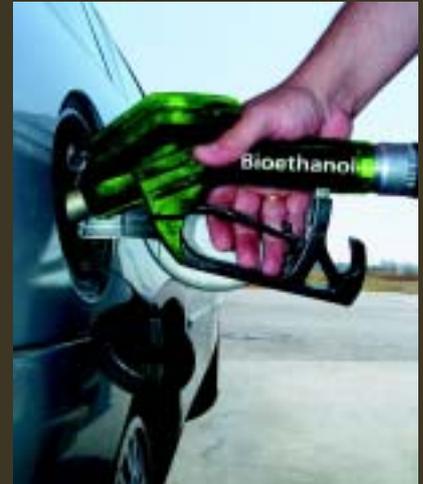
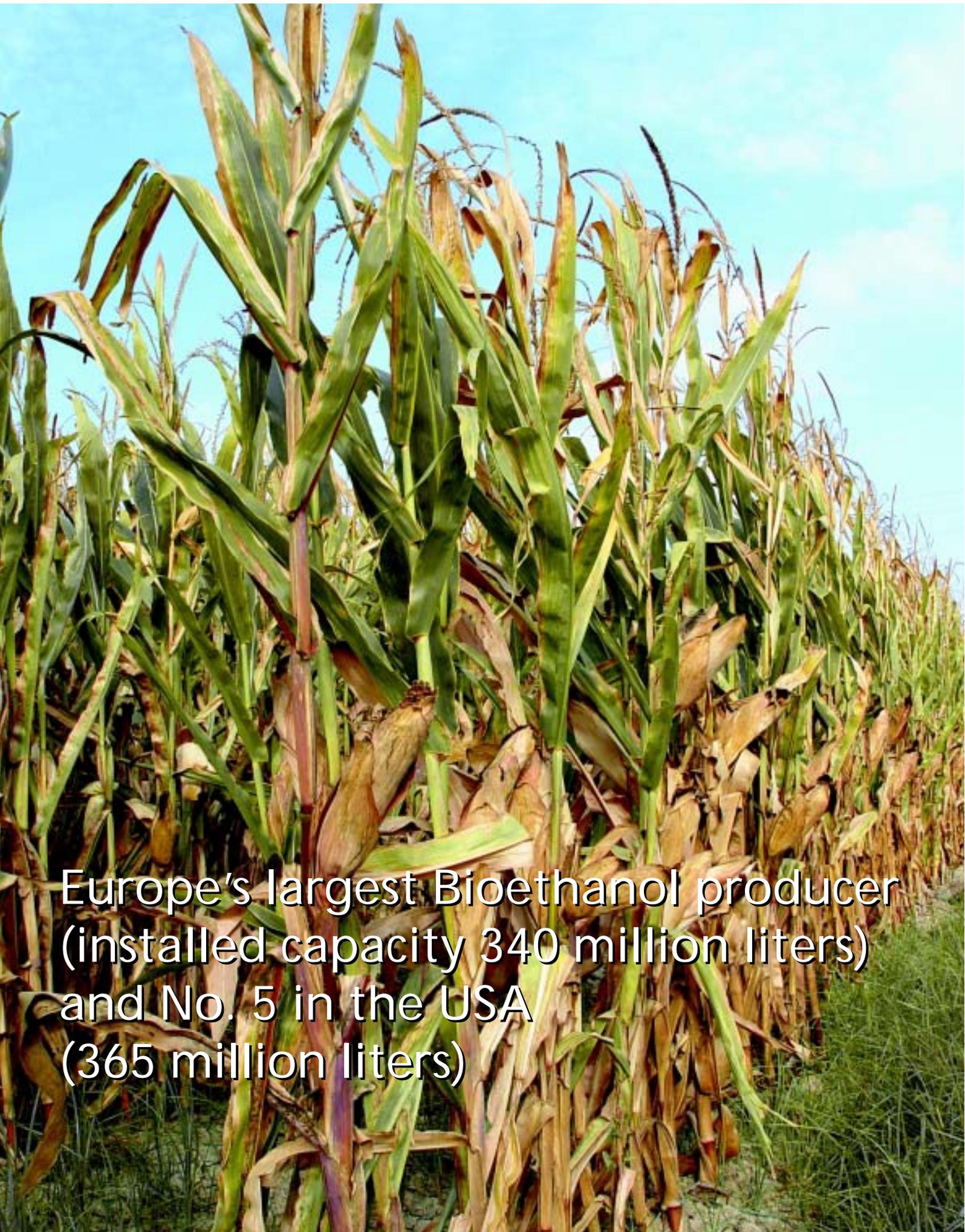


