Energy storage cost 14 kWh

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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 only lithium-ion batteries (LIBs)--those with nickel manganese cobalt (NMC) and lithium iron phosphate (LFP) chemistries--at this time, with LFP becoming the primary ...

Energy storage technologies can provide a range of services to help integrate solar and wind, from storing electricity for use in evenings, to providing grid-stability services. Wider deployment and the commercialisation of new battery storage technologies has led to rapid cost reductions, notably for lithium-ion batteries, but also for high ...

The 2024 ATB represents cost and performance for battery storage with durations of 2, 4, 6, 8, and 10 hours. It represents lithium-ion batteries (LIBs)--primarily those with nickel manganese cobalt (NMC) and lithium iron phosphate (LFP) chemistries--only at this time, with LFP becoming the primary chemistry for stationary storage starting in ...

battery system based on those projections, with storage costs of $245/kWh, $326/kWh, and $403/kWh in 2030 and $159/kWh, $226/kWh, and $348/kWh in 2050. Battery variable operations and maintenance costs, lifetimes, and efficiencies are also discussed, with recommended values selected based on the publications surveyed.

The 2022 Cost and Performance Assessment provides the levelized cost of storage (LCOS). The two metrics determine the average price that a unit of energy output would need to be sold at to cover all project costs inclusive of taxes, financing, operations and maintenance, and others.

The 2021 ATB represents cost and performance for battery storage with two representative systems: a 3 kW / 6 kWh (2 hour) system and a 5 kW / 20 kWh (4 hour) system. 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 (2020) costs for residential 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 both AC- and DC-coupled systems for a less-resilient (3 kW/6 kWh) installation and a more-resilient (5 kW/20 kWh) installation. 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 2020 battery pack costs of $248/kWhDC 2019 USD(Bloomberg New Energy Finance (BNEF), 2019).

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.

Available cost data and projections are very limitedfor distributed battery storage. Therefore, the battery cost and performance projections in the 2021 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 2019 to 2050 are developed for scenario modeling based on this literature.

NREL has not maintained future cost projections for residential BESS for the ATB as it has for utility-scale systems. In their absence, 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(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. The total costs by component for residential-scale stand-alone battery are demonstrated in Table 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: