CASE STUDY

COPELAND VARIABLE SPEED COMPRESSORS

Solar-powered cold storages: Elevating rural Indian agriculture and inspiring pride

A "magic" story from an incredible country.

Copeland and Ecozen have developed an innovative solar cold room system that addresses critical postharvest challenges in India. This state-of-the-art refrigeration solution, widely adopted across rural India, is designed to be reliable, efficient, and sustainable. By integrating cutting-edge technology with renewable energy, it has quietly revolutionized agricultural practices and significantly improved the quality of life for farmers.

The challenge is to develop a refrigeration system for off-grid cold rooms at the farm level. The solar cold room solution features Copeland's cutting-edge and highly efficient ZBW variable speed compressors, which offer a large frequency variation from 30 Hz to 100 Hz. This capability allows the system to start at low current/voltage, achieve faster pull-down at peak load, and provide simultaneous thermal storage to support cooling during nighttime. Additionally, the system ensures smooth operation even during periods of low solar intensity or during the monsoon season. Copeland's innovative variable speed technology coupled with enhanced vapor injection (EVI) improves efficiency by up to 17%, delivering phenomenal energy savings through total off-grid operations.

The ability to start at low current/voltage also enhances operational reliability, allowing users to reduce the overall material and system cost. This contributes to a lighter and slimmer system profile, making it easier to install and more convenient for farmers to use.

COPELAND

Improve sustainability

As of now, Copeland has deployed over 300 variable speed compressors in the solar cold room system. The system has achieved a remarkable reduction of approximately 22 tons of CO_2 emissions (for 5 tons of cold room) compared to traditional systems. It supports multiple low-GWP (Global Warming Potential) refrigerants, which further reduce CO_2 emissions. Moreover, the technology eliminates the need for diesel generator backups, helping to decrease operating expenses and CO_2 emissions.

Enhance agricultural development

The solar-powered refrigeration "magic" boxes have become indispensable for the "first mile" of local agriculture, by rapidly cooling and preserving crops post-harvest in a sustainable manner. The system not only reduces waste but also boosts farmers' income. A prime example is the pumpkin: during peak seasons, it can be sold fresh at four times the off-season price when stored properly in these units. It also extends the shelf life, quality, and nutritional value of farm products, thereby enhancing the overall health and economic well-being of the communities. In this way, it ushers in a more prosperous and sustainable future for Indian agriculture.

Copeland value proposition

Save up to 17% power consumption with variable speed and vapor injection scroll technology (versus conventional compressors)

Enjoy faster payback and reduced lifecycle costs, helping to maximize investment returns over time

Lower noise levels and reduced vibrations due to less moving parts

15% lighter than conventional compressors, optimizing overall system for better efficiency and easier handling

Variable speed technology helps optimum use of solar power

Multi-refrigerant application including low-GWP

Achieve zero CO_2 emissions during off-grid operation, reinforcing our commitment to sustainable practices

Extend perishables' shelf life while maintaining quality, nutrition, and product weight.

To learn more, visit **copeland.com**

COPELAND