E-NEWSLETTER 2

Waste-to-Wheel Pilot Test-Runs

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The pilot test-run of the technologies developed in the context of the Waste to Wheel Project was performed at Paphos Wastewater Treatment Plant, on the 10th of October 2020. The biogas Upgrading, Storage, and Refueling Unit (USRU) was repeatedly tested in real world condition during Plant operation, resulting in consistent performances between tests. The focus of the test-runs was to evaluate the energy efficiency of the USRU and the biomethane quality. It was observed from the results that methane purity of the upgraded biogas was on average 92.94% .

Additionally, the energy efficiency of the system has been derived based on the test results. The energy of the raw gas, the energy of upgraded biogas and the energy consumed during upgrading were known, then the energy efficiency of the system has been measured at 88.7%. Overall, the biogas USRU operated as expected during the design stage. As stated by Dr. Sotiris Petrakides, the performances claimed by InoMob LTD, the project coordinator and the startup company driving the biogas USRU development, have been verified and approved by the Environmental Engineering Lab of the Cyprus University of Technology led by Dr. Yiannis Virydis.

Following the evaluation of biomethane purity, an existing diesel commercial vehicle has been retrofitted with InoMob's dual fuel system as to utilize biomethane as a primary fuel. Then, on-board real calibration tests have been conducted for the single fuel and dual fuel modes in order to evaluate the energy efficiency and CO_2 emissions reductions. From the results, it is observed that in dual-fuel mode the total energy usage is reduced by about 7% for the same power output in comparison to the single fuel.

Furthermore, the CO_2 emissions of single fuel mode were calculated at 103.5 gCO_2/km, where in dual fuel mode the emissions decreased to 80.6 gCO_2/km which corresponds to a reduction of 22% in CO_2 emissions from the combustion process by the substitution of biomethane in a dual fuel operation mode.

The final steps for Waste-to-Wheel project are the assessment of environmental and socio-economic impacts raised from the implementation of the project and the financial analysis for the upgrade and usage of biomethane as a renewable transport fuel.