

Energy Analyses and Operating Costs of Biodiesel Production

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Abstract: *Fluctuating petroleum prices, environmental concerns and the understanding that petroleum is a finite resource have encouraged investigation into alternative fuels. Coconut oil can be potentially be used as the triglyceride feedstock for biodiesel production. The objective of this study was to complete energy performance analyses of four (4) coconut oil biodiesels. The energy performance metrics investigated were net energy ratio (NER), net energy balance (NEB), net renewable energy value (NREV) and fossil energy ratio (FER). NER values ranged from 0.51 to 0.77, NEB from -12.00 MJ/L to -46.21 MJ/L, NREV from 9.00 to 21.31 MJ/L and FER from 1.52 to 2.88. The energy metrics implied that the small-scale transesterification process is neither energy-efficient nor sustainable in Trinidad and Tobago. At the atom efficient 3:1 methanol to oil ratio, the NREV and FER values are improved, however, compared to the 6:1 methanol to oil ratio process. Additionally, since most of their physical properties are already within specification for use in the local vehicular market, all biodiesels are a prospective component of environmentally friendly blends with petrodiesel.*

Keywords: Coconut oil, biodiesel, energy analysis, operating cost, NER, NEB, NREV, FER