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Renewable energy technologies in the Maldives—determining the potential

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Abstract

The Maldives is one of the most vulnerable countries to the projected impacts of climate change, due to a combination of the small sizes of the islands and their low height above sea level. Like other small island developing states, the Maldives depends overwhelmingly on petroleum imports for their electricity production, which creates serious economic and financial difficulties. The Government of Maldives is therefore committed to promote sustainable energy and has been actively pursuing several inter-related initiatives to overcome the existing barriers to the utilization of renewable energy technologies. To assist this, the quantification and evaluation of the potentials of available solar and wind resources in the country for electricity applications has been performed. The hybrid system design tool HOMER has been used to create optimal renewable energy (RE) system designs. In order to evaluate these different RE alternatives a multi-criteria analysis is performed using a number of criteria that are likely to be decisive in implementation decisions. The evaluation shows that fully RE system configurations are not financially viable in the Maldives while the RE-diesel hybrid systems could bring down the price of electricity with 5–10 $cent/kWh in smaller outer islands. Assuming that these latter systems with a high probability of adoption are implemented, the results

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show that 10% of the electricity in the Maldives could be supplied by RE based systems in a cost effective way.

Keywords: Resource assessment; Renewable energy technology; Adoption; Multi-criteria analysis; Small island developing states; Maldives

Contents

1. Introduction

The Republic of the Maldives is blessed with abundant renewable energy (RE) resources, but depends overwhelmingly on petroleum imports for their electricity production. In fact, petroleum products account for more than 16% of the total imports in the Maldives. This creates serious economic and financial difficulties, similar to other Small Island Developing States (SIDS)[1]. The reason for this is that these SIDS are often very isolated and have high transport costs for fossil fuel imports. Furthermore, a limited demand for fuels domestically and diseconomies of scale in electricity production, makes power production not only extremely expensive but also bears financial risks on the long term [2,3]. As a consequence of this fossil fuel dependence, a sharp increase in the price of oil can cause severe macroeconomic consequences; deflationary, reducing demand for goods and services, thereby creating unemployment [4].

Also the environmental effects of fossil fuel use on a global scale are disastrous for SIDS since climate change and sea level rise will have dramatic implications for all coastal communities, and the increasingly intense nature of destructive weather systems will hit