# Bioenergy

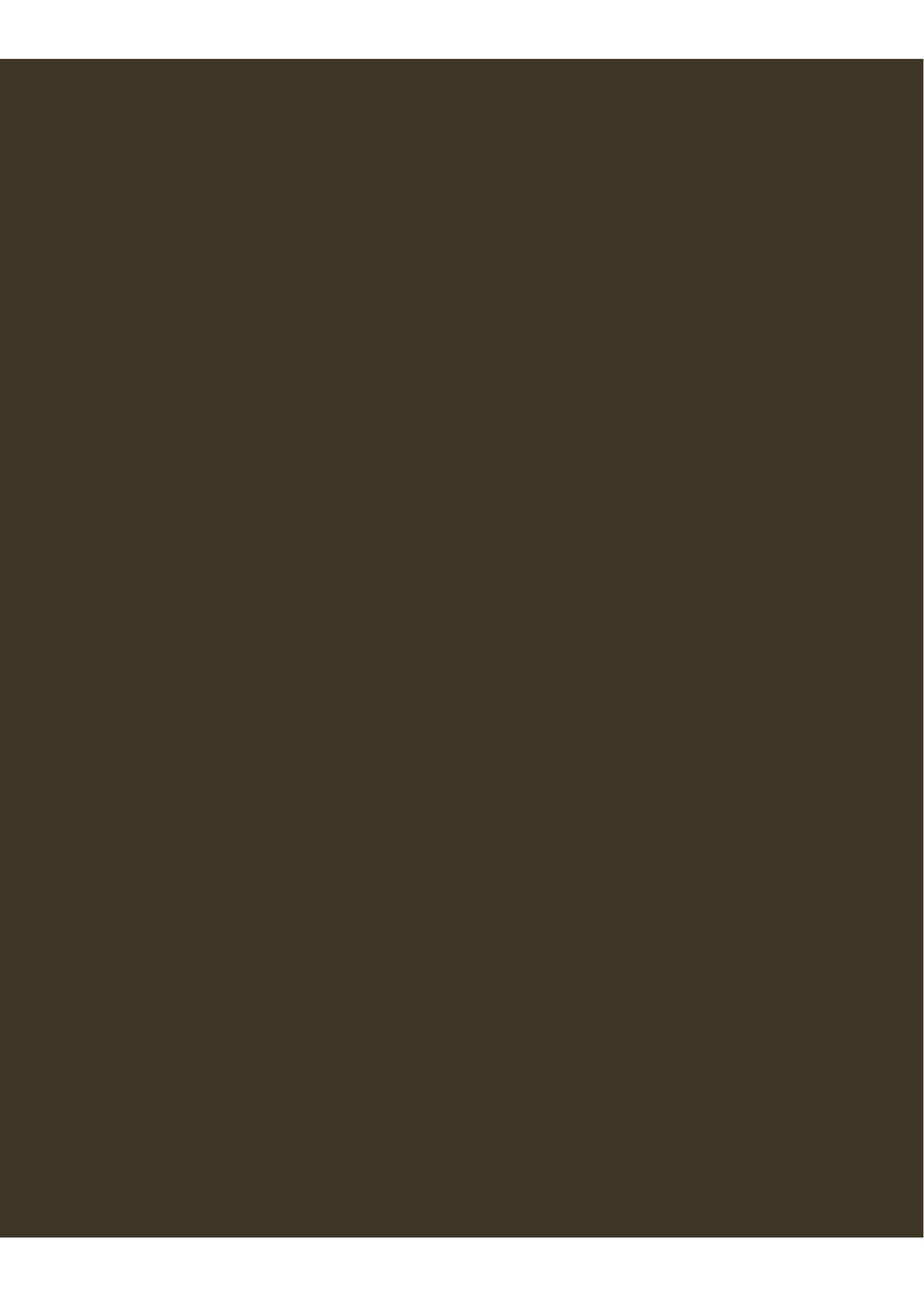
[www.abengoabioenergy.com](http://www.abengoabioenergy.com)

