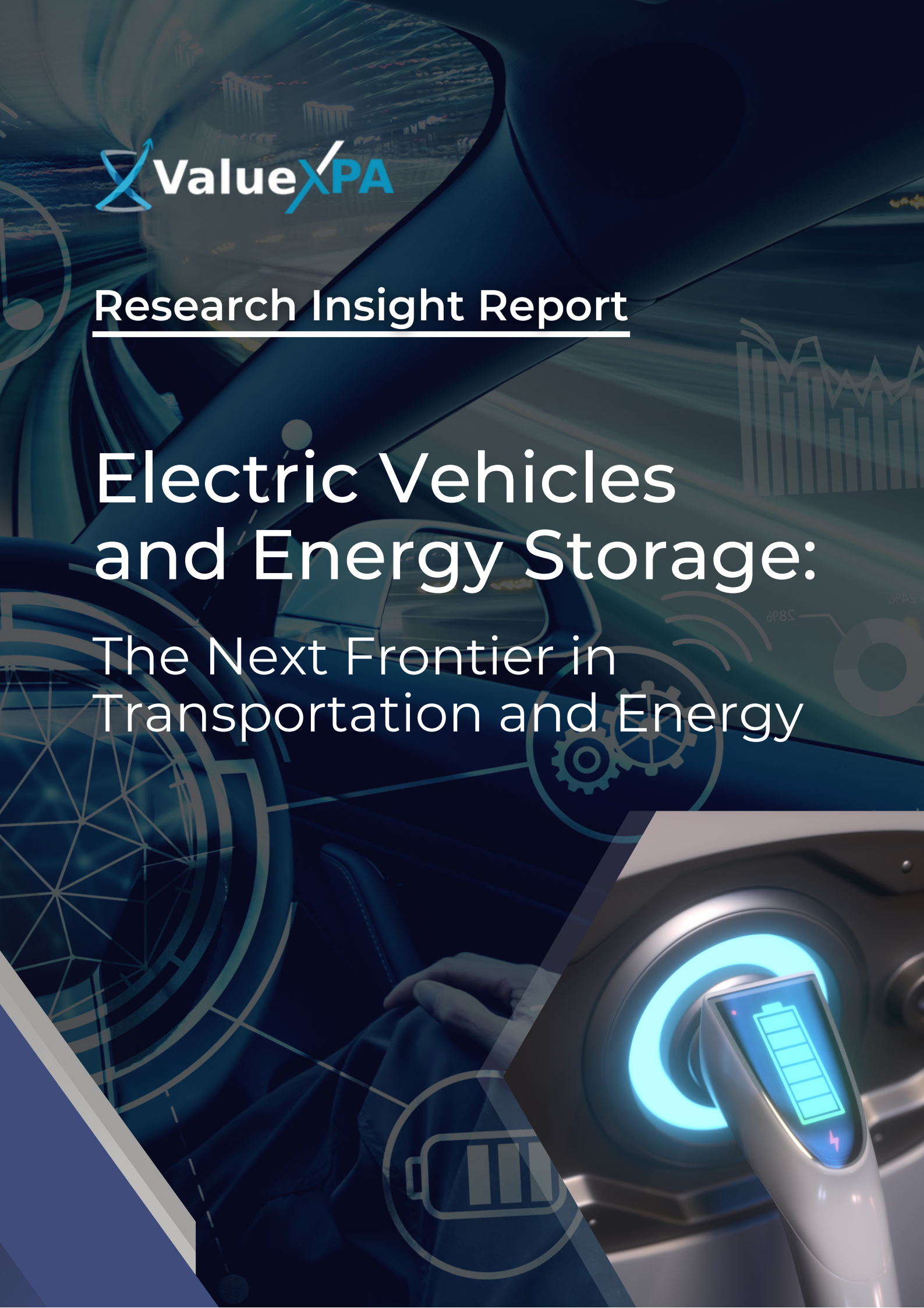
ValueXPA

Research Insight Report

Electric Vehicles and Energy Storage:

