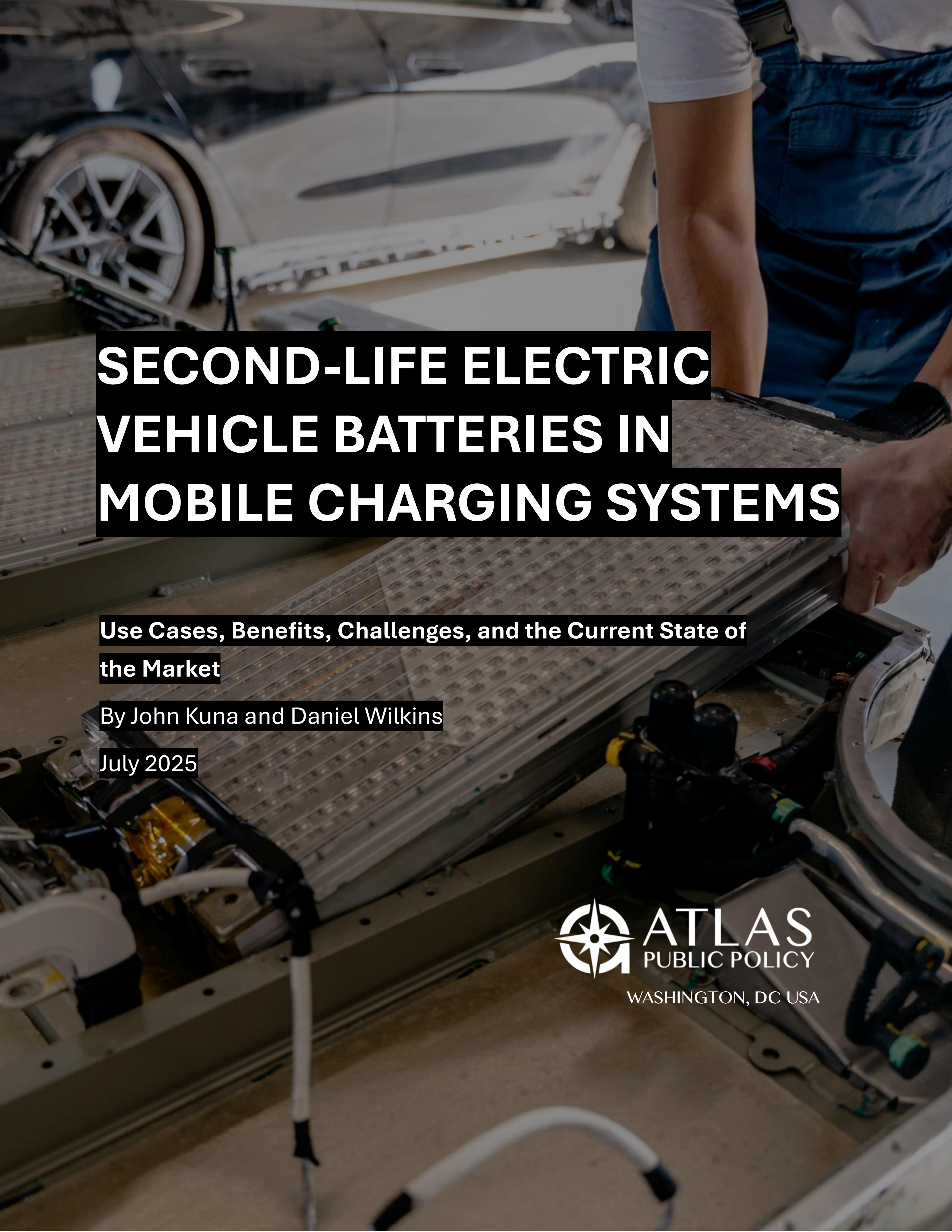

SECOND-LIFE ELECTRIC VEHICLE BATTERIES IN MOBILE CHARGING SYSTEMS

Use Cases, Benefits, Challenges, and the Current State of the Market

By John Kuna and Daniel Wilkins

July 2025

ATLAS PUBLIC POLICY

WASHINGTON, DC USA

Table of Contents

Acknowledgments

This material is based upon work supported by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) under the Vehicle Technologies Program Award Number DE-EE0010404.

