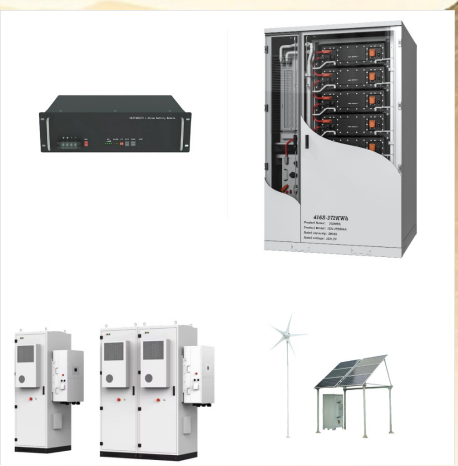
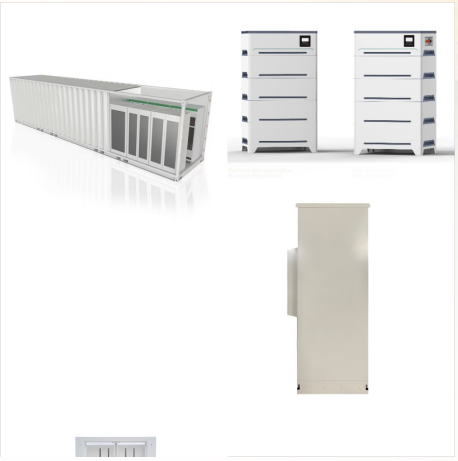
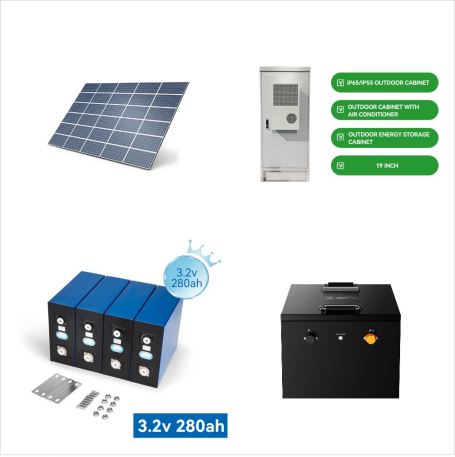


Energy storage costs in the US grew 13% from Q1 2021 to Q1 2022, said the National Renewable Energy Laboratory (NREL) in a cost benchmarking analysis. The research laboratory has revealed the results of its "U.S. Solar Photovoltaic System and Energy Storage Cost Benchmarks, With Minimum Sustainable Price Analysis: Q1 2022" report.

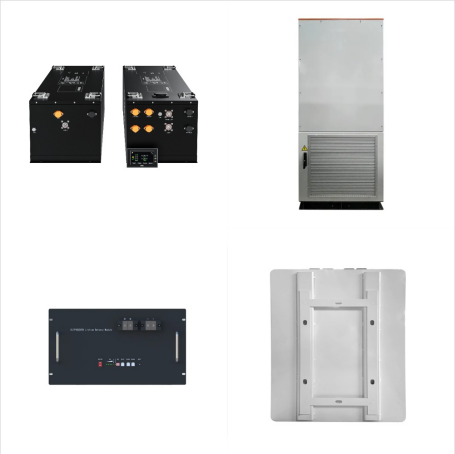


Cost Analysis: BESS - Capital Costs . Cost Analysis: Utilizing Used Li-Ion Batteries. Economic Analysis of Deploying Used Batteries in Power Systems by Oak Ridge NL 2011 A new 15 kWh battery pack currently costs $990/kWh to $1,220/kWh (projected ???

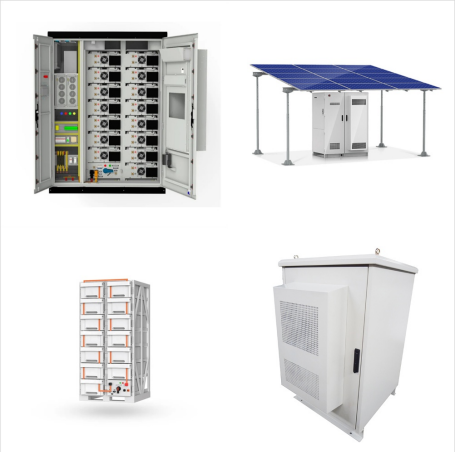


Data File (U.S. Solar Photovoltaic BESS System Cost Benchmark Q1 2020 Report) 536.42 KB: Data: NREL has been modeling U.S. solar photovoltaic (PV) system costs since 2009. This year, our report benchmarks costs of U.S. PV for residential, commercial, and utility-scale systems, with and without storage, built in the first quarter of 2020 (Q1

HONG KONG NREL BESS COST



Base year costs for commercial and industrial 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 a 600-kW DC stand-alone BESS with 0.5???4.0 hours of storage. We use the same model and methodology but do not restrict the power or energy capacity of the BESS.



