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On-grid or off-grid solar power for homes and MSMEs?

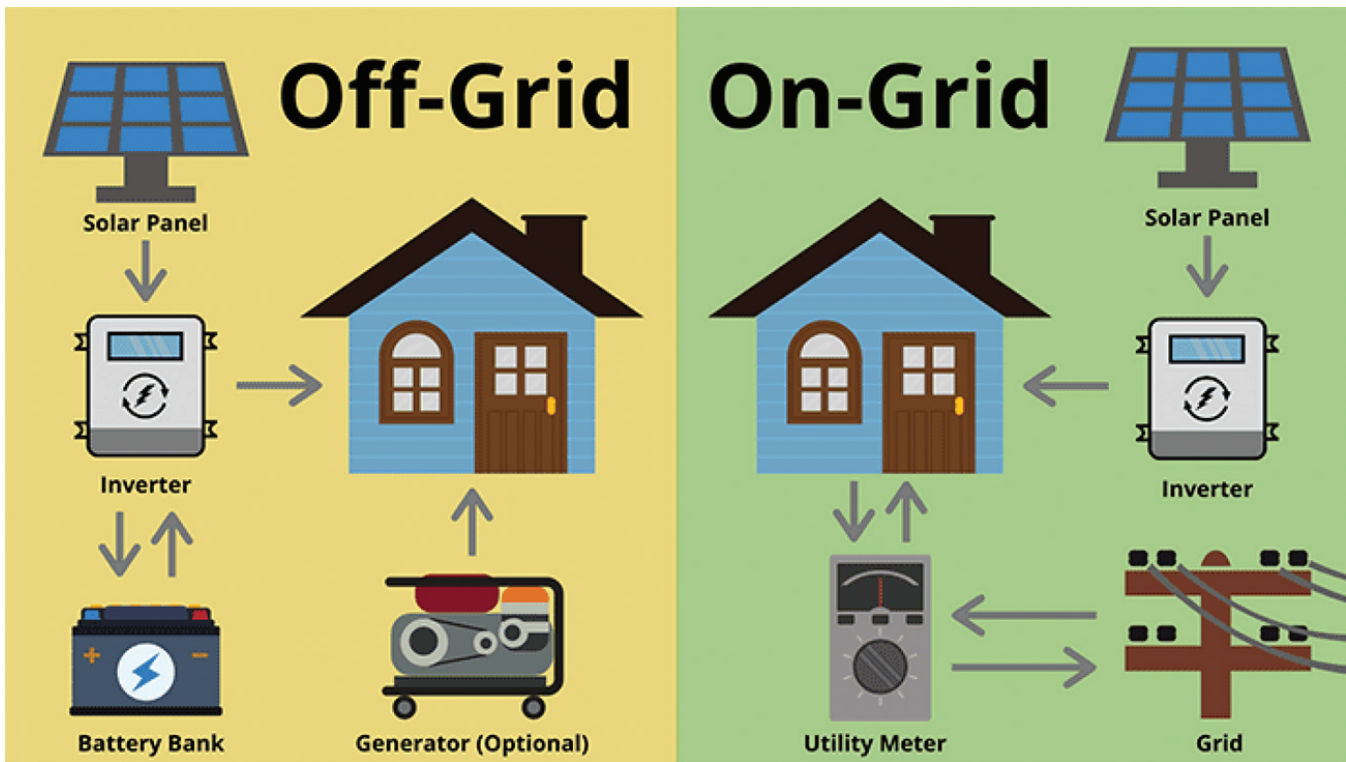
To a solar power utility there is a choice to make – whether to connect (on-grid) or not to connect (off-grid) with a local grid. On-grid means the solar system is tied to local utility’s grid. This is what many utilities like because in times when one’s own output is less than required, it can draw from the grid and when you are producing excess you deliver the extra to the grid. So the utility is covered if its solar system under or

over-produces. All this means is that the utility system acts battery in off-grid solar power system. It is a type of solar power system with a backup which works in day and night both. During the day, the solar panel charges the battery. At night, the inverter provides the power to the utility. Understandably, both throw up cases for choice. Let us discuss.

Aspect	On-grid solar power	Off-grid solar power	Comments
01 Flexibility	You will not need a major battery storage and hence less system complications.	You will need a major battery storage and hence more system complications.	Both are vulnerable to natural events but on-grid solar systems are supported by a service organization, which can be costly, so catastrophic events can be better managed and the service can be resumed quickly.
02 Outage	In a grid-tied solar system if the grid goes down, there will not have electricity, unless the grid is tied the system with battery backup.	The system is working independent of the power grid. In bad storm or knocking out of the power, the system can continue operating. No changes in the service or access to electricity if the event does not impact the off grid power.	Recent one of the worst winter storm Texas, US power outage point towards a battery in the garage; a thing that may become more common. The soaring electricity prices and massive outages following the collapse of the power system after the Feb. 15, 2021 storm is likely to be a turning point for the solar industry.
03 Cost	Capital cost and running cost are lesser because the battery, etc. is not required. Grid connection and service is an added cost.	Capital cost and running cost are higher because of the battery, etc. Grid connection and service is an added cost.	Taken into the considerations of subsidy, etc. and local availability of equipment and labor the cost difference may be marginal and might favor one against the other. Texas grid operators scrambled to avoid damaging equipment that could have left the state in the dark for months. The Texas event as mentioned above the shortfall in the on grid sent electricity prices soaring 10,000%. For some customers on variable-rate plans who were fully exposed to wholesale price fluctuations, utility bills followed suit.

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04 Performance	Simulation results show that both the systems exhibit excellent performance, but the on-grid photovoltaic power system requires cheaper cost compared with the off-grid photovoltaic power system. The total net present cost of the off-grid solution is \$6,244, and its energy cost is \$0.196/kWh.	Simulation results show that both the systems exhibit excellent performance, but the off-grid photovoltaic power system requires higher cost compared with the on-grid photovoltaic power system. The total net present cost of the on-grid system is \$6,115, with energy cost equal to \$0.183/kWh.	The case study is based in Iraq where the sunlight is available for long duration and summer energy requirements at homes are much higher than the winter. The readers must use discretion in referring to this text.



Picture courtesy and acknowledgement: Sara Gambone, "The difference between off-grid and on-grid solar energy" source: <https://www.paradisolarsolarenergy.com/blog/difference-between-off-grid-and-on-grid-solar-energy>

New solution: The choice is hybrid where the user will have the flexibility of saving by a battery as well as the choice of being connected to the grid – all obviously with higher price but more convenience and flexibility.

Take this example: retail electricity prices in Australia have nearly doubled since 2005 to help pay for upgrades to aging infrastructure. Combined with incentives and falling solar

prices, residential solar installations have taken off. The country has the highest rate of home solar adoption of any major economy: at least one in four Australian homes have rooftop solar panels. The systems typically pay for themselves in a few years. One homeowner claimed that installing a \$3,000 solar panel system, his monthly \$190 utility bill turned into a \$30 credit (thanks to the utility paying for excess electricity he or she are passing to the grid).