



EUROpean multilevel
integrated BIOREFinery design
for sustainable
biomass processing



CONTEXT AND TODAY'S CHALLENGES

The development and implementation of biorefinery processes is of crucial importance for building a bio-based economy. However, most of the existing biorefinery concepts use limited feedstock and technologies. They solely produce ethanol or biodiesel and generally keep focusing on producing biofuels, with the consequence of substantially reducing the added value

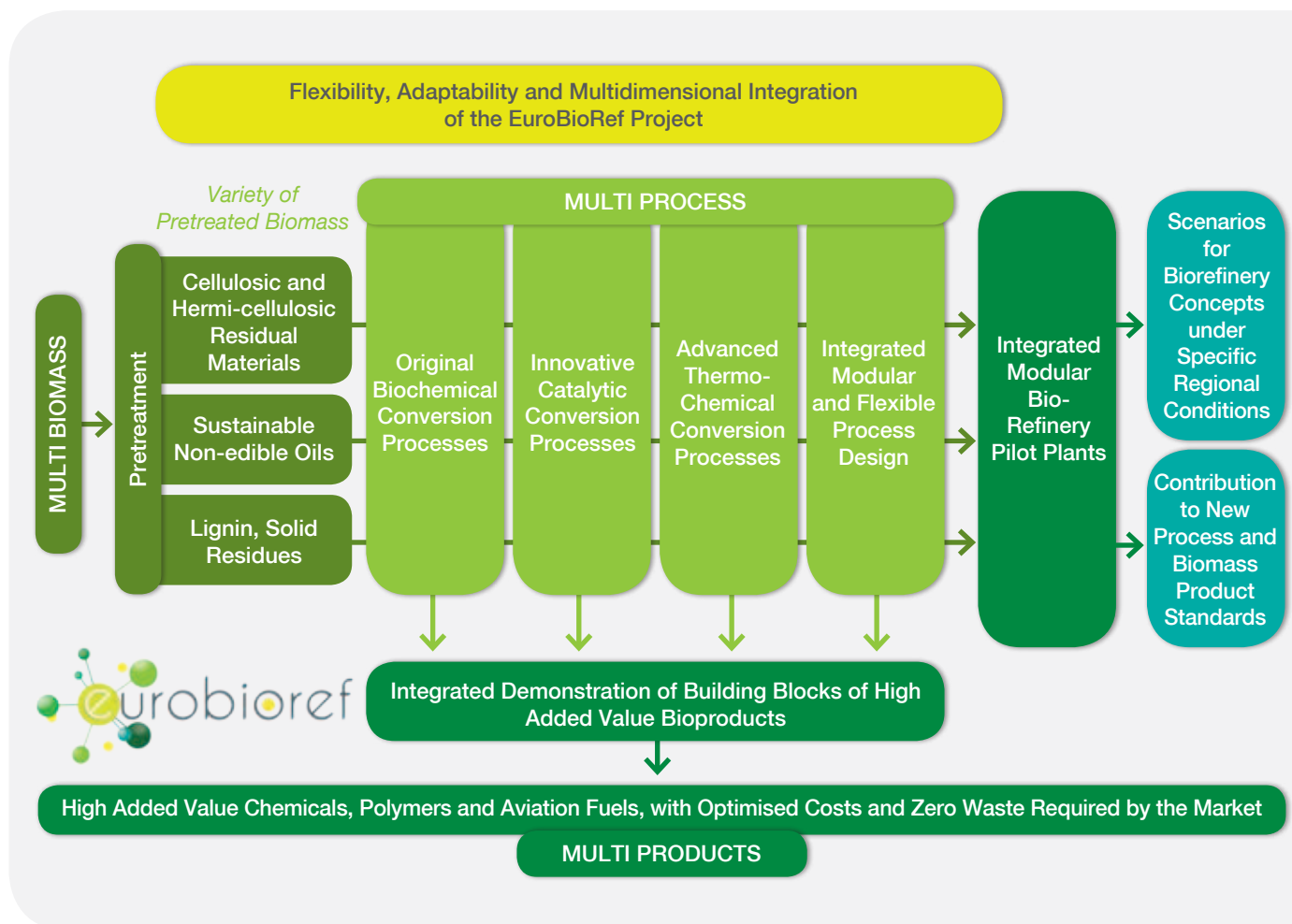
of the biomass chain. Moreover, the "standard" biorefinery concepts use massive economies of scale at one dedicated site in order to achieve higher performance and optimise along few product lines (e.g. liquid biofuels and electricity, basic biochemicals plus ethanol or biodiesel).



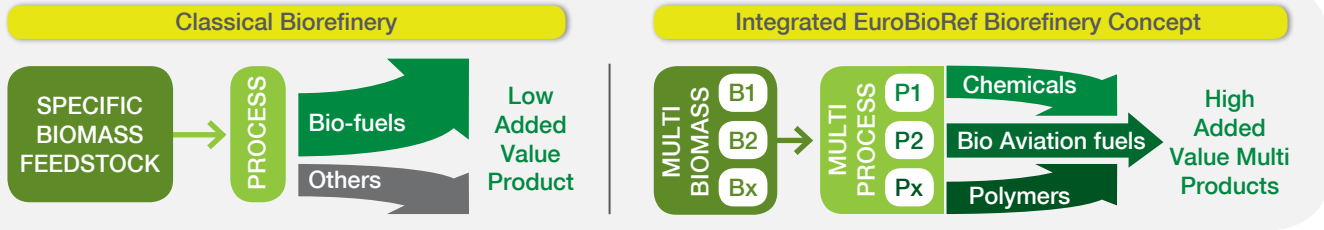
EUROBIOREF CONCEPT AND INNOVATION

The EuroBioRef project is an ambitious biorefinery approach aiming at demonstrating the technical and economic viability of the synergy of the biomass agro-industry with chemical, biochemical and thermochemical conversion processes and technologies that will be combined so as to optimise production routes of high added value bio aviation fuels, chemicals and polymers. The final objective is to show in pilot or industrial plants the feasibility of the biorefinery and demonstrate some of

the sub-processes in industrial pilot plants. The integration of all the elements will be designed for a large or small-scale production in order to enable adaptation in various EU regions, and will take into consideration life cycle management, socio-economic constraints and policy rule issues.



EuroBioRef will bridge the gap between agriculture and chemical industry by integrating the whole biomass chain in a multi-feedstock, multi-process, commercially viable multi-products and adaptable approach for a sustainable bioeconomy in Europe.



The EuroBioRef basic concept uses a new flexible approach to combine “virtual integration” with proximity to both feedstock sources and product markets:

- The variety of available biomass feedstock matched with a variety of pre-processing options to pretreat feedstock into viable pre-products, which are subject to logistical optimisation;
- The variety of markets for bio-based products matched with a variety of integration options to combine several conversion modules with pretreated feedstock availability, thus avoiding excessive transport needs for both inputs and outputs;
- The flexibility of conversion routes, which enables integration of key modules with existing facilities to reduce investment risks;
- Proximity to both adapted feedstock and expected markets, which can be combined with the integration into existing or specifically adapted facilities, selecting adequate sites through system analysis.

EUROBIOREF TECHNICAL OBJECTIVES

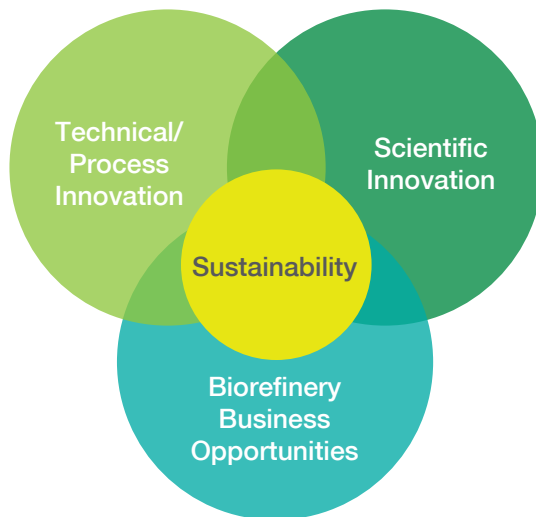
The key challenge for the new biorefinery process design is to apply its potential towards significant improvement of the whole biomass efficiency:

- Produce a large diversity of sustainable biomass;
- Produce high energy aviation fuels;
- Produce multiple products;
- Produce zero waste and rationalize the use of raw materials;
- Improve cost-efficiency by 30 %;
- Reduce by 30 % the needed energy;
- Reduce the time-to-market by 30 %.



Technical Advancement

- Crop rotation optimization, selection of appropriate sustainable biomass feedstock;
- Rationalization/optimization of chains including logistics and LCA considerations;
- Quality control of a variety of feedstock for a variety of end-products;
- Elaboration of multidisciplinary processes combining various technologies;
- Demonstration of sub-units at the lab-scale, the pilot scale, the industrial level;
- Integration of several reaction and separation steps.



Scientific Innovation

- Methods for conceptual process design in the chemical sector towards bio-/chemical applications;
- Novel heterogeneous, homogeneous, enzymatic catalytic systems;
- Novel low energy separation techniques;
- Novel reactor technologies;
- Co-products reutilization/valorisation technologies;
- Integrated reaction/separation technologies;
- Development of new purification technologies using green solvents.

Expected Business Results

- Demonstration of the economic and technical over performance of bio-based products including bio-aviation fuels and chemical commodities markets;
- Demonstration of the increase in economical performance due to the use of second generation feedstock;
- Demonstration of the sustainable value chain of non-food crops cultivated in synergy with food-crops;
- Definition of final products specifications and tests of new products (blend of several components to yield bio-aviation fuel).

