A UNIQUE COMPLEX IN EUROPE

THE EUROPEAN BIOREFINERY INSTITUTE IN REIMS, CHAMPAGNE-ARDENNE

IEB
Institut européen de la bioraffinerie
WITH THE EBI, INVEST IN A LAND OF INNOVATION!

THE SITE

The EBI is located in the Champagne-Ardenne region, in the Marne département, 15 km from Reims.

2 hours from Brussels and 1 hour from Roissy Charles-de-Gaulle airport by TGV

THE EBI IN REIMS, CHAMPAGNE-ARDENNE

The EBI includes a biorefinery and an innovation platform. The biorefinery is composed of primary and secondary processing facilities for biomass feedstocks, forming a true ecosystem in which companies exchange water, steam, wastewater, products, energy, etc.

The BRI innovation platform (Biorefinery, Research & Innovations) was certified by the IAR competitiveness cluster (Industries & Agro-resources). It has been recognized by the Ministry of Industry. It includes:

- the private research center ARD (Agro-Industry, Research & Development), an international reference in the field of white biotechnology, working with companies on and off the site;
- the excellence center in white biotechnology includes the chairs of Centrale Paris and AgroParis Tech, The University of Reims Champagne-Ardenne, and Neoma Business School. Their teams work on collaborative projects with ARD, notably.
- pilot plants and industrial demonstrators making it possible to scale processes up and assess the feasibility of future industrial processes.

This site is the only one of its kind in Europe. This site is a realisation of the new bioeconomy based on renewable biomass feedstocks, aimed at generating economic growth in regions producing raw vegetable materials.

This approach shows that the environment is a vehicle of economic development and constitutes one of the working responses to “total oil reliance”.

The EBI personifies the IAR cluster of competitiveness’s strategy.
The EBI in Reims, Champagne-Ardenne, includes a biorefinery and an innovation platform...

The EBI is a biorefinery operating in line with the concept of a circular economy...

...as well as an innovation platform comprised of public and private research teams, pilot plants and demonstrators.

BRI, an open innovation platform and unique development accelerator, from the laboratory to the pilot-scale demonstrator.

At the BRI platform (Biorefinery, Research & Innovations), public and private research groups, demonstrators and pilot plants come together to provide a one-of-a-kind environment to any organization looking for comprehensive support in order to quickly develop their projects in the field of white biotechnology processes.
The purpose of this biorefinery is to recover all plant components in an optimal fashion. The production there is primarily dedicated to nutrition. The co-products of this first stage are transformed into a wide range of biogenous products to be used in replacement of non-renewable fossil materials or providing new functions, thus filling the demand of various sectors.

FROM CONCEPT TO PRODUCTION-READY PRODUCT

From idea to development, without forgetting the search for financing, the facilities comprised in the EBI test and develop new technologies and products. Based on a wide array of vegetable materials, the EBI supplies the demand of various sectors: human consumption, livestock feeding, biofuels, cosmetics, pharmaceuticals, chemicals, paper-making industry, etc.

This environment is highly conducive to the emergence of start-ups and the development of young companies.

THE RESEARCHERS INVOLVED IN THE BRI INNOVATION PLATFORM

A PRIVATE RESEARCH CENTER:

AGRO-INDUSTRY, RESEARCH & DEVELOPMENT (ARD) is a private research organization sharing knowledge to develop skills relating to:

- fractionation and biorefinery,
- white (industrial) biotechnology
- chemurgy and agro-based materials,
- the environment.

ARD has nearly 130 employees.

BRI (Biorefinery, Research & Innovations) was created on the initiative of ARD. This allowed ARD to become an open innovation platform certified by the IAR cluster and recognized by the Ministry of Industry since December 2009. This platform features laboratory facilities, pilot plants and an industrial demonstration facility called BioDémo.

AN ACADEMIC CENTER: THE EXCELLENCE CENTER IN WHITE BIOTECHNOLOGY (ECWB)

As the academic component of the BRI platform, the ECWB welcomes professorial and research chairs from prestigious higher education institutes:

ÉCOLE CENTRALE PARIS was the first chair created on the site in 2010. It focuses on biotechnological processes.

AGROPARISTECH in 2012, a chair of Industrial Agro-Biotechnology (IAB) was created in order to develop research and educational resources relating to the expertise and facilities of the industrial site.

In 2012, THE NEOMA BUSINESS SCHOOL developed a chair of Industrial Bioeconomics aimed at studying the locally-integrated biorefinery model as implemented on the site.

THE EBI IN REIMS, CHAMPAGNE-ARDENNE, RELIES ON A LOCALLY-INTEGRATED BIOREFINERY MODEL IN WHICH AGRICULTURE, INDUSTRY AND RESEARCH ARE CLOSELY LINKED.

JUMP AT THE OPPORTUNITIES OFFERED BY THE INNOVATION PLATFORM

The agro-industries holding shares in the private research organization ARD managed to attract industrial partners and public research teams to develop a complete value chain in the field of industrial biotechnology.

