

Solar Mill

The challenge: Farmers in off-grid rural areas often lack milling facilities in their local community. This means they must transport their crops, often by foot, to neighbouring settlements for milling. The nearest mill may be run off the grid, though they are often diesel-powered, causing pollution.

The solution: Solar-powered mills can be installed and operate effectively in off-grid communities, saving farmers time and effort. Local milling solutions are also, usually, cheaper per kg.

The technology: The system is battery-less. It consists of solar panels (e.g. 7 kilowatt-peak (KWp)), a Variable Frequency Drive, a 3-horsepower Permanent Magnet Synchronous Motor and a combined mill. A 'combined' mill can be used for both de-husking and grinding. The combination of a Variable Frequency Drive and a Permanent Magnet Synchronous Motor makes this system more robust and enables it to operate even when sunlight is less powerful in the morning and during the late afternoon. The Variable Frequency Drive has an inbuilt Maximum Power Point Tracking charge controller which is used to harness the maximum available energy from sunlight and maintain the frequency required to run the mill smoothly. The direct current generated by the solar panels is converted to alternating current at the frequency required to run the motor at a speed of 1400 rpm. The motor then connects to the mill by a belt drive. There is a change-over switch which allows the operator to select whether to use the mill for grinding or de-husking.

Illustrative output: The size of the system can vary, but a typical mill can process 100 kg per hour. So, on an average day of 5-6 hours of sunshine, the mill can process 500-600 kg.

Lifespan? @15 years.

Why choose a solar mill?

- ✓ Efficient, effective and environmentally-friendly milling option.
- ✓ Can operate in remote and off-grid locations.
- ✓ Cheap to run and maintain.
- ✓ Can be shared by cooperatives and farmers' groups.