- Production of ethyl alcohol from vegetable products (cereals, biomass). The resulting alcohol (bioethanol) is used to manufacture ETBE (a petrol additive) or is blended directly with petrol or gas oil. Thus, upon it being a renewable energy, net CO<sub>2</sub> emissions are reduced (greenhouse effect). Production of DDGS (Distillers' Dried Grains with Solubles), a protein complement for animals and CO<sub>2</sub>.





Europe's largest Bioethanol producer  
(installed capacity 340 million liters)  
and No. 5 in the USA  
(365 million liters)



## Organization

During the year 2004, Abengoa Bioenergy completed the integration of the Business Unit initiated in 2002-2003. The most noteworthy advances are the following:

- Management Structure for the Business Unit implemented.
- Leadership position in the market consolidated
- Establish commodities risk management policy
- Integrated Management System implemented
- Corporate Identity established

Focusing on the main items, Abengoa Bioenergy has accomplished the following goals:

### United States:

- Colwich Expansion (+6 MGPY) and has launched the Portales Expansion (+ 15 MGPY).
- Control of Ravenna Project (80 MGPY) and qualified for the 22 MUUSD state incentives.
- Closed the first phase of the York Operating Lease.
- Implemented the working capital policy.

### Europe:

- Initiated construction of Biocarburantes Castilla y León (200 MI).
- Exports of 44 MI of Bioethanol
- Successful start up of the ETBE Huelva facility
- Registration ISO 9001, ISO 14001 and OSHA 18001 for Ecocarburantes Españoles and Bioetanol Galicia.



### Research & Development:

- Complete staffing of R&D group
- Construction of the pilot plant was completed in March of 2003 and commissioning was completed in May.
- Develop and demonstrate Residual Starch technology for corn
- Complete agreement with Novus for Coproduct development and marketing.
- Complete preliminary design for the commercial demonstration of Biomass technology at Biocarburantes Castilla y León.
- Complete Hydrogen Fuel Cell ethanol reforming prototypes at 1 kW and 10 kW
- ISO 9001:2000 obtained

The Business Unit integrates the management of the following companies:

Ecocarburantes Españoles, S.A.  
 Ecoagrícola, S.A.  
 Bioetanol Galicia, S.A.  
 Biocarburantes de Castilla y León, S.A.  
 ETBE Huelva, S.A.  
 Abengoa Bioenergía, S.A.  
 Abengoa Bioenergy Corporation  
 Abengoa Bioenergy R&D Incorporation.  
 Grencell, S.A.



## Operations in Europe

### Introduction

Abengoa Bioenergía is the No. 1 producer of fuel bioethanol in Europe. Current operations include two cereal-based bioethanol plants in Spain, Ecocarburantes Españoles, in Cartagena (Murcia) and Bioetanol Galicia, in Teixeira (Coruña). The first with an installed capacity of 150 million liters annually, and the second with a yearly installed capacity of 176 million liters.

In partnership with Ebro Puleva, Abengoa Bioenergía is developing a third plant in Babilafuente (Salamanca) with a capacity of 200 million liters annually, of which 5 million liters is derived from the conversion of biomass from cereal crops by means of a new technology being developed by Abengoa Bioenergía R&D.

We would also highlight the fact that ETBE Huelva, S.A., participated by Abengoa Bioenergía (90%) and the Spanish oil company Cepsa (10%), started-up a new ETBE production plant, with an installed capacity of 40,000 tm, last June 2004.

