

Assessment of Tidal Current Energy Potential at LAMU and Mombasa in Kenya

Authors : Lucy Patricia Onundo, Wilfred Njoroge Mwema

Abstract : The tidal power potential available for electricity generation from Mombasa and Lamu sites in Kenya will be examined. Several African countries in the Western Indian Ocean endure insufficiencies in the power sector, including both generation and distribution. One important step towards increasing energy security and availability is to intensify the use of renewable energy sources. The access to cost-efficient hydropower is low in Mombasa and Lamu hence Ocean energy will play an important role. Global-Level resource assessments and oceanographic literature and data have been compiled in an analysis between technology-specific requirements for ocean energy technologies (salinity, tide, tidal current, wave, Ocean thermal energy conversion, wind and solar) and the physical resources in Lamu and Mombasa. The potential for tide and tidal current power is more restricted but may be of interest at some locations. The theoretical maximum power produced over a tidal cycle is determined by the product of the forcing tide and the undisturbed volumetric flow-rate. The extraction of the maximum power reduces the flow-rate, but a significant portion of the maximum power can be extracted with little change to the tidal dynamics. Two-dimensional finite-element, numerical simulations designed and developed agree with the theory. Temporal variations in resource intensity, as well as the differences between small-scale and large-scale applications, are considered.

Keywords : energy assessment, marine tidal power, renewable energy, tidal dynamics

Conference Title : ICECSE 2015 : International Conference on Electrical and Computer Systems Engineering

Conference Location : Montreal, Canada

Conference Dates : May 11-12, 2015