Executive Summary

The growth of electric vehicle (EV) adoption in the United States will necessitate novel charging solutions to give EV drivers the freedom to travel, no matter the conditions. Mobile charging systems can be an important part of the solution due to their flexibility and potential to overcome certain barriers associated with fixed charging systems, such as high installation costs, complex permitting processes, and challenges connecting to the grid, especially in rural areas. Mobile charging systems could be valuable in certain use cases, such as augmenting charging capacity at fixed charging stations, providing charging in remote areas where grid access is challenging, and providing temporary charging services for events or disaster situations, such as evacuations.

Mobile charging systems also have challenges of their own to acknowledge, such as high battery costs and the need for battery health assessment and management. In addition, since faster charging requires larger batteries, system designers must balance the system's ease of mobility with its ability to provide fast charging. Deploying and transporting these systems requires planning, which can be complicated depending on the size of the system and where it needs to be transported.

Using second-life batteries (SLBs) retired from EVs—which typically have 70-80 percent of their original capacity—in mobile charging systems can help overcome cost barriers as well as alleviate battery supply chain constraints and the environmental impacts of batteries. SLBs can cost as little as 25 percent of the cost of an equivalent new battery and can be coupled with advanced battery management system software to optimize SLBs, ensuring safety and performance. SLBs have some unique challenges though, such as arduous safety certification requirements, the lack of homogeneity of battery packs from different EV models, and no standard to assess and track battery health through its lifecycle.

There are several mobile charging systems available on the market, including both portable and containerized solutions. Portable mobile charging systems are designed to be easily and frequently moved, whereas containerized solutions, while still mobile, are much larger and are intended to be used at the same location for longer periods of time. However, many of these solutions are in early stages of deployment. With return on investment posing a major concern for the development of this important technology, utilizing SLBs can drive down costs on the most expensive component of a mobile charging system—the battery.

Introduction

Mobile charging systems use batteries to power EVs, and range from suitcase-sized packs that deliver a 20-mile ‘top-up’ to full-size shipping containers that house 300 kWh or more. At the smaller end, portable packs or tow trailers like roadside assistance can be rolled out by one person in minutes. Mid-tier trailer units with 150-200 kWh on board are road capable but may need a pickup or light-duty truck to relocate. The largest containerized or solar-canopy units trade day-to-day mobility for autonomy; once dropped onsite, they may stay for weeks, using rooftop solar panels or a small generator to recharge themselves off-grid.

This spectrum allows mobile charging systems to meet many use case needs: tiny, wheel-in packs excel at emergency roadside boosts; mid-size trailers supplement busy fixed sites or cover disaster corridors; containerized solar units shine in remote parks or military forward bases where grid extension may be cost-prohibitive. See Figure 1 for an example of a mobile charging solution.

Figure 1. An off-grid solar powered EV charging station

Source: U.S. Department of Energy [1].

SLBs from EVs typically still have 70-80 percent of their original capacity, making them capable of providing continued value in other uses. SLBs are less expensive than new batteries, usually ranging between $44 and $180 per kilowatt-hour (kWh) towards the lower end, compared to around $150-250 per kWh for new batteries [2]. Many applications for mobile charging systems do not require the high-capacity performance of new batteries (e.g., rural chargers that are expected to see low utilization), making SLBs a good option to reduce project costs.

Governments, companies, and personal EV drivers can take advantage of mobile charging systems in a variety of applications. Examples include augmenting fixed charging systems that have high utilization, providing charging support during disaster or emergency situations, offering charging services to rural or off-grid environments, and providing temporary charging solutions where long permitting process, construction, and energization times impede fixed charging system deployment.

This report will provide readers with an overview of mobile charging systems for passenger EVs, including use cases, advantages and disadvantages, the potential to reduce costs using SLBs, and the current state of the mobile charging system market.

Market Overview of Mobile Charging Systems

There are several mobile charging system options currently available on the market, including portable units and containerized solutions. Portable charging solutions are designed to be mobile and flexible, allowing them to be transported to various locations as needed. These systems provide on-demand charging services and are ideal for applications such as special events, roadside assistance, and temporary setups. Containerized charging solutions housed within upcycled shipping containers can also be transported; however, they are much larger than portable systems and are designed to be transported by heavy-duty vehicles. These systems are particularly useful in urban areas or for fleet operations where space is limited and fixed charging systems are not viable. Containerized solutions offer a scalable and flexible charging option that can support a mix of charger types and power levels, allowing for quick setup and relocation as needed.

Several currently available systems are specifically designed to provide emergency charging solutions. Emergency charging solutions are designed for rapid deployment in crisis situations where the grid may be down or unreliable. These systems can be quickly transported to disaster-stricken areas to provide essential power for emergency vehicles and critical infrastructure. Emergency charging solutions ensure continued operations during crises and can include features like robust battery storage and independent power sources, such as off-grid solar panels, to enhance their reliability and effectiveness.

