

## **Subject number: 3; sub-section: 3.2**

### **Autonomous biodiesel production unit “Daedalus” A complete solution for rural sustainable biodiesel production**

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## **Abstract**

### **Background**

Access to modern and sustainable energy services and resources is critical to improve the living standards in the developing world. In the past, many attempts have been undertaken within the sub-Saharan countries in order to incorporate modern renewable energy production in rural areas, but some of these attempts have been proved unsuccessful as they require energy supply for their operation. As this energy is mainly provided from generators, the designing and the viability of the project is often subject to malfunctions due to technical or social obstacles. Moreover, in many developing areas exists a great potential of unexploited solar energy, which can be easily used for biofuel production.

### **Purpose**

In the framework of this study, we present the experience of the Technical University of Crete for the design and construction of “Daedalus”, the world’s first autonomous biodiesel production unit. This innovative unit is already operational in the University Campus, producing biodiesel from different feed-stocks. In addition, this work examines some initial results from the quality tests of the produced biodiesel as well as the advantages and disadvantages of the unit.

### **Approach**

The data required for the optimum design of this unit were obtained from a wide study on the existing literature and experience on biodiesel units. In addition, for the quality tests EN approved methods have been used in order to determine the different quality parameters. Energy balances has been applied in order to estimate the greenhouse gases emissions that are avoided per cycle of use due to the use of renewable energy for covering the production energy needs.

### **Innovation and Relevance**

The goal of this project was the development and operation of a prototype for autonomous small scale biodiesel production. The energy autonomy is based in the exploitation of the solar radiation for the efficient production of heat and electricity. The combination of different renewable energy sources transform this unit to an innovate product which can serve rural developing communities which present high biomass and solar potential. In addition, “Daedalus” can be used as a tool for improving the sustainability of biodiesel production through the decrease of the use of fossil fuels during the production process.

### **Results-Conclusions**

The results of this endeavor are manifold and relevant especially if viewed under the limelight of the United Nations Millennium Developmental Goals, which are poverty reduction and especially sustainable development to improve the quality of life in the developing world. It will also provide a new business idea for commercializing this product to various contexts.