

# Current battery cost analysis



## Overview

Lithium-ion batteries (LiBs) are pivotal in the shift towards electric mobility, having seen an 85 % reduction in production costs over the past decade. However, achieving even more significant cost reductions is vital to making battery electric vehicles (BEVs) widespread and competitive with internal combustion engine vehicles (ICEVs). Recent trends indicate a slowdown, including a slight cost increase in LiBs in 2022. This study employs a high-resolution bottom-up cost model, incorporating factors such as manufacturing innovations, material price fluctuations, and cell performance improvements to analyze historical and projected LiB cost trajectories. Our research predicts potential cost reductions of 43.5 % to 52.5 % by the end of this decade compared to 2020. Furthermore, reaching cost parity between BEVs and ICEVs is expected in the latter half of this decade, contingent on a total installed capacity of 3500 to 4100 GWh.year<sup>-1</sup> across giga-factories. The determinants influencing these cost reductions evolve over time, with historical significance placed on savings in cathode materials and anticipated future importance on minimizing scrap rates. This research offers valuable insights for policymakers and investors in the LiB industry, aiding informed decision-making.

- LiB costs could be reduced by around 50 % by 2030 despite recent metal price spikes.
- Cost-parity between EVs and internal combustion engines may be achieved in the second half of this decade.
- Improvements in scrap rates could lead to significant cost reductions by 2030.

Lithium-ion batteryBottom-up cost modelingHistorical priceProjected priceSince the first commercialized lithium-ion ba...

## Article Content

### Trajectories for Lithium-Ion Battery Cost Production: Can Metal ...

Over the past decade, different studies have shown average improvements ranging from 18 % to 76 % in the specific energy of lithium-ion battery cells, 8, 21 with current values exceeding 270 Wh/kg cell. 44, 45 This wide range can be attributed to various factors, including a broad choice of battery geometries and sizes, as well as challenges in ...

### Current and future lithium-ion battery manufacturing

The floor space cost was calculated based on \$3,000/m<sup>2</sup> per year (includes rent, utility, and management) (Nelson et al., 2019). The depreciation cost was calculated by 16.7% of capital investment and 5% of floor space cost (Nelson et al., 2019). II OPEN ACCESS iScience 24, 102332, April 23, 2021 3 iScience Perspective

### Cost and performance analysis as a valuable tool for battery

The analysis of cost and performance is a crucial aspect of battery research, as it provides insights and guidance for researchers and industry professionals on the current state and possible ...

### A review of lithium-ion battery recycling for enabling a circular ...

Based on the battery's pack size, the disassembly time and cost were evaluated for manual, semiautomatic, and fully automatic processes . A 50 % reduction in modules and connecting screws in the “Beijing Automotive Industry Corporation (BAIC)” battery pack leads to a >24 % and >29 % reduction in disassembly costs, respectively.

### Techno-economics Analysis on Sodium-Ion Batteries: Overview ...

14.2 Sodium-Ion Battery Cost Analysis. ... A detailed cost analysis using the Argonne National Lab's BatPaC model ... According to, the cost shares of the current collector foils are 11.6% for copper and 2.7% for aluminium in terms of the total cost of a lithium-ion cell. Replacing the copper foil with an aluminium foil in a SIB would result ...

### Historical and prospective lithium-ion battery cost trajectories ...

Still, the current cost modeling approach is flexible to be input by other datasets and conditions to follow other possible cost trajectories under the given circumstances. ... Prospective improvements in cost and cycle life of off-grid Lithium-ion battery packs: an analysis informed by expert elicitations. Energy Policy, 114 (2018), pp. 578 ...

### Capital cost evaluation of conventional and emerging redox flow ...

Over the past decades, although various flow battery chemistries have been introduced in aqueous and non-aqueous electrolytes, only a few flow batteries (i.e. all-V, Zn-Br, Zn-Fe(CN)<sub>6</sub>) based on aqueous electrolytes have been scaled up and commercialized at industrial scale (> kW) , , .The cost of these systems (E/P ratio = 4 h) have been ...

Battery cost forecasting: a review of methods and results with an ...

It provides transparency by an in-depth analysis of the most relevant battery cost forecasts including application, applied method, underlying assumptions and forecasted ...

An Electric Vehicle Battery and Management Techniques: ...

The reusable battery PL was calculated at \$234-278·MWh<sup>-1</sup>, whereas new battery power cost \$211·MWh<sup>-1</sup>. They concluded that reusable batteries are not cost-effective although their initial costs are much lower. The new battery cost estimates from Steckel et al. were \$151·kWh<sup>-1</sup>, and the one from Kamath et al. were \$209·kWh<sup>-1</sup>.