The Next Frontier in Transportation and Energy



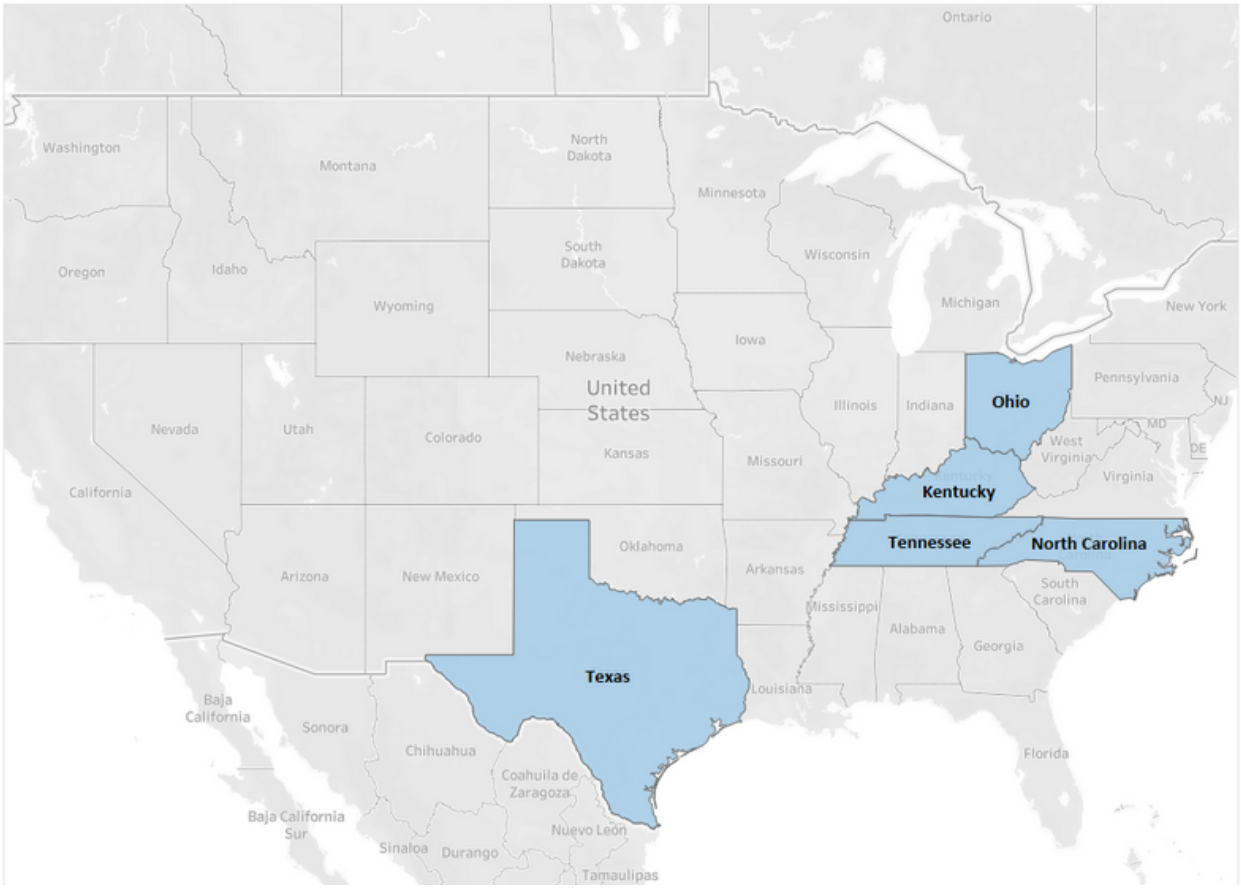
Executive Summary

In the dynamic landscape of the Electric Vehicle (EV) battery market, the United States is poised to become a significant player. This growth trajectory is propelled by Federal incentives, such as the Inflation Reduction Act, which aims to mitigate the impact of rising raw material costs. Major automotive companies are also contributing to this momentum with their anticipated orders. Regulatory bodies like FERC, SEC, and FASB play a crucial role in shaping the sector's financial landscape, classifying renewable energy storage assets based on their use. California, a pioneer in lithium-ion battery storage, is setting ambitious targets, aiming to surpass 10,000 MW by 2024. This approach of treating storage resources as transmission assets not only offers cost savings and sustainability benefits but also opens up opportunities for small and medium-scale businesses. Furthermore, participation in energy and operating reserve markets enhances grid reliability, ensuring a balanced supply-demand equation.

