KEY CHALLENGES FOR THE NEXT GENERATION OF BIOFUELS

Biofuels reduce greenhouse gas emissions and the dependence on transportation fuels derived from finite petroleum sources. The development of biofuels from sustainable feedstocks is improving Europe's fuel security and supports achieving the EU's objective of having 10% of transport fuel deriving from renewable sources by 2020.

However, conventional, first generation biofuels (ethanol and biodiesel) exhibit a number of limitations relating to their sustainability, high production costs, performance properties and incompatibility with existing infrastructures.
More advanced biofuels (such as biobutanol), based on sustainable feedstocks and highly efficient production processes, have the potential to overcome these limitations.

BARRIERS FOR BIOBUTANOL MARKET UPTAKE

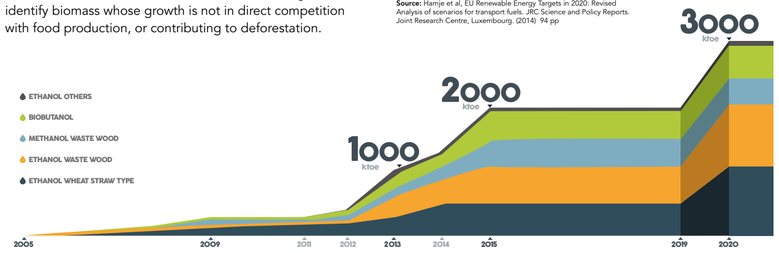
As yet biobutanol has not established itself in the market, due to a number of technical and economic barriers. For biofuels to reduce emissions, without adversely affecting the environment or social sustainability, they must be produced from sustainable feedstocks. This creates a challenge to identify biomass whose growth is not in direct competition with food production, or contributing to deforestation.

The conversion of sustainable feedstock into fuel remains technologically challenging. Current fermentation techniques suffer from low butanol yields, while the subsequent distillation required is the most energy intensive step in the entire production process.[1] The development of a more efficient production process, to convert the feedstock into biobutanol, is therefore necessary.

Despite these barriers, biobutanol has the capacity to be integrated into our current transport infrastructure. Advanced biofuels, such as biobutanol, have the potential to replace gasoline in spark ignition engines, or petroleum diesel in diesel engines. It is also expected that biobutanol can be used as a key component in fuel blends, for instance ethanol-butanol-gasoline and biodiesel-butanol-diesel. However, some key properties, relating to the performance and emissions behaviour of such fuels, still require optimisation.

DEVELOPMENT OF NON-CONVENTIONAL BIOGASOLINE TOWARDS 2020 IN THE EU

Source: Hamje et al, EU Renewable Energy Targets in 2020: Revised Analysis of scenarios for transport fuels. JRC Science and Policy Reports. Joint Research Centre, Luxembourg. (2014) 94 pp



[1]Ni, Y., Sun, Z., Recent progress on industrial fermentative production of acetone–butanol–ethanol by Clostridium acetobutylicum in China. Appl. Microbiol. Biotechnol. 83 (2009) 415-423

design: www.formatdopossivel.com | Printed using vegetable-based ink on 100% recycled paper FSC®
Pictures © Green Biologics Ltd. © Greenovate! Europe 2015

CONSORTIUM

Green Biologics — COORDINATOR
DYADIC
C-Tech INNOVATION
E4tech — Strategic thinking in sustainable energy
zabala innovation consulting
Greenovate!
TECNICAS REUNIDAS
CENER — ADItech
vito
UCLM — UNIVERSIDAD DE CASTILLA-LA MANCHA

COORDINATOR
Tim Davies
Jenna Hewitt
Green Biologics Ltd.
ButaNexT@greenbiologics.com

COMMUNICATION AND DISSEMINATION
Emma Bello
Greenovate! Europe
info@butanext.eu

WWW.BUTANEXT.EU

The ButaNexT project has received funding from the European Union Horizon 2020 Research and Innovation Programme under grant agreement n.° 640462.

BUTANEXT
Next Generation **Biobutanol**

BRINGING BIOBUTANOL A STEP CLOSER TO THE MARKET

The ButaNexT project will contribute to overcoming the current challenges and limitations exhibited by the first generation of biofuels. This will be achieved through the development of highly efficient processes for the conversion of sustainable feedstocks into the next generation of biobutanol.

The ButaNexT consortium is a multi-disciplinary team comprised of SMEs, a large company and research centres from Belgium, the Netherlands, Spain and the United Kingdom. The team aspires to optimise each stage of the biobutanol production value chain: biomass pre-treatment, fermentation, downstream processing and blending.

It is expected that ButaNexT will realise significant reductions of both production costs (up to 50%, to attain price-parity with first generation biofuels) and carbon emissions (up to 85%) compared with fossil fuels (gasoline and diesel). Moreover, the project will work on maximising the biobutanol conversion yields from selected lignocellulosic feedstocks such as wheat straw, miscanthus and the organic fraction of Municipal Solid Waste.

"High energy density and low volatility are proven advantages that raise significant interest for biobutanol as a blend component for gasoline and diesel. In combination with recent advances in biotechnology, biobutanol is becoming an attractive biofuel that - with the improvements proposed by ButaNexT to its production value chain - will be able to reach the market at a competitive price."

OPTIMISING THE BIOBUTANOL PRODUCTION VALUE CHAIN

The ButaNexT project aims to overcome the current challenges associated with biobutanol by optimising each stage of the production value chain:

SUSTAINABLE FEEDSTOCK
Focusing on wheat straw, miscanthus and organic fibre from Municipal Solid Waste.

BIOMASS PRE-TREATMENT
a) Mechanical and thermochemical improvements: Designing and constructing a biomass milling process to reduce feedstock particle size, ensuring a higher yield at subsequent stages while also being more energy efficient.

b) Enzymatic hydrolysis: Developing more specialised enzyme cocktails to be used during fermentation, leading to a reduction in the number of enzymes required, as well as time and cost savings.

FERMENTATION
Redesigning the fermentation process to produce butanol as the sole product in high yield.

DOWNSTREAM PROCESSING
Using and integrating a more energy efficient method for the separation and recovery of butanol using pervaporation.

BLENDING PERFORMANCE AND EMISSIONS
Demonstrating the efficacy of using biobutanol in fuel blends, both with conventional fuels (gasoline and diesel) and existing biofuels (biodiesel and ethanol).

ENVIRONMENTAL, RESOURCE, TECHNO-ECONOMIC AND SOCIAL IMPACT ASSESSMENTS
Demonstrating significant societal impacts relating to: waste minimisation, reduced air pollution, reduced GHG emissions and job and wealth creation within the EU.