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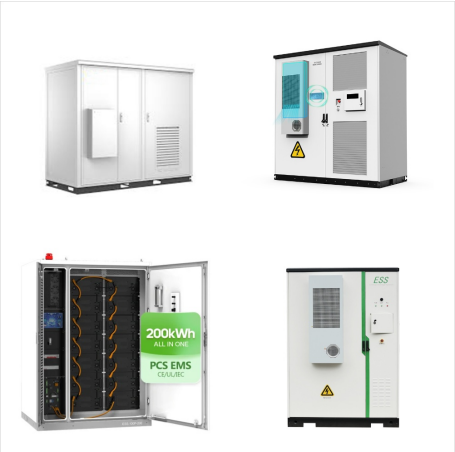
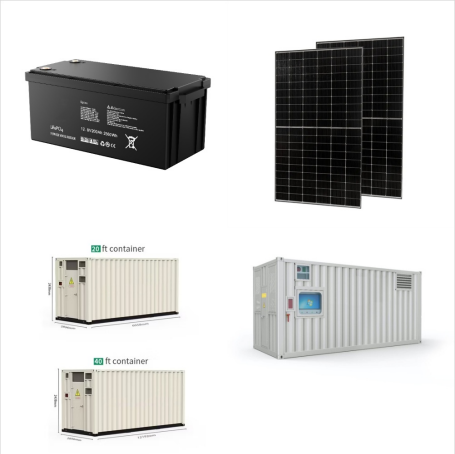
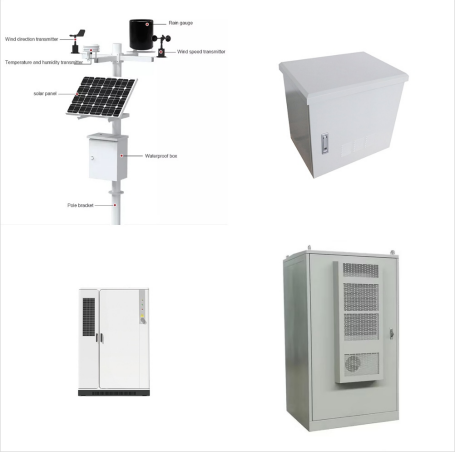


NOTICE This work was authored by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE -AC36-08GO28308.

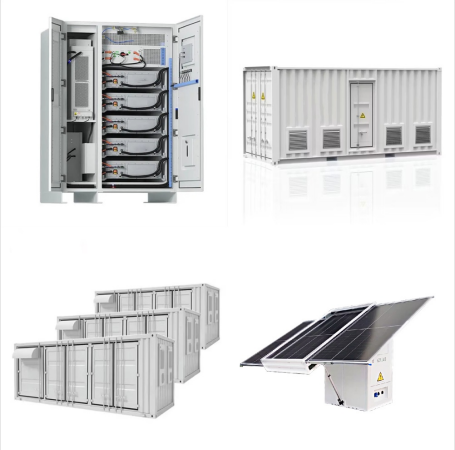
HONG KONG NREL BESS COST



Base year costs for commercial and industrial BESS are based on NREL's bottom-up BESS cost model using the data and methodology of (Ramasamy et al., 2022), who estimated costs for a 300-kW DC stand-alone BESS with four hours of storage. We use the same model and methodology, but we do not restrict the power or energy capacity of the BESS.

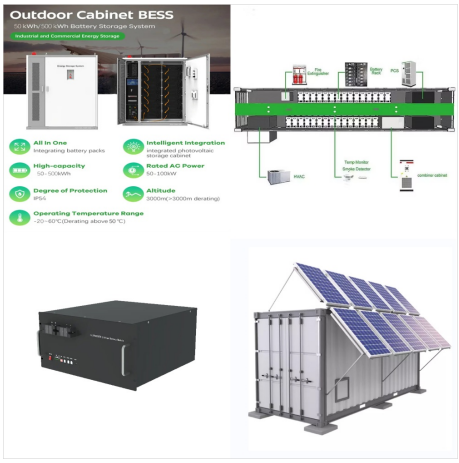


In their absence, we base residential BESS cost projections on the NREL bottom-up cost model for residential systems combined with component cost projections from BNEF. BNEF has published cost projections for a 5-kW/14-kWh BESS ???

