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Produced water treatment and reuse in oil and gas industry- Mathematical modelling and optimisation for infrastructure utilisation

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Currently, oil and gas industry dispose the produced water under the ground without treatment and with minimal consideration on the beneficial reuse applications. Yet, in recent years and in response to the worldwide water shortage concerns, produced water management and treatment has gained more attention and interest. Managing produced water is subject to different limitations specially if it is done for offsite applications. This includes the consideration of transportation cost and removal of dispersed and dissolved oil, metals, ammonia, salinity, alkalinity and ion toxicity for human and agricultural use which can result in a greater economic cost in terms of chemical usage and desalination operations. The importance of properly managing produced water is mainly rely on the clear vision of the treating method used which must be defined based on regulatory parameters and reuse standards. This study investigates mathematical modelling and optimisation to include the reuse specification into the produced water quality management and discusses its implication.