

Using a PV system to power an emergency water disinfection system

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Emergency relief efforts commonly include the provision of safe drinking water to populations whose normal water supplies have been disrupted. An alternative to the shipment of bottled water to the impacted areas is the disinfection of locally available water which may be contaminated with microbiological pathogens. An ideal system would provide reliable water treatment without requiring chemicals or other supplies which would require periodic replacement while in storage. Another desirable feature would be the ability to operate without requiring portable electrical generators which, along with the fuel necessary to operate them, may be in short supply during emergency situations. To address these needs, a trailer-mounted self-powered water disinfection system was constructed and successfully field tested. The primary components of the system included an array of photovoltaic panels to generate electrical energy, an ultracapacitor to provide robust energy storage, and a certified ultraviolet light system to provide disinfection. Additionally, pretreatment was included to address aesthetic water quality issues and to improve the clarity of the raw water prior to disinfection. The conceptual design of the system included the use of a small wind turbine, but it was found to be not necessary because the solar panels provided sufficient power to operate the disinfection unit. The elimination of the wind turbine has several technical, cost, deployability, and safety advantages. It is anticipated that the system may have both civilian relief and military applications.