1.3.2.3 Photovoltaics is not an alternative

Is photovoltaics a viable alternative to OPEN WINDMILL?

Problems and disadvantages of water supply from pumps powered by electricity:
Drinking water and water for land irrigation must be absolutely reliable. Failures - even of short duration - have catastrophic consequences.

Advantages undisputed
Undoubtedly, there are many applications in which, overall, solar-powered water pumps have clear advantages over the KUKATE34 wind pump. This may be the case, for example, where a political and economic infrastructure is intact and stable. Neighbors help out with water. Spare parts can be procured at short notice and repairs are quickly arranged there.

But the decisive disadvantages in all areas of the world where this is not the case are as follows:

1. Coordinated **photovoltaic modules** must always be available and replaceable. They must be withstand thunderstorms, hail, storms (including sandstorms) and cloudbursts without damage. They should be secured against sabotage and theft and may need to be guarded day and night.

2. Special electrochemical energy storage devices (accumulators) are usually useful and/or required, which will
can store a certain amount of solar energy for night pump operation. Often, for example land irrigation makes more sense at night than during the day for economic and ecological reasons. The service life of these expensive batteries is limited. Therefore, they must be replaced periodically.

3. Reliable and suitable **electrically operated centrifugal pumps** (dry-running safe, waterproof ...) and their **spare parts** must be available with absolute guarantee. If the delivery head is more than 7m, even electric submersible pumps are required, which have to push the water from the depth to the surface at high speeds. These centrifugal pumps are not self-repairable. They must operate reliably for several thousand hours per year at high speeds. These pumps are expensive.

4. An **electronic and electrical control system** must be adapted to the individual components (accumulators, pump) and electrical control system must function fail-safely. For this reason, only expensive control components that are overvoltage that are surge- and lightning-proof are suitable. Their housings must protect the electronics from insect, moisture and, in most cases, water.
It is essential to store **suitable electronic and electrical control elements** as spare parts on site , if necessary, to be able to procure them again quickly.

5. Ensuring the operation of all components, units and assemblies requires professional qualification on the part of the operators at the level of the mechatronics technician, who can be called up immediately and used on site with the appropriate equipment.

Summary:
A chain is as strong (or weak) as each individual link. If, at the place of consideration the political and economic infrastructure is intact and stable, a photovoltaic-powered water supply may be

may make more sense than a wind-powered pump.

If the conditions do not match these favorable circumstances and one of the many components enumerated above components listed above fail, the entire operation breaks down - the chain breaks - and there is no water .....
The possibility of being able to repair even technical damage with simple means is not available. The required permanent, multiple, secure provision of most components is both expensive and utopian,
at the same time. The multiple technical, economic and political dependencies from outside threaten the entire water supply when using a photovoltaic-dependent system. There are hardly **possibilities for improvisation.** A lightning strike, a hailstorm, a theft or sabotage, the failure of a part of the electronics or the pump: the consequences are in any case catastrophic for those affected ...

Advantages of the KUKATE34 wind pump
The OPEN MILL system is different: In case of a component failure, it can be replaced or repaired with little effort or repaired within hours. Steel components, wooden bearings or leather seals are easy to replace.
The KUKATE wind energy converters have no pneumatic, electronic or hydraulic construction components. Simple agricultural machinery construction skills on the level of a medium technology are sufficient to be able to operate them reliably in the long term.