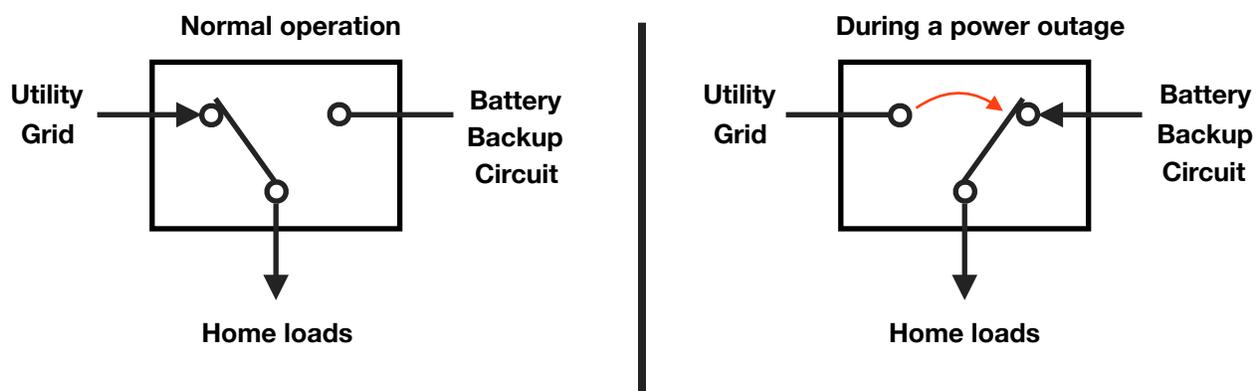




Whole home backup challenges to consider

Systems with backup power capabilities require an external automatic transfer switch (ATS) to allow for off-grid operation. This component connects your home, the grid, your battery energy storage system, and your solar energy system all together so the battery system can automatically power your home appliances when the grid goes down. The ATS separates the home's electrical system from the grid during a power outage and allows a battery backup system to safely operate without feeding power back to the grid.

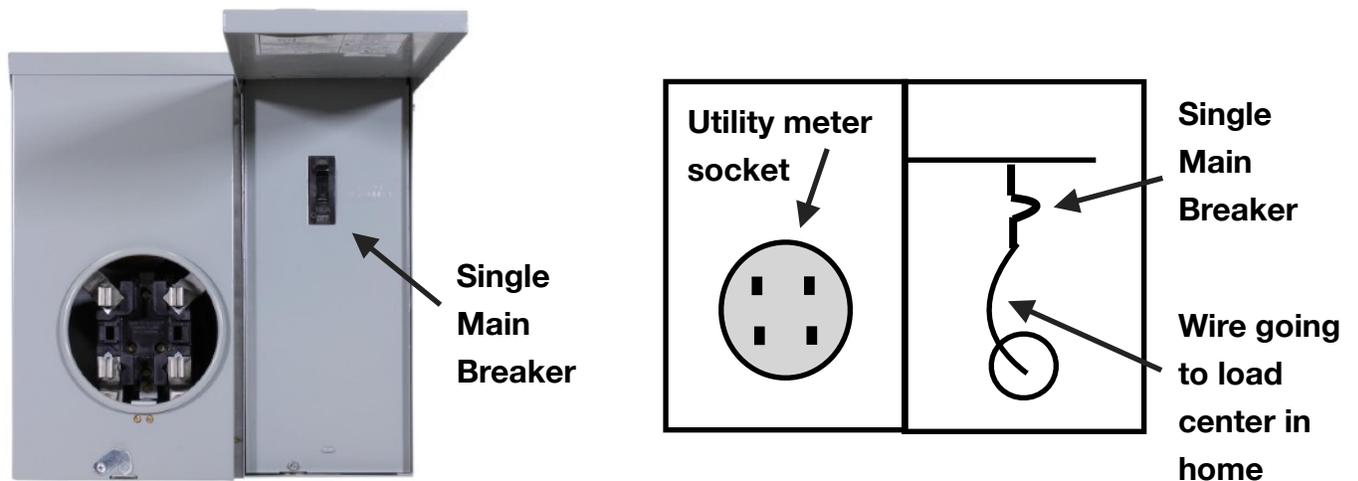


Battery energy storage systems with backup capabilities work best when they are designed to ration battery capacity and minimize the use of major appliances. Whole home backup systems are typically designed similar to off-grid living: the homes are typically smaller and well insulated; use combustion heating with propane backup; incorporate active and passive solar thermal systems; and do not have power-hungry air conditioning systems, level 2 EV chargers, or swimming pools.

