Title: Distributed Renewable Entrepreneurship with Solar-in-Box Solutions

Team Name: Solar-in-Box

Short Description:

We combine two of our system level innovations Solar-powered-digital-classroom-in-box or SPDCB in short and tensegrity-enabled solar nanogrid-in-box to propose entrepreneurial initiatives for disadvantaged communities.

Tensegrity is a structure made of rods and cables where tension and compression co-exist to offer robust, stable structure with reduced mass of materials and cost. We have developed an end-to-end design algorithm that can work as a blackbox to provide the design configuration of a tensegrity-enabled solar photovoltaic system…to the details of modules, inverters, materials for rods and cables, their lengths and radius and the system configuration. So, once the pre-designed system is shipped out in a container, the local people, when trained, can install the system for various applications of solar photovoltaic energy. We envision many new and growing applications of such portable, easy-to-install solar photovoltaic systems including carport canopy for electric vehicle charging, agrivoltaics for integrating power generation with farming, adult learning in off-grid areas and water canal covering for preventing water evaporation. These applications are of tremendous economic impact and will only see growth trajectory in the foreseeable future. Now, we look to integrate SPDCB, a tiny education system in box, into this plan. SPDCB uses a battery powered pico-projector to display the educational contents, read from the pre-loaded SD card or from the internet using WiFi connectivity. The internal and external batteries can be charged by the foldable solar panels. Besides reskilling the target communities for solar installation, deployment and electrical safety, SPDCB can unlock other entrepreneurial ventures like running schools/training centers in container.

Our team brings in a lot of learnings from our experience of rolling out SPDCB solutions in several countries in Africa, Asia, and South America through INGOs and local partners. During phase-1, we aim to deliver three pilot projects for three different applications and establish sustainable operating models involving the ecosystem stakeholders. Once successful, the solutions and their operating model can be replicated in different parts of the country and freshly include tens of thousands of people into the clean energy economy.

Key Team Members:

Shamsul Arefeen, Lubbock, TX-70409, shamsul.arefeen@ttu.edu, 806-730-0048,
https://www.linkedin.com/in/shamsul-arefeen/

Tim Dallas Ph.D., Lubbock, TX-79409, tim.dallas@ttu.edu, 806-834-6856,
https://www.linkedin.com/in/tim-dallas-2358bb11/

Location: Texas Tech University, Lubbock, TX-79409-3102