Developing a Cost Effective Solar-Powered Surgical Sterilization System

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The engineering goal of this project was to develop a solar powered device designed to be able to fully sterilize surgical instruments. This device aimed to find an effective way to sterilize surgical instruments when proper equipment, or outside power sources are not available. It was predicted that through the construction of a solar powered surgical sterilization device, the quality of sterilization of medical instruments will be improved as well as costs being lowered and limit chemicals being released into the environment. A device was constructed utilizing thirty-six solar cells; the efficiency of the device was tested with three different heating elements through a series of twenty trials each, which tested the amount of time needed for the water contained in the sterilization chamber to boil, as well as the amount of time the device was able to maintain the boil. The three heating elements utilized included a screw in water heating element, one halogen bulb, and the final element of two halogen bulbs contained in copper pipes. The two halogen bulbs in the copper pipes proved to be the best heating element, followed by the one halogen bulb then the screw in element. It took half the time for the two bulbs in copper pipes compared to the longest time presented with the screw in heating element, with the one halogen bulb falling between the two elements. The effects and implications of this device are very positive, utilizing a completely renewable energy source as well as not requiring chemicals, it is very environmentally conscious, while still effectively sterilizing surgical instruments in a timely, efficient manner, without sacrificing the safety of the patient and integrity of the procedure.