The EBI is now a reality:

- scientific and technological advances,
- job creation,
- energy and resource efficiency,
- recovery of local plant resources for the producing region.

The EBI, a new model for industrial growth which could be exported abroad, including in developing countries.

UNIVERSITY OF REIMS CHAMPAGNE-ARDENNE

These chairs work in close collaboration with the University of Reims Champagne-Ardenne (URCA) for both research and educational activities. They now employ around twenty researchers, who pool their resources in the spirit of making the best of the complementarities between their different fields.

Initially financed by public authorities (the Champagne-Ardenne region, the Marne département and the Reims conurbation community). They are part of the Condorcet research federation (SFR: structure fédérative de recherche). A structure which today brings together 23 public and private research organisations around the promotion of agro-resources. The activities of the ECWB focus on the recovery of agricultural resources, notably in collaboration with regional companies. The purpose of these chairs is to shorten the time to market of research projects and support training efforts in the field of bioeconomics.

The research themes are:

- industrial biotechnology
- chemurgy,
- process engineering (from biomass fractionation to downstream processing),
- industrial bioeconomics.

Activities include:

- managing research programs,
- conducting specific studies,
- as well as elaborating educational material and participating in teaching activities.

The building accommodating these teams is located in the heart of the innovation cluster. Eventually, around fifty researchers, PhD students in engineering and technicians will work on this site. The ambition of the ECWB is to form part of the best national and international networks in the field.
PILOT PLANTS AND INDUSTRIAL DEMONSTRATORS

FUTUROL PROJECT

FUTUROL PROJECT aims to develop and market a complete production process for second-generation ethanol. This project stands out because of its multi-resource approach, i.e. the use of various feedstocks: whole plants, wood, coproducts and residual waste.

For future production sites, the goal is to be able to procure feedstocks locally, thus limiting the environmental impact. The Futurol project, the pilot plant of which is located on the site of the biofinery, is spearheaded by the PROCETHOL 2G company and its 11 shareholders: ARD, IFP Énergies Nouvelles, INRA, Lasaffre, Vivescia, Tateos, Total, the National Forestry Commission (Office National des Forêts), Unigrains, Crédit Agricole for the Northeast region and the General Confederation of Beet Growers.

Thanks to its one-of-a-kind pilot factory, the developed Futurol technology gives remarkable results thanks to the complementarities of the innovations on the process, the enzymes and the yeast.

BIODEMO

This industrial biotechnology demonstration facility is an investment by ARD for the scaling up of biotechnological processes. It was the first facility in the world to perfect a process for the production of succinic acid. It is also used to develop other acids and synthons (biomolecules) within the framework of partnership agreements.

INDUSTRIAL PARTNERS

SOLIANCE

Soliance develops, produces and markets ingredients of vegetable origin for the cosmetics industry. The company uses extraction, fermentation and bioconversion technologies for raw vegetable materials of agricultural or marine origin.

Number of employees: 70

CHAMTOR

Each year, this starch and glucose factory, which is part of the SICLAE group, processes 450,000 tons of wheat grown in the Champagne-Ardenne region. Glucose syrups, proteins and starch are sold to the food and beverage industry and used as ingredients in drinks, cookies, candy, various types of bread and pastries, as well as some cooked pork meats. Bran, wheat solubles and proteins are sold as animal feed, while the fermentation substrate and native starch are respectively solubles and proteins. The group also sells animal feed, as well as some cooked pork meats. Bran, wheat solubles and proteins are sold as animal feed, while the fermentation substrate and native starch are respectively sold as solubles and proteins.

Number of employees: 200

BAZANCOURT’S SUGAR REFINERY

It processes 2 million tons of beets each year and is part of the agro-industrial cooperative group CRISTAL UNION, which represents approximately 35% of French beetroot production.

The group brings together 10,000 cooperating farmers and 2,200 employees. In 10 years, Cristal Union has become the 5th largest sugar refinery group in Europe.

In line with an ambitious investment policy, the group is developing its two traditional segments:

- sugar intended for the food and beverage industry (Daddy and Erstein brands),
- alcohol and ethanol (carburation, industry, perfumery, cosmetics, food and beverage, spirits).

It is also positioning itself in the growth segments of green energy and bio-based chemistry, which offer additional possibilities to recover the agricultural waste of cooperators within the group.

With a turnover of 1.6 billion Euros, a third of which originates outside the European Union, the group now includes ten high-tech sites in the Champagne-Ardenne region: Cristanol (Marne) and Arcis-sur-Aube (Aube) - which are among the largest such facilities in Europe. In its concern to meet its customers’ expectations and to address environmental and community issues, Cristal Union has committed itself to developing its activities in a sensible and sustainable way, notably by reducing its CO2 emissions and consumption of water and fossil fuels, which are replaced by green energy from biomass.

Number of employees: over 300

CRISTANOL

This company is one of the leading producers of bioethanol in Europe. CRISTANOL is a subsidiary of Cristal Union (majority shareholder) and Bilitanol (French union of grain cooperatives). It constitutes an investment of 250 million Euros for a production capacity of 280,000 tons of ethanol derived from beets and wheat.