Introduction

The Electric Vehicle (EV) and energy storage sectors in the United States are undergoing a significant transformation, driven by various factors such as Federal incentives, grid stability concerns, and environmental sustainability goals. In this report, we explore the opportunities and challenges that small and medium-scale businesses in the US face in these dynamic industries aimed at providing a well-rounded overview of the current landscape.

Federal Incentives Driving Investments in EV Battery Production Facilities:



Significant Capital Expenditures & Planned EV Battery Facilities

- According to Bank of America Analysts the Federal incentives have stimulated investments in EV battery production facilities, with 17 new facilities announced and capital expenditures reaching approximately $52 bn in 2023.
- Major automotive companies, including Ford, General Motors, Toyota, Honda, and Tesla, are expected to place orders for these facilities, driving further growth in the EV battery market.

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The Inflation Reduction Act's Advanced Manufacturing Production Credit

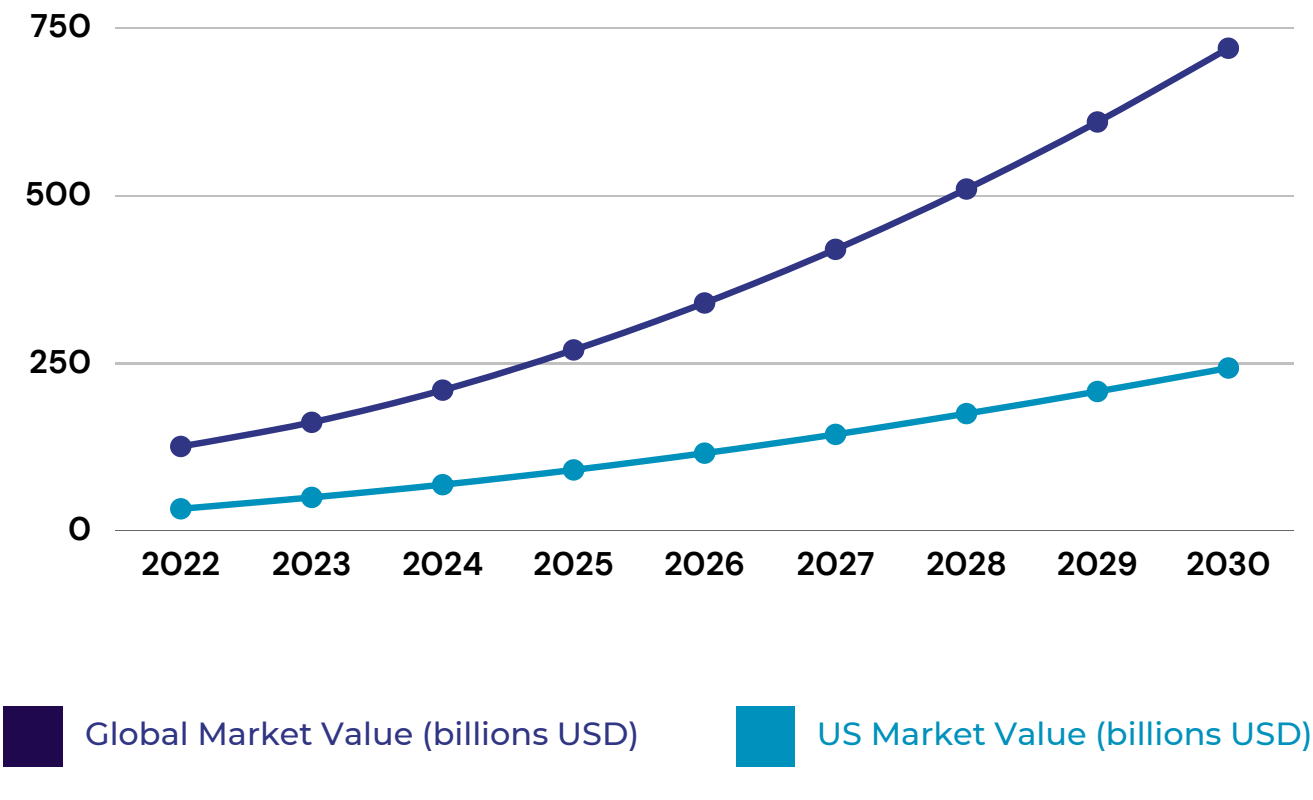
- The Inflation Reduction Act introduced the Advanced Manufacturing Production Credit (AMPC), estimated to be worth $31 bn from 2022 to 2031.
- The AMPC offers a tax credit of $4,500 per kilowatt-hour (kWh) of battery capacity for both domestic and foreign production of battery manufacturing equipment including battery cells, battery modules, and the critical minerals needed to produce these components.
- This credit is expected to boost the EV battery industry significantly, creating over 100,000 jobs and encouraging businesses to participate in the market.
- Additional federal incentives supporting the domestic EV battery industry include the $7,500 federal tax credit for EV purchases, the California ZEV mandate, and Michigan's $1 bn investment in EV battery manufacturing.