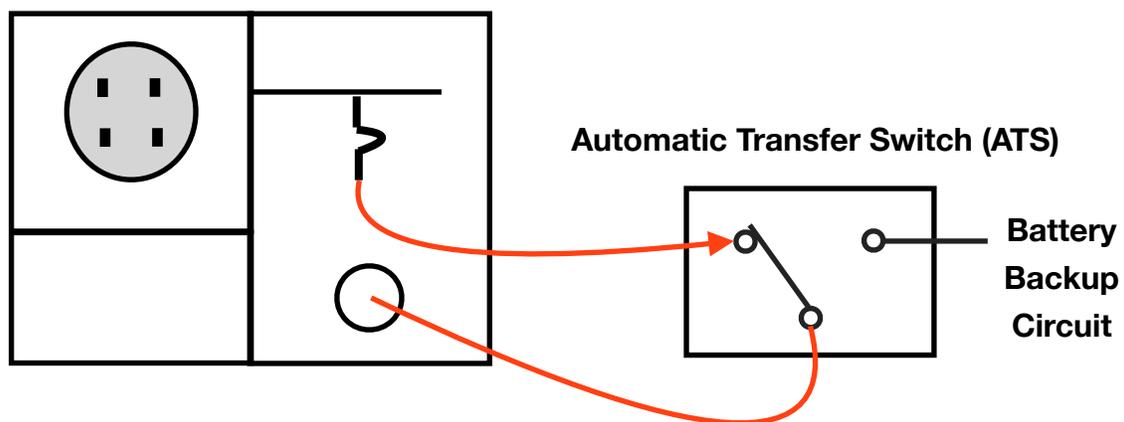
Of course, installing additional battery capacity and inverter power can address these energy and power limitations. But the cost of these systems may be too high for the typical homeowner. For more information on this topic please refer to the document, *Battery Energy Storage Fundamentals*.

If you are still interested in pursuing whole home backup, then you should be aware of some technical challenges encountered along the way. These challenges typically start with the design of the home's existing electrical infrastructure and type of utility meter enclosure.

An ATS is designed to isolate the home's electrical system from the grid at a single point of connection. This is typically done with the home's "main breaker" located at the utility meter.



Example of a single main breaker feeding the whole home on the left and an illustration view of the same on the right

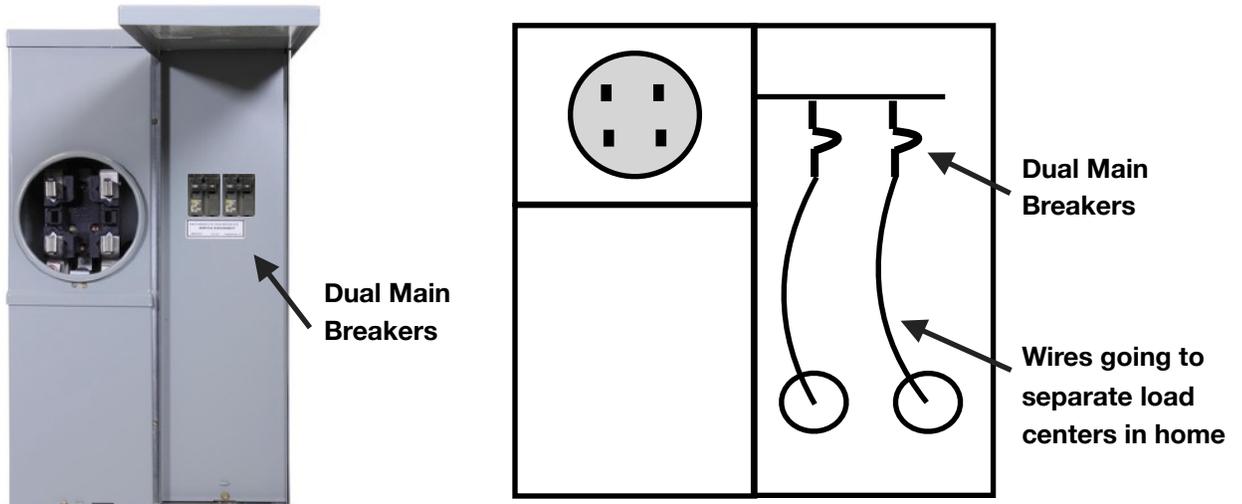


A single main breaker allows the entire home's power to be routed through the ATS for whole home backup.