Table 1 provides an overview of several market players within the mobile charging system sector, classifies each solution as containerized or portable, and flags solutions that are geared toward providing emergency services.

Table 1. Market Players within the Mobile Charging Systems Sector

Company	Type of Mobile Charging Systems	Description
Beam Global	Portable, Emergency	EV ARC systems are off-grid, solar-powered charging solutions that generate and store their own electricity; ideal for rapid deployment, temporary setups, and disaster response scenarios [3] [4] [5].
BoxPower	Containerized	SolarContainer is a full microgrid solution with an integrated solar array to provide continuous charging capabilities without grid connection. Multiple SolarContainers can be linked to expand their capabilities [6].
BP Pulse	Portable, Containerized	Inrush brand offers multiple models, including mobile units, containerized stations, and surface mount systems, providing flexible, battery-supported charging without the need for existing electrical infrastructure [7] [8] [9].
EvoCharge	Portable	The Mobile DC Charger is a rollable platform that provides DC fast charging capabilities in a mobile charging system form factor, designed for commercial applications [10].
FreeWire Technologies[1]	Containerized	Battery-integrated Boost Chargers have ultrafast EV charging capabilities and embedded battery storage, enabling rapid

[1] As of June 2024, FreeWire closed all business operations. [40]

Company	Type of Mobile Charging Systems	Description
		deployment without extensive grid upgrades; the chargers are also optimized with AI for strategic deployment [11] [12].
Lightning Systems	Portable, Emergency	Lightning Mobile offers flexible mobile EV charging solutions with robust battery packs and DC fast charging technology, suitable for fleet operations, events, and remote or emergency locations [13].
SETEC Power	Portable, Emergency	Emergency mobile EV charging system with a 56-kWh battery pack delivering 60 kW of charging power; designed for rapid deployment in roadside or remote areas; supports various DC fast charging standards [14].
SparkCharge	Portable	The Roadie Portable system offers portable, scalable charging solutions designed for businesses and fleet operators, providing on-demand charging with handheld modular battery packs that can be easily transported for rapid deployment [15]. The Roadie V3 system offers a larger off-grid mobile charging system designed for fleet charging that offers greater power output than the Roadie Portable [16].
Xos	Portable, Emergency	The Xos Hub is a rapidly deployable charging system intended for tow by a pickup truck that can provide DC fast charging for fleets, emergency applications, or semi-permanent installations [17].

Mobile Charging System Use Cases

The versatility of mobile charging systems offers a wide range of solutions to address the limitations and challenges of fixed EV charging infrastructure. This section describes specific use cases of mobile charging systems and their potential to provide efficient and flexible charging options across various scenarios.

EV Charging as a Service

EV charging as a service (CaaS) models allow customers to rent rather than own charging equipment, allowing them to avoid the upfront costs and ongoing maintenance efforts required to own a charging station. EV CaaS using mobile charging systems has further benefits, like making deployment of charging infrastructure more rapid. Unlike fixed charging systems, mobile systems do not need lengthy permitting processes to deploy. The hardware for mobile charging systems also tends to be relatively less expensive than comparable fixed charging models.

Additionally, many use cases for mobile charging systems are temporary, meaning a mobile EV CaaS model can be even more cost-effective for users. For example, mobile EV CaaS could support temporary charging demand in disaster situations where many EV drivers may need to charge in a short period of time. Mobile EV CaaS systems can also serve special events like festivals and large gatherings by supporting temporary, high charging demand without the need for permanent infrastructure.

Another potential use case for mobile EV CaaS systems is roadside assistance services. Much like when an internal combustion engine (ICE) vehicle driver runs out of gas and calls roadside assistance to bring spare fuel to get to a gas station, an EV driver who runs out of charge could call for emergency charging services. Companies such as AAA are making inroads into the EV roadside assistance market. In December 2022, AAA expanded its roadside assistance capabilities by launching a Mobile EV Charging pilot program geared toward EV owners in 14 markets across the country, including in cities such as Orlando, FL, Denver, CO, San Francisco, CA, and Philadelphia, PA [18].

Certain EV CaaS providers offer on-demand charging with portable charging vans and trailers, while others offer modular charging packs that businesses can operate themselves. For commercial applications, companies also offer scalable charging solutions that cater to the needs of businesses and fleet operators with small, modular batteries that can be delivered onsite and are even more portable than vans or trailers [15].