First Wave of New Orders and Growth Prospects

The first wave of new orders for EV battery plants is anticipated to begin this year, driven by increasing demand for electric vehicles and federal incentives.

- Immediate opportunities are presented for businesses in the EV battery production sector, particularly small and medium-scale enterprises.
- The EV battery industry has promising growth prospects, with the United States projected to capture 15% of the global EV battery market by 2028.
- The global market for EV batteries is expected to reach $220 bn by 2028.
- Challenges such as rising raw material costs and the need for sustainable sourcing and recycling practices must be addressed for long-term success in the evolving market.

The projected growth of the EV battery market in the United States and Globally



Grid Operators & Stakeholders: The Challenge of Revenue Model for Storage as Transmission Asset

Essential Grid Services Compensation Challenge

- In the US, grid operators and stakeholders are grappling with how to monetize storage as a transmission asset. The challenge lies in the fact that while energy storage provides essential services like load balancing, frequency regulation, and backup power, these services don't always translate into direct, easily quantifiable revenue streams. Traditional utility revenue models are based on the sale of electricity, but storage assets often contribute more to grid stability and efficiency, which are harder to monetize. Therefore, creating a revenue model that adequately compensates utilities for these services is a complex task.

Essential Grid Services Compensation Challenge

- A proposed solution is to treat storage resources as transmission assets, allowing utilities to recover costs through the transmission tariff. FERC has approved this approach for certain storage resources (FERC Order No. 841).

Maximizing Storage Resources Value

- To fully utilize storage resources, innovative approaches are needed. This includes exploring additional revenue streams like participation in energy and operating reserve markets such as frequency regulation and voltage support

- CAISO (California Independent System Operator) has implemented market rules allowing energy storage resources to participate in its wholesale electricity markets, providing services such as frequency regulation and reserves (CAISO Energy Storage and Distributed Energy Resources Initiative).
- Storage resources can also provide consumer services like demand-side management and backup power, helping consumers save on energy bills and improve reliability.

Importance of Long-Duration Energy Storage for Renewable Penetration

Renewable energy sources, such as solar and wind, are intermittent in nature. Long-duration energy storage (LDES) plays a crucial role in ensuring a steady supply of power, even when these sources are not generating electricity. According to a report by the U.S. Department of Energy, the deployment of LDES could increase the penetration of renewable energy from 30% to 90% by 2050.

