

Lignite Power Generation plant could potentially use crude glycerol by-product of biodiesel existing plants in Greece as alternative fuel in an industrial symbiosis perspective -the Glyco Project

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ABSTRACT.

Crude glycerol is the principal by-product of biodiesel production accounting for 10 wt% of biodiesel production. The environmental and sustainable valorization of crude glycerol, is an imperative task which affects directly the biodiesel production cost. This paper summarizes the currently available and possible ways of valorization of crude glycerol generated from the biodiesel industry and focuses on its utilization as potential alternative fuel for the Greek lignite based power plants.

The Greek power generation sector is based on lignite and emitting important amounts of CO₂ in the atmosphere against climate change. The necessity for sustainable power production and the adoption of the principle of sustainability in Greece, energy strategy and political choices have been stipulated since the increasing energy demands impose the continuation of lignite consumption. Lignite reserves are depleting, while the concerns about climate change and environmental protection are becoming more intense and lead to the identification of alternative energy production routes and the development of new technologies for power generation in order to optimize the exploitation of the existing conventional fuel reserves, based on economical and environmental benefits. The partial co-combustion of lignite with biomass without major plant changes seems a promising solution, while other fuels including SRF of crude glycerol could play the same role of substituting lignite towards decreasing emissions and reserving resources with a parallel zero waste economy. Crude glycerol could also be a substituting fuel. However, incorporating crude glycerol with lignite demands identification of logistics of supply chain of glycerol being a by-products from biodiesel plants located in different areas of Greece.

This study is being conducted under the frame of a research project (the GLY-CO Bio-Diesel project) actually conducting at AUTH, co-funded by EU and Greek Ministry of Education, regarding the innovative utilization of crude glycerol in order to have sustainable, profitable and competitive biodiesel production sector. Utilization of waste glycerol for lignite substitution proved to have among economical benefits, other technical specific benefits such as upgrading of lignite' heating value and CO₂ and NO_x emissions' reduction. Discussion over sustainability of the synthetic fuel material formed is carried out.