World Academy of Science, Engineering and Technology
International Journal of Energy and Power Engineering
Vol:14, No:06, 2020

Advancement of Oscillating Water Column Wave Energy Technologies through Integrated Applications and Alternative Systems

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Abstract : Wave energy converter technologies continue to show good progress in worldwide research. One of the most researched technologies, the Oscillating Water Column (OWC), is arguably one of the most popular categories within the converter technologies due to its robustness, simplicity and versatility. However, the versatility of the OWC is still largely untapped with most deployments following similar trends with respect to applications and operating systems. As the competitiveness of the energy market continues to increase, the demand for wave energy technologies to be innovative also increases. For existing wave energy technologies, this requires identifying areas to diversify for lower costs of energy with respect to applications and synergies or integrated systems. This paper provides a review of all OWCs systems integrated into alternative applications in the past and present. The aspects and variation in their design, deployment and system operation are discussed. Particular focus is given to the Multi-OWCs (M-OWCs) and their great potential to increase capture on a larger scale, especially in synergy applications. It is made clear that these steps need to be taken in order to make wave energy a competitive and viable option in the renewable energy mix as progression to date shows that stand alone single function devices are not economical. Findings reveal that the trend of development is moving toward these integrated applications in order to reduce the Levelised Cost of Energy (LCOE) and will ultimately continue in this direction in efforts to make wave energy a competitive option in the renewable energy mix.

Keywords : wave energy converter, oscillating water column, ocean energy, renewable energy
Conference Title : ICWPET 2020 : International Conference on Wave Power and Energy Technology
Conference Location : Copenhagen, Denmark
Conference Dates : June 11-12, 2020

Open Science Index, Energy and Power Engineering Vol:14, No:06, 2020 publications.waset.org/abstracts/124721.pdf