Overview of Different Energy Storage Technologies

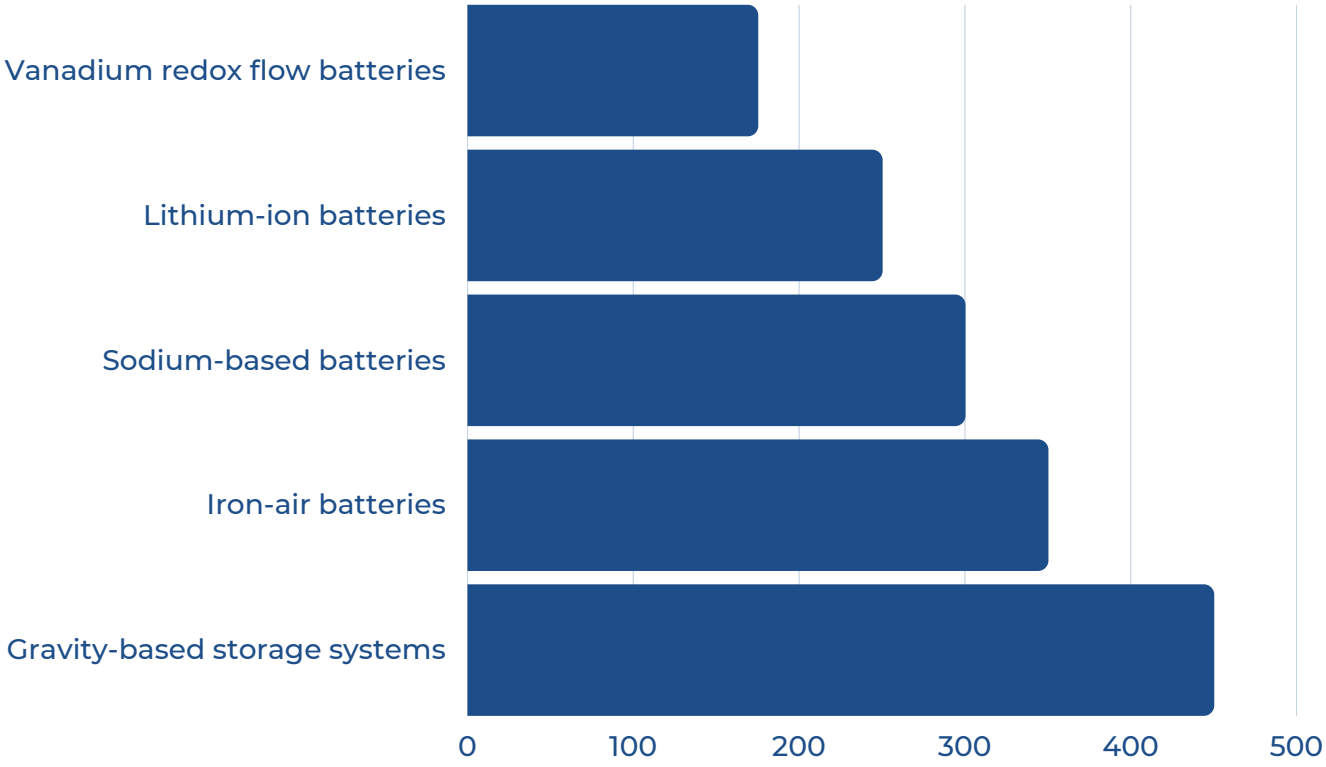
1. **Flow Batteries:** Flow batteries, such as vanadium and zinc-bromine, offer advantages in terms of scalability and long cycle life. A study by the National Renewable Energy Laboratory (NREL) in 2022 showed that vanadium redox flow batteries could offer a lower levelized cost of storage (LCOS) compared to lithium-ion batteries for durations above 6 hours. According to a report by Grand View Research, the global flow battery market size was valued at USD 214.7 million in 2022 and is expected to grow at a compound annual growth rate (CAGR) of 30.8% from 2023 to 2028.

2. **Salt or Sodium Batteries:** Sodium-based batteries, including sodium-sulfur and sodium-ion, are gaining attention due to their low cost and abundant raw materials. A report by MarketsandMarkets projected that the global sodium-sulfur battery market would reach USD 430 million by 2025, growing at a CAGR of 12.0% during 2020-2025.

3. **Iron Air Batteries:** Iron-air batteries, such as those developed by Form Energy, offer the potential for multi-day energy storage at a lower cost than lithium-ion batteries. In 2022, Form Energy secured a 20-year power purchase agreement with Great River Energy to deploy a 1MW/150MWh system.

4. **Gravity-Based Storage:** Gravity-based storage systems, such as those developed by Energy Vault and Gravitricity, use the potential energy of elevated masses to store and release energy. According to a report by Allied Market Research, the global gravity-based energy storage market is expected to reach USD 589 million by 2027, growing at a CAGR of 8.2% from 2020 to 2027.