This plant has been built at Cepsa's Refinery of La Rábida (Huelva), and the bioethanol used as raw material is produced in the plants of Bioetanol Galicia and Ecocarburantes Españoles.

In addition, Abengoa Bioenergía's business plan calls for the construction of two new cereal-based bioethanol plants in Europe. Following the recent guidelines approved in the European Directives for the Promotion and Taxation of Biofuels, these plants will be built in countries where the demand and legal framework make it possible to quickly and effectively initiate bioethanol production. Feasibility studies and collaboration agreements with local partners are now being developed for both facilities.



Abengoa Bioenergía's production plants in Spain, Ecocarburantes Españoles and Bioetanol Galicia, have ample capacity to produce cereal-based bioethanol for export to European countries, which supply markets more rapidly, less expensively and cheaper than any other source. This will allow for the development of necessary infrastructures for the expansion of biofuels in Europe, prior to the start up of new production plants in those markets with a growing demand.



## Main milestones achieved (market, legislation and internally)

### Market:

- Bioethanol exports to Sweden (1 MI), Germany (34 MI) and France (11 MI).
- Agreed development for E85 and FFV with BP and Ford.
- Agreements with new EU partners (AGPM, KWST, Roquette, BP Chemical, Lyondell, ...)

### Legislation:

- New legislation approved in Spain to allow direct blending of bioethanol with gasoline and its use in gas stations.
- Coming into force of Taxation and Promotion of Use of Biofuels Directives, and its transposition to different Members States (Spa, UK, Fr, Ger, Pol, Swe, Che, ...)
- Mercosur-EU negotiations on bioethanol trading with Brazil and other countries.
- New European CAP legislation with regard to energy crops.
- New legislation about CO<sub>2</sub> emissions trading.
- Development of bioethanol standards in the CEN of the EU.

### Internally:

- Start-up of the ETBE facility in Huelva.
- Construction of the Biocarburantes de Castilla y León plant in Salamanca.
- Signating of the financing agreement for Biocarburantes de Castilla y León project and first layout plan.
- Continuation of wine alcohol bids from the EU, used as a raw material for Ecocarburantes Españoles and Bioethanol Galicia plants.
- Implementation of an Integrated Management System.
- Development of a Risk Management Policy in companies subject to commodity volatility
- Holding of the World Biofuels Conference for the third consecutive year.



## Plant Operation Results (bioethanol, DDGS and electricity production)

Production	Ecocarburantes	Bioethanol Galicia	ETBE Huelva	Total
Bioethanol (m <sup>3</sup> )	119,156	135,000	0	254,156
DDGS (Tm)	85,855	73,384	0	159,239
Electricity exported (Mwh)	145,335	173,661	0	318,996
ETBE (Tm)	0	0	22,516	22,516



**Ethanol contract highlights:**

Last 2004, Abengoa Bioenergía has achieved a contract bioethanol supply to PCK, a German refinery owned by BP, Shell, Total and Agip, for 43 million liters .

This supply has been executed jointly with KWST, and the bioethanol, has been used for ETBE production.

Abengoa Bioenergy has recently executed a supply contract with Ruhr-Petrol, a trading company based in Germany, for the delivery of 10 million liters of bioethanol to the Miro refinery in Karlsruhe, Germany. This bioethanol is to be consumed by Exxon and Conoco to produce ETBE.

Another significant contract has been to supply 10.5 million liters to Lyondell for ETBE production at its Fos facility (France).

Finally, last may, Abengoa Bioenergía spot-supplied 1 million liters of bioetanol to Preem oil, a company in Sweden, to be used in direct blending.

**New projects:**

The Business Plan for Europe also includes the promotion and construction of two new bioethanol plants to be located in countries in which the demand and legal framework enable a quick and effective development of bioethanol, following the recent guidelines approved in the European Directives for the Promotion and Taxation of Biofuels and its implementation in Member States. Collaboration agreements with local partners and feasibility studies are now being developed for these facilities in key countries such as Germany, France, Holland and Poland.