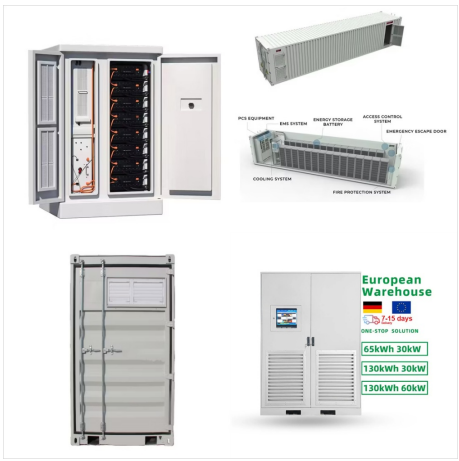


We also consider the installation of commercial and industrial PV systems combined with BESS (PV+BESS) systems (Figure 1). Costs for commercial and industrial PV systems come from NREL's bottom-up PV cost model (Feldman et al., 2021).We assume an inverter/load ratio of 1.3, which when combined with an inverter/storage ratio of 1.67 sets the BESS power capacity at ???

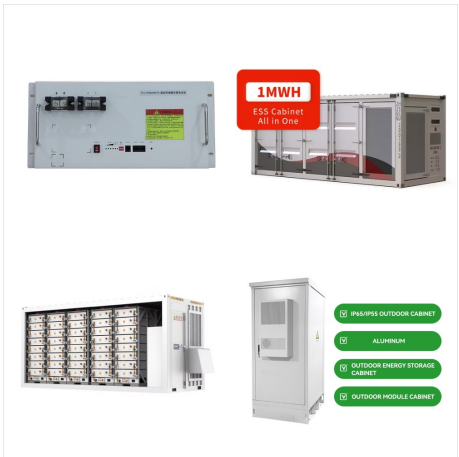
HONG KONG NREL BESS COST



NREL uses these insights to develop roadmaps for future cost reductions and to provide context for cost variability observed in the market. Publications U.S. Solar Photovoltaic System and Energy Storage Cost Benchmarks, With Minimum Sustainable Price Analysis: Q1 2023, NREL Technical Report (2023)

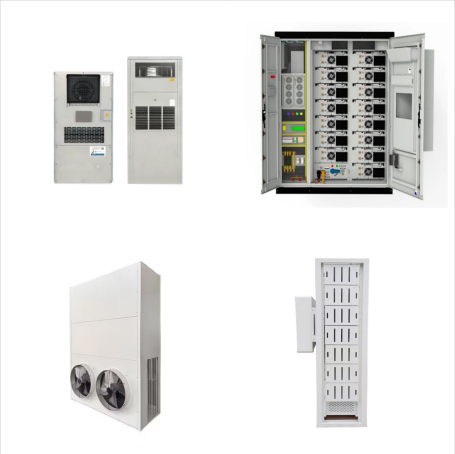


The most important takeaway is that the NREL estimates that BESS costs will start to fall this year in its "low" and "mid" cost projections, with an increase over the next few years forecast in its "high" scenario, visualised in ???

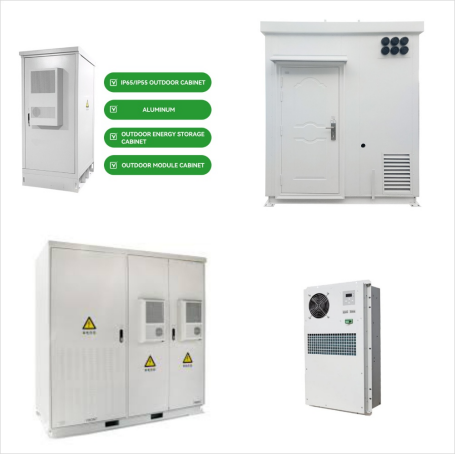


This work was authored by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE -AC36-08GO28308. (NREL) published a set of cost projections for utility-scale lithium-ion batteries (Cole et al. 2016). Those 2016 projections relied heavily on

