From Biomass to Bioproducts

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BRI: an innovation platform in the heart of an integrated biorefinery

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ARD
Agroindustrie Recherches & Développements

>> Focus on sustainability, innovation and international
ARD is Owned by a Large Consortium of French Agrobusinesses

53.20% SICLAE
An industrial and financial agro-business player with significant expertise in processing and valorizing plant products (consolidated turnover: 1 638 M€). Belongs to Vivescia (one of the leading European grain producers stemming from the merging between Champagne Céréales and nouricia), EMC2, other shareholders (Champagne Coligny, Coopérative Agricole de Sézanne…), FSI, Unigrains, Crédit Agricole du nord Est, Subsidiaries: Malteurop, Nutrixo, Kalizea, Chamtor, Nestal, Inéos-Champlor, LMT-Oléagineux

17.82% Cristal Union
Sugar & ethanol producer from sugar beets (turnover €1.5 Bn€). Trademark: Daddy Sucre

14.59% Crédit Agricole du Nord Est

7.92% Chamtor
Wheat refiner, subsidiary of SICLAE. Produces starch, glucose, gluten, wheat bran, etc…

4.18% LRD
Union of alfalfa producers

1.35% CRD
Union of cereals cooperatives

0.94% Unigrains
ARD is a Private Mutualised Research & Development Centre

Who we are

ARD is a private mutualised R&D centre in the field of biotechnology and bio-based chemistry

What we do

We develop innovative processes to produce chemicals derived from biomass

What we stand for

We add value to agricultural products via R&D and we introduce new outlets for the agricultural economy.
We develop innovative and competitive products and processes that are sustainable and ecologically sound alternatives to petrochemicals.
We focus on bio-refinery concepts that are designed to process all plant fractions to valuable products.
We capitalize on synergies among various crops for discovery of innovative molecules.
We actively promote utilization of bio-based resources in industrial applications and more generally in the economy and the society.
ARD’s Activities are Focused on Biorefinery Management

**Biomass Fractionation**
- Pentosides from wheat bran
- Plants extracts isolation
- Crops elicitors
- Cellulosic Ethanol
- Proteins from alfalfa

**Industrial Biotechnology**
- Di-Hydroxy-Acetone
- Biopolymers incl. Hyaluronic Acid
- 1st and 2nd generation Bio-ethanol
- Succinic acid
- Chemical intermediates

**Bio-based Chemistry**
- Succinic acid derivatives
- Polyesters & Agro-materials
- Organic synthesis
- Green surfactants
- Epoxydized oil resins

**Environment**
- Olfactory pollution analysis
- Methanisation & Waste treatment
- Biodegradability tests
- Eco-toxicity tests
- Life Cycle Analysis
ARD offers an Open Biotech Platform for Process Scale-up

With all necessary DSP equipment (filtration, ion exchange, electrodialysis, evaporator, crysalisator, centrifuges, etc...)

ARD scaled-up several technologies: Eladium™ (exo-polysaccharide), biolygel, hyaluronic acid, dihydroxyacetone, bioethanol, sophorose lipids, 5-ceto-gluconic acid, succinic acid...

ARD’s partners can benefit from this platform for their own process scale-up
A leading company in the field of bio-based chemistry since 1989:

- More than 100 employees in its facility
- ARD budget: 12 Mn €
- Investment budget: 500 000 €

Investment development not included

ARD is member of:

- IAR cluster
- the french association ACDV
- EuropaBio
ARD is an Active Member of IAR

A world class cluster dedicated to biobased products and Biorefinery

- 230 members
- 40% SMEs
- 120 R&I projects
- Total R&I budget: 1 bn €

www.iar-pole.com

Agronomy

Sustainable Development

Biobased feedstock

Logistic & pre-treatment

Green Chemistry

Industrial Biotech

Lab Pilot plant

Industrial demonstration

Biobased products

biofuels, chemicals, materials, ingredients

Markets
The Bioeconomy: a global issue facing big and universal challenges

Farmers, involved in ARD, via their cooperatives, realized early their potential contribution for mitigating the environmental issues while creating value from their productions by processing and by investing in R&D for opening new opportunities of market.

From Becoteps program
Fully convinced of the importance and the opportunity opened through the new bioeconomy, promoted by the commission, ARD decided to join, like the cluster IAR, the dynamic of the BioPPP, as founding partner.

The target is to accelerate the setting up of new value chains, in particular, for agricultural products. Around 40 companies are members of BIC (BiolIndustry Consortium), the private part of the PPP.

A great adventure for Horizon 2020 in perspective…
The development of the biorefineries is fully integrated in the “new bioeconomy” as defined in the USA as well as in Europe.

For Europe, it is one of the top priorities of its strategy for 2020 and for Horizon 2020*.

It represents an important opportunity for rural development.

The challenges are global, but the local contexts will be determinant.

The Future of the Biorefineries: StarColibri and the way forward
StarColibri: Biorefineries will have a key role to play!

In 2030 biorefineries will provide:

• A wide spectrum of competitive biobased products.
• A competitive edge for Europe by focusing on sustainable products.
• A growing integration of biobased industrial sectors.
• A renewed, competitive and knowledge intensive rural economy.

