Our aim is to create a consumer product that can be installed by anyone to improve the energy available in remote areas. We would offer two product types: home integrated and stand-alone.

**Motivations/Objectives**

- **Motivations**
  - Solar is abundantly renewable and cost-effective for energy.
  - Solar is cost-effective and can be installed easily.
  - Solar is a great source for energy in remote areas.

- **Objectives**
  - Design combiner box with DC-DC conversion.
  - Create a consumer product with panels, DC-DC converters, DC-AC inverter, and AC integration.

**Challenges**

- How to safely integrate to the home or load with little electrician aid or added cost.
- Finding parts that meet our design requirements for the prototype.
- Scaling our final 1kW product from our prototype.
- How to overcome power loss.

**Product Results**

- It would take less than 5 years (in NJ) for the $2,500.00 system to pay for itself, with the avoided electricity cost, tax incentives, and SRECs.
- Across the 15-year lifetime of the array, the return on investment would be over $6,000.
- Present Worth (assuming MAPR 1.48%, the current rate of US Treasury Bonds) is $680; its future worth is $280. The projects internal Rate of Return is 7.3%.
- We would offer two product types: a home integrated and stand-alone.
- The home integrated option would utilize a Static Transfer Switch, the installation of the switch into the home would be the only part of the installation that would need to be installed by an electrician.
- The stand-alone would have a battery and charge controller to control the flow of power. This offering would be ideal for remote areas without an electric grid. No electrician aid would be needed.

**Acknowledgement**

THANK YOU TO:

- SPS for the discounted solar panels
- Labern Machine Products, for helping with structural needs

**Social Impacts Globally**

Every year millions of babies are born with jaundice, 9 million of which are in developing countries where it is difficult to get treatment or in some cases the treatment isn’t even available. Blue LED Phototherapy lights run on little power and can help save the lives of babies in need of treatment for neonatal jaundice. One new device by D-REV only costs $400. A plug and play solar product, combined with their device, could help start newborn jaundice clinics in these areas that do not have a power grid. 54,740 babies could be treated over the lifespan of the combined product for a cost of $3,000.

**Social Impacts Nationally**

Solar will be affordable enough to be on homes nationwide lowering dependence on non-renewable resources, such as coal. 100 homes in NJ with a MASS Solar product would offset 72 tons of CO₂ a year, and 1,080 tons across the products’ 15-year life.

**10% Scale Prototype – Voltage Drop and Max Power**

<table>
<thead>
<tr>
<th>Power Converter</th>
<th>Efficiency and Voltage Drop: Solar Panel</th>
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<tbody>
<tr>
<td>Efficiency P&lt;sub&gt;m&lt;/sub&gt; = 5,954.8 + 10.58%</td>
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<tr>
<td>Voltage Drop V&lt;sub&gt;in&lt;/sub&gt; = 100 ft.</td>
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**References**