

A Sensitivity Analysis on the Production of Potable Water, Green Hydrogen and Derivatives from south-west African Seawater

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Abstract : The global green energy shift has placed significant value on the production of green hydrogen and its derivatives. The study examines impact on capital expenditure (CAPEX), operational expenditure (OPEX), levelized cost and environmental impact, depending on the relationship between various production capacities of potable water, green hydrogen and green ammonia. A model-based sensitivity analysis approach was used to determine the relevance of various process parameters in the production of potable water combined with green hydrogen or green ammonia production. The effects of changes on CAPEX, OPEX and levelized costs of the products were determined. Furthermore, a qualitative environmental impact analysis was done to determine the effect on the environment. The findings indicated the individual process unit contribution to the overall CAPEX and OPEX, while also determining the major contributors to changes in the levelized costs of products. The results emphasize the difference in costs associated with potable water, green hydrogen and green ammonia production, indicating the extent to which potable water production costs become insignificant in the complete process, which therefore can have a large social benefit through increased potable water production resulting in decreased water scarcity in the south-west African region.

Keywords : CAPEX and OPEX, desalination, green hydrogen and green ammonia, sensitivity analysis

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