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Options of alternative fuels for electricity generators in Africa using PESTLE analysis tool

Hu Li[1], Zahida Aslam[1], Jason Ferns[1], David Maxwell[1], Consalva Msigwa[2]
[1]The University of Leeds, UK
[2]Dar es Salaam Institute of Technology, Tanzania

Alternative fuels are being sought to replace fossil fuels in a wide range of applications. Alternative fuels can be derived from renewable or non-renewable resources. This paper looks at the potential use of replacing diesel with alternative fuels in diesel engines used for electricity generation in the African developing countries which has low electrification rates. Fuels for consideration for partial or whole replacement of fossil diesel were: Biofuels (ethanol and biodiesel), gas to liquid (GTL), coal to liquid (CTL), coal water slurries (CWS), hydrotreated vegetable oil (HVO), straight vegetable oil (SVO), animal fats and biogas from anaerobic digestion. The potential feasibility of each alternative fuel was assessed using PESTLE analysis whilst considering a number of factors such as are political, economic, social, technical, legal and environmental. PESTLE (Political, Economic, Social, Technological, Legal and Environmental) analysis revealed that GTL, CTL, HVO, CWS and Biodiesel are not currently suitable as diesel fuel replacements for this application. This was due to a combination of reasons including limited supply of feedstock, economics, poor transport infrastructure, lack of arable land for growing edible crops for biofuels. Arable land is limited and using this to grow edible crops for biofuels competes with food production. The study showed that bioethanol, animal fats, SVO from non-edible crops and biogas from anaerobic digestions were viable alternatives for this application. Further work is required to identify which of these fuels is the best alternative by conducting a life cycle assessment, a cost analysis exercise and further emissions testing. This data then needs to be compared with one another and against fossildiesel.

FUEHLI@LEEDS.AC.UK