

WEC member protocol to consider how to select/size battery energy storage system (BESS).

Members who want to minimize the inconvenience of power outages have been able to install generators, using licensed electricians and a transfer switch. While generators still are an outage option today battery energy storage systems (BESS) are available, and offer advantages over generators.

There is enormous change in the market and what technology offers for battery choices.

Reduced to a simplified example are three cases, below:

1. Existing residential membership with identified “critical” loads. These will be assessed, and a “standard” BESS proposed.
2. Existing location with net metering installation; grid-tied without any BESS.
3. Existing residential membership, no existing BESS, but plans to install PV/ net metering at some point.

WEC here is describing a BESS for case #1, only.

The other possible cases need to be assessed in a different manner and with different technical solutions and costs.

HOW TO SIZE A BESS? For a majority of WEC residential members the average duration of a power outage is less than four hours. There are locations where the average duration is longer; the solution where the outage history shows a relatively longer duration means the BESS could still work, but the amount of energy stored may be greater than for the “standard” BESS.

CRITICAL LOADS. In order to properly size a BESS for a WEC household, the first step is to understand that what is being proposed is NOT a whole house solution for outages. Rather, the electric loads that will operate during an outage are limited to those which the member selects as “must have”.

Below is a typical “critical loads” list, and a list of loads not considered critical for sizing a BESS:

Critical load	Not a critical load
Water pump	Washing machine
A fossil heat source (boiler, furnace, wall furnace)	Clothes dryer
Some lighting	Electric space heater or hot water
A refrigerator or freezer	Heat pump hot water heater
Microwave	Oven, stove
Sewage pump	Tv, computer/entertainment devices
Router	

This list is not complete, but believed to include the most likely typical loads which members want to be able to use during an outage. There is some flexibility in which loads are considered critical; be aware that adding to the list could increase costs overall.

HARDWARE/INSTALLATION:

The BESS will use approximately 4' x 4' x 2' of wall area, next to the main service entrance. The BESS will have a display (wired, wireless) which provides various operational metrics, including how much power is available in storage.

TAX CREDITS: The federal tax credit for BESS is only applicable when there is a renewable energy generation system installed on a DC-coupled BESS. No federal tax credit is applicable to a BESS on its own.

TRANSFORMER SIZING: The Co-op must provide an adequately sized transformer, for each member household. As members install net metering generation on their property, one trend is that the average size of a household PV array has increased. The increase in PV capacity may cause the transformer to need to be upsized. In addition, member households may also be planning to switch from fossil heating and hot water equipment to electric options, such as heat pumps (HP) and heat pump water heaters (HPWH). The household also may plan to drive an electric vehicle, to further decrease fossil fuel use.

The combination of (1) self-generation under net metering, (2) the transition from fossil heat and hot water and (3) the transition to electric vehicles (EV) or plug in hybrid vehicles (PHEV) will cause the outage issue to become more important. And as the intensity of loads increases, the notion of a BESS may still work, but not necessarily for the additional loads described above. The best solution for a BESS is for "critical loads" only, and not a "whole house" list of electric loads.

HOW TO GET A FIRM QUOTE TO INSTALL A BESS:

First, provide your selection of what you have as "critical loads"; see the earlier explanation. IF there are any loads not described above which the member feels are critical to them, say what this is and include in the selection.

Second, for the water pump, and sewage pump IF present, provide information on the motor size. Most household water pumps are 240 volt, ½ horsepower. There are some with ¾ hp motors as well. One way to determine this size is to look on the control box of the pump (typically on the wall between where the storage tank is, and where the load is energized in the main service entrance).

Third, if there is both a refrigerator and separate freezer which the member believes to be "critical" be sure this is clear (there are 2 such loads, in this example).

Sizing a BESS is similar to sizing a generator, at least initially. Once the details of which critical loads are determined, then there are changes to how BESS is wired, compared to the generator; the generator is often sized as a "whole house" device, and not just for critical loads.

Other issues affecting the installed cost of a BESS include: whether there are existing code or wiring deficiencies, whether a net metering system is already installed or not, convenient access to the service entrance location or not, whether a generator is also intended to be used, or not, and whether the BESS is DC or AC coupled.