Ameristar Solar, LLC Technical Assistance Request

A unique challenge or need facing us is finding a clean building with a dedicated lab facility that could help us run the proposed testing necessary to prove the feasibility of our totally solar powered portable water treatment system. Our goal of this proposal is to provide a working prototype starting with the fabrication of an individual transportable water treatment system that can be transported by women and children in underdeveloped countries. The platform we are proposing is essentially a container, tank or bladder on an aluminum structure with all-terrain tires that can be solely powered by people or assisted with a small "DC" solar power motor/Li-ion battery system for steep inclines when a person, especially women and small children are unable to push or pull the water containers. The individual transportable system would have an embedded solar window on top of the unit to allow UV light to pass through the top window around or adjunct to a small mono-crystalline solar panel that provides DC current to an anode and cathode positioned inside the container that has been coated with photocatalyst such as TiO2. Past water treatment companies provided yellow LED lights that required AC current and that were powered from a grid-tied or generator system. Our mon-crystalline solar powered system would be the only power source for the photocatalytic reactions but as the platform is tested and found to be sufficient for the reaction cycles, we would like to expand the solar array or improve the solar panel types to more efficient panels. This could be addressed with the help of an NREL scientist or an American-Made member solar manufacturing company.

One suggestion by the Solar Challenge Connector, Mr. David McFeeters-Krone, was to contact Focal Technologies and see if their teams could assist us in our first reflective coating or internal reflective container to determine how much UV light would be required to assist the entire photocatalytic reaction. At this first stage, we are open to working with a local lab, a private facility or members of the American-Made Network. Fortunately, many of the initial components are commercially off-the-shelf (COTS) but the actual assembly of the components may have to be retooled to fit within the interior of water containers. The racking and positioning of the graphene substructures may require special adhesives or structural support and that would require a mechanical engineer to calculate the necessary points of contact, adequate strength to withstand water torques within the container and finally the best materials to attach the photocatalytic structurers.

The same mechanical engineers may be able to assist us with the bursting strength of containers and the methods of sealing the components inside the containers to prevent damage to the outside tank or bladder. Most aluminum T6061 sub-assemblies such as round, square, flat and tubes are resistant to moisture and harsh water environments without creating additional contaminants in potable water supplies. In some instances, we may have to use Stainless Steel for more resistance to coastal, ocean or acidic water sources. Once again, a national lab or American-Made member may have specific knowledge or research completed with what materials hold up best in harsh environments.

The water treatment module will be initially constructed and tested at the laboratory scale to identify and optimize the various system parameters such as catalyst loading, flow rate, catalyst power requirements. Once these parameters have been defined, we will assemble a mockup of the PTWS and begin testing in the field. In all preliminary testing and fabrication, we will require a computer coder to assist us with customizing LabView software to mate up with all our various system water quality sensors. This is one of the most essential technical needs that we face, since our team has no dedicated software programmer. Potentially, this could be addressed with the assistance of a private facility programmer, national lab or local university.