Behind the meter batteries

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Battery energy storage systems (BESS) are emerging in all areas of electricity sectors including generation services, ancillary services, transmission services, distribution services, and consumers" energy management services.

Applications of the BESS in the electricity sector are divided into three categories: front-the-meter (FTM), behind-the-meter (BTM), and off-grid, which for long-term operation have to be supported by an off-grid generator.

BTM BESS are connected behind the utility service meter of the commercial, industrial, or residential consumers and their primary objective is consumer energy management and electricity bill savings. The BTM BESS acts as a load during the batteries charging periods and act as a generator during the batteries discharging periods.

BTM BESS, which is in parallel with the utility supply network should be used solely on the consumer side and there should not be any power flow back to the grid. In addition to the BTM BESS, there might be BTM PV or other types of distributed energy resources (DER) in consumer"s facility, as well.

It is necessary to ensure that BTM BESS is not discharging real power to the grid. To meet this requirement, BESS system shall continually monitor the facility load and adjust the BESS discharge not to exceed the facility consumption. In addition to this measure, a reverse power monitoring relay shall be used at the utility supply point to prevent power injection to the utility network in case of failure of BESS monitoring system.

Like the FTM BESS or DER, BTM BESS shall be equipped with the Islanding detection and anti-islanding protection system where BESS inverters cannot meet the anti-islanding requirements as stipulate in IEEE Std 1547, a separate remote or local anti-islanding detection system might be required.

Peak shaving and demand charge management is the use of BTM BESS by the consumer for peak shaving, or smoothing of own peak demand, to minimize the part of their invoice that varies according to their highest power demand, and reducing the overall costs for electric service by reducing demand charges during peak periods specified by the utility.

Power quality management has the objective of using BTM BESS to provide a high level of power quality above and beyond what the utility offers where the facility"s critical loads are very important. In addition, BTM BESS could be used for the limitation of disturbances transmitted at upper levels.

Electric Vehicles (EV) fast charging Integration is the BESS in parallel with DC converted grid supply for charging of electric vehicles or ferries or supplying the peak DC loads. If BTM BESS is being used for this

application only, its inverter is not required to be bidirectional.

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