

Grid System

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1. OFF-Grid PV System.

- An off-grid PV system is an installation that operates independently from the electricity grid.
- This means all the energy generated is stored and consumed on-site.
- To ensure a continuous power supply, off-grid systems require battery storage and often a backup generator.
- Typically, battery banks need replacement after about 10 years.
- Batteries are complex, costly, and reduce the overall system efficiency.
- In certain remote areas, off-grid systems can be more cost-effective than extending power lines.
- Additionally, off-grid systems are unaffected by power outages on the utility grid.

2. ON-Grid PV System

- **Grid-tied** or **on-grid** systems refer to solar installations that are connected to the utility power grid.
- These systems do not require batteries, which reduces the initial investment.
- During the day, electricity generated by the solar panels powers the building or is sent to the grid. At night, when no solar power is produced, electricity is drawn from the grid.
- A key component of this setup is a **net meter**, which measures the electricity supplied to the grid and the amount taken from it. This setup improves efficiency by utilizing the grid as backup power.

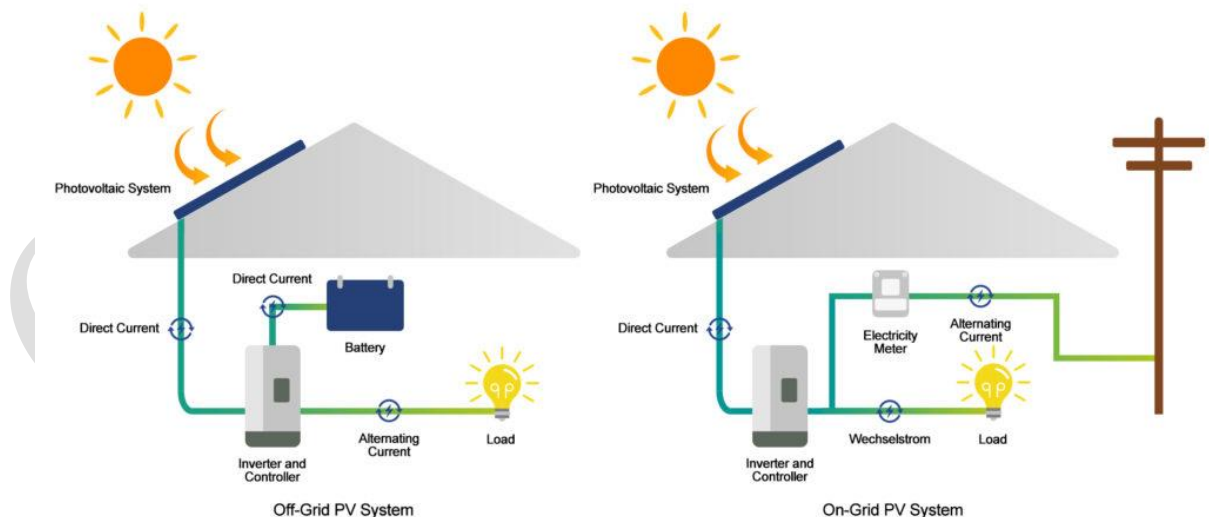


Figure 1: Grid systems.

3. Hybrid PV System

- These systems combine the best features of both grid-connected and off-grid setups by including a battery, allowing them to operate without relying on the grid unless necessary.

- If there is a malfunction in one of the batteries or unfavourable conditions for the solar panels, the grid can provide the required power.
- The overall cost is lower compared to off-grid systems, as the battery capacity can be reduced due to the ability to use grid power when needed.

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