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Water demand management in the upper Orange River catchment of South Africa

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The study addresses uncertainties that emanate as a result of methods used to determine irrigation areas in the upper Orange River catchment area. The largest water user is the irrigation sector. What is not known for all schemes are the return flows but an average estimation of 13% is done for the main irrigation areas? Though several previous studies have addressed water conservation and demand management in the Orange-Senqu River catchment area; some pitfalls/caveats remain identified by these studies pertaining to the practical implementation of results. It was necessary to look into several methods used since the results produced, in some instances differed so much. The major problem in the study area is the unlawful water abstractions for irrigation use. In South Africa, indications show that about 240 million m^3 per annum of illegal water use is due to unauthorised withdrawals or violations of water use licenses. The status of water use for irrigation in the upper Orange-Senqu Basin also shows that insufficient information exists such that work needs to be done to understand the potential for increased efficiency of water use, taking into account issues pertaining to crop type, soil type and technological options. Studies like this one could also shed light on the potential impact of climate change on water use in the basin as this area may well experience significant impacts from rising temperatures and changing rainfall patterns. The processes of validation and verification will determine the extent of existing lawful water use. The use of remote sensing techniques (satellite, aerial photographs, etc.) could be employed to determine if the volume of water use registered by irrigators is accurate, i.e. valid and that the volume of water use registered is lawful (verification). Currently, ecological requirements for the river mouth are met through releases from Vanderkloof Dam and amount to just 290 million m^3 per annum. However several recent studies including the Gesellschaft für International Zusammenarbeit - Integrated Water Resources Management (GIZ – IWRM) study highlight that this is based on a fairly outdated methodology. The more recent Lower Orange Management study found a high level estimate of ecological requirements to be in order of 1,062 million m^3 per annum.

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Sustainable development of HV substation in urban areas considering environmental aspects

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Gas insulated switchgears by using an insulation material named SF6 (Sulfur Hexafluoride) and its significant dielectric properties have been the only choice in urban areas and other polluted industries. However, the initial investment of GIS is more than conventional AIS substation, its total life cycle costs caused to reach huge amounts of electrical market share. SF6 environmental impacts on global warming, atmosphere depletion and decomposing to toxic gases in high temperature situation and highest rate in Global Warming Potential (GWP) with 23900 times of CO2e and a 3200-year period lifetime was the only undeniable concern of GIS substation. Efforts of international environmental institute and their politic supports have been able to lead SF6 emission reduction legislation. This research targeted to find an appropriate alternative for GIS substations to meet all advantages in land occupation area and to improve SF6 environmental impacts due to its leakage and emission. An innovative new conceptual design named Multi-Storey prepared a new AIS design similar in land occupation, extremely low Sf6 emission and maximum greenhouse gas emission reduction. Surprisingly, by considering economic benefits due to carbon price saving, it can earn more than $675 million during the 30-year life cycle by replacing of just 25% of total annual worldly additional GIS switchgears.

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