Unfortunately, there are many meter configurations on the market that allow for multiple points of connection between the utility grid and the home's electrical system. Below are some scenarios that help describe this issue along with some example photos and illustrations.

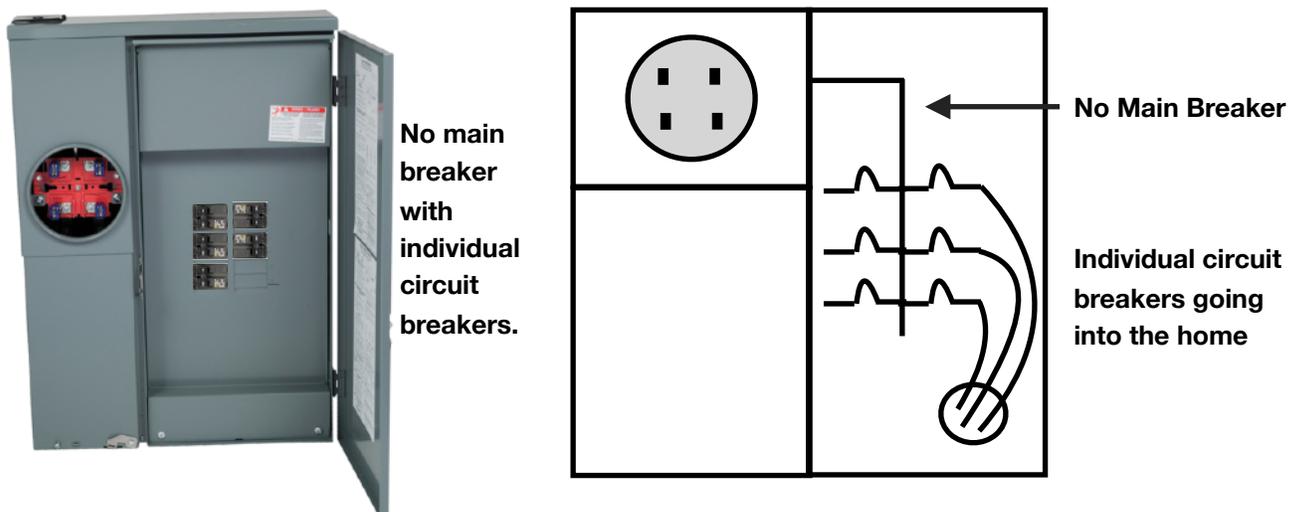
1) Dual Main Breakers

Some homes may have dual main breakers that feed separate load centers within the home.



