Commercial energy storage batteries

The 2021 ATB represents cost and performance for battery storage across a range of durations (1-8 hours). It represents lithium-ion batteries only at this time. There are a variety of other commercial and emerging energy storage technologies; as costs are well characterized, they will be added to the ATB.

Current costs for commercial and industrial BESS are based on NREL"s bottom-up BESS cost model using the data and methodology of(Feldman et al., 2021), who estimated costs for a600-kWDCstand-alone BESS with 0.5-4.0 hours of storage. We use the same model and methodology but do not restrict the power and energy capacity of the BESS. Feldman et al. assumed an inverter/storage ratio of 1.67 based on guidance from(Denholm et al., 2017). We adopt this assumption, too.

Key modeling assumptions and inputs are shown in the Table 1. Because we do not have battery costs that are specific to commercial and industrial BESS, we use the battery pack costs from(Feldman et al., 2021), which vary depending on the battery duration. These battery costs are close to our assumptions for battery pack costs for residential BESS at low storage durations and for utility-scale battery costs for utility-scale BESS at long durations. The underlying battery costs in Feldman et al. come from(Bloomberg New Energy Finance (BNEF), 2019a)and should be consistent with battery cost assumptions for the residential and utility-scale markets.

Table 1. Commercial and Industrial LIB Energy Storage Systems: 2019 Model Inputs and Assumptions (2019 USD)

60-1,200 kWDC power capacity

Figure1. Estimated costs of commercial and industrial stand-alone PV, stand-alone BESS, and PV+BESS using NREL bottom-up model

Available cost data and projections for distributed battery storage are very limited. Therefore, the battery cost and performance projections in the 2021 ATB are based on the same literature review as for utility-scale and residential battery cost projections. The projections are based on a literature review of 19 sources published in 2018 or 2019, as described by(Cole and Frazier, 2020).Three projections from 2019 to 2050 are developed for scenario modeling based on this literature.

Future cost projections for commercial and industrial BESS and PV+BESS are made using the same methodology as is used for residential BESS and PV+BESS. The normalized cost reduction projections for LIB packs used in residential BESS by(Mongird et al., 2020)are applied to future battery costs, and cost reductions for other BESS components use the same cost reduction potentials in Figure 2. Costs for commercial and industrial PV systems come from the 2020 ATB Moderate and Advanced Scenarios). We

could not find projected costs for commercial and industrial BESS in the literature for comparison.

Figure 2. Changes in projected component costs for residential BESS

Data Source:(Bloomberg New Energy Finance (BNEF), 2019a)

Definition:The bottom-up cost model documented by(Feldman et al., 2021)contains detailed cost buckets for both solar only, battery only, and combined systems costs. Though the battery pack is a significant cost portion, it is a minority 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 relative costs for commercial scale stand-alone battery are demonstrated in Table 2.

Table 2. Capital Cost Components for Commercial Building-Scale Battery Systems