South Humber bank, UK and come on stream in 2010. It will be the first plant of its kind in the Humberside area. The facility includes the production of bioethanol and DGS and has embedded electrical generation with the capacity for electricity export. The location will provide the headquarters for ABUK where a team of 73 professional people will provide the support and services to deliver products to customers

Bioener Energía

- Owned 50% by Abengoa Bioenergy, and 50% by EVE (Ente Vasco de la Energía).
- The construction will start at the end 2008
- 53 million gallons bioethanol per year production capacity
- 176,000 tons per year of DGS designed production capacity
- 527,000 tons per year of grain designed consumption

Bioener Energía, S.A. is located in Zierbana, Bilbao, Spain. This company is owned 50% by Abengoa Bioenergy, and 50% by EVE (Ente Vasco de la Energía). The plant has obtained the environmental permit and it will start the construction at the end 2008. The plant will employ around 65 highly trained professionals. The plant includes a cogeneration of 40.4 MW.

United States

Abengoa Bioenergy of Indiana

- Construction began in year 2007
- Operations to Start-up year 2009
- 88 million gallons of bioethanol installed production capacity annually
- 300,000 tons of DGS production capacity per year
- 32 million bushels of corn consumption per year

ABI was funded and began construction in 2007. Abener/Abencs will take 24 months to engineer and build the facility, with startup coming in 2009. When operational, ABI will have 63 employees.

ABI will consume corn and produce bioethanol and distillers grains. ABI will have the capability of drying all or any portion of the distillers' grains it produces. The plant is located on the Ohio River, which provides access to the entire eastern half of the US as well as world-wide export markets.

ABI is incorporating Vogelbusch, continuous fermentation technology. It will be a replica of ABNE.



Abengoa Bioenergy of Illinois

- Construction began in year 2007
- Operations to Start-up year 2009.
- 88 million gallons of bioethanol installed production capacity per year
- 300,000 tons of DGS production capacity per year
- 32 million bushels of corn consumption per year

ABIL was funded and began construction in 2007. Abener/Abencs will take 24 months to engineer and build the facility, with startup coming in 2009. When operational, ABIL will have 63 employees.

ABIL will consume corn and produce bioethanol and distillers grains. ABIL will have the capability of drying all or any portion of the distillers' grains it produces. The plant is located on the Mississippi River, which provides access to the entire eastern half of the US as well as world-wide export markets.

ABIL is incorporating Vogelbusch, continuous fermentation technology. It will be a replica of ABNE and ABI.

Biodiesel

Biodiesel is a renewable and biodegradable biofuel which is obtained by means of the reaction of a light alcohol - bioethanol or methanol-with any type of oil or fat, vegetable or animal, by means of a chemical reaction denominated transesterification, and from which products like biodiesel or methylic ester of fatty acid (Fatty Acid Methyl Ester, FAME) and glycerin are obtained.

Biodiesel does not contain sulfur and, with respect to the diesel derived from petrol, the gas emissions from the greenhouse effect (CO₂, among others), carbon monoxide (CO), particles (PM) and other polluting products all decrease. In addition, it is totally apt for its use as fuel, replacing, total or partially, petrol in diesel engines, with no need to convert, adjust or regulate the engine of the vehicle; likewise, it increases the lubricity of the engine and the point of ignition, therefore reducing the danger of explosions by gas emanation.



The conversion technology chosen by Abengoa Bioenergy for the development of its plants is that of the company Desmet-Ballestra, leader in the sector of vegetable oil treatments and production of biodiesel. This technology uses crude vegetable oils for the production of biodiesel, and its main differentiating characteristic, with the rest of existing technologies, is the flexibility of the design of the plant for the processing of any type of vegetable oil. The vegetable oils that will be used are mainly soybean, rapeseed and palm, or fractions of the latter.

Abengoa Bioenergy San Roque

- Owned 100% by Abengoa Bioenergy.
- Operations will start on October 2008.
- 200,000 tons of biodiesel installed production capacity per year
- 18,500 tons of Purified Glycerin designed capacity per year
- 205,000 tons of vegetable oil designed consumption per year

Abengoa Bioenergy San Roque, S.A. is located in Algeciras Harbor, Cádiz, Spain. This company is owned 100% by Abengoa Bioenergy. The plant will start the commissioning on June 2008 and the provisional reception would be on October 15. It will employ 45 highly trained professionals.



