

A Case Study of Low Head Hydropower Opportunities at Existing Infrastructure in South Africa

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Abstract : Historically, South Africa had various small-scale hydropower installations in remote areas that were not incorporated in the national electricity grid. Unfortunately, in the 1960s most of these plants were decommissioned when Eskom, the national power utility, rapidly expanded its grid and capability to produce cheap, reliable, coal-fired electricity. This situation persisted until 2008, when rolling power cuts started to affect all citizens. This, together with the rising monetary and environmental cost of coal-based power generation, has sparked new interest in small-scale hydropower development, especially in remote areas or at locations (like wastewater treatment works) that could not afford to be without electricity for long periods at a time. Even though South Africa does not have the same, large-scale, hydropower potential as some other African countries, significant potential for micro- and small-scale hydropower is hidden in various places. As an example, large quantities of raw and potable water are conveyed daily under either pressurized or gravity conditions over large distances and elevations. Due to the relative water scarcity in the country, South Africa also has more than 4900 registered dams of varying capacities. However, institutional capacity and skills have not been maintained in recent years and therefore the identification of hydropower potential, as well as the development of micro- and small-scale hydropower plants has not gained significant momentum. An assessment model and decision support system for low head hydropower development has been developed to assist designers and decision makers with first-order potential analysis. As a result, various potential sites were identified and many of these sites were situated at existing infrastructure like weirs, barrages or pipelines. One reason for the specific interest in existing infrastructure is the fact that capital expenditure could be minimized and another is the reduced negative environmental impact compared to greenfield sites. This paper will explore the case study of retrofitting an unconventional and innovative hydropower plant to the outlet of a wastewater treatment works in South Africa.

Keywords : low head hydropower, retrofitting, small-scale hydropower, wastewater treatment works

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