Energy storage battery installation 110 kWh

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The 2022 ATB represents cost and performance for battery storage with a representative system: a 5-kW/12.5-kWh (2.5-hour) system. It represents onlylithium-ion batteries (LIBs)--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 well characterized, they will be added to future editions of the ATB.

2021 costs for residential BESS are based on NREL"s bottom-up BESS cost model using the data and methodology of(Ramasamy et al., 2021), who estimated costs for both AC- and DC-coupled systems. We use the same model and methodology but do not restrict the power or energy capacity of the BESS to two options. Key modeling assumptions and inputs are shown in Table 1. We assume 2021 battery pack costs of $252/kWhDC 2020 USD (Ramasamy et al., 2021)

As with utility-scale BESS, the cost of a residential BESS is a function of both the power capacity and the energy storage capacity of the system, and both must be considered when estimating system cost. Furthermore, the Distributed Generation Market Demand (dGen) model does not assume specific BESS system sizes and it needs an algorithm to estimate residential BESS system cost based on the attributes of the residences (agents) it generates.

We develop an algorithm for stand-alone residential BESS cost as a function of power and energy storage capacity using the NREL bottom-up residential BESS cost model(Ramasamy et al., 2021)with some modifications.

Available cost data and projections are very limitedfor distributed battery storage. Therefore, the battery cost and performance projections in the 2022 ATB are based on the same literature review as for utility-scale and commercial 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(Cole and Frazier, 2020). Three projections from 2020 to 2050 are developed for scenario modeling based on this literature.

NREL does not maintain future cost projections for residential BESS for the ATB as it does for utility-scale systems. Instead, we base residential BESS cost projections on the NREL bottom-up cost model for residential systems combined with component cost projections from BNEF. BNEF has published cost projections for a 5-kW/14-kWh BESS system through 2030(Frith, 2020), with the projections being based on learning rates and future capacity projections.

Definition:The bottom-up cost model documented by(Ramasamy et al., 2021)contains detailed cost bins for both solar only, battery only, and combined systems. Though the battery pack is a significant cost portion, it is

a fraction 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. The total costs by component for residential-scale stand-alone battery are demonstrated in Figure 2 for two different example systems.

Within theATB Dataspreadsheet, costs are separated into energy and power cost estimates, which allows capital costs to be constructed for durations other than 4 hours according to the following equation: