Capital pumped hydro storage

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

Cost reductions in the Advanced Scenario reflect various types of technology innovations that could be applied to PSH facilities. These potential innovations, which are discussed in the DOE Hydropower Vision Roadmap(DOE, 2016), are largely similar to technology pathways for hydropower without pumping.

No explicit deployment assumptions or learning rates are used to define the Advanced Technology Innovation Scenario for PSH. All cost reductions are attributed to improved technology, processes, designs, and contracting along with advanced materials and improved construction practices. Deployed PSH capacity is 23 gigawatts (GW) in the Base Year (2021), and the rate of cost reduction is 0.6%/yr through 2035 and 0.2%/yr from 2035 to 2050.

(Mongird et al., 2020)characterize PSH O& M costs using a literature review of recently published sources of PSH cost and performance data. For the 2024 ATB, we use cost estimates for a 1,000-MW plant, which has lower labor costs per power output capacity compared to a smaller facility. O& M costs also include component costs for standard maintenance, refurbishment, and repair. O& M cost reductions are not projected for future years because the relevant technical components are assumed to be mature, so they are constant and identical across all scenarios.

Round-trip efficiency is also based on a literature review by(Mongird et al., 2020), who report a range of 70%-87% across several sources. The value of 80% is taken as a central estimate, and no improvements are projected either in(Mongird et al., 2020)or here because the relevant technical components are assumed to be mature. Thus, round-trip efficiency is constant and identical across all scenarios.

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(Mongird et al., 2020)characterize PSH O& M costs using a literature review of recently published sources of PSH cost and performance data. For the 2022 ATB, we use cost estimates for a 1,000-MW plant, which has lower labor costs per power output capacity than a smaller facility. O& M costs also include component costs for standard maintenance, refurbishment, and repair. O& M cost reductions are not projected because the relevant technical components are assumed to be mature, so they are constant and identical across all scenarios.