**US Operations****Introduction**

The focus throughout 2004 was on building for the future. This focus was evident in all company activities from the expansion of the Portales, New Mexico plant, to improvements in internal business systems, to the acquisition of controlling interest in a project company developing an 88 million gallon per year ethanol plant in Ravenna, Nebraska.

Everyone in Abengoa Bioenergy Corp. has focused on their specific activities supporting these building for the future initiatives. Through these collective efforts, Abengoa Bioenergy Corp. has successfully completed the foundation necessary to embark on the aggressive growth strategy developed in the strategic plan. Abengoa Bioenergy Corporation has maintained its position as one of the 5 largest ethanol producers in the United States with an overall annual capacity of more than 95 million gallons. Abengoa Bioenergy Corporation operates three plants in the states of Kansas, Nebraska and New Mexico.



Throughout 2004 the world experienced dramatic increases in all fossil fuel prices. Oil exceeded \$55/bbl in U.S. futures trading, and gasoline futures also reached record levels. Seven additional states banned MTBE in 2004 bringing the total number of states banning MTBE to 25. All of these factors combined to support strong ethanol prices in 2004. Offsetting the strong ethanol prices was a dramatic increase in corn prices, exceeding \$3.20/bu, for the first 9 months of 2004. As the 2004 corn crop matured, corn prices returned to normal levels in anticipation of the largest corn crop in U.S. history of more than 11.5 billion bushels. These combined external market forces, coupled with steady operational performance led to improved financial performance in 2004 compared to 2003.

### Milestones Achieved

#### Industry:

The U.S. industry continued its rapid expansion, with 81 plants having installed capacity in excess of 3,400 million gallons per year. This represents an increase of 600 million gallons for 2004, compared to 2003. An additional 14 plants with 630 million gallons per year capacity are currently under construction, with expected commissioning in 2005 or early 2006. The farmer owned cooperatives continue to represent the majority of all newly constructed capacity in both the 2004 and 2005 capacity currently under construction.

#### Legislation

For the second consecutive year, the U.S. Congress failed to pass an Energy Bill. On several occasions the Energy Bill appeared to have the necessary



support, only to fail at the last minute. The main issue surrounds MTBE liability limitations for past producers of MTBE. However, with the November elections dramatically increasing the Republican majorities in both the U.S. House of Representatives, and the U.S. Senate, it is now very likely an Energy Bill will be passed immediately after the new Congressional session begins in 2005.

Favorable legislation was passed during 2004 in the form of the Volumetric Ethanol Excise Tax Credit (VEETC), which extends the ethanol tax incentive from 2007 to 2010 and eliminates any impact of the ethanol program on the Highway Trust Fund.

An additional 8 states passed laws prohibiting the use of MTBE in 2004, bringing the total number of states with MTBE bans to 20.



Internal

Many key internal milestones were achieved in 2004. Most importantly the R&D facility at Ravenna, Nebraska was successfully constructed and operated, qualifying the larger project for the Nebraska Ethanol Production Credit. Engineering was completed for the Portales, New Mexico plant expansion from 15 to 30 million gallons per year.

Many internal management systems were developed or improved in 2004.

Some of these systems include, rail fleet management, customer service, commodity management, and various human resource systems. A

particular company-wide human resource initiative included the development and implementation of a personnel competency program designed to identify opportunities for individual skill improvement and to develop individual career development plans for all employees.

Plant Operations Results

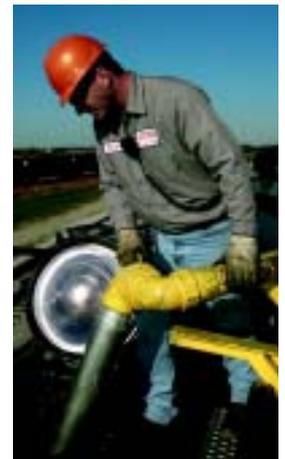
Production	York, NE	Colwich, KS	Portales, NM	Total
Bioethanol (millions/gallons)	55.8	23.8	16.6	96.2
DDGS (dry, tons)	165,000	71,775	51,235	288,010
CO2 (tons)	58,500	38,000	0	96,500

Ethanol and Co-Product Market Overview and ABC market share & strategy

Ethanol

End of year 2003 robust ethanol market values continued into the first and second quarters of 2004. The third and fourth quarters of 2004 saw even more strengthening as gasoline values reached new all-time highs. These record gasoline values were fueled by an all-time high crude oil value on the heels of continued un-rest in the Middle East, hurricanes in the Southeastern United States, the Russian Yukos Oil Company financial issues and Nigerian Oil Company labor strikes. 2004 saw ethanol values ranging from \$1.45 - \$1.90 in the spot railcar market, with much of the year seeing values above \$1.60.

The spot truck market value reached an all-time high average of \$2.03 during the first week of November.



Abengoa continued its strong presence in the California market with over 70% of our contracted production being delivered into various destination markets. Abengoa was however contracted with every major US Refinery/Marketer for ethanol supply in the year 2004.

### Co-product Marketing Strategy

Abengoa Bioenergy Corporation's Feed Marketing group received high customer satisfaction ratings in recent customer surveys. This commitment to continued customer satisfaction is essential to our business and demonstrates this focus by building strong customer relationships through commitment to improving customer service and through the production and delivery of consistent feed products. In order to guarantee a high level of customer satisfaction, Abengoa Bioenergy Corporation continues to market directly to its customers, rather than using third-party brokers to interact with our customers. This greatly enhances the responsiveness to customer needs and provides more rapid responses to changing customer and market needs. To ensure this commitment to our customers is met, each U.S. facility employs experienced grain and feed merchandisers dedicated to providing customers with the most up-to-date market information and logistics professionals to ensure accurate and timely product delivery, on a plant specific basis.

Abengoa Bioenergy Corporation strives to provide its customers with the highest quality feed products available in the U.S. marketplace. This is accomplished through providing consistent product quality through a consistent commitment to research and development. Abengoa Bioenergy Corporation continued the extensive research and development initiatives from 2003 throughout 2004 through partnerships with the University of Nebraska, Kansas State University, and Texas Tech University. These research initiatives are focused on the development of feed products which will meet the nutritional requirement for various feed markets such as cattle, dairy, swine, poultry, aquaculture and companion animals. These internal and external research projects demonstrate ABC's commitment to livestock nutrition.

### **New Projects**

Several new projects were initiated or continued in 2004.

#### Abengoa Bioenergy of Ravenna

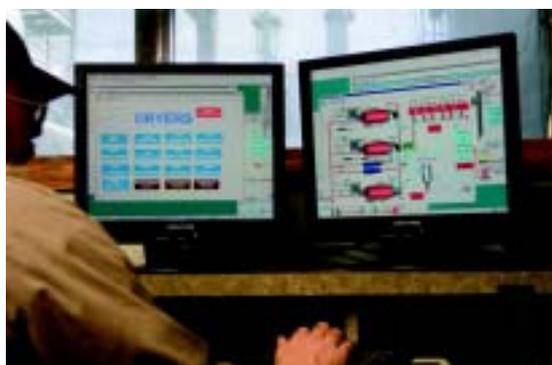
Abengoa Bioenergy Corporation completed the acquisition of the controlling interest in a project company developing an 88 million gallon per year dry-mill ethanol plant located in Ravenna, Nebraska. This project included the design, construction and operation of a research and development facility at the plant site, to meet a minimum production requirement and allow qualification for the Nebraska ethanol producer incentive program. The 88 million gallon per year facility is scheduled to be operational by mid-2006.

#### Portales, New Mexico Expansion

This project required the design and construction of a 15 million gallon per year expansion of the existing facility in Portales, New Mexico. This expansion included a complete re-engineering of all production processes. The full expansion is scheduled to be operational in mid-2005.