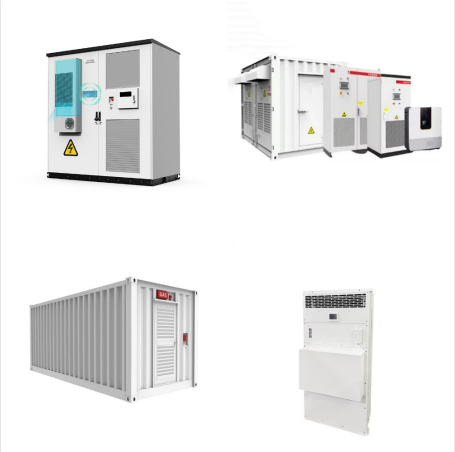
HONG KONG NREL BESS COST



Battery storage costs have changed rapidly over the past decade. In 2016, the National Renewable Energy Laboratory (NREL) published a set of cost projections for utility-scale lithium-ion batteries (Cole et al. 2016). Those 2016 projections relied heavily on electric vehicle

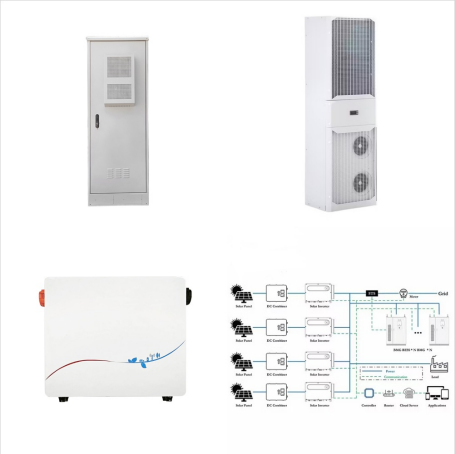


Future Years: In the 2024 ATB, the FOM costs and the VOM costs remain constant at the values listed above for all scenarios. Capacity Factor. The cost and performance of the battery systems are based on an assumption of approximately one cycle per day. Therefore, a 4-hour device has an expected capacity factor of 16.7% (4/24 = 0.167), and a 2-hour device has an expected ???

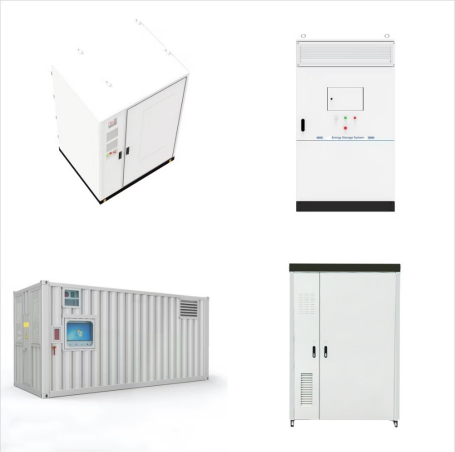


The National Renewable Energy Laboratory's (NREL"s) 2021 costs for residential BESS are based on NREL's bottom-up BESS cost model using the data and methodology of (Ramasamy et al., 2021), who estimated costs for both AC- and DC-coupled systems. We use the same model and methodology but do not restrict the power or energy capacity of the

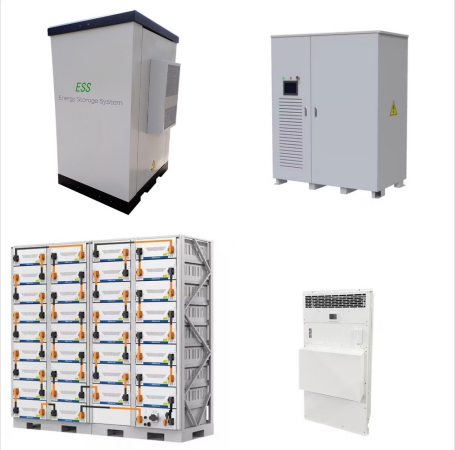
HONG KONG NREL BESS COST



In other pumped hydro news, the US National Renewable Energy Laboratory (NREL), has launched an open-source cost estimation tool for modelling potential PHES sites. While the majority of new energy storage capacity being added to the grid today is electrochemical and almost without exception lithium-ion (Li-ion) battery-based within that, ???