Average LCOS (USD/kWh) for different energy storage technologies, focusing on durations above 6 hours



Source: Lazard Research Insights

Assessing the Financial Viability of Energy Storage Technologies

1. **Capital Expenditure (Capex) Reduction with DC-Coupled Storage:** DC-coupled storage systems can reduce Capex by sharing components with the PV system, leading to lower installation and hardware costs. A study by the National Renewable Energy Laboratory (NREL) in 2022 found that DC-coupled systems could provide a 7% reduction in Capex compared to AC-coupled systems.

2. **Total Cost of Ownership (TCO) Analysis**: TCO analysis considers all costs associated with an energy storage system over its lifetime, including installation, operation and maintenance, and replacement costs. According to a report by Wood Mackenzie, the TCO of lithium-ion batteries decreased by 40% between 2015 and 2022 due to improvements in technology and economies of scale.

3. **Investment Tax Credit (ITC) Benefits:** The ITC provides a tax credit for the deployment of energy storage when paired with solar. In 2023, the ITC for solar and storage stood at 26%, which means that for every $100 spent on a solar and storage system, the taxpayer would receive a $26 tax credit, providing a significant incentive for investment in these technologies.

Revenue Recognition and Contractual Aspects

1. **Long-Term Contracts and Revenue Streams:** Long-term contracts, such as power purchase agreements (PPAs), provide a stable revenue stream for energy storage projects. According to a report by BloombergNEF, the average PPA price for solar-plus-storage projects in the U.S. was $35/MWh in 2022.

2. **Accounting Treatment for Contract Revenue:** Under the International Financial Reporting Standards (IFRS), revenue from energy storage contracts is recognized over the contract term when the service is provided.

3. **Performance Obligations and Project Milestones:** Performance obligations and project milestones, as defined in the contract, determine the timing of revenue recognition. For example, a milestone-based contract may recognize revenue upon the completion of each milestone. In the US, adherence to ASC 606 principles of revenue recognition become critical.

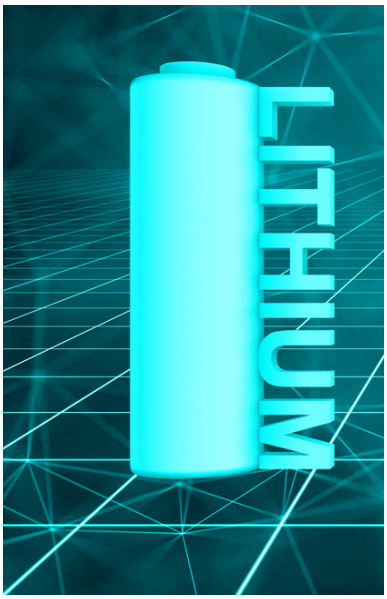
Depreciation and Asset Management

1. Determining Depreciation Methods, Useful Life, and Salvage Value: The depreciation method, useful life, and salvage value of an energy storage asset significantly impact its financial performance. According to a report by the International Renewable Energy Agency (IRENA), the typical useful life of a lithium-ion battery is 10-15 years.

2. Accounting for Energy Storage Assets: Energy storage assets are typically accounted for as property, plant, and equipment (PPE) under IFRS and are depreciated over their useful life.

Accounting & Financial Implications of Supply Chain Disruptions

Supply chain disruptions, such as those caused by the COVID-19 pandemic, can have significant financial implications for energy storage projects.



A **Impact of Supply Chain Disruptions on Energy Storage Projects:** Supply chain disruptions can lead to delays in project completion, increased costs, and potential contract penalties. According to a report by the Energy Storage Association, supply chain disruptions in 2022 led to an average increase in project costs of 20%.

B **Delays & Financial Implications**: Delays due to supply chain disruptions can lead to increased costs and potential penalties for late delivery. According to a survey by the Solar Energy Industries Association (SEIA), 83% of solar and storage companies experienced delays due to supply chain disruptions in 2022.

C **Mitigating Supply Chain Risks and Ensuring Project Stability**: Strategies to mitigate supply chain risks include diversifying suppliers, maintaining a buffer stock, and including force majeure clauses in contracts.

Financial Risks, Risk Management and Safety Consideration

Investing in energy storage projects involves various financial and safety risks that need to be identified and managed.