Supplement or Alternative to Fixed Charging Systems

High utilization at fixed charging system sites can force drivers to wait in long queues to use a charger. Adding chargers to a site or building a new fixed charging system can be time-intensive and expensive due to permitting, construction, and energization requirements. These processes can take months, but typically take more than a year. By contrast, battery-integrated mobile charging systems are often able to connect to a standard low-voltage circuit or run completely off-grid so they can sidestep lengthy utility interconnection studies and most building permits, however they still need permits under fire code for mobile energy-storage equipment and may be required to follow hazmat transport rules for batteries [19]. To illustrate this difference further, EVgo, a charging company that operates one of the largest direct current (DC) fast charging networks in the United States, estimates that bringing a new DC fast charging site online takes an average of 18 months, not including utility or construction delays [20]. With the U.S. government's goals of a net-zero transportation sector by 2050, a rapid buildout of charging infrastructure is necessary [21]. Mobile charging systems can help provide charging options without going through all the processes required to build fixed chargers. While some mobile charging systems have slower charging speeds than fixed chargers, many mobile charging systems can support fast charging [13].

Another limiting factor for most fixed charging systems is their reliance on the electric grid, which can result in high demand charges. Demand charges are based on a site's peak power demand from the grid [22]. The higher the peak demand, the higher the overall charge. Therefore, if all chargers at a charging site are used at the same time, this can result in a high demand charge. Mobile charging systems can help keep demand down for fixed charging systems by drawing on batteries instead of the grid when the site is experiencing high utilization. Additionally, if a fixed charging site is on a time-of-use rate, in which energy prices are higher during the grid's peak demand times, a mobile charging system can help keep costs down by drawing on batteries instead of the grid when energy prices are high. The batteries on mobile charging systems can also be charged during times when energy prices are low, furthering cost savings.

Off-Grid EV Charging

Across the United States, many areas, including large swaths of popular state and national parks, are not connected to the electric grid and therefore cannot support grid-connected EV charging stations. In some situations, this is due to restrictive geography that makes electric distribution prohibitively expensive to build and maintain. For example, the U.S. Forest Service sidestepped the six-figure cost of stringing new distribution lines by deploying a standalone, solar-powered charger at the remote Wolf Creek Job Corps Civilian Conservation Center in Oregon's Umpqua National Forest [1]. In these circumstances, mobile charging systems that do not rely on the electric grid could also offer a potentially viable charging solution. These systems can use renewable energy, such as solar or wind, coupled with battery storage to provide grid-independent charging options [23]. Off-road EVs used in wilderness conditions also lack access to electrical infrastructure and could therefore also benefit from mobile charging systems.

Disaster Situations

In the event of a grid failure from a natural or manmade disaster, contingency operations for EV charging will become a necessity. While medium and heavy-duty vehicles like ambulances and firetrucks are only in the early stages of electrification, light-duty emergency vehicles (e.g., pickup trucks or patrol cars for law enforcement) are actively in the process of electrifying [24]. A future in which emergency vehicles are electrified will require emergency charging options. Mobile charging systems are useful for disaster scenarios in which either total or partial grid failure occurs. Using mobile charging systems during these times allows the grid to focus resources on critical infrastructure like hospitals.

There are some advantages to owning an EV during an evacuation order, such as being able to charge at home and avoid long gas station lines from drivers rushing to refuel. Since most evacuation orders come well before grid failure, this is likely a sufficient and advantageous solution for EV drivers who have access to home charging. However, for EV drivers who do not have access to home charging, or in cases where there is a shorter lead time, EV drivers face the risk of struggling to find an available public charger in time to charge and evacuate safely. Mobile charging systems could be valuable in these situations. State governments could deploy mobile charging systems along evacuation routes at rest stops, gas stations, or other EV charging sites [25]. With increasingly common extreme weather events that can impact grid outages and that may require evacuation, states need effective evacuation strategies that can accommodate EVs.

Defense Applications

The U.S. Department of Defense has stated that it intends to electrify its fleet of non-tactical vehicles by 2035 [26]. In addition, the U.S. Army is exploring electrifying its fleet of light reconnaissance vehicles [27]. Doing so has tactical advantages for the military, such as a reduced noise signature, but also raises questions about how the military will ensure the vehicles stay in operation in austere, off-grid conditions.

