Energy storage battery installation 370 kWh

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The 2024 ATB represents cost and performance for battery storage with a ...

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The battery storage technologies do not calculate levelized cost of energy (LCOE) or levelized cost of storage (LCOS) and so do not use financial assumptions. Therefore, all parameters are the same for the research and development (R& D) and Markets & Policies Financials cases.

The 2024 ATB represents cost and performance for battery storage with a representative system: a 5-kilowatt (kW)/12.5-kilowatt hour (kWh) (2.5-hour) system. 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.

2023 costs for residential BESS are based on NREL"s bottom-up BESS cost model using the data and methodology of(Ramasamy et al., 2023), who estimated costs for only alternating current (AC) coupled systems. We use the same model and methodology, but we 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 2022 battery pack costs of $283/kilowatt hours direct current (kWhDC) in 2022 USD(Ramasamy et al., 2022).

Table 1. Residential Battery Storage Systems Model Inputs and Assumptions (2022 USD)

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 requires 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., 2023)with some modifications.

Available cost data and projections are very limitedfor distributed battery storage. Therefore, the battery cost and performance projections in the 2024 ATB are based on the same literature review as that done for utility-scale and commercial battery cost projections: Battery cost and performance projections in the 2024

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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 review.

The three scenarios for technology innovation are as follows:

Scenario assumptions for residential BESSs were derived using a literature review and are not based on learning curves or deployment projections.

For a 5-kW, 12.5-kWh battery, the technology innovation scenarios for residential BESSs described above result in capital expenditures (CAPEX) reductions of 17% (Conservative Scenario), 30% (Moderate Scenario), and 52% (Advanced Scenario) between 2022 and 2035. The average annual reduction rates are 1.4% (Conservative Scenario), 2.3% (Moderate Scenario), and 4.0% (Advanced Scenario).