

## Publication in *Nature Communications* of a paper describing the mechanism of enzymes yielding renewable isobutene

**Evry (France), 6 September 2021 - A paper describing the results of collaborative work between Global Bioenergies and the team of Dr. David Leys at the University of Manchester has been published today in *Nature Communications*.**

This paper describes the evolution and mechanism of isobutene forming enzymes far superior to previously used catalysts. Isobutene, a gaseous hydrocarbon, is one of the major building blocks of the petrochemical industry: 15 million tons are produced every year and are turned into fuels, plastics, elastomers and cosmetic ingredients.

This is the first time a member of a widespread enzyme family that depends on an unusual vitamin B2 derivative has been repurposed to yield isobutene. This has been made possible through the extensive work performed on both sides of the Channel, with laboratory guided evolution carried out at Global Bioenergies, and detailed structure analysis of the the evolved enzymes at the University of Manchester.

David Leys, group leader at the Manchester Institute of Biotechnology of The University of Manchester, says: "Our collaboration with Global Bioenergies on the subject of isobutene production combines in a unique manner quantitative molecular bioscience and industrial, high-throughput approaches. It is very satisfying to see how fundamental understanding of these enzymes obtained with European Research Council funding supports industrial application. The evolved enzymes represent several orders of magnitude improvement in the efficiency of isobutene bioproduction, directly contributing to an economically viable and renewable process, thus contributing to a more sustainable future."

Marc Delcourt, co-founder and CEO of Global Bioenergies, adds: "*Nature Communications* stands among the high-class peer-reviewed scientific journals. We are very pleased to see the work we conducted jointly with the team of Dr. David Leys reaches such a striking scientific recognition. The evolved enzymes, on which Global Bioenergies holds exclusive intellectual property rights for the isobutene production, will have a significant role in the environmental transition our world is now engaged in."

As an alternative to fossil isobutene, Global Bioenergies assembled a modified pathway and developed a process for the fermentative conversion of glucose and other feedstocks into isobutene. The crucial final step yielding the desired product makes use of a decarboxylase enzyme. This particular enzyme has been evolved from naturally occurring microbial decarboxylases that depend on an elaborately modified Vitamin B2 (called prenylated flavin or prFMN) for activity. The Leys group has been at the forefront of studying these prFMN-dependent catalysts, and determined structure and biochemical properties of isobutene yielding enzymes evolved by Global Bioenergies. The company screened an enzyme library for inherent isobutene production activity, and used directed evolution to yields variants with up to an 80-fold increase in activity. Structure determination of the evolved catalysts reveal that changes in the enzyme pocket are responsible for improved production.



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## About GLOBAL BIOENERGIES

Global Bioenergies has developed a process to convert plant-derived resources into a key family of ingredients used in the cosmetics industry. The process was first developed in a laboratory, where the Company is further enhancing performance. It now operates as a pilot and a demo plant, with sufficient capacity to enable the Company to access the market by first creating a long-lasting makeup home brand launched in 2021'. The Company is gradually increasing its production capacities and is looking to improve the environmental footprint of not only the cosmetics industry but also that of other areas such as transportation and materials. Global Bioenergies is listed on Euronext Growth Paris (FR0011052257 – ALGBE).

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