Mark J Walker's challenge details for challenge:

Solar Prize Round 7

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Explanation

Technical Assistance Request

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Challenges in creating a new disruptive product are: Incorporating high quality low amp high voltage photovoltaic modules seamlessly a sports stadium seat, units which can be mass produced to serve large outdoor stadiums will require partners & funding at a significant level. Senior level experts at institutions & in business have expressed interest & provided moral support, IP support, material support & encouragement, but is not enough.

Without a prototype field demonstration project, investors will be lacking. However the sum of the parts will enable success on a commercially valuable scale.

Key Needs

Science:

Sunflower Seating will require assistance at all levels in order to be successful. Rapidly developing research with regards photovoltaic materials & composition requires individuals & organizations that are up to date with the latest research developments. Taking advantage of high reflectance in concrete sports stadium & managing shading issues are key.

Product development:

My proprietary patent for incorporating photovoltaics into sports stadium seats follows two other design patents, both unrelated but similar in terms of marketing, sourcing, manufacturing, & shipping. My patent seeks to optimize full scale energy capture, perhaps using concentrator photovoltaic (CPV) panels using transfer printing, is that too expensive? Do we convert DC power to AC at the unit level? What kinds of diodes will be necessary when seats are full or at night? What's best way to wire such large numbers of units?

Fabrication and prototyping:

Manufacturing modules which are larger than current standard pv sizes are desired. Copper backed flexible Maxeon cells may serve as a starting point, to develop larger (16”x16”) bifacial modules to reduce manufacturing costs & ease of installation

would be better.

Public Policy:

Outdoor stadiums are resilient structures which often literally overlook underserved local populations.

Sunflower Seating can create emergency centers in sports stadiums for use by first responders & communities at risk in power outages. Medical services can offer challenged individuals help. I have witnessed such situations around the world where emergency power failed. Creating & wiring these solar power & power collection sites in a protected environment like stadiums may prove most useful.

Utility Scale:

Wiring 40,000 to 60,000 seats in large outdoor stadiums can create up to 3 Mwh of power. This

requires careful wiring design & installation. Willing electrical power utility partners will be key.

Product Design:

Using Maxeon cells I have been educating myself at home wiring modules to fit on a stadium seat. Since these cells are somewhat flexible given the right coatings and jig they can be curved to fit seats. Soltronix by PowerFilm currently produces a 24 watt flexible panel for charging 12v batteries. As they are copper backed cells they are more resilient. Sports fans are notoriously rowdy, so robust engineering will be employed to protects units to reduce shock, impacts and weather related conditions.

System design:

As a whole there are a lot of moving parts & co-ordination at all levels of the creative process to assure best outcomes will

be key.

Key Needs

- Testing and Validation (3 / 5): Field testing of high quality prototypes is essential for validation
- Funding & Investments (3 / 5): Without a high quality prototype unit and field testing funding will be very difficult.
- Hardware Development (3 / 5): I have been developing this concept with a model of my own using flexible copper backed Maxeon cells, however we need a bifacial module 16"x16" (inches)
- Legal, Insurance, and Public Policy (3 / 5): Outdoor sports stadiums are resilient structures which ignore the needs of the local community, we can create emergency centers in sports stadiums which can be utilized by first responders and communities at risk in power outages. Medical services may be offered to individuals with immediate needs. I have witnessed such situations around the world where emergency power was and was not available.
- Procurement of Raw Materials (2 / 5): The procurement best raw materials composition of large bifacial modules is critical for success, those materials specifically are to be determined
- Science, Research and Development (2 / 5): Rapidly developing advances in the field of photovoltaics requires expertise in the field, at all levels of research and development
- Utility Scale (2 / 5): Wiring 40,000+ pv seats in large stadiums to create a couple of megawatts of power will require careful planning and installation.
- Manufacturing (2 / 5): I understand the complexity of manufacturing, materials, production machinery, supply chains
- Fabrication & Prototyping (2 / 5): creating a prototype with high quality materials that can be inexpensively mass produced and recycled is a key area of interest.
- Product Development (2 / 5): Have two design patents in addition to the patent for photovoltaics embedded in sports stadium seats have given me a basic understanding of Product Development
- System Design (1 / 5): I understand the wiring harness and interface to the grid will require a level of sophistication which is limited in my case, and in addition will be a large upfront cost for installation.

Matches

1. Circuit Launch: 87.59%
2. Georgia Institute of Technology: 87.58%
3. MassRobotics: 87.58%
4. BlueTree Allied Angels: 87.58%
5. IoT Conduit: 87.58%
6. RDH Building Science Inc.: 87.58%
7. International Business and Technology Service Corporation : 87.58%
8. NextEnergy: 87.58%
9. North Shore InnoVentures: 87.57%
10. New Mexico Clean Energy Resilience and Growth: 87.57%