Technical Assistance Request
Locally Grown Power[SM] Team

Solar panel manufacturers are eager to reduce both the cost of the components in a solar panel and the carbon footprint of fabrication. But they confront a problem. As solar panels increase in efficiency, they are ever more susceptible to impurities and to fabrication defects in silicon cells—which represent approximately half the cost of all components taken together. Achieving the level of purity required for today's panels is extraordinarily costly and doing so entails an outsize investment in energy. This "embedded energy" detracts from the net carbon reduction a solar panel can achieve in its life cycle. And if the most expensive component in a panel can't be fabricated in a significantly cheaper manner, the single most obvious avenue for cost reductions in components is lost.

In our submission, we introduce a module-level power electronics solution that allows us to utilize cells rejected by other manufacturers because of the presence of trace impurities or microcracks that make them unsuitable in any other panel. **Another way of stating this: we can convert a particular type of industrial waste into safe, efficient, and extraordinarily robust American-made solar panels.** We explain how our technology works and why manufacturers would want to donate cells unsuitable for their panels or sell them to us at vastly reduced prices. We also detail how when we produce at scale we can safely employ cells made through ways of rendering fresh silicon wafers that achieve slightly lower levels of purity but at vastly lower cost and with no untoward consequences in our panels.

Our MLPE module controls reverse bias, the root cause of hot spots. We couple this with a distinctive quarter-cell panel architecture: 240 cells in a single string and zero bypass diodes, all in the footprint of a standard residential panel and with unrivaled safety.

We handed the practical challenge of proving our solution over to a team of skeptical physicists and engineers at one of the nation's leading schools of science and

technology, Harvey Mudd College. We asked them to test our Gen4 prototype panels side by side with those of a leading manufacturer, with the express goal of provoking hot spots.

Through partial shading, they consistently induced hot-spots in the pristine commercially available defect-free panels within a matter of minutes, but not in ours. As a letter attached with this proposal attests, the key finding about our panels was this:

> *The modules we tested are the only ones in existence that simply do not develop hot spots under any circumstances. And we tried hard to prove otherwise.*

Our primary requests:

- Field testing concluded that partial shading could not provoke hot-spots in our panels under any circumstances, which is not true of any commercially available alternative. We wish to establish through testing in a national laboratory that our panels are likewise impervious to cells with trace impurities and microcracks, conditions that would render them hazardous in panels lacking our MLPE device.
- We wish to connect with entrepreneurs and manufacturers who would consider reviving older less expensive techniques for purifying silicon in solar cells, techniques that require far less energy and capital expenditure than what is required for high-efficiency panels lacking our MLPE solution.