

## Team 2020-03 - Solar Direct Drive Vaccine Refrigerator and Effective Cold Chain System

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**Theme** – Healthcare

### **Proposal**

Design and implementation of an effective solar direct drive vaccine refrigeration system.

### **Project Summary**

We are developing a smart vaccine refrigeration and storage system, which harnesses the power of the sun to create ice banks that help keep vaccines at an optimum temperature throughout the night and cloudy days when irradiance levels are low. We have achieved this by using solar direct drive technology, which replaces the need for traditional batteries.

### **Key design highlights**

We have used two separate chambers in our design, with a partition between the vaccine chamber and the ice bank chamber. The two-chamber design has the following functions:

1. It separates the ice layer and the vaccines, providing more storage.
2. Each chamber can be accessed individually, which helps maintain low temperatures and prevents gases from escaping the vaccine chamber.
3. Separate chambers provide better thermal insulation for both the vaccines and the ice banks.
4. It allows for greater temperature control in the vaccine chamber.

### **Cost**

Our final product will roughly cost around \$500 USD. However, the costs of manufacturing and production can be reduced in future through economies of scale and linear production line methods.

### **How does your design help to work towards the Sustainable Development Goals (SDGs)?**

Our design works to address the following SDGs:

- **SDG 3 (Good Health and Well-being):** by promoting greater health and greater security to the well-being of people in off-grid locations by giving them the means to be vaccinated.
- **SDG 7 (Affordable and Clean Energy):** by using solar energy as our main source of power and omitting the use of batteries to reduce both cost and environmental impact, particularly as batteries are very difficult to dispose of.
- **SDG 8 (Decent Work and Economic Growth):** By helping boost the immunity of people in rural off-grid areas, we allow for a safer work environment. We believe that this will increase morale and, in turn, boost the overall economic output of the region.

### **Social, environmental and economic considerations**

The availability of vaccines in remote and off-grid locations will help marginalised people in these areas to live better lives with fewer health risks. A healthier population can mean a healthier economy. Healthier people can more effectively contribute to society, support one another, and build a more robust community.

The lack of a battery reduces the emissions and overall carbon footprint of our product, throughout its lifecycle.

[Link to the Full Report](#)

[Video Submission](#)