Abengoa Bioenergy San Roque has signed a contract with Cepsa to construct, operate and maintain the biodiesel plant, with the condition to sell them a minimum of the installed capacity. The biodiesel produced in this plant will be blended with diesel in a 5% proportion in Cepsa's refinery.

Research and Development and Innovation

R&D&I Strategy

The mission of Abengoa Bioenergy New Technologies is to develop and demonstrate new technology solutions through science and innovation to achieve Abengoa Bioenergy's Strategic Business Plan Objectives, which include:

- Develop and commercialize price competitive biomass technology.
- Increase co-products add value and develop new co-products.
- Improve current dry mill technology.
- Promote development of energy crops.
- Develop final use programs.

We are focusing our efforts in the processes of enzymatic hydrolysis, and gasification and catalysis, to identify new raw materials as a source for carbon. In the process of enzymatic hydrolysis we have developed a simulation model to research the fractioning and conversion of lignocellulosic biomass, which has served as a basis for the hybrid production plant proposed to the DOE. Currently, we are carrying out the optimization of the units of production in order to get the necessary information for the design of an industrial scale biomass plant in Hugoton, Kansas, USA.

As for the gasification and catalysis processes, during 2007 we have launched the catalysts research programs, included in the I+DEA project. Additionally, we have made technoeconomical and environmental designs, and sustainability models, for thermo-chemical process. In Spain, our activities have been focused in projects for the use of forest biomass residues, and a gasification plant has been designed for vapor production, integrated within a bioethanol from biomass production plant. In order to develop the proper catalyst for the conversion of synthesis gas into bioethanol, this year we have launched an ambitious program in which we combine existing catalysts with new technologies and catalysis concepts.

We have also worked in the development, evaluation and validation of new processes for and increasing value of our co-products, obtained in bioethanol production from cereal, resulting in greater nutritional values.

In our pilot plants, we have developed improvements in the bioethanol production processes, obtaining greater bioethanol/ cereal yields. At the same time, we are experimenting we new enzymes for evaluating further yield increases and less environmental impact.

Raw material represents between 60% and 70% of the total biofuel production cost, and 30% to 40% of the life cycle greenhouse effect gases emissions, according to Concawe. As a result, we have developed programs in order to reduce the economical and environmental impacts of the raw material destined for biofuel production, and to identify and develop alternative species for the use of first and second generation production technologies. Additionally, we have launched programs for the evaluation of other resources potential, such as forest, industrial and agricultural residues, and for the use of several types of cereal obtained from different types of seeds.

Aware of the environmental benefits obtained from the use of biofuels, we are carrying out demonstration programs for the use of e85 and e95, and other studies of blends of bioethanol-diesel to develop stable blends that comply with existing gasoline and diesel engines characteristics.

Furthermore, we have been performing demonstration tests on all types of commercial engines, on several captive fleets.

Another concept on which we are strongly focusing our efforts is that of the Biorefinery, by which we intend to obtain market value products from biomass. Currently, we are developing a conceptual model, and carrying out market research for potential products. Given the required consumption for the production of bioethanol from biomass, and to carry out the biorefinery processes, we have launched different projects for the selection of the proper enzymatic blends, and for designing the necessary processes engineering to produce these on-site.

Projects

Starch Program

Pilot plant experiments were conducted to validate the yield improvements identified in 2006. Due to the price of corn and bioethanol, process improvements are being evaluated using EBITDA model rather than purely bioethanol yield. One of the process improvements has been partially implemented in the York facility; however, due to volume demands of the plant, complete implementation and evaluation are pending. Work will continue to validate other process improvements using the EBITDA model in 2008.

In addition to process improvements, pilot plant experiments were also conducted to evaluate new enzymes and their impact on yield improvements. Work is in progress to implement better performing, lower cost enzymes in plants.

ABNT is also evaluating dry corn fractionation technology as front-end processing for bioethanol plants. Initial York Pilot Plant evaluations started in 2007 and will continue in 2008.

ABNT has designed a document management system for the security, control and standardization of research documents. Implementation should be complete by first quarter 2008. All of the analytical procedures were evaluated using classical gage reliability and reproducibility methods and documented results in the Procedure Management Database.



