

BIOENERGY

BIOMASS FOR THE MARKET COMPETITIVE AND ENVIRONMENTALLY FRIENDLY SYNTHESIS OF BIO-PRODUCTS TOGETHER WITH THE PRODUCTION OF SECONDARY ENERGY CARRIERS THROUGH THE BIREFINERY APPROACH.



A European Integrated Project supported through the Sixth Framework Programme for Research and Technological Development



Main project goals

The need for renewable energy sources is rapidly growing in order to reduce greenhouse gas emissions and to enhance the security of supply. Biomass is a versatile and abundant resource that can fulfill a substantial share of this growing demand. The BIOSYNERGY project aims to use BIOMass for SYNthesis processes (transportation fuels, platform chemicals) and enERGY production (power, CHP) by application of innovative, fully integrated, synergetic biorefinery concepts, using advanced fractionation and conversion processes, and combining biochemical and thermochemical pathways.

The use of biomass as feedstock for the production of transportation fuels – and to a lesser extent energy – is still more costly than the use of fossil resources. The aim of BIOSYNERGY is to contribute to the cost-effective use of biomass –especially lignocellulose and residues– by sound techno-economic process development of integrated production of value-added chemicals, transportation fuels and energy by process development from lab-scale to demonstration at pilot-scale.

BIOSYNERGY works towards achieving sustainable management of Europe's natural resources and their integration with human activities, specifically in the bioenergy, fuels and chemical industry. The project will be instrumental in the establishment of facilities for integrated co-production of bulk quantities of chemicals, fuels and energy from a range of biomass feedstocks in Europe. BIOSYNERGY has great potential impact as it will set up pilot plants of the most promising technologies for a bioethanol side-streams biorefinery. It will do so in close collaboration with the lignocellulose-to-bioethanol pilot-plant of Abengoa Bioenergía Nuevas Tecnologías that is under construction in Salamanca, Spain.

Approach

The approach of the project includes:

- Development of advanced technologies for physical/chemical fractionation of biomass feedstocks including DDGS, raw and pre-treated straw, hardwood and softwood as representatives of major European biomass streams into their composing components for further downstream processing.
- Development of innovative thermo-chemical conversion technologies and advanced biochemical conversion techniques for the processing of feedstock into biomass-derived intermediate products (e.g. butanol, phenolic oils, furfural).



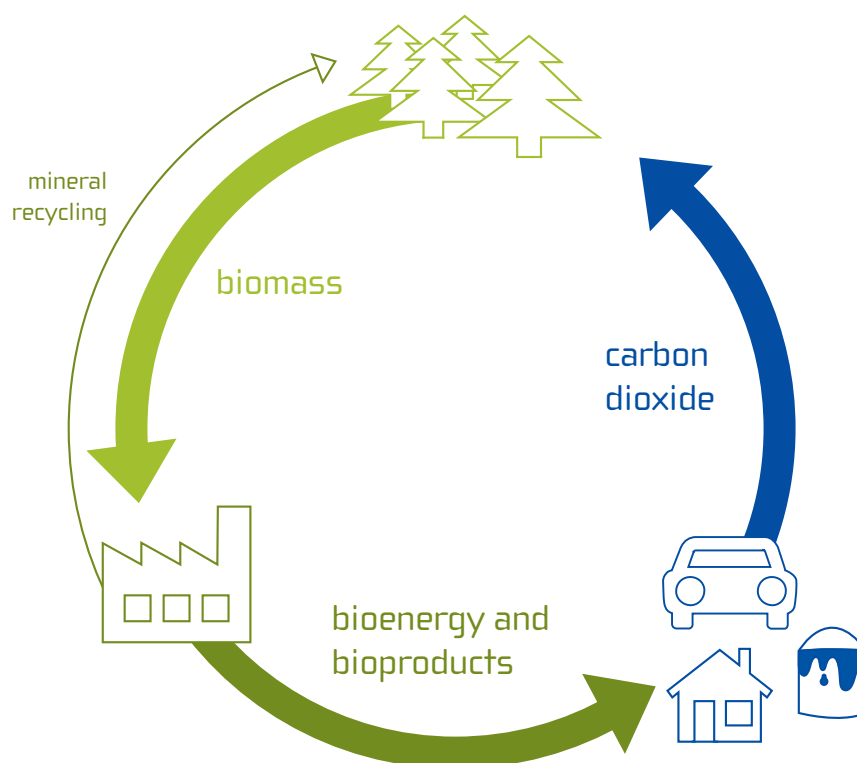
BCyL lignocellulose to bioethanol pilot-plant of Abengoa Bioenergía Nuevas Tecnologías under construction in Babilafuente (Salamanca, Spain)

