Solar-PV-Powered Refrigerator



Why to choose this solution?
The solar refrigerator is a cooling unit that uses electricity produced by a photovoltais (PV) solar cell panel and stored in a battery. The fridge typically has low-voltage (12V or 24 V) input. They can be used in hospitals, homes, and for commercial purposes like shops and dairy products. They are used mostly in off-grid areas. The size typically varies from 10 to 85 liters

Savings per day or production:
The solar-powered fridge helps to reduce financial bills, as once it is installed, there are no monthly bills for electricity to run it. This also helps to save money because the expenditures are reduced for buying ice blocks and diesel or petrol for generators to keep drugs and foods fresh daily in off-grid / on- grid areas. It is environment-friendly, as there is no release of CO2/kWh emission from a solar-based refrigeration system.

Cost in money and in own time to construct:
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Lifetime:
It is durable. The refrigerator has a lifespan of over 10 years, the solar panel 15 years, and the batteries last 5 year.

Maintenance needed:
Unlike traditional refrigerators, there is no need for any fuel or gas. The panel must be cleaned regularly to remove dirt that can prevent sun rays from reaching the panel. The refrigerator does not need regular checking, except the usual cleaning.

Resources needed in use:
Sunlight, panel, batteries, refrigerator, wires, regulator.

Problems and limits:
Requires a relatively big investment. The initial cost involved is high, which makes it unavailable to people with low incomes. There may be a lack of good quality materials or equipment in the markets. Improper connections of wire to the refrigerator can cause short circuit.

Where and how can you get it or make it?
JEEP is promoting it. It has been installed in health centres and green power units on Ssese islands for business purposes. The solar-powered refrigerator can be purchased from shops in Uganda that sell solar equipment, or it can be shipped from China, England, Germany, etc. It will then require installation with solar panel.

Skills needed to produce, install. maintenance, use:
A trained electrical engineer must install the system and orient the end-user to start using the solar refrigerator.

How to use it:
Not necessary.

How to maintain it:
Not necessary.

Climate effect (if any):
It is environment-friendly, since there is no emission of carbon. Solar-powered refrigerators run solely on natural radiation from the sun. The system reduces carbon emissions to the atmosphere when it replaces use of generators for power. It is simple, reliable, and safe for the person operating it. It is also energy-efficient.

Where it is used and how many users are there?
It is effectively used in off-grid, rural, and peri-urban areas and used by around 1,000,000 people for domestic, hospital and commercial purpose.

Why is it successful?
It is efficient and can be operated easily. It is well known and can be used in several places, e.g., for hospitals and green enterprises. It has greatly contributed to improved services at health facilities, keeping medicines and vaccines cool. Hence, it has helped to reduce the infant mortality rate in many off-grid areas. After the equipment is purchased, professional maintenance can be done after 3 -5 years.

If you can make it, a short description, typical problems, materials needed:
Not applicable. Requires trained personnel.

How to make it (if possible):
Not relevant.

How is it delivered and by whom?
The business model of the refrigerator is through procuring the refrigerator, batteries, solar panels, inverter, and other accessories. A professional electrical engineer installs these. It can be adopted and acquired by various parties through the private sector, NGOs, and government. To ensure quality, Uganda National Bureau of Standards (UNBS) and Uganda Solar Electrification Association (USEA) certify the solar equipment. The effectiveness of the solar fridges encourages people to buy these solar-powered refrigerators. Solar Associations and CSOs have promoted the use of solar energy. JEEP also promotes these technologies.

Successful financial model
Support from government and other development partners provides these refrigerators mainly in hospitals as well as in small-scale enterprises in rural, peri-urban, and off-grid areas. Establishment of solar associations has occurred. There has been training of local electricians, and â€œstart your own businessâ€• incentives have

been offered.

What policies and strategies helped the success?
Government programs implemented by different ministries, for example the Ministry of Energy, are conducting training of communities on use of solar energy and use of equipment that can be installed, to encourage people to get equipment. The Uganda Ministry of Energy has brought together organisations that can procure equipment for a group, which remits funds to the organisation; it is also cheaper for the group. Training and advocacy in communities promote positive attitudes toward environmental conservation. The government, through the Ministry of Health, is promoting solar refrigerators in off-grid, peri-urban, and rural hospitals to facilitate drug and vaccine storage. There are many solar subsidies and tax waivers, which have been put in place through the Uganda revenue authority.

More info:
https://apps.who.int/iris/bitstream/handle/10665/254715/WHO-IVB-17.01-eng.pdf?sequence=1

Sources:

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