Co-Products

Novel processing methods have been developed to enhance the nutritive content and value of distiller's co-products. Positive results were obtained in work conducted at Kansas State University and then validated in the Pilot Plant. A provisional patent application is in draft.

Biomass Enzymatic Hydrolysis

a) Process Development

ABNT developed an Aspen Plus simulation model for the fractionation and conversion of lignocellulosic biomass to bioethanol and co-products. This model forms the design basis for a commercial hybrid cereal and biomass production facility which will be constructed under scope of the US DOE award.

ABNT entered into a Cooperative Development Agreement with the Idaho National Laboratory to develop a rapid NIR method model for analyzing chemical composition of wheat straw.

b) Biomass Pilot Plant Construction and Operation

Construction of the York biomass pilot plant was completed in July 2007. The first batch of bioethanol was produced from wheat straw on September 19. Testing and optimization of various unit operations are ongoing to generate data for designing the commercial biomass bioethanol facility to be built in Hugoton, Kansas. Fractionated biomass materials will be produced for co-product development.

Energy Crops

Milestones achieved:

- Jerusalem artichoke and sweet sorghum agronomic development for different edafo-climatic conditions. Logistics and storage studies. Cost analysis
- Development of a tool able to trace the cereal consumed in the bioethanol production facilities associating GHG emissions, primary energy consumption and sustainability criteria for every stage in the provisioning process
- Externalities derived from the use of cereal as energy crop.
- Launch activities related with species selection, varieties improvement and agronomic development of crops as cardoon, reed, prickly pear, treelike tobacco, paper sorghum, pawlonia, poplar

Raw material represents between 60-70% of the production cost of the bioethanol production processes. In addition, in the cultivation and



distribution phase GHG emissions represents 30-40% of the emissions of the whole LCA of the bioethanol production. The capacity for the production of raw material in a sustainable and usable manner will indicate the maximum potential for bioethanol production in both locally and global basis.

For this reason, ABNT has launched an ambitious program with the following main objectives:

- Reduce economical and environmental impact of the raw material used in the bioethanol production
- Identify and promote the development of alternative species (woody or herbaceous) for the use of both first and second generation conversion technologies
- Identify and evaluate the potential of other resources (agricultural, forest and industrial residues) for bioethanol production
- Understand for each selected specie, its production potential, optimal cultivation techniques, storage and logistics alternatives and cost associated to these operations (both economical and environmental)

Biocarburantes de Castilla y León

Construction of the plant is approximately 85% complete. ABNT and Abener are working with a European supplier to re-design the feedstock preparation system and supply the necessary equipment. It is expected that the feedstock preparation system will be completed by early summer 2008. In order to make up some lost time, commissioning of utility systems and some down stream unit operations will commence in the spring of 2008.

Gasification and Catalysis

- Launched programs for catalysts development, included in I+DEA project.
- Work in catalysts testing in own managed laboratories, either slurry or fixed bed reactors.
- Work in process design and linked techno-economic-environmental assessments of thermochemical process.
- Started to work in projects for residual forest biomass in some areas of Spain, combined with pilot facilities to develop the bioethanol synthesis technology.
- Gasification plant design for steam production, to be included in a biomass bioethanol facility.

The technology for bioethanol production from biomass via thermochemical processes is being developed based in an integrated approach, so that actions are targeted in process design, catalyst research and reactors studies in a parallel scheme, taking into account the overall sustainability from an integrated criteria.

With the goal of developing an appropriate catalyst to convert synthesis gas into bioethanol, a wide research program has been set up and launched in 2007, this is composed by several subprograms, combining the existing catalysts families, and very new high throughput techniques with the more traditional ones, and introducing very new concepts in the catalytic systems.

Simultaneously, two testing laboratories are available to assess the advance and status of the research, and to know and most properly develop the synthesis process. In these reactors, catalysts prepared in the research programs are being tested.

The final goal of the G&C project is to develop an overall technology to convert biomass into bioethanol and, therefore, the whole process is being modeled with chemical process design software. These tools are used as well to assess the techno-economical and environmental performance of the technology, considering current status and the potential for improvements.

As a more advanced step in the biomass gasification technology development, a biomass gasifier will be included in the industrial enzymatic hydrolysis plant developed in Kansas, in order to supply heat and steam to the facilities. This project will enable the acquisition of real knowledge about the gasification process in an industrial approach, as well as improving the life cycle emissions of the product.

