



# ***3rd WORKSHOP ON BIOENERGY, RENEWABLE ENERGY AND GREENBUILDING***



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**Book of abstracts and posters  
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## REN-012

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### Energy generation by crude glycerol (biodiesel byproduct)

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The increasing of the biodiesel production in the world can cause a non-desired effect, formation of crude glycerol. This growth is due many countries aim to decrease their energy dependence on fossil fuels and reduce emissions of greenhouse gases, which has motivated the search for alternative energy sources such as the biofuels. This glycerol can't be discarded on the nature, become an environmental problem. The world production of biodiesel in 2015 was 23.6 billion liters (bl), and in 2021, the production estimated is of 42 bl, according to OECD. In Brazil is used only about 15% of the all glycerol produced in the country. It is fundamental find new uses for the glycerol waste. The current work proposes to use the glycerol as fuel to generate energy by the combustion. Nevertheless, the combustion of the crude glycerol poses a number of difficulties because its higher heating value is lower (5971 kCal/kg) than others fuels, like diesel oil (10 890 kCal/kg), besides it has high viscosity (57 cP, while the diesel oil has 0.46 cP), and as well as, high auto-ignition temperature. These characteristics do the crude glycerol, atomization and burning, a hard technological process that need to be solve, and likewise. This work uses the oxy-fuel technique to burn glycerol, because it promote some advantages as reduction of the pollutants emissions of the NO<sub>x</sub>, UHC and CO, and can be a strong ally to auxiliary in the sequester of the CO<sub>2</sub>. An experimental setup compound of a pilot flame and of a swirl with alteration in the angle its blades was build. Analysis of the glycerol to determine its physical-chemical properties were make. The droplets size was been measured by diffraction technique in different temperature of preheating glycerol. It was possible to verify the pressure swirl produced smaller droplet (with glycerol preheated). The measures of the emissions (O<sub>2</sub>, CO<sub>2</sub>, CO, UHC and NO<sub>x</sub>) and temperature (exhaust) were measured.

**Keywords:** *Crude Glycerol, Combustion, Biodiesel, Experimental, Renewable Energy, Bio Waste, Waste Improvement.*