

**Código do projeto | POCI-01-0247-FEDER-069583**

**Designação do projeto | BacchusTech - Integrated Approach for the Valorisation of Winemaking Residues**

**Apoio no âmbito do Sistema de Incentivos**

**Objetivo principal | OT1 - Reforçar a investigação, o desenvolvimento tecnológico e a inovação**

**Região de intervenção | Norte, Centro**

**Entidades beneficiárias |**

Caves Campelo, S.A.

Instituto Politécnico de Bragança

Instituto Politécnico de Viseu

**Data de aprovação | 29/12/2020**

**Data de início | 01/01/2021**

**Data de conclusão | 30/06/2023**

**Investimento total elegível | 953.779,58 €**

**Apoio financeiro da União Europeia | 684.650,99 €**

**Síntese do projeto, objetivos, atividades e resultados esperados/atingidos |**

Wine production is one of the oldest and most important agricultural activities worldwide (28 billion liters produced worldwide in 2018). Portugal is the 5th and 11th largest producer in the EU and worldwide, respectively. The consortium leader, Caves Campelo Lda., founded in 1951, produced 6 million liters of wine in 2019, from which 18.4 % were exported to countries all over the world.

In order to obtain an adequate appearance, to stabilize the wine chemically and biologically, and to eliminate suspended solid fractions, wines need to be filtered. The most widespread method to filtrate wine consists on the use of diatomaceous earth as an adsorbent. Caves Campelo employs an average of 4,000 kg/year of this material. The spent diatomaceous earth is currently discarded and forwarded to waste management facilities (landfills). However, it is well known that these residues are rich in bioactive compounds (e.g. flavonols, anthocyanins), valuable e.g. for the pharmaceuticals, food and cosmetics industries. Moreover, currently recovery technologies available for other kind

of residues consist of multiple-step separation operations with relatively low efficiency and high costs.

The BacchusTech project seeks to develop a new innovative process, that includes the extraction, purification and concentration of bioactive compounds present in winemaking residues. The technology will be based on the use of tailored adsorbents (molecularly imprinted) for the purification/concentration of bioactive compounds and includes also the development of a continuous sorption/desorption process allowing an efficient and economic operation. Besides the spent diatomaceous earth, also recovery from the solid and liquid residues of distillation operations will be explored. The recovered bioactive substances will be explored as functional ingredients for the food and cosmetics industries.

The extracted spent diatomaceous earth will thereafter be converted into geopolymers, to be used i) as an alternative to conventional Portland cement and concrete composites, and ii) as an innovative membrane filtration, combined with advanced oxidation processes, to be applied in a new treatment for the winery liquid effluents. On the one hand, cement production is becoming perceived as environmentally unsustainable and geopolymer binders appear in this context as preferred options, since they generate 70–80% less carbon dioxide, with remarkably lesser greenhouse gas emissions than ordinary Portland cement. On the other hand, geopolymer foams show promising results as adsorbent and ion capacity exchanger for the removal of inorganic compounds from wastewater effluents. However, there are only a few studies reported and geopolymers are not found in market to accomplish the requirements for the treatment of winery wastewater and for use as geopolymer binder for civil construction materials (e.g. masonry or concrete elements).

Lastly, the gain in terms of environmental sustainability of the company, resulting from the implementation of the aforementioned technologies will be estimated by a life cycle analysis approach. This will allow for the identification of opportunities to improve the environmental performance of products and processes, and will be used to communicate the company's environmental performance meeting the growing societal environmental demands.

To attain these objectives, a consortium was built that aggregates the key technical and scientific competences needed, namely the Instituto Politécnico de Bragança, the Instituto Politécnico de Viseu, the Hanze University of Applied Sciences and the University



College Copenhagen. Moreover, key end-users that have already shown interested in the new materials to be developed have joined the consortium as partners, namely companies in the cosmetics (Cosmetek Lda.), civil construction materials (Pavimir Lda.) and food (BEPPO Gelados Lda) industries. Moreover, Campellus Innovatio Lda., a spin-off of Caves Campelo, and an international organization specialized in technology transfer to the market, Tecnalia, will collaborate with the consortium in order to assure that appropriate strategies and mechanisms are put in place, that guarantee the economic valorization of the technologies to be developed.

In face of the above, the consortium seeks with this project to convert current environmental issues into business opportunities that will improve the technological profile of Caves Campelo, and generate new revenue sources in the context of foreseen expansion of the leading company economic activities.