Cost, range anxiety and future electricity supply: A review of how ...

In this review paper, we show that the current battery electric vehicle (BEV) scale-up relies on several key technologies which all have detailed roadmaps with good track records for being met. ... It then provides novel analysis (Section 4) ... Battery cost remains one of the main factors for the price difference of BEVs in 2018 and 2025, as ...

Battery cost modeling: A review and directions for future research

Current battery research focuses on two different technological areas: the state-of-the-art and currently mass produced lithium-ion-batteries (LIBs) [16, 17] and the post-lithium-ion-batteries ... A cost and resource analysis of sodium-ion batteries: 18: Berckmans et al. (2017)

(PDF) Optimal Capacity and Cost Analysis of Battery Energy ...

Optimal Capacity and Cost Analysis of Battery Energy Storage System in Standalone Microgrid Considering Battery Lifetime Pinit Wongdet 1, T erapong Boonraksa 2, Promphak Boonraksa 3, W ...

Cost and Performance of Electric Vehicle Batteries

Future Lithium-Ion Battery Cost As noted previously, current battery pack costs for a pure EV (a midsize car with 30 kWh pack) are around \$730/kWh. ... the CCC's wider analysis of total cost of ownership of a range of future vehicles suggests that EVs will be a cost effective CO<sub>2</sub> abatement technology to decarbonise surface transport.

Cost evaluation and sensitivity analysis of the alkaline zinc-iron ...

After model validation, the capital cost for a 0.1 MW/0.8 MWh Zn-Fe flow battery system was calculated considering the shunt losses and pumping losses. Moreover, a sensitivity analysis for the battery system is performed to deeply understand the influences of the operating conditions and cell components on the system economy.

Battery price per kwh 2024 | Statista

Lithium-ion battery pack price dropped to 115 U.S. dollars per kilowatt-hour in 2024, down from over 144 dollars per kilowatt-hour a year earlier. Lithium-ion batteries are one of the most ...

BriefCASE: Where are EV battery prices headed in 2025 and ...

Understand why EV battery prices have been decreasing over the last few years. Get S& P Global Mobility's forecasts for EV battery cell prices through 2030.

Optimal Capacity and Cost Analysis of Battery Energy ...

The cost reduction analysis was estimated for the battery State of Health (SOH) and artificial intelligence was applied to help with the battery management system. A proper battery health assessment can extend the battery's lifetime ...

Cost and Price Metrics for Automotive Lithium-Ion Batteries

can also be referred to as a battery cost. Further, technology research and development ... sources. Market prices are observed values. Modeled costs and prices are intended to benchmark the current cost and price, respectively. While lab VTO achieved costs are reported in current year, they are projections of expected costs in 3-5 years for ...

Trends in electric vehicle batteries - Global EV ...

China's current leading role in battery production, however, comes at the cost of high levels of overcapacity. In 2023, excluding portable electronics, China used less than 40% of its maximum cell output,<sup>1</sup> and cathode and anode active ...

A cell level design and analysis of lithium-ion battery packs

The world is gradually adopting electric vehicles (EVs) instead of internal combustion (IC) engine vehicles that raise the scope of battery design, battery pack configuration, and cell chemistry. Rechargeable batteries are studied well in the present technological paradigm. The current investigation model simulates a Li-ion battery cell and a battery pack using ...

Cost modeling for the GWh-scale production of modern lithium-ion ...

Tesla announced on their first battery day in September 2020 that they plan to reduce the cost per kWh of a battery pack by about 56% compared to the current state of the art <sup>6</sup>, resulting in ...

Real Cost Behind Grid-Scale Battery Storage: 2024 European Market Analysis

Recent industry analysis reveals that lithium-ion battery storage systems now average €300-400 per kilowatt-hour installed, with projections indicating a further 40% cost reduction by 2030. ... Current Cost Components of Utility-Scale Battery Storage ... Graph showing battery storage cost reduction trends from 2020 to 2024 with future projections

Battery cost modeling: A review and directions for future research

Current status of hybrid, battery and fuel cell electric vehicles: from electrochemistry to market prospects. *Electrochim Acta* (2012) ... BESS technology overviews for large scale applications [2,12]; battery management systems [13,14]; BESS life cycle cost analysis and detailed battery cost modelling [15,16]; and even energy storage policies ...

Battery Power Online | Transient Response Analysis: Time and Cost ...

June 6, 2018 | Electrochemical impedance spectroscopy (EIS), also called Frequency Response Analysis (FRA), is widely used for detailed analysis of battery capability. EIS is a non-invasive technique used to assess secondary battery performance and electrochemical characteristics by measuring resistance and capacitance at various frequencies.

