



Cost of Grid-Connected Mobile Energy Storage Containers at US Ports





Overview

In this work we describe the development of cost and performance projections for utility-scale lithium-ion battery systems, with a focus on 4-hour duration systems. The projections are developed from an analysis of recent publications that include utility-scale storage costs.

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The Energy Storage Grand Challenge (ESGC) is a crosscutting effort managed by the Department of Energy's Research Technology Investment Committee. The project team would like to acknowledge the support, guidance, and management of Paul Spitsen from the DOE Office of Strategic Analysis, ESGC Policy.

Maritime ports, a cornerstone of international trade and local economies, are upgrading their infrastructure and turning to diverse energy sources to cut energy costs, enhance resilience, and strengthen global competitiveness. Nearly 80 percent of the world's annual trade by volume moves by sea.

This report is available at no cost from the National Renewable Energy Laboratory (NREL) at Cole, Wesley and Akash Karmakar. 2023. Cost Projections for Utility-Scale Battery Storage: 2023 Update. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A40-85332.

MSE International has implemented the ESSOP project (Energy Storage Solutions for Ports) in order to highlight solutions that seem most attractive now and in the future. 2 What are the Challenges?

Storing energy, particularly in the form of electrical energy which is the form required for shore.

Resilience - Cargo activities at US seaports generate over \$5T in economic activity, equal to 26% of the U.S. economy [1]. They are also gateways to critical supplies, particularly in the case of a natural disasters. Climate - Maritime activities account for 3% of global carbon emissions [2].



Electrical Energy Storage (EES) systems store electricity and convert it back to electrical energy when needed. 1 Batteries are one of the most common forms of electrical energy storage. The first battery, Volta's cell, was developed in 1800. 2 The U.S. pioneered large-scale energy storage with the. How does energy storage impact the grid and transportation sectors?

Energy storage and its impact on the grid and transportation sectors have expanded globally in recent years as storage costs continue to fall and new opportunities are defined across a variety of industry sectors and applications.

What are base year costs for utility-scale battery energy storage systems?

Base year costs for utility-scale battery energy storage systems (BESSs) are based on a bottom-up cost model using the data and methodology for utility-scale BESS in (Ramasamy et al., 2023). The bottom-up BESS model accounts for major components, including the LIB pack, the inverter, and the balance of system (BOS) needed for the installation.

Is grid-scale energy storage a viable alternative to electric vehicles?

Grid-scale energy storage, however, lacks the stringent power and weight constraints of electric vehicles, enabling a multitude of storage technologies to compete to provide current and emerging grid flexibility services.

How much does gravity based energy storage cost?

Looking at 100 MW systems, at a 2-hour duration, gravity-based energy storage is estimated to be over \$1,100/kWh but drops to approximately \$200/kWh at 100 hours. Li-ion LFP offers the lowest installed cost (\$/kWh) for battery systems across many of the power capacity and energy duration combinations.



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Utility-Scale Battery Storage , Electricity , 2024 , ATB , NLR

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Due to intra-annual uncertainty, the reported costs may have changed by the time this report was released. The cost estimates provided in the report are not intended to be exact numbers but ...

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Capacity of Containerships Calling at U.S. Ports: this series is now based on CBP's Vessel Management System (VMS) data (previously based on AIS data from IHS).

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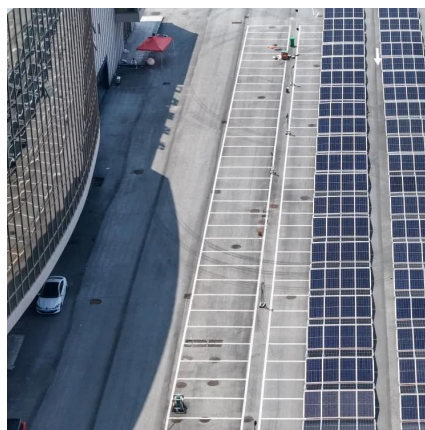
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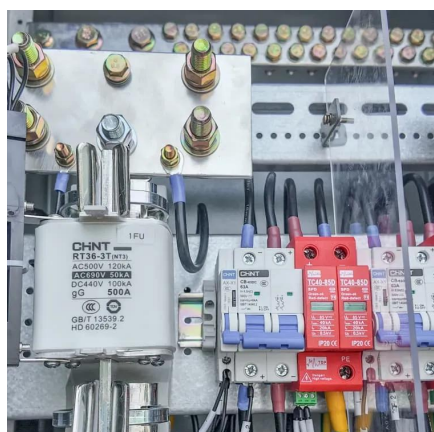
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