Mobile charging systems that can be transported by an electric service vehicle can provide benefits to electric light reconnaissance vehicles and other service vehicles. Mobile charging systems that soldiers can employ in the field can extend the operational range of the U.S. Army's prototype electric light reconnaissance vehicles. Equipping the mobile charging systems with a solar array could also substantially improve range capabilities and fuel availability [28].

As the Department of Defense expands its electrification efforts to other service vehicles, equipping vehicles with mobile charging systems could reduce the military's reliance on fossil fuel in their supply chain logistics, improving operational flexibility.

Benefits and Challenges of Mobile Charging Systems

Mobile charging systems offer several key benefits, including the flexibility to be quickly deployed and relocated, the ability to operate independently from the grid, low installation costs due to less construction and electrical work, and fewer permitting requirements. These benefits are listed and described in Table 2.

Table 2: Benefits of Mobile Charging Systems

Benefit	Description
Flexibility in deployment and relocation	Mobile charging systems can be quickly deployed and relocated as needed, making them ideal for temporary events, emergencies, and areas with limited or no grid access. This flexibility allows for efficient utilization and adaptability to changing demands, ensuring that EV charging infrastructure can be provided wherever it is most needed.
Grid independence	Mobile charging systems can operate independently of the grid, using battery storage and renewable energy sources like solar power. This makes them particularly valuable in disaster-prone areas or regions with unreliable power infrastructure. Their ability to provide power during grid outages enhances their utility in maintaining continuous EV operations under adverse conditions.
Low or no installation costs	Since mobile charging systems do not require significant construction or electrical work, they typically have lower installation costs compared to fixed infrastructure. This can make them a more cost-effective option for expanding EV charging capabilities without the financial burden associated with traditional installations.
Few permitting requirements	Because mobile charging units are not fixed to a specific site, they can bypass the lengthy permitting processes required for fixed charging systems [13]. This can significantly speed up deployment times and reduce administrative burdens, allowing for quicker responses to immediate charging needs.

Deploying and maintaining mobile charging systems also has some unique challenges. For example, while these systems have lower installation costs compared to fixed charging systems, batteries are expensive and can make overall project costs prohibitively high. In addition, mobile charging systems require logistical planning to get the systems where they need to be, training to ensure the systems are operated properly, and ongoing management and assessment of the battery's health. Some mobile charging systems, particularly those that must be small enough to allow easy transport, may offer low charging capacities, increasing the amount of time it takes to charge a vehicle. These challenges are listed and described in Table 3.

Table 3: Challenges of Mobile Charging Systems

Challenge	Description
High battery costs	Despite lower installation costs, the initial purchase price of mobile charging systems can be high, primarily due to the cost of the large battery packs required.
Transportation and deployment logistics	Moving and setting up mobile charging units requires logistical planning and resources. This includes ensuring the availability of transport vehicles and personnel trained to operate the systems. Additionally, as lithium-ion batteries are classified as Class 9 hazardous materials, there are specific regulations and safety concerns that must be addressed during transportation [29].
Battery management and assessment	Managing the health and performance of batteries in harsh outdoor environments can be challenging. Effective battery management systems are essential to monitor and optimize battery performance and ensure the safety, which can add to the overall complexity and cost of mobile charging solutions.
Limited charging capacity	Some mobile charging systems may offer limited battery energy storage capacity, compared to traditional fixed chargers, which can limit their effectiveness in high-demand scenarios. This limitation needs to be considered when planning deployments to ensure that the systems meet the specific charging needs of the intended application.

Benefits of Second-Life Batteries in Mobile Charging Systems

Once an EV battery degrades to about 70-80 percent of its original capacity, it is typically no longer usable in an EV and is available for second life use cases [30]. Mobile charging systems can benefit from these SLBs due to the substantial cost savings, particularly for use cases in which the cost of a new battery may make a return on investment less likely. For example, rural and off-grid chargers often see low utilization rates and do not require new batteries with high capacities. The cost of SLBs ranges between $40 and $160 per kilowatt-hour (kWh), which is substantially lower than the cost of new batteries, which was around $150-250 per kWh [2]. Therefore, the use of SLBs can significantly enhance the financial viability of these systems without compromising functionality.

Advanced battery management system software plays a crucial role in optimizing the performance of SLBs, extending their lifespan and ensuring safety. Battery management software can monitor and manage the health of SLBs, balancing charge and discharge cycles to maximize usable capacity and reduce degradation. This optimization extends the lifespan of SLBs and enhances the reliability and safety of mobile charging systems, which further improves both their relative performance and cost-effectiveness when compared to new batteries.

