

Technical Assistance Request from the Sandia National Laboratories for Weatherproof PV Power for Storm Resilience submitted by Fredric Milder as Team Leader Representing AMENERGY, Inc.

AMENERGY, Inc., is requesting the assistance of the Sandia National Laboratories (Sandia) in supporting and advancing the goals of this project in the Ready! phase as indicated in the narrative submission. Assuming a successful Ready! execution, the assistance will continue in the Set! phase. AMENERGY has done preliminary work on this project with Sandia under a previous New Mexico Small Business Administration grant and is anxious to take the project through the next steps with the help of Sandia.

The overall task activities and objectives of the Ready! and Set! phases of this project are indicated below. Sandia assistance will be required for tasks 1, 4.1 and 5 for Ready! and for tasks 6, 7, and 10.1, and 11 for Set!.

1. Design Proof-of-Concept mechanized deployment and retraction system (the **Mechanism**)
2. Purchase all components
3. Fabricate prototype Mechanism
4. Set up In-house Test Station
 - 4.1. Design the Test Station
 - 4.2. Fabricate / Assemble the Test Station
 - 4.3. Mount Array Mechanism to Test Station
5. Test basic functionality of the Mechanism
6. Finish the mechanical engineering of the mechanized array for the actual product (the **Product Mechanism**)
7. Perform mechanical engineering theoretical design analysis of **Critical Criteria**
 - 7.1. Wind loading when deployed
 - 7.2. Wind loading during deployment and retraction
 - 7.3. Power and energy consumption for deployment and retraction
 - 7.4. Wind tipping risk assuming the Product Mechanism is mounted to a 20 ft container with specified internal components
 - 7.5. Tolerance of deployment for non-level surfaces
 - 7.6. Time of deployment and retraction
 - 7.7. Mechanical stresses at support connection points
 - 7.8. Damage resistance in retracted position (for shipping)
8. Construct the Product Mechanism
9. Mount the Product Mechanism into a shipping container
10. Physically test Critical Criteria of prototype Product Mechanism (see 7.1 –7.8 above)
 - 10.1. Perform tests not involving wind in New Mexico
 - 10.2. Perform wind tests at the Wall of Wind testing facility of the Florida International University
11. Report on results

The specific assistance requested from Sandia engineers and scientists are:

- Engineering concept design for the Mechanism;
- Component selection for the Mechanism;
- Consulting on the Mechanism test design, including acceptability parameters;
- Consulting Engineering of the Product Mechanism detail;
- Developing the Critical Criteria for the Product Mechanism as installed in a shipping container, including:
 - Stress and strain requirements of mechanical supports;
 - Wind loading analysis in deployed configuration;
 - Wind loading analysis in retracted configuration;
 - Wind loading analysis during deployment and retraction;
 - Tipping and balance tolerances during deployment and in use;
- Providing Theoretical Analysis for the above Critical Criteria of the completed Product Mechanism as installed in a 20 ft shipping container with additional delineated equipment installed inside (e.g., ballast);
- Reporting on the Theoretical Analysis above;
- Consulting on the Product Mechanism test design, including acceptability parameters.