VesprSolar
MAKING SOLAR ENERGY CLICK

The VesprSolar V-Clamp: Technical Assistance Request

1. Further R&D work with Sandia National Labs

- **Unique Challenge:** As result of the Research & Development activities performed so far, thanks to the support provided by the American Made Solar Challenge, VesprSolar was able to work with a team of experts from Sandia National Labs in analyzing the mechanical behavior of the V-Clamp under a limited set of simplified loading conditions, including preliminary cyclic loading for fatigue analysis. Initial results from this collaboration, while positive, have also increased our awareness about the importance of interactions that may arise at the assembly level. In particular, complex loading interactions between the V-Clamp and different PV module frames of varying shapes and sizes, that need to be better understood and mitigated (e.g. prying forces), to increase the robustness and resilience of our solution.

- **Technical Resources Needed:** To address this problem, a detailed characterization of the phenomena involved is required first, through a series of advanced computational models at different levels of granularity, from the component level of the V-Clamp, to the assembly level involving the mounting rail, the V-Clamp and the module frame. These models are necessary to provide a more rigorous basis for performance verification by means of physical experiments for fatigue, that considers not only the effects of complex cyclic loading on the V-Clamp, but also in the mounting rail and PV module frame. This in turn is necessary to inform possible improvements of the design geometry of the V-Clamp, as well as of the mounting interfaces required to receive the V-Clamp.

2. Complete dynamic, multi-axial load testing under severe weather conditions

- **Unique Challenge:** Structural performance for PV module clamps and connections may be compromised under severe wind conditions, particularly turbulent wind gusts. Combinations of uplift and vibration may lead to displacement of clamps and modules, and eventually structural failure.

  After meeting with 20+ industry leaders while conducting our customer discovery, we confirmed that there is strong demand for a faster, more reliable attachment solution. However, there is some skepticism surrounding attachment clips because of product failures from other companies. In our work with Sandia National Lab and other partners, we have developed initial plans for how we can conduct thorough, comprehensive, in-depth testing that will convince the industry that our product will work under severe weather conditions.

- **Technical Resources Needed:** We will investigate not only the behavior and performance of the clip itself, but also the entire assembly with the PV module and the mounting rail. This testing will be conducted with the Wind Technology Testing Center at the Massachusetts Clean Energy Center (MassCEC). Their team has extensive experience testing wind turbines—this is the exact expertise we need to complete this very extensive testing.

3. Testing for VesprSolar Family of Adaptors

- **Unique Challenge:** The majority of our testing to date has been of the V-Clamp with the Direct Mounting Interface. We will need to replicate much of this testing with the V-Clamp Adaptive Interface, testing with each individual adaptor. Because this testing will be similar to the V-Clamp with the Direct Mounting Interface testing, the roadmap for testing to commercialization is clear.

- **Technical Resources Needed:** Key tests will include: Fatigue testing, corrosion and electrical bonding testing per UL 2703 standards, performance uplift testing, and vibration testing. We do not anticipate any roadblocks, and we have already assembled a strong team of partners to complete this testing.

VesprSolar has assembled a team of partners who will be critical in meeting our goals after Go! Demo Day:

Using connections from the American-made Network and personal networks, we have assembled a team of partners that have helped us clearly define our path forward. These partners and their capabilities that will be critical to bring our product to market are listed below:

- **The University of Oklahoma:** Access to first class prototyping and testing facilities to perform many of our R&D activities, including structural performance under severe weather conditions.

- **Greentown Labs:** As an incubator company with Greentown Labs (largest cleantech incubator in North America), VesprSolar has access to a leading network of energy experts who will provide fundraising, business model development, and commercialization support.

- **Sandia National Labs:** Dr. Laurie Burnham is one of the leading experts on PV module connections globally. Her team's experience will be an invaluable asset to our team.

- **Georgia Tech:** Dr. Russell Gentry has extensive experience designing and testing PV mounting solutions. He is working to develop a full-module testing rig at Georgia Tech that will be able to assist with the assessment of multi-axial load testing.

- **ICSN, Inc.:** ICSN is market leader in contract manufacturing and will be VesprSolar's primary manufacturing partner for the commercialization of the V-Clamp. They have onshore and offshore production capabilities, and have a global reputation for top quality, IP protection, and service.

- **Global Ecopower, Quest Renewables, and Helical Solar:** As our pilot partners, they will provide insight on customer problems faced today and give us the credibility we need to commercialize globally.

- **Dartmouth College:** Through the Tuck Startup Incubator and Academic Venture Lab, VesprSolar will have access to a network of experienced start-up CEOs and venture capitalists to support business model development and customer outreach.