

**Context:** Solar lighting systems have substantial cost advantages over grid connected lights however the reliability of cost competitive products remains a performance disadvantage. APT Solar Solutions aims to provide a reliable and cost-effective turnkey lighting solution for various mobility applications, including providing lighting to poorly lit areas that present as trouble spots or hazards. These could be known problems at the intersection between people, wildlife, and vehicles or in areas requiring temporary improved lighting such as road construction works. Our team has conducted more than 500 customer discovery interviews with mobility-infrastructure and electrification industry stakeholders, ranging from vehicle charging to landscape lighting entities. From this research it was clear there was a market need for cost-effective, rapid deployment, and off-grid lighting solutions for both retrofit and new installations. The current approach of providing a grid connected lighting solution to trouble spots or areas requiring improved safety involves a high level of cost, particularly with the labor, planning, and equipment involved in extending or connecting to the grid. This problem is further amplified in remote and underserved communities where the costs to implement are higher while available resources are generally lower. While the need for rapid deployment and flexibility lends itself to free standing solar systems, traditional solar products that have tried to solve these challenges are bulky which then adds cost and limits their design and application flexibility. Additionally, their large flat solar cells are subject to reliability issues due to dust, snow, and other environmental contaminants.

**Value Propositions:** Our 3D solar modules provide the following unique value propositions over conventional flat solar panels: 1) Cost and Time Savings: avoids grid extension costs, Do-It-Yourself (DIY) installation, and minimal maintenance; 2) Superior Performance: 10X-30X more electricity per installation footprint and highly efficient due to the full-sky (360-degree) light collection area; 3) Adaptable: can be integrated into existing applications and products, and also can be implemented as plug & play installations; 4) Scalable: larger modules generate more electricity. Backup units can be installed and linked for more electricity; and 5) Versatile Design and small footprints: can easily be integrated into existing transportation and urban infrastructure across many applications, with a low-cost aerodynamic design, unlike bulky solar panels. The uniqueness of these lights is highlighted by the fact that our 3-ft bollard light has the lighting power of a standard grid connected streetlight.

**Key Milestones:** Significant traction has been achieved including demonstrating the viability of the product in partnership with a local farm fencing business. This trial successfully demonstrated the superior performance of twenty 3D solar lighting fixtures during Winter of 2022 in Northern Michigan, including generating max power output during snowstorms. A more extensive trial has now been sponsored by the State of Michigan to deploy 125 field trials through late 2023 in both the upper and lower Peninsulas. A variety of trial partners have been secured including municipalities (including City of Ann Arbor, MI and Southfield, MI), Opportunity Zones (City of Detroit, as well as native tribal lands, such as Sault Ste. Marie, MI), as well as commercial and residential properties, including marinas and campuses. Informed by the initial trial, a near market ready product will be fabricated for the winter 2023 trial with final product development to be completed in early 2024. Additionally, the first utility patent grant has been achieved with another 4 utility patents and 2 design patents pending worldwide.

**Development Stage:** APT Solar Solutions has developed a powerful, yet compact, 3D solar module that significantly improves the reliability of solar products. APT Solar Solutions proposes the deployment of 50 of our 3D Solar Lighting Fixtures throughout the United States. The objectives of these trials are: (1) to demonstrate superior performance in a multitude of environmental conditions throughout the US, (2) to inform final (universal) product design, and (3) market validation.

**Technical Assistance Request:** To realize the potential of our 3D solar modules, APT Solar Solutions is seeking technical assistance in five key areas: (1) pilot partnerships, (2) accelerated product testing, (3) design for manufacturing and assembly, (4) product manufacturing, and (5) channel partners.

**1. Pilot partnerships:** APT Solar Solutions has partnered with a variety of trial partners, including municipalities (City of Ann Arbor, MI and Southfield, MI), Opportunity Zones (City of Detroit, MI) and native tribal lands, such as Sault Ste. Marie, MI, as well as commercial and residential properties, including marinas and campuses. APT Solar Solutions is seeking partners in municipal, commercial, and residential sectors across different socio-economic and geographical conditions. We are seeking partners in the seven regions indicated in Figure 1.

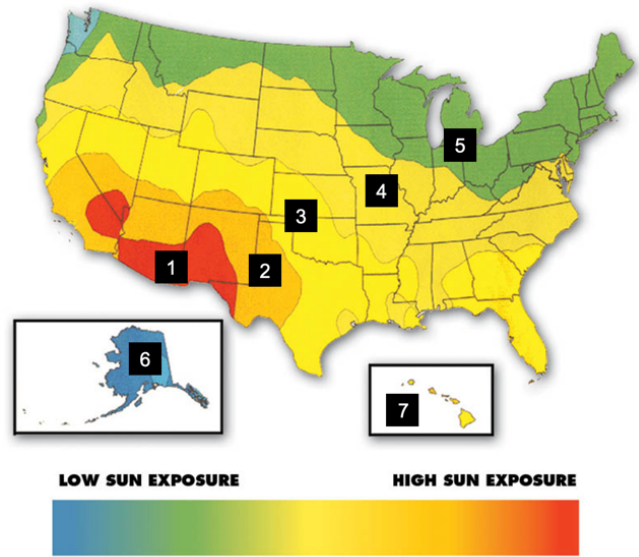


Figure 1: APT Solar Solutions aims to identify at least one partner in each of the above seven regions.

- 2. Accelerated product testing:** APT Solar solutions has extensively tested the environmental resilience of our solar lighting products through a multitude of pilots across the State of Michigan. However, further testing is needed to verify the reliability and resilience of our solar lights, as well as future products. We are seeking accelerated product testing capabilities, including exposing our products to cycles of humidity, UV exposure, heat, wind, and impact levels. We are also seeking accredited entities to certify our consumer products, including Unified License (UL) certificate and Ingress Protection (IP) rating.
- 3. Design for manufacturing and assembly:** In collaboration with our product design and rapid-prototyping partner, Sundberg Ferar, APT Solar Solutions combines superior performance with elegant aesthetics. We are seeking a partner to comb through our product designs to optimize them for scalable manufacturing.
- 4. Product manufacturing:** APT Solar Solutions is seeking manufacturing partners capable of working with our diverse team of product experts to fabricate and process 1,000 solar lights in second quarter of 2024. Our goal is to double manufacturing every year thereafter.
- 5. Channel partners:** APT Solar Solutions has been working with local landscape lighting partners through business-to-business channel partnership agreements. We are seeking landscape lighting partners, including retailers, distributors, and contractors selling lights to residential, commercial, and municipal end users to work with to market and sell our solar lighting products.