#### E-85 Supply

Abengoa Bioenergy Corporation supplied the ethanol for individual E-85 stations in 2004. An overall E-85 supply strategy was also developed with implementation scheduled for 2005. E-85 has a large potential for growth through captive fleet utilization and as a general fuel as the major automobile manufacturers continue to increase production of flexible fuel vehicles. Abengoa Bioenergy Corporation is ready to support the growth of this emerging fuel.



## Research and Development

### Introduction

The mission of Abengoa Bioenergy R&D, Inc. is to develop and demonstrate new technology solutions through science and innovation to achieve Abengoa Bioenergy's Strategic Business Plan Objectives.

### Main Strategic Milestones Achieved

In the year 2004, many milestones were achieved.

#### General

- Completed staffing of R&D group
- Maintain an independent oversight committee
- We are maintaining a group of three external advisors to provide independent oversight over our R&D activities.
- Obtain ISO 9001:2000 certification
- Develop Aspen Models
- Completed the development of the initial Aspen models for starch and Biomass hydrolysis, gasification to ethanol and ethanol reforming. These models will be maintained, improved, and validated with relevant experimental results.

#### Residual Starch

- The construction of the pilot plant was completed in March of this year and the commissioning was completed in May.
- Develop and demonstrate Residual Starch technology for corn. The 2.9 gal/bu yield objective was achieved in September 2005. The validation was completed in November 2004. We are initiating the planning for the roll out of the new technology.

Background information on the residual starch project:



In September, 2002 the Department of Energy of the United States (DOE) awarded Abengoa Bioenergy R&D a project of 35.5 million dollars "Advanced Biorefining of Distiller's Grain and Corn Stover Blends: Pre-commercialization of a biomass-derived process technology" the Residual Starch Conversion is the project contemplated in the first phase of the program.

The objective of the first phase of this project is centered on the development of the processes and technologies that allow improvement of the yields in the production of bioethanol and the quality of the DDGS co-product to increase the protein content. A pilot plant has been constructed within Abengoa Bioenergy Corporation's York (Nebraska) facility, with a budget of 2.4 million dollars. The production capacity of the plant is almost 2 million liters (0.53 million gallons) of bioethanol. The plant was designed to test different materials, such as corn, barley, and wheat.

Abengoa Bioenergy R&D's strategic plan for the new technology developed at the pilot plant to be implemented in the United States plants by the end of 2005 and by 2006 in the European plants.

### Co-Products

- Completed agreement with Novus for the development and commercialization of new feed products.
- The University of Nebraska and Kansas State DGS field trials completed.
- Baseline DGS product characterization completed.

### Biomass Enzymatic Hydrolysis

- Complete preliminary design of Biomass pilot plant
- The preliminary design was completed in September 2004.

Background project information:

In 2002, the United States Department of Energy (DOE) awarded ABRD a \$35.5 million cost-shared financial assistance agreement for the two-phase project, "Advanced Biorefining of Distiller's Grain and Corn Stover Blends: Pre-Commercialization of a Biomass-Derived Process Technology."

One of the main objectives of the DOE project is to develop cost effective technologies for converting cellulosic biomass to ethanol and co-products and integrate biomass conversion with existing dry grind ethanol plant to improve the overall process economics. ABRD has formed alliances and partnerships with companies and research organizations, who are recognized as leading experts in the biomass conversion field, to ensure the successful development of biomass ethanol technologies. Bench scale research and process evaluation are being carried out at the National Renewable Energy Laboratory, Novozymes North America, SunOpta Inc., and Auburn University.



### Biocarburantes de Castilla y León

- Complete preliminary design of BCyL
- The preliminary design was completed in July 2004. The revision of the BCyL design will be completed in December. As result of these efforts SunOpta had offered a turnkey contract for BCyL for the final design, construction and commissioning of the biomass plant.