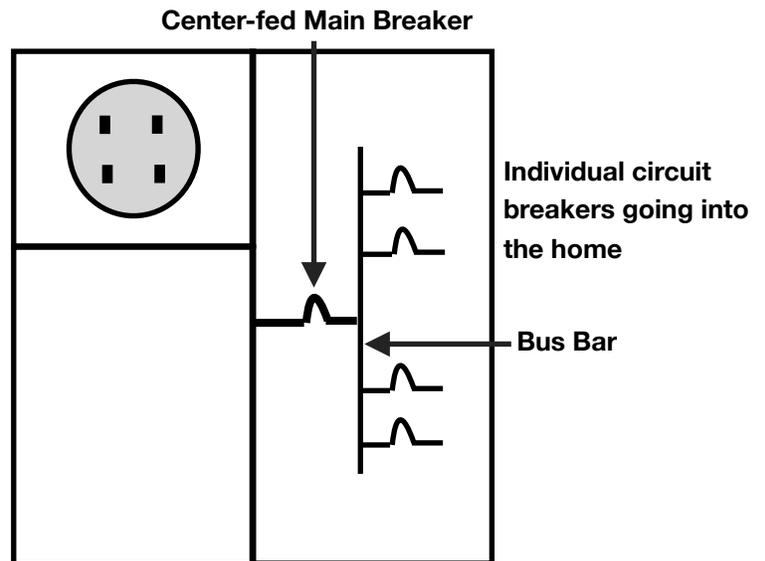
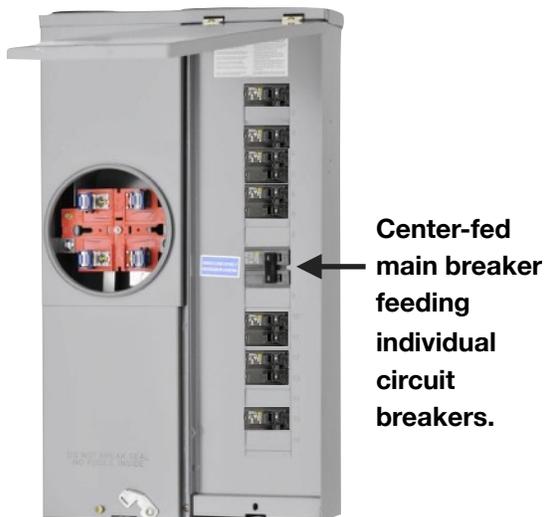
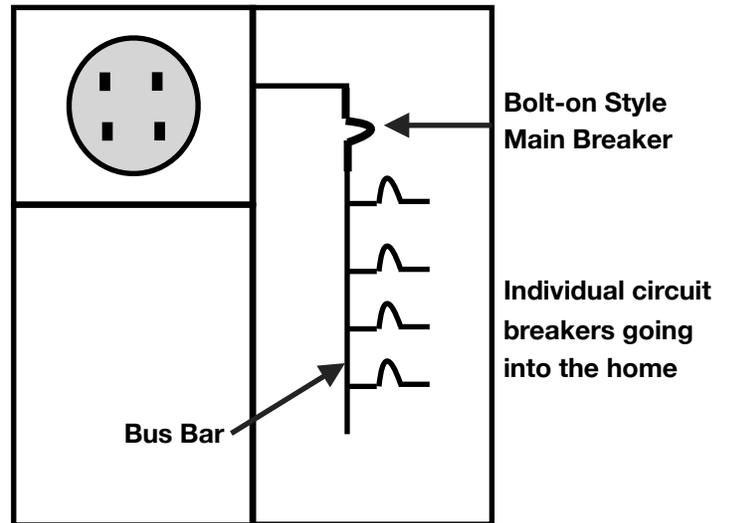
2) No Main Breakers

Some meter enclosures have no main breaker, but instead have individual circuit breakers directly feeding separate home loads.



3) Main Breaker Feeding Bus Bar

Some meter enclosures have a single main breaker, but it is directly connected to a distribution “bus bar” feeding individual circuit breakers to separate home loads. In this case there is no way to get in-between the main breaker and the individual circuit breakers.



In many of these scenarios you will most likely be required to upgrade the electrical service and/or meter enclosure to a different style, or possibly consolidate all of the existing home load breakers into a new main ‘sub panel’ to create a single point of connection for the ATS input.

A possible alternative in these situations is to do a “partial” home backup instead of “whole” home backup. For example, in the first scenario above, you would choose one of the two main breakers to back up a single load center in the home.

A more cost effective and practical approach may be to have the ATS connected to a separate protected loads panel only: no large appliances such as air conditioning, 240-volt EV chargers or electric stoves. Instead, just an appropriate amount of circuits in the house for refrigeration, lighting, entertainment, communications and convenience outlets. A protected loads panel allows a homeowner to segment off a smaller subset of the home’s electrical needs that they want to keep powered during an emergency power outage.

By default, Kumukit battery energy storage systems that have backup power capabilities include a protected loads panel as part of our standard installation. These protected panels provide limited backup power to dedicated electrical outlets located inside the panel. Many homeowners simply plug extension cords into the convenience outlets for emergency power during a power outage, similar to a backup generator.

These protected load panels will not supply power to the entire home during a power outage. There is an option to hard-wire a limited limited number of circuits from within the home to this protected load panel for an additional fee. Every home’s electrical layout is different, so we will need to estimate this amount on a case-by-case basis.

If you are still interested in pursuing a whole home backup solution, we will be more than happy to discuss possible solutions.

