

Team 2020-10 - Point of Use Solar UV Water Disinfection For Emergency Situations

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Theme – Water purification

Proposal

Different methods used to disinfect water in Ugandan refugee settlements include boiling with charcoal or firewood and solar disinfection. These methods are both inefficient and unreliable due to high fuel costs and considerable time invested. Our design solution proposes a point of use disinfection systems that is low cost and uses solar energy, which can help boost disinfection rates in refugee settlements and off-grid communities in Uganda.

Project summary

The system consists of a raw water tank plus a bio-filtration unit where raw water is filtered at a flow rate of 10L/hour and then fed into the UV-C disinfection chamber. This allows for sufficient exposure to intensive radiation to enable the >4-log reduction of pathogens.

Key design highlights

The designed system uses solar powered, direct current (DC), ultraviolet light emitting diodes (UV-C LEDs) that expose pathogens to electromagnetic radiations of 100- 400nm, which are then absorbed by the proteins in DNA and RNA, damaging their structure.

Cost

The prototype components cost \$284.5 USD. There are other expenses involved in conducting laboratory tests and shipping, as well as lower costs that will be highlighted in the report, amounting to \$599 USD.

How does your design help to work towards the Sustainable Development Goals (SDGs)?

Our design pursues SDG 6 (Clean Water and Sanitation) and SDG 3 (Good Health and Well-Being) by ensuring access to safe clean affordable water in refugee settlements which consequently improves health through safe water.

Social, environmental and economic considerations

A social consideration made during this design process was to ensure the product can be operated by everyone with ease. The environmental impact was considered through the use of renewable energy (solar), by ensuring no air pollution was emitted by system, and by fitting a bio-filter to filter out pollutants.

Economic considerations were made during the design process to help ensure the materials for the design were locally available, the container materials and the bio-filter were affordable, and that the maintenance costs were low.

[Link to the Full Report](#)

[Video Submission](#)