A **Identifying Financial Risks Associated with Energy Storage Projects:** Financial risks include market risks (e.g., changes in electricity prices), credit risks (e.g., default by a counterparty), and operational risks (e.g., system failure or underperformance).

B **Addressing Safety Concerns and Implementing Risk Mitigation Controls:** Safety concerns in energy storage primarily relate to the risk of fire or explosion, particularly for lithium-ion batteries. Risk mitigation controls include the use of advanced battery management systems, fire suppression systems, and safety training for personnel.

C **Quantifying and Managing Financial Risks:** Financial risks can be quantified using techniques such as sensitivity analysis, scenario analysis, and Monte Carlo simulation. Risk management strategies include diversification, hedging, and the use of insurance.

Ancillary Revenue Streams and Financial Benefits

Energy storage can provide various ancillary revenue streams and financial benefits, in addition to energy arbitrage.

A **Demand Charges Mitigation through Storage Integration:** By discharging during periods of peak demand, energy storage can help to reduce demand charges, which can account for a significant portion of a commercial electricity bill. According to a report by the Rocky Mountain Institute, demand charge savings can provide a payback period of less than five years for behind-the-meter storage.

B **Additional Revenue Streams from Ancillary Services:** Energy storage can provide ancillary services to the grid, such as frequency regulation and voltage support, which can provide additional revenue streams. According to a report by the U.S. Energy Information Administration, ancillary services accounted for approximately 10% of the revenue for utility-scale battery storage in 2022

C **Energy Arbitrage and Dispatch Flexibility:** Energy storage allows for energy arbitrage, i.e., buying electricity when prices are low and selling when prices are high. This can provide significant financial benefits, particularly in markets with high price volatility.

Accounting Considerations for Energy Storage Retrofitting

Retrofitting existing renewable energy installations with energy storage can provide significant financial benefits, but also involves specific accounting considerations.

A

Financial Implications of Retrofitting Solar Installations with Storage: Retrofitting solar installations with storage can increase the value of the project by providing additional revenue streams and reducing demand charges. However, it also involves additional capital expenditure and potential changes to existing contracts.

B

Depreciation, Asset Valuation, and Tax Implications: The addition of energy storage to an existing installation may require a reassessment of the depreciation schedule and asset valuation. It may also affect the eligibility for tax credits, such as the ITC. For example, if the energy storage system was placed in service after the ITC was modified, then the taxpayer may not be eligible for the full credit.

Financial Metrics and Profitability Evaluation

Evaluating the financial performance and profitability of energy storage investments requires the use of specific financial metrics.

A

Internal Rates of Return (IRR) in Energy Storage Investments: The IRR is a key metric for evaluating the profitability of energy storage investments. According to a report by the National Renewable Energy Laboratory (NREL), the IRR for utility-scale battery storage projects in the U.S. ranged from 5% to 15% in 2022.

B

Evaluating Profitability in the Current Market: The profitability of energy storage projects depends on various factors, including the cost of capital, electricity prices, and regulatory incentives. According to a report by Wood Mackenzie, the levelized cost of storage (LCOS) for lithium-ion batteries decreased by 85% between 2010 and 2022, making many projects financially viable.

Data Management & Financial of Renewable Energy Storage

Data management and analysis have become increasingly important in the renewable energy sector, particularly in relation to energy generation and storage. In 2022, a report by the International Renewable Energy Agency (IRENA) highlighted the critical role of data in optimizing the operation of renewable energy systems, reducing costs, and improving reliability. The report also emphasized the importance of data in facilitating the integration of renewable energy into the grid, which is crucial for achieving sustainability goals.

The use of data for performance monitoring and optimization has been particularly significant. Advanced data analytics tools have enabled energy providers to monitor the performance of renewable energy systems in real-time, identify inefficiencies, and implement corrective measures. According to a 2023 study by the Energy Storage Association, the use of data analytics in energy storage systems has resulted in a 15% increase in operational efficiency.

Financial Reporting and Accounting Practices

Financial reporting is another area where data plays a crucial role. Accurate and timely financial reporting is essential for maintaining investor confidence and ensuring regulatory compliance. The use of automated data collection and processing tools has streamlined the financial reporting process, reducing errors and improving accuracy.

