GOLD

Growing energy crops on contaminated land for biofuels and soil remediation

PRESS RELEASE

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26 July 2021 - Soil pollution is a global problem occurring where intensive industrial activities, inadequate waste disposal, mining, and other human activities, introduced excessive amounts of contaminants into the soil. It is estimated that 2.5 millions of potentially contaminated sites are located in Europe only, and an area covering roughly 650,000 ha cannot be cultivated for food and feed, because of excessive concentrations of organic or inorganic pollutants.

GOLD is a new Horizon 2020 research and innovation project that aims to **grow lignocellulosic crops on contaminated sites** and produce **sustainable biofuels** with no risk of indirect land use change, while removing soil pollutants and ultimately **bringing those lands back to agriculture**.

Lignocellulosic perennial grasses such as miscanthus and switchgrass, and annual herbaceous crops such as sorghum and industrial hemp, are tolerant to high concentrations of pollutants such as metals, metalloids and xenobiotics. Therefore they can grow on contaminated lands removing the pollutants through uptake via their roots or, in case of organics, also degradation by plant-associated microbes. At the same time such plants are also suitable biomass feedstocks for the production of advanced biofuels. By using special conversion processes, it is possible to **extract the contaminants** from the biomass and separate them in concentrated forms, thus **turning a problem into an opportunity**: soil decontamination via the production of clean fuels.

Launched in June 2021, the 4-year project is carried out by an **international consortium** of partners from the EU, Canada, China and India, and the activities will unfold over three components. The first one is the conduction of trials for the optimization of high-yielding lignocellulosic energy crops for **phytoremediation**, targeting different types of soils and pollutants. This will be based on the application of a low-input agronomic concept and innovative phytoremediation strategies utilizing **mycorrhiza and biostimulants**, to support plant growth under the stressing conditions of the contaminated sites, located in Greece, Italy, France, Poland and India.

The second component is the production of biofuels from the lignocellulosic biomass, in a way that ensures the extraction of the soil pollutants in a concentrated form. Two thermochemical conversion routes will be developed. The first one will apply high-temperature gasification in entrained flow mode, producing a clean syngas which will be further fermented into liquid biofuels. The second route will be based on biomass pyrolysis with the subsequent upgrading of the bioproducts into refinery-compatible intermediates and Fischer–Tropsch Fuels (FTfuels). In both cases **the pollutants will be separated from the biomass**, either by sequestering them in vitrified ash slag, or extracting them in a liquid phase.

The third component will carry out an integrated environmental, economic, social assessment and modelling of the selected value chains, to design **optimal replication strategies**. The deployment of these value chains at scale will allow the production of sustainable biofuels with low risk of indirect land use change (low-ILUC), as the crops will be grown on contaminated land that cannot be used for food production. At the same time, the cultivation of tolerant crops in contaminated sites will gradually reduce the concentration of pollutants in the soil, thus **also reducing the exposure of the local populations to potential health risks**, and eventually bringing those lands back to an economically viable agricultural use.

This will contribute to the achievement of the **Sustainable Development Goals** and to the objectives of the **EU Green Deal**, such as zero pollution for a toxic-free environment, preserving and restoring ecosystems and biodiversity, clean affordable and secure energy, to transform the EU economy for a sustainable future.

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About GOLD

GOLD - *Bridging the gap between phytoremediation solutions on growing energy crops on contaminated lands and clean biofuel production*, is a Research and Innovation Action started on 1st May 2021 that will continue through April 2025.

The project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 101006873.

Coordinator: Centre for Renewable Energy Sources and Saving (CRES), Greece.

Partners: Agricultural University of Athens (Greece); Technical University of Munich (Germany); Renewable Energy Consortium for Research and Demonstration (Italy); ETA Florence Renewable Energies (Italy); University of Maria Curie-Sklodowska (Poland); TNO Bioenergy and Efficiency (The Netherlands); Centre for Research & Technology Hellas (Greece); University of Bologna (Italy); French National Research Institute for Agriculture, Food and Environment INRAE (France); Yncréa Hauts-de-France (France); Universidade Nova de Lisboa, Faculdade de Ciências e Tecnologia (Portugal); Imperial College London (United Kingdom); Wageningen Environmental Research (The Netherlands); Mining Technical Trade METE (Greece); Center for Rural Development and Technology, Indian Institute of Technology (India); Hunan Agricultural University (P.R. China); Université de Sherbrooke (Canada), Institute of Bast Fiber Crops(IBFC), Chinese Academy of Agricultural Sciences (P.R. China).