Sustainability Assessment and Performances

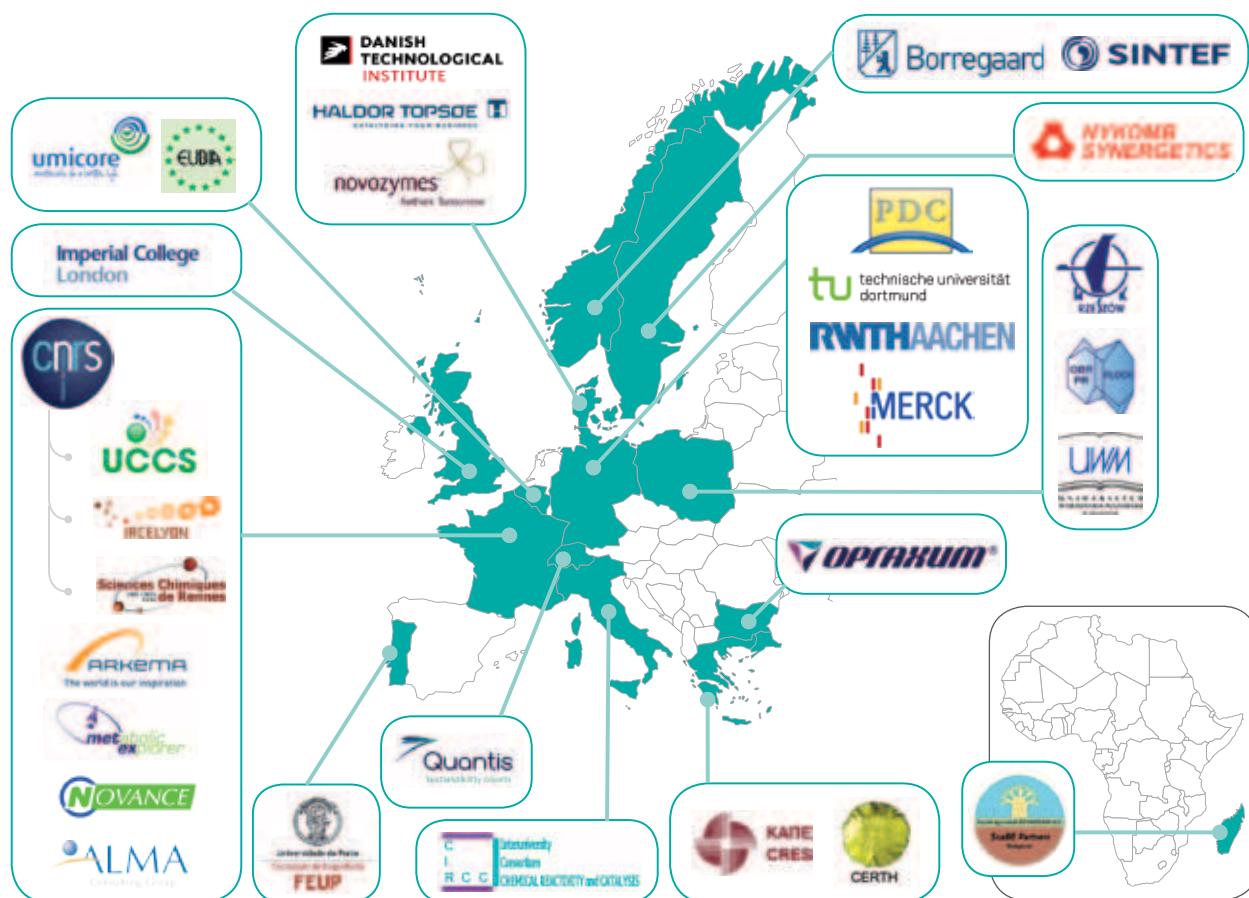
- Specific logistics methodology for cultures in North and South of Europe;
- LCA methodology for evaluation of environmental performances;
- Economic modelling for assessment of the economic viability;
- Sustainable assessment of the whole chain for economics.

CONSORTIUM

The 28 project partners from 14 countries gathering actors from the whole biomass value chain are involved in the project, including:

- Biomass producers, culture developers and logistics specialists (SOABE, CRES, DTI, UWM);
- Advanced biomass pretreatment industries (BORREGAARD, NOVANCE);
- Catalytic and enzymatic reactions developers (CNRS, TUDO, FEUP, CIRCC, RWTH, METEX);
- Thermochemical reactions developers (CERTH, NYKOMB);
- Catalyst and enzymes producers (HTAS, NZ, UMICORE);
- Process designers and engineers (PDC, CERTH, SINTEF);
- Final chemical and biochemical producers and end-users (ARKEMA, METEX, ORGACHIM, MERCK, NYKOMB, OBRPR).

The consortium includes also an aviation refinery (OBRPR) and a jet-engines maker (WSKRZ) for bio-aviation fuel testing. The sustainability of the whole project will be analysed and optimised by socio-economics and life cycle analysts (IMPERIAL, QUANTIS), civil organisation analysts (EUBIA) as well as specialists for project management (ALMA).



ACKNOWLEDGEMENT

The EuroBioRef (Large Scale Collaborative Project) addresses the thematic joint call "FP7-ENERGY.2009.3.3.1 Sustainable Biorefineries". It has been running since March, 1st 2010 and will last 48 months. The research led in this project has received funding from the European Union Seventh Framework Programme (FP7/2007 2013) under grant agreement n° [241718].

Official website of the EuroBioRef project:
www.eurobioref.org

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