Solar Water Disinfection for a Developing Region

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EXTENDED ABSTRACT

Our team will design, build, and test a scale model of a functioning water disinfection system. The system will be designed for a developing nation’s rural population without sustainable access to potable water. The system will extract water from a surface water source such as a river and use appropriate, inexpensive, and readily available, natural resources to remove settable and colloidal solids from solution. The water will have a sufficiently low turbidity to allow ultraviolet radiation (UV) penetration to inoculate the pathogens as the water is passed through clear plastic tubing. The tubing is placed on a metal roof to heat and expose the water to UV. Photovoltaic powered pumps will provide the appropriate head to move water through the system. The solar panels will track the sun for optimal power recovery. Flow in the pumps will be variable to provide a constant intensity of solar radiation-to-detention time ratios during overcast days. The water will be stored in reservoirs to maintain drinking supplies for several days for a community of approximately 500 people.

Individual team tasks for the project are as follows: Lindsay will program the feedback and control systems for the solar panel motion and the variable pump flow; Handziuk will design the unit operations and processes for water disinfection; Maxwell will conduct experimental design and simulation of the full scale system as well as create a business plan for the full scale system.