- Designing and developing downstream conversion processes for synthesizing value-added chemicals and fuels from intermediates obtained from the thermochemical and biochemical processing steps.
- Identification of the most promising biorefinery chains for the EU and for specific market sectors based on energy efficiency, environmental performance and cost, and to quantify the overall environmental effects of these chains.
- Implementing and demonstrating technologies that result from the project at pilot scale.
- Integrating the developed technologies in a basic design for an innovative cellulose ethanol based biorefinery process in collaboration with the “lignocellulose-to-bioethanol” pilot-plant of Abengoa Bioenergía Nuevas Tecnologías in Salamanca, Spain.
- Training and knowledge dissemination

EXPECTED ACHIEVEMENTS

The most important results towards meeting the EU program goals are:

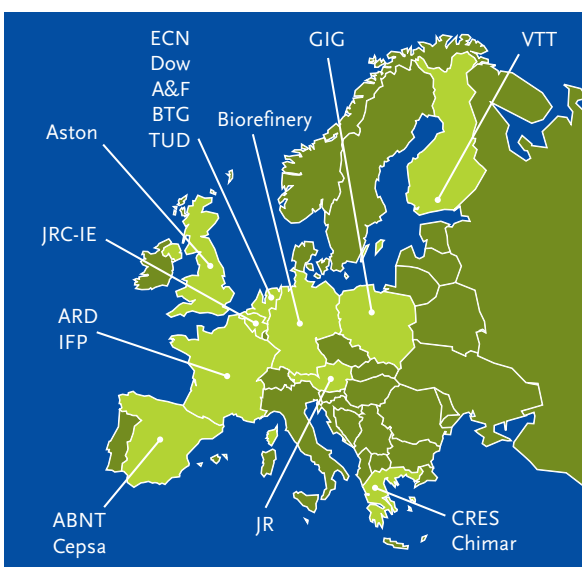
- Technical, socio-economic and ecological European perspective of integrated refinery processes for the co-production of chemicals, transportation fuels and energy from biomass by performing integral biomass-to-products chain design, analysis and optimisation.
- Lab-scale development and pilot-scale demonstration of biorefinery-based composing sub-processes, i.e.: physical/chemical fractionation processes, thermo-chemical conversion processes, biochemical conversion processes, and chemical conversion and synthesis processes.
- Basic design of an innovative cellulose-ethanol based biorefinery process in which the residues are upgraded to added-value products (chemicals, power, CHP).
- Properly trained persons in relevant industries, RTD institutes and universities.
- Knowledge dissemination (website, workshops, lectures et cetera).



CONSORTIUM

The project is performed by a consortium comprising 17 partners from industry, research institutes and universities from 10 EU countries.

1. Energy research Centre of the Netherlands (ECN) – The Netherlands
2. Abengoa Bioenergía Nuevas Tecnologías (ABNT) – Spain
3. Compania Espanola de Petroles S.A. (Cepsa) – Spain
4. DOW Benelux B.V. (Dow) – The Netherlands
5. VTT Technical Research Centre of Finland (VTT) – Finland
6. Aston University (Aston) – United Kingdom
7. WUR Agrotechnology and Food Innovations B.V. (A&F) – The Netherlands
8. Agro Industrie Recherches et Developpements (ARD) – France
9. Institut Francais du Pétrole (IFP) – France
10. Centre for Renewable Energy Sources (CRES) – Greece
11. Biomass Technology Group (BTG) – The Netherlands
12. Joanneum Research Forschungsgesellschaft m.b.H. (JR) – Austria
13. Biorefinery.de (Biorefinery) – Germany
14. Glowny Instytut Gornictwa (GIG) – Poland
15. Joint Research Centre – Institute for Energy (JRC-IE) – Belgium
16. Chimar Hellas S.A. (Chimar) – Greece
17. Delft University of Technology (TUD) – The Netherlands



ACKNOWLEDGMENT

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