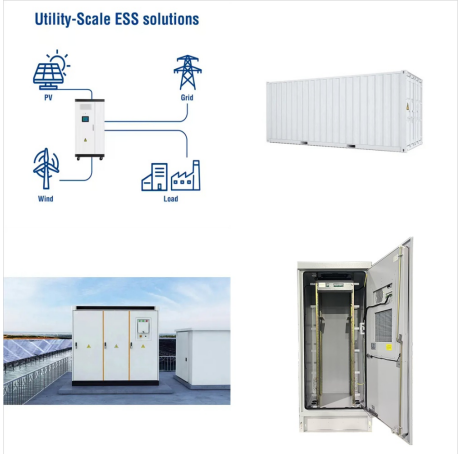


The report forecasts the future capital expenditure (capex) costs of Battery Energy Storage Systems (BESS) from 2022 to 2050. It specifically focuses on a four-hour lithium-ion BESS as a representative example.

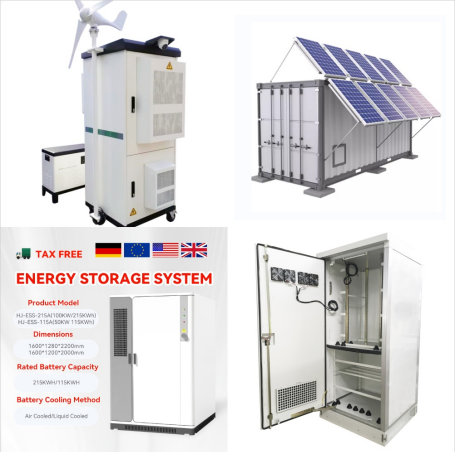


The National Renewable Energy Laboratory's (NREL"s) 2021 costs for residential BESS are based on NREL's bottom-up BESS cost model using the data and methodology of (Ramasamy et al., 2022), who estimated costs for only AC coupled systems. We use the same model and methodology, but we do not restrict the power or energy capacity of the BESS

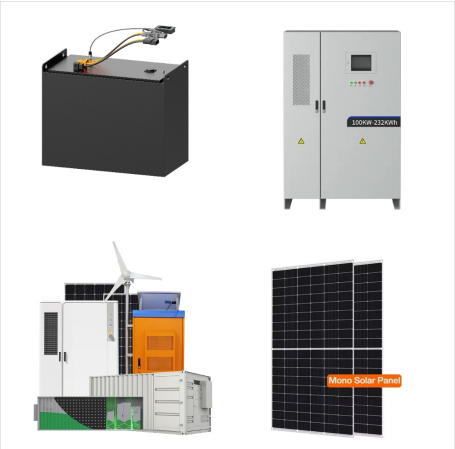
HONG KONG NREL BESS COST



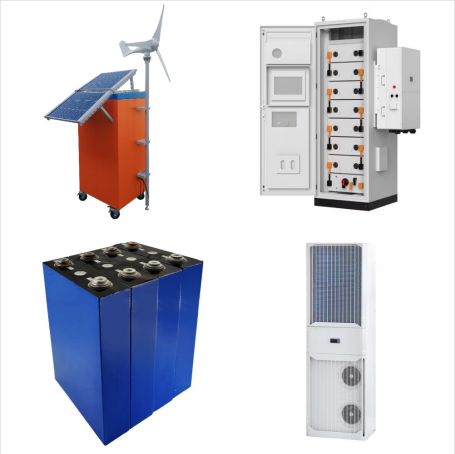
The US National Renewable Energy Laboratory (NREL) has just released the latest edition of its annual benchmarking exercise for the cost of solar PV and energy storage in the country. The cost of a utility-scale PV + BESS system, DC-coupled with 100MW PV and 60MW / 240MWh BESS fell by 11.55% from US$190 million to US$168 million. For an AC



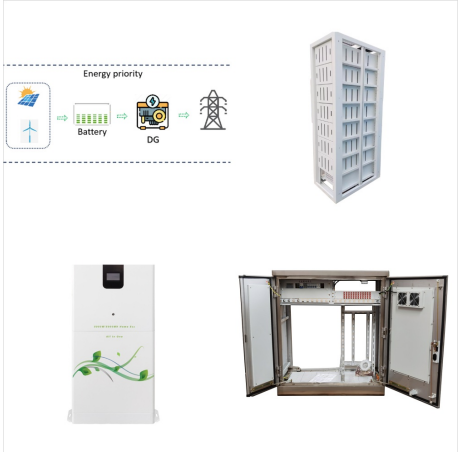
In their absence, we base residential BESS cost projections on the NREL bottom-up cost model for residential systems combined with component cost projections from BNEF. BNEF has published cost projections for a 5-kW/14-kWh BESS system through 2030 (Frith, 2020), with the projections being based on learning rates and future capacity projections.



