Optimal Solar: Request for Technical Assistance

Overview: Optimal Solar is a minority-owned, cleantech innovation firm. We are launching VIA™, a high efficiency, next-generation photovoltaic (PV) module. The solar technology concentrates solar radiation and splits it between visible and infrared and then generates electricity from the two sources of light using two separate chips.

Three things will allow us to maintain and grow our competitive advantage: better scientific understanding of our system, the mechanics and electronics that are key to drive its performance and building a long-term roadmap to continuously improve our design to stave off competition. In doing so, we have sought a relationship the NC Clean Energy Technology Center (NC CETC), National Renewable Energy Laboratory (NREL), and University of New Mexico (UNM). These three facilities will help us improve our design and increase our competitiveness to our marketplace.

We have worked with NC CETC for seven years and will continue to do so. Over the past year, we have started work with Dr. Johnney Green and his team. The work begins with understand the resiliency opportunities for our technology on the grid as well as with regards to military and space applications. And lastly, we have worked for the past two years with UNM on improving the infrared to electricity conversion.

Among our needs, we will include detailed work in the physical sciences. That is, although we have proven the theoretical merits of our approach, a more thorough review of the physics and engineering of the technology will lead to improved product road-mapping to remain competitive. Our work will include measuring and characterizing our devices and the subsequent system. These tools and equipment will include the following:

- Analytical microscopy
- Imaging
- Interfacial analysis
- Electro-optical characterization
- Real-time PV and solar resource testing
- Accelerated testing and analysis
- Outdoor system and performance
- Degradation and soiling analysis.

The results of the analysis will help us develop models and help to predict and/ or understand short and long-term performance. Further, we will be able to find methods and materials to improve performance, cost, and key features to enhance our product. It is important to understand that beyond the scientific needs, key economic factors will need to be understood including bankability and future funding. Here the system's

performance must be tested by a reputable, third party. NREL is the most trusted of sources. Further, the system's long-term ability can be tested, including its performance outdoors. Lastly, our claims on performance must be tested in light of any degradation, as well as how the system soils and its subsequent performance must be tested.

Lastly, the engineering of the system will be tested, and new manufacturing technologies will be sought to improve the efficiency in the fabrication of the components and the overall system. Specific activities include:

- System engineering
- System integration
- Device performance
- Solar PV Model Development

The work includes designing models for technology systems like PVWatts, PVsyst, and others. It will also include review of the overall system to improve the manufacturing needs for the system.

So far, we have shown that our system has performed better than traditional solar while working at the NC CETC. The work included testing the performance of the chip with and without light splitting. The results included a relative increase in performance by 33%. Our next steps will include improving performance more by use of our infrared chip.

Given that new technologies do not have the balance sheet initially to become a Tier 1. The performance and costs of our systems must be better than what's on the market. Given for solar, over 80% of technology derive from southeast Asia, American products having strategic innovation and performance capability can compete through the resources of partners such as NREL and NC CETC.