

SPECTRUM

Incubator: AIC-ISE

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Type of Intervention: 'Gelpacks/Gelpads' for maintaining -20°C and -70°C temperature for Moderna and Pfizer Vaccines respectively

Details of intervention:

1. Product:

Gelpacks are commonly used for transportation of 'Insulin', Vaccines, at 'Controlled Temperature conditions' of +2°C to +8°C. Our PCMs(Phase Change Materials) will replace the Gel material, to store the temperatures of -20°C and -70°C.

2. Technology:

Our Product works on the Science of 'PHASE CHANGE ENERGY'. Every material has large 'Thermal Energy Storage Potential' at its Phase Change Temperature, where 'Phase' could be solid, liquid or gaseous phase. For practical reasons, we select the Phase Transition, of Solid to Liquid and vice versa, for our products. (*Volumetric expansion; volume of 1kg of Ice, Water and Vapor respectively is 1.1, 1 and 1671 litres*) Our formulations have a tendency to melt and freeze at the chosen temperatures. So, for the specified solution, we have a Water based solution that stores energy at -23°C for Moderna Vaccine and -74°C for Pfizer Vaccine.

3. Methodology:

The working is quite simple and well known. The PCM packs we provide need to be put into Blast Freezers of respective temperatures overnight. The next day, the material can be placed just like the Gelpacks inside an insulated box and can be taken out for delivery. As shown in the image below, Blue boxes are regularly available insulated boxes, and the yellow pads can be filled with PCMs T-23°C and T-74°C, to be taken out for delivery for 6-10 hours.



Image: Gelpacks placed inside an Insulation Box for vaccine delivery

4. Milestones:

Both the PCMs T-23°C and T-74°C have been tested rigorously to check for their performance. And, they are ready to be rolled out.



5. Timeline:

We have a production capacity of over 1000 units of the PCMs per day. We can roll out products in a week's notice. Scaling up is easy at our stage too.

6. Line Wise Financials

The way we understand, if the above suggested approach were to be taken, auxiliaries in the form of 'Blast Freezers' would be required. Insulation Boxes, are commonly available, so the inventory currently available can be put to use.

Particular	Price	Availability	Maintenance
Blast Freezer (-30°C)- 500 ltr	*INR 50,000/ unit	Know suppliers	Moderate
Blast Freezer (-80°C)- 50 ltr	*INR 1,50,000/ unit	Know suppliers	Moderate
PCM T-23°C	INR 92/kg	Spectrum	None
PCM T-74°C	INR 260/kg	Spectrum	None

*-Rough prices, as per knowledge

So, in a **Ballpark value of INR 10 crores**, we shall be able to provide the Government with approximately **5,00,000 Daily Dose Delivery Capacity of Moderna Vaccines**, or approximately **60,000 Daily Dose Delivery Capacity of Pfizer Vaccines**. **(1. Delivery time: 12 hours, 2. Auxiliary Freezers: Included in the cost, 3. Electricity Cost: Excluded).**

7. USP:

The beauty of this supply chain format is; it is cyclical. Every day the freezers are loaded with the PCM packs, to be used next day, meanwhile an alternative second batch that was frozen for 24 hours, is out for delivery. Once, the vaccine doses are delivered, the insulated boxes are returned back to the central point. And the next day, the second lot of PCM packs goes out for delivery, while the first batch of PCMs are taken out for operations. This cycle can be repeated over and over flawlessly. Over the period of time, after 200, or 300 deliveries, the effective cost of PCM packs per delivery falls below INR 1, meanwhile, still able to continue service.

Unlike, the option of Dry Ice, the PCM packs are non-contact. The vapors of Carbon Dioxide released by Dry Ice is another problem altogether. Cost-wise Dry Ice is any day expensive, due to single-use ability.

No special maintenance is required for the PCM packs. So, in case of leakage or spillage, the packs need to be replaced. No other maintenance is required for the PCMs.

8. Miscellaneous

- a) We do not have any connection with the Government. So, support from CSR, is absolutely critical for us.
- b) **States that we can provide technology to – Pan India/ Pan Globe**
- c) **We have a Market Ready Technology. In terms of deployment and units available:**
 - **Deployment:** The Supply Chain of regular Vaccines needs to be replaced with special Freezers and PCM packs. Both of which are available to us.



- **Number of units available:** The production rate is 1000 units per day, which can be increased if need be (in a week's time)