Biorefinery

Biorefinery concepts

- Launched programs for biorefinery concepts development included in biosynergy project
- Started market analysis for potentially marketable products to be obtained from different biomass fractions

On-site enzyme production

- Started the selection of enzyme mixture optimised for the enzymatic hydrolysis of lignocellulosic biomass
- Engineering process design of an on-site enzyme production facility.

Biorefinery is understood as a further stage in the development of technologies based on biomass as feedstock with the optimization of the combination of biological, thermo-chemical, and chemical processes getting advantage of synergies between technologies, and aiming to produce a complete range of products, using a wide range of feedstock.

With the goal of developing a competitive process for bioethanol production from biomass by means of the integration of different process technologies (cereal, gasification and enzymatic hydrolysis), side-streams valorization (biopolymers, fine chemicals production) or integration up-wards or downwards the bioethanol production chain (e.g.: enzyme production) ABNT has launched a R&D program whose main objectives for 2007 were:

- Develop integrated concepts combining first and second generation technologies (including both thermochemical and biochemical pathways) for bioethanol production.
- Develop custom-made enzymatic mixtures and associated production strains to be used in the enzymatic hydrolysis of biomass
- Integrate enzyme facilities with existing bioethanol production plants for the production of tailor made enzymatic cocktails using selected hosts organisms.
- Identify and select potential value-added products able to be derived from

Fleet Demonstration (e-diesel, FFV, e95)

The main activities we have developed in this field are:

- Defined bioethanol-diesel blends and additives capable to maintain stability over the time for each European climate.
- Definition of bioethanol-biodiesel-diesel blends without additives for being used as fuels
- Logistics needs study for every fuel resulting of blending bioethanol with diesel or gasoline
- Start-up of fleets with bioethanol-diesel blends in Europe
- Start-up of fuel stations dispensing bioethanol
- Bioethanol final uses project promotion. Develop of engines and burners to the market penetration of motorbikes, electrical generators and trucks.

Bioethanol is an excellent fuel to be used in engines that usually run on gasoline. It is well known its good performance in bioethanol-gasoline blends with bioethanol content up to 15%. Abengoa Bioenergy New Technologies is setting up programs to demonstrate the performance of higher bioethanol-gasoline blends (e85 and e95), and bioethanol-diesel blends to be used in compression engines. E-diesel is a blend of bioethanol and diesel that could be used in diesel engines without modifications, in order to improve the environmental performance of the engines and to increase the bioethanol market. ABNT is working in the following areas:



- Fuel development: It is necessary to develop time-stable mixtures able to accomplish with all the needs for both diesel and gasoline engines
- Engine testing. Fuel are tested in all commercial engine technologies, therefore in both gasoline and diesel vehicles.
- Fleet demonstration, after having finished the bench development and engine testing of the fuel ABNT launch demonstration programs in captive real fleets

Renew

Milestones achieved:

- Preliminary conceptual design of the thermochemical process for bioethanol production from biomass
- Technical, economical and environmental assessment carried out.
- Developed a laboratory for synthesis catalysts testing, as well as a complete testing program.

The Renew project is an integrated project funded by the 6th Framework Program of the European Commission. Coordinated by Volkswagen it joins together some of the main actors of the European automotive industry, oil industry, biofuel producers, technology developers and research centers in a consortium composed by 33 partners from 9 different European countries. It has a total budget of 19.8 M€.

The project is focused on the thermochemical route for biofuels production. Several technologies for the production of diesel, DME and bioethanol are assessed, considering common criteria, technical, economical and environmental. Our main tasks have been the conceptual development of its thermochemical concept for the production of bioethanol, assessment, and the development of a laboratory for catalysts testing.

Biosynergy

Milestones achieved:

- First biorefinery concepts evaluated under technical, economical, environmental criteria
- Analysis of different pre-treatment options

Biosynergy aims to use biomass for the synthesis of bio-products – chemicals and/or materials – together with the production of secondary energy carriers – transportation fuels, power and/or CHP – through the biorefinery approach. The research is focused on the development of advanced and innovative fractionation and conversion processes combining both biochemical and thermo-chemical pathways, and process development from lab-scale to demonstration at pilot-scale.