Number of employees: over 130

Several activities are carried out on site:
- the production of very high quality alcohol,
- CO2 capture,
- the processing of Chamtor coproducts,
- the production of spent grains with a high content in proteins and non-saturated amino acids. The site is powered in part by a biomass boiler (wood, etc.)

VIVESCIA

This cooperative group rises to the great challenges facing the agricultural and food and beverage industries. With its expertise in all businesses from the field to the plate, along the entire producer-consumer chain, the VIVESCIA group offers value-generating and sustainable agro-industrial solutions, making it possible to boost the profits of its members while meeting the expectations of society and customers.

VIVESCIA is owned by its 12,000 members, 8,300 of which (stockbreeders, farmers, wine growers) are located in the northeast of France. Over 8,300 people work within the group (cooperatives, agricultural and industrial companies within the group).

VIVESCIA is a diversified and international group, which has positioned itself strongly in its various markets, on a regional, national and international level.

It is the largest grain cooperative in France, with 4 million tons collected. Present on four continents, VIVESCIA is:
- the world’s leading malt producer,
- one of the leading producers of flour, bread and pastry producers in Europe,
- and the second-largest corn producer in Europe.

The group is also involved in:
- the starch and glucose industry,
- animal feed,
- and the production of cosmetic active ingredients of vegetable origin.

Through SICLAE, VIVESCIA is also the majority shareholder of ARD.

In addition of these activities, it also produces first-generation (Ethanol/Cristanol and biodiesel) and second-generation (Pracethyl 2G) biofuels.

AIR LIQUIDE

The world leader in the production of gas for the industrial, health and environmental sectors operates a waste-to-energy plant where the biogenic carbon dioxide emitted by the Cristanol site is recovered. This CO2 is generated during the production of bioethanol, a byproduct of wheat and beet fermentation.

120,000 tons of CO2 are thus recovered each year for various processes:
- beverage carbonation,
- fast-freezing,
- packaging in a protective atmosphere,
- water treatment and purification,
- the preservation of vaccines, etc.

The group brings together 10,000 cooperating farmers and 2,200 employees.
THE EBI CREATES NEW JOBS

- 1,200 direct jobs
- 1,000 jobs generated indirectly
- 150 professors and researchers

This site offers synergy with other centres in the Champagne-Ardenne region: Nogent-sur-Seine with the Soufflet Group and in the Aube department, on the agro-materials carried by ARD (Agro-industry Research & Development).

THE EBI IN FIGURES

- 20 to 50 M€ invested each year in the EBI
- A surface area of 260 ha
- 1 M tons of wheat processed each year
- 2 M tons of beets processed each year
- Several biomasses of interest: beets, wheat, alfafa, miscanthus, by-products of the 1st transformation intended for dietary consumption.

GLOSSARY:

THE ACTIVITIES OF THE EBI

- BIOMASS
  Biomass is the feedstock used on the site of the EBI. It is produced in fields and forests, through the process of photosynthesis which converts solar energy to chemical energy in the form of sugars. In order to grow, plants consume CO2 which is then released when they are metabolized or burnt. This cycle yields a neutral CO2 footprint: over one’s lifetime, biomass consumption does not increase the amount of greenhouse gases in the atmosphere, as emissions correspond to the amount consumed for production. With fossil energies, the same mechanism is at work but this conversion takes millions of years.

- BIOREFINERY
  Biorefinery processes plants - or biomass - while refinery processes oil. The crop residues, wood, seeds, roots and other materials that come into a biorefinery are processed by a first plant to extract their most valuable components. After this first operation, the coproduct is sent to a second plant which again extracts what is most valuable and sends the coproduct to a third plant and so on. The final product can be used as animal feed or return to the field as fertilizer. During the biorefining process, water, heat, energy and gas are also exchanged. It is a practical illustration of industrial metabolism concept, with a series of transformations and extractions that slowly “digest” the entire plant. The specificity of the EBI lies in the presence of a locally-integrated biorefinery. This is a new way of understanding economic development, with growth and jobs that cannot be relocated elsewhere as they are linked to the production of biomass by our fields and forests.

- WHITE BIOTECHNOLOGIES
  All of this energy recovery is possible thanks to white biotechnologies (i.e. industrial biotechnologies). Although the terminology is new, biotechnologies include age-old methods (such as manufacturing techniques for bread, beer, vinegar, etc.) as well as more modern processes based on molecular genetics (which studies the biochemistry of gene components) and genetic engineering (which studies the alteration of genes). Biotechnologies use bacteria and enzymes for the manufacturing, conversion or degradation of renewable raw materials from agricultural or forestry activities, for industrial purposes.

- BIOECONOMY
  Using these biotechnologies for primary production, as well as in the health and industrial sectors, may lead to the emergence of a bioeconomy, i.e. a system in which biotechnologies account for a substantial part of economic production. Bioeconomics refers to sustainable production and the conversion of biomass into a wide range of foods, health products, fibers and industrial and energy products.