Understanding Where Energy Storage Connects

Battery Energy Storage Systems (BESS) can connect to the grid in several ways. This fact sheet focuses on three configurations: transmission-connected storage; distribution-connected front-of-the-meter storage; and, behind-the-meter storage located at a customer site.

The Basics:

Front-of-the-Meter (FTM) - *Transmission Connected*

- **Connects to the bulk power system, typically through a transmission substation or transmission line**
- **Provides critical grid services such as reserve power, frequency response, and flexible ramping**
- **Stores energy during lower demand or lower-cost periods and discharges during higher-demand or higher-cost periods**
- **Generates revenue through participation in wholesale electricity markets and/or contracted services**

Front-of-the-Meter (FTM) - *Distribution Connected*

- **Connects to medium voltage lines or local substations**
- **Helps to address local feeder constraints and local conditions on distribution lines**

Behind-the-Meter (BTM)

- **Located on the customer side of the electric meter and serves on-site energy needs by reducing electricity costs, providing backup power, and optimizing energy use**

Photo: American Clean Power Association

Each type of storage serves a different role. Behind-the-meter storage can help customers manage energy costs and provide backup power. Distribution-connected storage can address local grid needs and reduce demand during peak periods. Transmission-connected storage operates at bulk-system scale, providing capacity, energy and grid services to support reliability and affordability.

The Details:

Transmission-Connected Storage

- Adds significant amounts of flexible capacity to the bulk power system
- Adds supply to the capacity market, which can put downward pressure on capacity prices
- Can relieve transmission congestion when strategically located
- Can reduce energy costs by charging during lower-cost periods and discharging during higher-cost periods
- When strategically located, can defer or reduce the need for certain transmission upgrades

Distribution-Connected Storage

- Can reduce system peak demand when discharged during peak periods, potentially reducing capacity needs
- Can help customers reduce demand charges and participate in demand response or other utility programs
- Reduces demand on the bulk power system during peak periods

Important Facts:

Behind-the-meter and distribution-connected storage complement transmission-connected, utility-scale storage. All can reduce peak demand, support grid reliability, and help lower system costs, but they serve different functions and operate at different scales.

Distributed storage can provide important customer and local-grid benefits, while transmission-connected storage can add larger amounts of capacity and flexibility directly to the bulk power system. As PJM faces growing resource adequacy needs, both distributed and transmission-connected storage can play important and complementary roles.