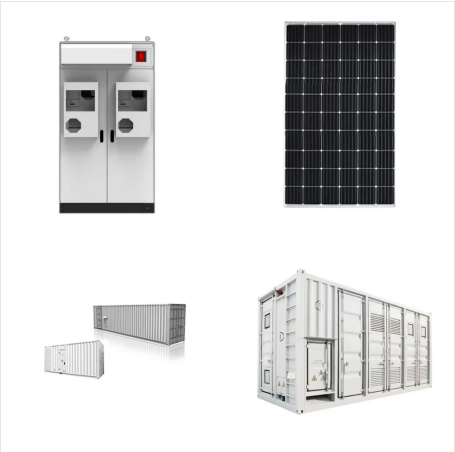
The initiative aims to reduce the cost of grid-scale energy storage by 90% for systems that deliver over 10 hours of duration within the decade. These are often described as long-duration energy storage (LDES) technologies. the two ministers also confirmed that the US National Renewable Energy Laboratory (NREL) and Australia's



cost estimate is developed using the bottom-up cost modeling method from the National Renewable Energy Laboratory's (NREL"s) U.S. Solar Photovoltaic System and Energy Storage Cost Benchmarks, With Minimum Sustainable Price Analysis: Q1 2022 (Ramasamy et al., 2022).

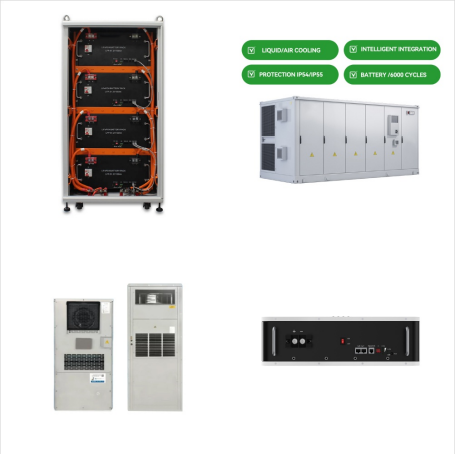


National Renewable Energy Laboratory January 2021 A product of the USAID-NREL Partnership noted that the cost of BESS is rapidly decreasing and the interest in the technology???both for grid-tied and remote Thailand were conducting a BESS pilot project in Mae Hong Son Province to support operations in the event of a

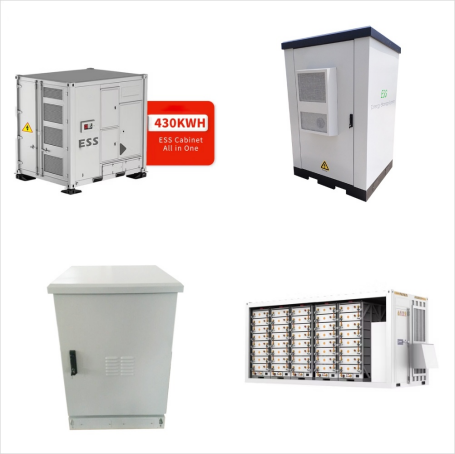


The NREL study states that additional parameters besides capital costs are essential to fully specify the cost and performance of a BESS for capacity expansion modelling tools.. Further, the cost projections developed in ???

HONG KONG NREL BESS COST



Using the detailed NREL cost models for LIB, we develop base year costs for a 60-MW BESS with storage durations of 2, 4, 6, 8, and 10 hours, shown in terms of energy capacity ($/kWh) and power capacity ($/kW) in Figures 1 and 2, ???



