up Gricd, has solar-powered batteries that can maintain stable internal temperatures as cold as -20°C for up to 24 hours.

For the time being, however, the most widely used subzero storage and transportation devices forgo electricity altogether. They use passive cooling instead, essentially functioning as giant, highly insulated super-Thermoses .

Solar power can also help with another essential electricity-dependent component of vaccine delivery systems: information and communication technologies. These enable national health programmes to monitor vaccine stocks and refrigerator temperatures in remote, rural health facilities in real time, and alert them when deviations occur that may compromise their integrity.

In rural areas that are far from the grid, cellular and internet connections are often more difficult to access. But in recent years, solar-powered cell towers have strengthened and expanded telecommunications networks in areas with unreliable power in countries such as Guinea, the DRC and Mali. Off-grid cell towers have also been used to power vaccine refrigerators in settings such as Zimbabwe. These refrigerators also rely on the cellular network to relay monitored temperature data to health facility staff.

Solar-powered cold chain technologies can be game-changers in the fight against COVID-19 in resource-limited settings in sub-Saharan Africa and beyond. As the COVAX initiative scales up across the continent, governments and development partners should consider how solar-based solutions can aid vaccine delivery. They are invaluable tools perhaps even equal in importance to the vaccines themselves.

Unreliable power is extremely costly for vaccination efforts. Each year, nearly 50% of freeze-dried and 25% of liquid vaccines are wasted.