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Novel Design of Cost-effective Solar Powered Brackish Water Reverse Osmosis Plant: A Possible Solution for an Affordable Supply of Safe Drinking Water for the Rural Communities in CKDu-affected Areas in Sri Lanka

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The government of Sri Lanka has established a Community-Based Organization (CBO) to supply safe drinking water on a payment basis through the application of electrically driven Brackish Water Reverse Osmosis (BWRO) plants in CKDu-impacted areas. Due to major drawbacks such as cost, issues in regular maintenance, membrane clogging, lack of expertise to rectify the defects encountered in electrically driven BWRO plants, etc. In this design, a multistage centrifugal high-pressure pump was integrated with the BWRO plant drastically bringing down the manufacturing cost. Then, evaluate the performance of the Brackish Water Reverse Osmosis system powered by solar electric energy under Sri Lankan weather, and environmental circumstances, and enhance the recovery ratio up to 75% through an automated mixture. The novel design of the solar-powered BWRO plant can be manufactured locally at a low cost, and hence it would be the ideal replacement for imported BWRO plants to provide high-quality drinking water for the farming community who could not have sufficient wealth to obtain safe drinking water on a payment basis The solar-powered BWRO plant considerably reduces the government overheads to reduce the water purification cost up to 90% of the existing expenses. Further, it leads to protecting the environment by reducing Green House Gas (GHG) emissions with a more than 75% of recovery ratio. Further, cost comparison of SLN manufactured BWRO vs imported BWRO in a similar capacity revealed that the SLN-manufactured BWRO plant was 7fold cheaper than that of the imported BWRO plant.

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