The Investment Tax Credit (ITC) for energy storage has had a significant impact on the market. According to a 2023 report by the Solar Energy Industries Association, the ITC has led to a 46% increase in energy storage installations since its introduction. This has not only stimulated the growth of the energy storage market but also facilitated the integration of renewable energy into the grid.

Accounting for income generation and trading in renewable energy systems can be complex due to the unique characteristics of these systems. However, proper accounting practices can ensure accurate financial reporting and compliance with regulations. A 2022 study by the American Institute of Certified Public Accountants highlighted the importance of understanding the unique accounting aspects of renewable energy transactions. The study recommended the use of specialized accounting software to handle the complexities of renewable energy accounting.

A

Regulatory Bodies and Standards for Financial Reporting

- The Federal Energy Regulatory Commission (FERC), the Securities and Exchange Commission (SEC), and the Financial Accounting Standards Board (FASB) govern financial reporting in the EV and energy storage sectors.
- FERC has established new accounts to record investment and operating costs of energy storage assets, and a purchased power account for power used in storage operations.
- FERC's Form Nos. 1, 1-F, and 3-Q (electric) now include operational and statistical data on storage assets, reflecting the sector's growing importance.
- Publicly traded companies must adhere to the Generally Accepted Accounting Principles (GAAP) set by the SEC and FASB, ensuring accurate reporting of revenues, expenses, assets, and liabilities.

B

Renewable Energy Storage Assets: Classification and Accounting

- According to FASB's Accounting Standards Codification (ASC) Topic 360, renewable energy storage assets used to generate electricity are typically classified as Property, Plant, and Equipment (PP&E). PP&E assets, like solar panels or wind turbines, are recorded at historical cost and depreciated, reflecting their wear and tear.
- On the other hand, intangible assets, such as power purchase agreements, are recorded at fair value and amortized, representing their gradual consumption. In 2022 and 2023, with the renewable energy sector's growth, these assets have become significant. For instance, the Energy Storage Association reported a 300% increase in energy storage deployment in Q1 2023 compared to Q1 2022, highlighting the increasing importance of accurately accounting for these assets.

In Summary

The electric vehicle and energy storage sectors in the United States offer promising opportunities for small and medium-scale businesses. Federal incentives are driving investments in EV battery production facilities, presenting avenues for growth and competitiveness. However, challenges remain in developing a revenue model for storage as a transmission asset, requiring innovative approaches to capture the full value of storage resources. The participation of storage resources in energy and operating reserve markets further expands opportunities for businesses in this sector. As these sectors continue to evolve, small and medium-scale businesses can play a vital role in shaping the future of clean energy and driving the transition towards a more sustainable and resilient energy landscape in the United States. They need to strengthen their financial capabilities in order to exploit opportunities and manage challenges. This includes developing a sound financial model, securing adequate funding, and managing risk. By strengthening their financial capabilities, SMBs can play a vital role in shaping the future of clean energy.

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About the Author:

Karthikeyan V Raaj has over 18 years of experience as a Senior Finance Executive and as a CFO business partner. He has championed strategic projects and helped transform finance functions to enable growth of his client organizations. Currently, he is the Founding Partner of ValueXPA, a Global technology- enabled Finance-as-a-Service Partner for Small and Mid-sized Businesses and Institutions. As a CFO Partner, he has advised and helped over 50 small and mid-sized businesses, start-ups and Not-for-profit Institutions - across areas like financial planning, tracking and managing their financial performance through systems, optimizing finance processes through automation and outsourcing.

His specialties include CFO Partnering on Strategic and Business Financial Advisory, Finance Transformation, Financial Modelling, Financial Planning and Analysis, Performance Management Reporting & Decision-support, Development of KPIs and Management Dashboards, Valuation and Analytical Process Automation using Low code/ No code tools. Earlier, he held leadership roles at Barclays and S&P Global. For Global Business Leaders/companies & Financial Institutions, he offered Financial Decision and Controller Solutions and also built & led Investment Research teams globally. He holds an MBA degree specializing in Finance and is also a qualified Engineer.

For more information on business partnering please connect with us!

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