The National Renewable Energy Laboratory's 2020) are applied to future battery costs, and cost reductions for other BESS components use the same cost reduction potentials in Figure 1. Costs for commercial and industrial PV systems come from the 2024 ATB Moderate and Advanced scenarios. We could not find projected costs for commercial and

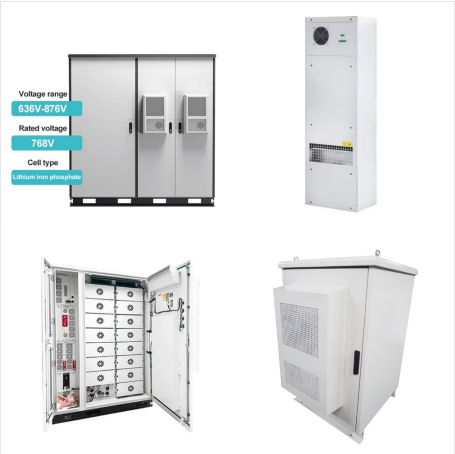
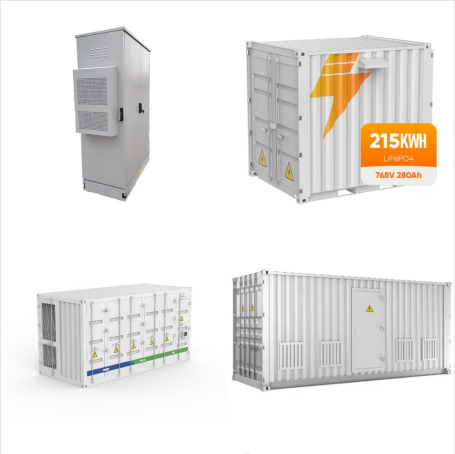
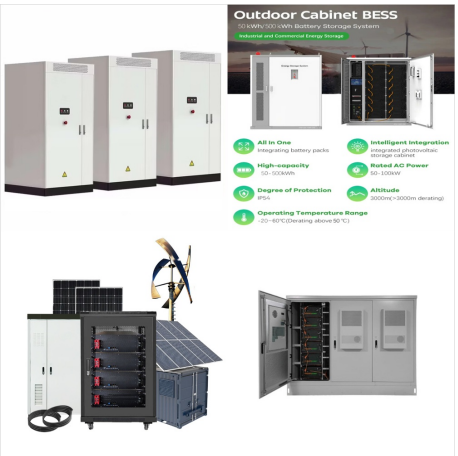


Figure 3 shows the resulting utility-scale BESS future cost projections for the Moderate Scenario for 2???10 hours in terms of both $/kWh and $/kW. For the Advanced and Conservative BESS cost scenarios, we apply the normalized cost reductions for the corresponding scenarios from (Cole et al., 2021) to the base year costs for all storage durations.

HONG KONG NREL BESS COST



BESS-only scenarios are cost-effective in 523 of 2,541 cases analyzed (21%). In the base-case BESS capital cost scenario ($840/kW plus $420/ National Renewable Energy Laboratory researchers model ed energy storage project economics - with and without accompanying solar photovoltaic systems - using local utility rates, ASHRAE climate zones



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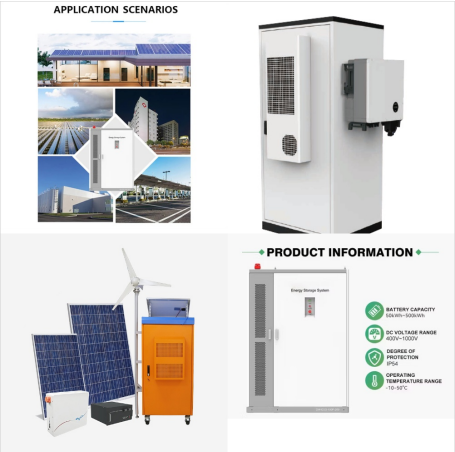

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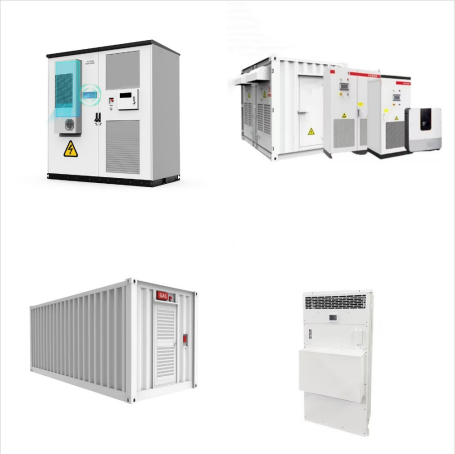

After the completion of this project, various parties in the industry have shown interest in applying BESS elsewhere in Hong Kong. Visits have been arranged with major companies and organisations. Figure 4: BESS project team . References. Divya K C and Ostergaard J (2009). Battery energy storage technology for power systems???An overview.