Commercial battery energy storage 19 kWh

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The battery storage technologies do not calculate LCOE or LCOS, so do not use financial assumptions. Therefore all parameters are the same for the R& D and Markets & Policies Financials cases.

The 2023 ATB represents cost and performance for battery storage across a range of durations (1-8 hours). It represents onlylithium-ion batteries (LIBs) - those with nickel manganese cobalt (NMC) and lithium iron phosphate (LFP) chemistries - at this time, with LFP becoming the primary chemistry for stationary storage starting in 2021. There are a variety of other commercial and emerging energy storage technologies; as costs are characterized to the same degree as LIBs, they will be added to future editions of the ATB.

Base year costs for commercial and industrial BESS are based on NREL"s bottom-up BESS cost model using the data and methodology of(Ramasamy et al., 2022), who estimated costs for a300-kWDCstand-alone BESS with four hours of storage. We use the same model and methodology, but we do not restrict the power or energy capacity of the BESS.(Ramasamy et al., 2022)assumed an inverter/storage ratio of 1.67 based on guidance from(Denholm et al., 2017). We adopt this assumption, too.

We also consider the installation of commercial BESS systems at varying levels of duration (Figure 1). Costs come from NREL"s bottom-up PV cost model(Ramasamy et al., 2022). As shown, the cost per kilowatt-hour is lowered dramatically with additional duration. Therefore, accurately estimating the needed duration in commercial applications is critical to determining the total system cost.

Available cost data and projections for distributed battery storage are very limited. Therefore, the battery cost and performance projections in the 2023 ATB are based on the same literature review as that done for the utility-scale and residential battery cost projections: battery cost and performance projections in the 2023 ATB are based on a literature review of 14 sources published in 2021 or 2022, as described by Cole and Karmakar(Cole and Karmakar, 2023). Three projections for 2022 to 2050 are developed for scenario modeling based on this literature.

For a 600kW 4-hour battery, the technology-innovation scenarios for commercial-scale BESS described above result in CAPEX reductions of 17% (Conservative Scenario), 36% (Moderate Scenario), and 52% (Advanced Scenario) between 2022 and 2035. The average annual reduction rates are 1.4% (Conservative Scenario), 2.8% (Moderate Scenario), and 4.0% (Advanced Scenario).

Between 2035 and 2050, the CAPEX reductions are 4% (0.3% per year average) for the Conservative Scenario, 20% (1.3% per year average) for the Moderate Scenario, and 31% (2.1% per year average) for the Advanced Scenario.

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Definition:The bottom-up cost model documented byRamasamy(Ramasamy et al., 2022)contains detailed cost bins. Though the battery pack is a significant cost portion, it is not the majority of the cost of the battery system. This cost breakdown is different if the battery is part of a hybrid system with solar PV or a stand-alone system. These costs for commercial scale stand-alone battery are demonstrated in Figure 3.

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