

EFFICIENCY FOR ACCESS RESEARCH AND DEVELOPMENT FUND: INNOVATOR SERIES

TRUCK-MOUNTED, SOLAR REFRIGERATORS TO ENABLE LOCAL FARMERS IN INDIA TO REACH NEW MARKETS



[Sustainable Development Goal \(SDG\) 12](#) (Responsible Consumption and Production) seeks to address the issue of global food loss and waste, which continues to be a significant problem, especially in developing countries.

Access to cold storage can help combat food loss and waste. However, in India, the cold storage market is fragmented. In 2020, India had about 8,200 cold storage facilities, 75% of which were suitable only for storing single commodities, such as potatoes, one of the major crops in India in terms of production and consumption. Currently, cold storage facilities are hugely capital-intensive, with rental premium of around three – four times that of traditional warehouses in India.

As a result, there is a need for reliable and affordable cold storage solutions that address the increasing demand for cold products, and reduces food waste.

The Efficiency for Access Research and Development Fund supported Devidayal to create a cold chain ecosystem with truck-mounted solar refrigerators & a smartphone-based demand and distribution system to enable local farmers to reach markets.

DID YOU KNOW?

Energy consumption in India has more than doubled since 2000.

DEVIDAYAL SOLAR SOLUTIONS: HELPING REMOTE COMMUNITIES GAIN ACCESS TO ENERGY

Devidayal Solar Solutions Pvt Ltd was established in 2015 and is based in Mumbai, Maharashtra. It has offices in Delhi and Indore in India. The company focuses on low-income households living in remote communities where access to reliable energy is a challenge.

DEVIDAYAL :

"The Efficiency for Access Research and Development Fund was critical for us and gave us the flexibility to innovate with our cold chain solutions whether mobile, by typology, and use cases and technologies. We are very grateful for this opportunity."

– Tushar Devidayal, Founder and CEO, Devidayal Solar Solutions

CREATING A DECENTRALISED, RENEWABLE ENERGY COOLING SOLUTION

The project aimed to create a decentralised, solar-powered cooling solution. This would strengthen the dairy value chain, support shop owners by helping to reduce their electricity bills, increase income, avoid fish spoilage, and save on the use of ice. Devidayal also worked with women cooperatives who picked forest fruit to be stored in their fridges.

Initially, Devidayal conducted a needs assessment to evaluate the requirements of microentrepreneurs. The assessment aimed to gather accurate information on technologies, the potential income generation through intervention, the design, and the overall business ecosystem of the possible sites for cold storage. The company then assessed the design of the product, from type of refrigerator needed, capacity, to solar design and battery backup. The main criteria were the requirement of the entrepreneurs and the potential market or type of products that need to be cooled.

Based on the needs of the microentrepreneurs demonstrated in the assessment, Devidayal decided to create a truck-mounted, DC refrigerator. The refrigerator is easy to transport and helps microentrepreneurs as they can travel with produce. The company trialed the use of flexi panels on the truck. These solar panels mean that the refrigerator can be used anywhere, and has a constant power supply.



With support from the Efficiency for Access Research and Development Fund, Devidayal conducted pilots with different cold storage solutions for different value chains. Each pilot saw the installation of several solar refrigerators and a partnership with local entrepreneurs. In the pilot, Devidayal tested its fridges as a dairy cooler, fish chiller, vaccine storage and fruit pulp preserver. The product team tailored these solutions specifically for customers based on the insights and data received from micro entrepreneurs.

Devidayal appointed a third-party impact assessment agency to conduct an end line survey and comparison study for between pre and post intervention. They also trialed financial support to meet the small business owner’s need to own the solution, by designing it to suit the entrepreneur’s income generation. Devidayal collaborated with a financial partner Ashv Finance to provide consumer financing on their products.

WHAT DID THE PROJECT ACHIEVE?

As part of this project, Devidayal successfully created a cold chain ecosystem with solar DC refrigerators. The refrigerators are suitable for dairy, fisheries, fruit pulp and kirana store micro-entrepreneurs, to support them in earning incremental income.



The company successfully installed 85 refrigerators at 44 locations. Through the surveys, Devidayal found that 73% of the respondents use the refrigerator only for business purposes, while the remaining home-based retailers also use it for household purposes. The refrigerator is in use for an average of almost 19–20 hours in a day. There were 41 individual beneficiaries (micro-entrepreneurs/ proprietors) and 2304 beneficiaries who are part of women-owned producer companies.

Overall, Devidayal's solar-mounted trucks helped their customers to increase their income. 94% of the respondents reported an increase or expansion in production or sales after the installation of the solar refrigerator.

61% of the respondents reported that, since they started using a solar refrigerator, the customers are using less energy and are saving money on grid electricity. All retailers have added a number of new products to their sales portfolio. These include snacks, cold drinks, mineral water, paneer, curd, vegetables, ice cream, mushroom, milk, lassi, and new varieties of fish. All of this has contributed to an increase in income for nearly all (93%) respondents. In fact, 46% of the respondents reported an increase in monthly income of INR 2,000–5,000.

Using the truck-mounted solar refrigerator also had a positive environmental impact. Before using Devidayal's refrigerators, 69% of customers were using grid-supported refrigerators, and 28% used diesel. Both of these have negative environmental impacts, as India's grid is largely powered by coal, and both grid and diesel-powered refrigerators emit harmful greenhouse gases, such as carbon dioxide. Using Devidayal's solar fridge avoids the use of either of these. Just over two-fifths of customers reported benefits of overcoming power outages and a fifth benefited from increased storage time and reduced waste.

Devidayal also tested its fridges in Tanzania. The company worked with ELICO Foundation; a non-profit organisation established with the main goal of accelerating access to modern energy solutions for socio-economic development of rural Africa. ELICO installed 24 Devidayal fridges, specifically targeted to help women and girls in vegetable trading, food vendors and fishing merchandising. This was Devidayal's first international assignment, and second largest installation. As a result, the company signed a tri-partnership with SELCO Foundation and ELICO. It was also able to explore how the fridges performed in completely new geographies.



DEVIDAYAL'S INCREASED MARKET STRENGTH

This project supported Devidayal by strengthening many of the company's verticals. The project helped the company create new jobs, as it hired two more members in the technical team for installation and after sales services. Devidayal also recruited a Communications and Impact Assessment Manager and created a new Marketing & Communications department. This department is responsible for all the communications with different stakeholders of the company, impact assessments, PR, social media and below-the-line (BTL) marketing activities.

Secondly, the project enabled Devidayal to form new partnerships with local social enterprises and NGOs. Devidayal partnered with four for-profit organisations, one government agency, and three social organisations. All these partners are working to provide livelihood opportunities to low-income households and have inclination towards women empowerment.



The data collected through the project and the segments the company was able to pilot because of the Fund played an important role to leverage two equity investments into Devidayal.

Finally, Devidayal was able to develop successful use cases from the installation and impact assessment conducted under the project. These success stories and impact figures will support the company to secure more investments and enhance market visibility in the future.

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