Source: Star-COLIBRI Joint European Biorefinery Vision for 2030
What kind of biorefineries in 2030?

« Harbour’s biorefineries »
- Ex: Ghent Bio-Energy Valley, Belgium
- Biomass available on the world market

« Territorial biorefineries »
- Ex: Les Sohettes, France
- Biomass locally produced
The Biorefinery of Bazancourt-Pomacle is located 15 km north of Reims, in the middle of a vast agricultural area that counts among the most productive in Europe…

…in the perimeter of the competitiveness cluster Industrie et Agroressources.

On this site, 2 « ecosystems » coexist: One is industrial and the other one is dedicated to research and innovation.
http://fbheuropabiovideos.co.uk/
This Biorefinery is one of Most Integrated Existing Biorefineries

- **Chamtor**: Wheat processing
- **BioDémo (ARD)**: Industrial demonstration plant
- **Cristal Union**: Sugar beet refinery
- **Procéthol 2G**: FUTUROL Project 2nd generation ethanol
- **ARD**: Mutualised research center
- **Cristanol**: 1st generation ethanol production
- **Soliance**: Actives and ingredients for cosmetics

Credit photo: Procéthol 2G

Soliance Actives and ingredients for cosmetics
Within this Site a lot of Synergies have already been established...
On Site 2 Types of « Ecosystems » can be identified…

... An industrial complex…
On Site 2 Types of « Ecosystems » can be identified...

... & an Innovation Platform (BRI)
Industrial Synergies
Industrial Synergies: the main players

- CRISTANOL Ethanol plant
- A.R.D. Research center & Soliance Cosmetic
- Cristal Union Sugarbeet refinery
- CHAMTOR Wheat refinery
Water synergy

50 000 m³ of water coming from the sugar production sent to CHAMTOR during the campaign.

Benefit: less withdrawing into the groundwater and energy saving
Steam Synergy

Cristal Union

CRISTANOL

CHAMTOR

Mutual help

benefit: reliability of industrial tools
Effluent Synergy

Water treatment – Storage – Spreading

Benefit:
Global management of the agronomic approach
Product Synergy

Ethanol production from different sources of substrates locally produced.

Wheat

CHAMTOR Amidonnerie-Glucoserie

Cristal Union Sucrerie de Bazancourt

Sugarbeet

Wheat/sugarbeet coproducts

Site de la distillerie CRISTANOL

Wheat/sugarbeet coproducts

Sugarbeet

Cristal Union Sucrerie de Bazancourt

CHAMTOR Amidonnerie-Glucoserie

Wheat
Biomass CHP Mutualized Project

Project of Combined Heat & Power Plant from Biomass:

**Benefit:**
- whole plant valorization
- 100 000 t of CO2 avoided
- substitution of fossil energy

**Partners:**
- CHAMTOR
- CRISTANOL
- A.R.D. Soliance
- Biomass CHP
- Cristal Union
Cooperative research programs between the different shareholders of ARD.
The Innovation Platform
BRI
Bioraffinerie Recherches & Innovations:
Preparing the future
BRI: an Open Innovation Platform built around ARD

BIOREFINERY RESEARCH AND INNOVATION

Teaching & academic research

Applied research

Technopole For start-ups

Lobbying

Foundation:
Cristal Union, Cristanol, Champagne Céréales, Siclaé, Chamtor, ARD

With the financial support from:

Centre d’Excellence en Biotechnologie Blanche

ard

Bio Démo

In progress
BRI: a Platform dedicated to sugars and fermentation ...

Starch and sucrose → Fermentable sugars

Improved microorganisms

Cellulose and hemicelluloses

ethanol

« Building blocks »
FUTUROL: a Major Project near BRI

This project focused on ethanol 2G is carried on by a consortium of 11 partners gathered in a company so-called: Procéthol 2G

Budget: 76,4 M€ among them 29 M€ of public support
Biodémo: a Demo Plant owned by ARD

An investment of € 22 million funded with € 17 million in private funds and up to € 5 million from public funds

For the time being, ARD-BioDémo is under contract with BioAmber for producing succinic acid
Succinic Acid Production in BioDémo for BioAmber: the future is now!

Sugar Refinery

OUTPUT

Sucrose

Wheat Refiner

OUTPUT

Glucose

Ethanol Plant

OUTPUT

CO₂

Succinic Acid Plant
Coming soon: a New Building for welcoming Academic Partners

CEBB: Centre d’Excellence en Biotechnologie Blanche

BRI-PLATFORM
Artistic view of the innovation platform BRI

Grand opening: 2015 Q1

A public investment of 30 M€ for building and launching operations
To conclude

One cannot understand the « system » set up on the site of Bazancourt-Pomacle, without taking into account the time and the spirit of cooperation

Cooperation among farmers, cooperation among cooperatives, cooperation with local authorities and finally with academics

Today, this site, within the cluster IAR, is recognized as one the most integrated biorefineries in Europe but progressively as one of the leading innovation platforms.

With a steady support of local authorithies, with commitment on long term of the coops and with the arrival of prestigious academic partners we ambition to become a « campus » dedicated to the new bioeconomy
Thank you for your attention

www.a-r-d.fr
In case of further questions

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