



Solar-Powered Dome Drying: A Green Solution for Reducing Post-Harvest Losses and Improving Agricultural Value

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Authors: Virakroth VY, Saveth PATH, Sopheak THY

ABOUT ARDB ACE-GFA

APRACA Center of Excellence – Green Finance to Agriculture of Agricultural and Rural Development Bank (ARDB ACE-GFA), established on August 8, 2024, continues to play a pivotal role in advancing sustainable development within Cambodia's agri-food and financial sectors under the framework of APRACA. The Center focuses on fostering green and climate finance solutions, strengthening institutional capacity through research and training, and promoting knowledge exchange and policy dialogue.

What is Solar-Powered Dome Drying?

Solar-powered dome drying is an eco-friendly food and crop preservation method. It uses a greenhouse-like parabolic structure covered in UV-protective polycarbonate sheets. Solar panels power small exhaust fans to circulate air, trapping heat to dry items like fish, fruits, and coffee quickly and hygienically.



❖ Key Features and Design

Parabolic Shape

Minimizes wind resistance and maximizes sunlight capture from all angles.

Polycarbonate Cover

Replaces heavy glass to create an affordable greenhouse effect while blocking harmful UV rays that degrade food quality.

Solar Ventilation

Uses small photovoltaic panels to run exhaust fans, pulling fresh air in and pushing humid air out.

❖ Primary Core Benefits

- **Speed:** Cuts drying time drastically compared to open-air methods (e.g., hours instead of days for fish).
- **Hygiene:** Keeps out dust, rain, insects, and animals.
- **Quality Control:** Preserves natural color, smell, taste, and nutrients.
- **Sustainability:** Produces zero emissions and removes the need for firewood or fossil fuels.

❖ Solar-Powered Dome Drying Specification

TYPE	MINI	SMALL	MEDIUM	LARGE
Dimension	2*4	6*8	8*12	8*20
Capacity	150-200 kg	350kg	600kg	1000kg
Remark	Zero Electricity 40 Trays (5 Shelves) No resistance	Zero Electricity 30 Trays (1 Shelf) No resistance	Zero Electricity 66 Trays (1 Shelf) No resistance	Zero Electricity 114 Trays (1 Shelf) No resistance
Warranty of Pc Carbonate	10 years	10 years	10 years	10 years
Control	Temp & Humi	Temp & Humi	Temp & Humi	Temp & Humi
Price (USD)	Approx. 3,900	Approx 14,500	Approx. 21,000	Approx. 30,000

Sources: Harvest the Sun, ITZ Resources

-Exclude transportation and installation cost,
-Exclude GAS Burner approx. USD 3,900

❑ Why Does It Matter?

- Agricultural products often require proper drying after harvest to reduce moisture, prevent spoilage, and maintain product quality.
- However, traditional open-air drying can be affected by rain, high humidity, dust, insects, animals, and other contaminants.
- Uneven or insufficient drying can also lead to mold growth, deterioration, reduced shelf life, and lower market value.
- Solar-powered dome drying provides a more controlled, hygienic, and energy-efficient drying environment by using solar energy as a clean and renewable source of heat.
- It can help achieve more consistent drying, reduce drying time, and protect products from unfavorable weather and contamination.
- For farmers and agricultural businesses, improved drying can reduce post-harvest losses, maintain product quality, extend storage life, reduce energy costs, and potentially achieve better market prices.
- At the same time, replacing conventional fuel-based drying with solar energy can reduce fossil-fuel consumption and greenhouse-gas emissions, supporting a more sustainable and climate-smart agricultural value chain.



❑ Suitable Agricultural Products

- Grains: Rice, maize, wheat, and other cereals
- Root crops: Cassava, sweet potato, taro, and other tubers
- Fruits: Mango, banana, pineapple, jackfruit, papaya, and other fruits
- Vegetables: Chili, tomato, onion, garlic, pumpkin, and leafy vegetables
- Herbs and spices: Ginger, turmeric, lemongrass, pepper, and other herbs and spices
- Seeds and legumes: Beans, soybean, peanuts, and other crops requiring proper drying before storage
- Other agricultural products: Fish and selected animal products where appropriate drying conditions and food-safety standards can be maintained.



➤ How Does It Benefit Agriculture?

- Reduces post-harvest losses, spoilage, and product wastage.
- Improves product quality, including color, taste, appearance, and nutrient retention.
- Provides faster and more consistent drying while reducing labor, energy, and drying costs.
- Ensures high hygiene standards by protecting products from dust, pollution, insects, animals, moisture, and other contaminants.
- Extends product shelf life and improves storage durability.
- Uses UV protection to help preserve the color and nutrients of fruits and vegetables.
- Parabolic dome design allows water to run off the walls, preventing contamination.
- Increases product value and profit margins through better-quality dried products.
- Enables farmers to obtain better prices, including by storing products longer and selling when market conditions are favorable.
- Improves farmers' affordability, profitability, and repayment capacity.



➤ Climate & Environmental Benefits

By using abundant solar energy instead of conventional fuels, solar-powered dome drying can reduce emissions and energy costs while minimizing post-harvest losses and supporting a more sustainable and climate-resilient agricultural value chain.

- ☀ **Uses renewable energy:** Harnesses solar energy as a clean and renewable source of heat for drying agricultural products.
- 🌱 **Reduces greenhouse-gas emissions:** Reduces reliance on diesel, firewood, or other fossil fuels, helping lower CO₂ and other emissions.
- ♻️ **Reduces energy consumption:** Solar drying can reduce the need for conventional heating and fuel, lowering the environmental footprint of agricultural processing.
- 🍃 **Reduces post-harvest losses:** Better drying and preservation can reduce food and agricultural waste, helping avoid the environmental impacts associated with producing food that is ultimately lost.
- 🌳 **Reduces pressure on natural resources:** Where firewood is traditionally used for drying, solar energy can reduce demand for biomass and help limit pressure on forests.
- ☁️ **Supports climate-resilient agriculture:** A protected drying environment can reduce farmers' dependence on unpredictable weather conditions, particularly during rainy or humid periods.
- 🌍 **Supports sustainable agricultural value chains:** Integrating renewable energy into post-harvest activities contributes to cleaner and more climate-smart agricultural production.

✓ Green Financing Opportunity & Access to Finance

Solar-powered dome drying is a practical green investment for farmers and agricultural businesses that can help reduce post-harvest losses, improve product quality, lower drying costs, and create greater value from agricultural products.

As a state-owned bank with a strong focus on agriculture, ARDB provides concessional financing through its Green Loan to eligible farmers and other stakeholders across the agricultural value chain.

Solar-powered dome drying can be considered a green investment

supporting both climate change mitigation and adaptation, while promoting sustainable agricultural production and resilience.

Through ARDB Green Loan, eligible farmers and agricultural businesses can explore financing for solar-powered dome drying systems and related investments, helping them reduce post-harvest losses, improve product quality, lower energy costs, and build more resilient and sustainable agricultural businesses.

On the supply side, notably Harvest the Sun a premier provider of agricultural drying technologies in Cambodia. Harvest the Sun specializes in the supply, installation, and distribution of advanced Solar Domes (solar dryer domes). Their greenhouse-style solar dryers leverage solar thermal energy to deliver hygienic, weather-protected, and highly efficient crop drying solutions.



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