A cost and resource analysis of sodium-ion batteries

In this Perspective, we use the Battery Performance and Cost (BatPaC) model to undertake a cost analysis of the materials for sodium-ion and lithium-ion cells, as well as complete batteries, and ...

Utility-Scale Battery Storage | Electricity | 2024

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 ...

Lithium-ion Battery Cost Analysis in PV-household Application

Lithium-ion Battery Cost Analysis in PV-household Application ... The maximum prices scenario relates to an analysis of the current prices of household BESS of the Bundesverband f<sup>ür</sup> Solarwirtschaft e.V. (BSW) , whereby the annually decrease of 4.96 % is assumed considering . The installation cost accounts for 5 % of the whole ...

Life cycle environmental and cost comparison of current and ...

Thus, battery cell energy consumption is included as an uncertain parameter that ranges from 4 to 20 kWh/kg battery cell (most likely 8 kWh/kg) for current batteries and 4–12 kWh/kg battery cell (most likely value 8 kWh / kg battery cell) for future batteries; similarly, a current power density of 1.3–2.3 kW/kg (most likely value 2 kW/kg ...

## Techno-Economic Analysis of Material Costs for Emerging Flow ...

Baseline Cost Analysis Vanadium Pentoxide Flow Battery. The material costs and the associated distribution by component for the VRFB system are provided in Table 1 and Fig. 2. Due to the high cost of vanadium pentoxide and its use as the major species in the electrolyte, the cost of electrolyte accounts for 80% of the total material cost.

A systematic analysis of the costs and environmental impacts of ...

Whereas profitability analysis was not the focus of this study, a simple revenue/cost analysis at prevailing market rates shows that the revenue potential from the recovery of Ni and Didymium accounts for just 50%–60% of total recycling cost per battery (60%–70% including all rare earth products) for conservative and optimistic scenarios ...

## Trends in electric vehicle batteries – Global EV Outlook 2024 ...

China's current leading role in battery production, however, comes at the cost of high levels of overcapacity. In 2023, excluding portable electronics, China used less than 40% of its maximum cell output,<sup>1</sup> and cathode and anode active material installed manufacturing capacity was almost 4 and 9 times greater than global EV cell demand in 2023 ...

## Cost Projections for Utility-Scale Battery Storage: 2023 Update

In 2019, battery cost projections were updated based on publications that focused on utility-scale battery systems (Cole and Frazier 2019), with updates published in 2020 (Cole and Frazier ...

## Battery Cost Index

12 AAM price analysis 13| Cell Cost Forecasts 13 Methodology 13 Analysis Cell cost summary September 2024 0 10 20 30 40 50 60 70 80 90 China S. Korea Germany USA Poland Hungary Cell Cost [\$ / kWh] NCM-622 NCM-712 NCM-811 NCA LFP LMFP Source: Fastmarkets Key Highlights Average NCM-811 cell cost breakdown, (China, September 2024) CAM 47.1% AAM ...

## 2022 Grid Energy Storage Technology Cost and Performance ...

The second edition of the Cost and Performance Assessment continues ESGC's efforts of providing a standardized approach to analyzing the cost elements of storage technologies, engaging industry to identify theses various cost elements, and projecting 2030 costs based on each technology's current state of development.

## Impact of Driving Cycles and Terrain on the Performance and Cost ...

The widespread adoption of electric vehicles (EVs) faces significant cost challenges, primarily driven by battery pack expenses. Key attributes such as energy density, longevity, power density ...

Life cycle cost optimization analysis of battery storage system for ...

Lithium ion Batteries are not cost effective for the current market costs: Chatzisideris et al. (2019) PV-Batteries for application in Greece and Denmark, battery selection based on cost optimization/System design based on cost minimization: 10% battery cost reduction for Greece and 30% for Denmark will make it possible for the storage to be ...

Technical and cost analysis of an electric hand plow tractor for ...

The manufacturing cost of electric tractors increases significantly in line with the battery capacity. Although the manufacturing cost of an electric tractor is 3-5 times higher than that of a fuel tractor, the operational cost of an electric tractor is about 79% that of a fuel tractor.

How much does it cost to build a battery energy storage system ...

Financing and transaction costs - at current interest rates, these can be around 20% of total project costs. 1) Total battery energy storage project costs average £580k/MW. 68% of battery project costs range between £400k/MW and £700k/MW. When exclusively considering two-hour sites the median of battery project costs are £650k/MW.

## Contact Us

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