Background information on the BCyL Project:

The Biocarburantes de Castilla y León S.A. (BCyL) Project includes the design, construction and operation of a 5 million L/year straw-to-ethanol commercial demonstration plant. This plant will be installed next to a 195 million L/yr. cereal ethanol plant to share some of the utilities. Abengoa Bioenergy R&D is charged with providing the process and engineering design, construction supervision, and start-up of this first of its kind turnkey plant.



## Gasification and Catalysis

- Development of an ethanol catalyst initiated
- The ACES catalyst development project launched at ICP.

Background project information:

Under gasification and catalysis research, the Sixth Framework contract has been signed. The ACES Project is progressing with preparation of reactor and laboratory conditioning.

ACES is a research project that is being carried out with the CSIC, in the ICP (Catalysis and Petrochemical Institute) facilities in Madrid, where are being developed other ABRD projects as well. The main objective of ACES is the development of a catalyst ready to produce ethanol from syn-gas, which consists essentially in a mixture of Carbon Monoxide and Hydrogen. This is the key step on the thermochemical pathway to ethanol synthesis from biomass.

## E-Diesel/ FFV/ E95

- Agreement established to initiate e-diesel viability evaluation
- Profit agreement signed and viability evaluation initiated in collaboration with Cidaut, and additive suppliers.

## Fuel Cell

- Complete ethanol reforming prototypes (1kW and 10kW)
- The milestones were met and the deliverables to the Spanish Navy have been accepted. We are in negotiations to sign a new contract for a 300 KW reformer.

Background information on the fuel cell research project:

Abengoa Bioenergy initiated the EOS Project three years ago. The goal of this Project is to demonstrate the viability of the bioethanol process as a hydrogen

source to feed fuel cells; and turn bioethanol into a hydrogen vector.

The EOS Project has been developed in collaboration with the Catalysis and Petrochemical Institute (ICP) of the CSIC (Superior Council of Scientific Research). All the project's experimental activities have been carried out at their facilities. The project has received financial support from the CDTI, the Centre for Industrial Technological Development of the Ministry of Science and Technology.

## Energy Crops (Profit)

- Initiate development of energy crops
- Initiated the development of sweet sorghum and Jerusalem artichoke under the profit award in collaboration with the Escuela Superior de Ingenieros Agrónomos of the Universidad Politécnica de Madrid, and the Instituto Tecnológico Agrario of Castilla y Leon.

The clone selection study by sugar content is completed in the energy crops arena.



## New Projects

### USC grant for wheat and barley:

Abengoa Bioenergy through its subsidiary Bioetanol Galicia has been awarded, by the Headquarter of Investigation and Development of the Xunta of Galicia, an R&D project for the study and optimization of the production of bioethanol from cereals, such as wheat and barley.

The applied research activities will be developed at the Technological Research Center belonging to the group of Chemical Biotechnology and Bioprocesses of the Engineering Department of the University of Santiago de Compostela (IIT-USC).

### Agrobiol Project (Profit):

The Spanish government awarded Abengoa Bioenergy S.A. the Profit project to study the viability of producing bioethanol from sorghum and artichoke crops.

The project will also demonstrate the suitability of bioethanol as an alternative fuel, in both ethanol/gasoline and ethanol/diesel blends for conventional vehicles, and to produce hydrogen for fuel cells.

### Renew Project

The RENEW Project was awarded under the 6th Framework Programme of the European Commission to develop, compare, (partially) demonstrate and train on a range of fuel production chains for motor vehicles. This project is coordinated by Volkswagen AG (Germany) and Abengoa Bioenergy is one of the key participating partners.



## Alliances and Partnerships

### Alliances

ABRD entered into two strategic alliances this year:

- (1) SunOpta for pretreatment, fractionation, and engineering services.
- (2) Novus for product characterization, proof-of-concept, field validation and commercialization of new feed products.

### Partnerships

ABRD has entered into collaborations with the following partners to develop and demonstrate biomass technology:

- Novozymes Enzyme application
- Genencor Enzyme supplier
- Auburn University Analytical support
- NREL Pretreatment, AspenPlus Model, NIR Rapid Analysis
- Harris Group Engineering design.