The coordinator of the project is ECN and the Consortium is formed by companies such as DoW Europe, VTT, Biorefinery.de, CRES, Universities of Aston and Delft.

The objective of Abengoa Bioenergy activities is to generate data necessary for the evaluation of various options for physical or chemical fractionation of pretreated feedstock and post-treated materials. These data are necessary for developing process configuration and selecting appropriate equipment for the biorefinery plant. They are also needed to develop a conceptual design of a biorefinery plant that converts agricultural residues of energy crops into bioethanol and value-added co-products.



Strategic Singular Project in Energy Crops (PSE)

Milestones achieved:

- Externalities associated to the use of the cereals as energy crops
- Tool able to trace the cereal entering in the conversion facilities and calculate primary energy consumption and GHG emission in the production and provision chain
- First batch of cereal varieties optimized for bioethanol production selected
- Agronomical development of Sweet Sorghum and Jerusalem Artichoke (crop techniques, harvesting periods and techniques, sugar yield and so on)

Abengoa Bioenergy, Ecoagricola and Abengoa Bioenergy New technologies are taking part in this project, awarded by the Spanish Government to develop energy crops for different applications (heat, electricity and biofuels). The Consortium is formed by many different partners from the energy sector.

New Projects

I+DEA Project

Milestones achieved:

- I+DEA project has been approved for funding. The budget approved is 28.3 M€
- The Consortium is formed by 25 partners
- 27 research centers carry out part of the research work.
- 29% of the overall budget is for the subcontracting of R&D centers and Universities

Abengoa Bioenergy New Technologies is leading this multidisciplinary consortium which main objective is to generate knowledge for the use of bioethanol as fuel.

Specific objectives included in the project are:

- Develop energy crops for both the current technology and second generation technologies
- Develop enzyme mixtures for the enzymatic hydrolysis process that reduce the impact of this stage in the overall operating cost
- Catalyst selection and design and integration of the gasification and catalytic bioethanol synthesis process
- Develop bioethanol market through e10, e85, e100, e-diesel and bioethanol-biodiesel-diesel blends.

The consortium is formed by important companies, as Syngenta, KWS, Oryzon Genomics, Cepsa, Derbi, Ros Roca and Idiada, investing large amounts of money for the development of bioethanol as fuel.

Hybrid Project

Milestones achieved:

- Received DOE phase-1 contract award; \$38 M
- Staffed and mobilized ABHK Project Office
- Signed land and water options
- Obtained approval of the starch / biomass hybrid plant Proforma
- Obtained approval of the project pre-construction and EPC Master Schedule.

- Completed enzymatic hydrolysis and biomass gasification simulation model
- Selected Vogelbusch to provide starch plant process specification
- Assigned and mobilized 3rd party Architectural / Engineering consulting firms.

Abengoa Bioenergy New Technologies is leading this project execution effort. Its main objective is:

- Design, construct, and operate a 100 million gallons per year biomass and starch hybrid commercial plant.

Specific project objectives include:

- Demonstrate commercial viability of the biomass to bioethanol conversion process
- Ensure technologies developed are capable of deployment to existing and future plant sites

ABNT has been assigned to design, construct and operate the DOE large Biorefinery demonstration plant. The DOE award will partially fund the project. The biorefinery will be collocated with a starch bioethanol plant, to form a hybrid complex in Hugoton, Kansas.

The biorefinery will have a conversion capacity of minimum 700 dry metric tons/day and consist of two parts: an Enzymatic Hydrolysis (EH), and a Gasification part. The EH part will convert biomass (400 dry metric tons/day) to bioethanol, lignin, and biomass animal feed. The Gasification part will convert 300 tons per day biomass to syngas, which will be combusted for steam generation. The steam will be used internally in the biomass facility, with the excess being sold to the adjacent starch plant.

The hybrid plant is segmented by process areas, including (1) biomass origination and collection - ABT; (2) biomass handling – ABNT / ABT; (3) biomass pretreatment – ABNT; (4) biomass enzymatic hydrolysis – ABNT; (5) biomass gasification – ABNT; (6) grain handling – ABNT; (7) starch plant – Vogelbusch; and, (8) Fractionation and oil extraction – ABNT. Hybrid or combined plant areas include distillation, dehydration, and evaporation, utilities, and plant infrastructure.