Increasing use of SLBs can also help alleviate supply chain issues related to battery materials demand [31]. By 2030, the global supply of SLBs is forecasted to exceed 112 gigawatt-hours (GWh) from light-duty vehicles alone, approximately 40 GWh of which will be in the United States [32]. This substantial volume represents a valuable resource that can help reduce supply chain constraints. With mobile charging systems relatively nascent to the global battery market, manufacturers can maneuver around these constraints by adopting SLBs.

The environmental benefits of repurposing used batteries align with sustainability goals and regulatory frameworks aimed at reducing battery waste and promoting a circular economy [33]. Repurposing batteries for second life applications reduces the overall demand to produce new batteries, which has substantial localized environmental impacts in areas near raw material extraction, such as lithium and nickel mining operations. It also helps to reduce the risk of soil and water contamination from improper disposal of batteries in landfills [34].

Challenges Associated with Second-Life Batteries

Several considerations must be addressed to fully realize the potential of SLBs in mobile charging systems. Battery health is paramount, requiring thorough testing and validation at both the pack and module levels. Without testing and validation, performance issues can arise.

A major concern among mobile charging system manufacturers regarding SLBs is the arduous process of obtaining a variety of safety certifications to ensure that the repurposing of EV batteries does not impose undue safety risks to end users or those in the manufacturing process. Retired EV packs are first shipped to specialized repurposing or remanufacturing facilities where technicians dismantle, inspect, and reassemble modules for their second-life applications. SLBs require both the repurposing/remanufacturing facilities and the batteries themselves to undergo certification, adding to the challenge. Underwriters Laboratories (UL), a global safety certification enterprise, is the most ubiquitous organization providing such certification services. UL has three main certifications that may affect mobile charging system manufacturers [35] [36] [37]:

- UL 1974: Standard for Evaluation for Repurposing Batteries;
- UL 1973: ANSI/CAN/UL Batteries for Use in Stationary and Motive Auxiliary Power Applications; and
- UL 1642: Lithium Batteries.

However, other certifications may be required. For example, transport approvals if the batteries will be shipped by air or sea, fire safety tests when the system is parked indoors for long periods, or international safety listings if the unit is sold outside North America. These certification processes can be both expensive and time consuming, with the process taking anywhere from eight to 12 weeks to certify [38]. Streamlining these would help accelerate the use of SLBs in mobile charging systems.

The lack of homogeneity of battery packs and modules across different EV models is another important consideration. Each battery is designed with specific configurations, chemistries, and sizes, leading to significant variability. Having no standard design for battery packs, even sometimes among the same model from different years, complicates the refurbishment process, requiring tailored solutions for each type of battery [39]. Relatedly, a lack of standardized health assessments for SLBs adds challenges to securing warranties and determining expected battery lifespans. With not much data available, manufacturers could lack confidence in how long SLBs will last in mobile charging systems and therefore may not support the widespread use of SLBs in this application. It is very critical to collect and share the actual performance data from second-life batteries in real-world applications.

Due to the risk of fires, lithium-ion batteries are classified as hazardous materials, which adds complexity and costs to their transportation from disassembly points to new manufacturers [29]. This classification necessitates special handling, packaging, and shipping protocols, which adds additional expenses to utilizing SLBs.

Conclusion

As EV adoption continues to grow in the United States, innovative charging solutions will be essential to ensure EV drivers have the freedom to travel under any conditions. For certain use cases, mobile charging systems can offer a more cost-effective solution compared to fixed charging systems. Mobile charging systems are flexible and can be deployed rapidly, making them ideal for applications such as roadside assistance, special events, rural and off-grid environments, and emergency situations. Incorporating SLBs into mobile charging systems can improve their financial viability.

Despite some additional challenges that come with using SLBs, such as additional battery health assessments and safety certification requirements, SLBs have the potential to reduce costs and supply chain limitations as well as reduce the environmental impact of EV batteries. The diverse market offerings from companies innovating in this space highlight the potential and adaptability of mobile charging solutions, positioning them as a critical component in the broader EV charging infrastructure landscape.

Disclaimer

References

[1] United States Department of Energy, "United States Forest Service Leverages EV Charging Solution for Remote Areas," [Online]. Available: https://www.energy.gov/femp/united-states-forest-service-leverages-ev-charging-solution-remote-areas. [Accessed 4 June 2025].

[2] Q. e. a. Dong, "Cost, energy, and carbon footprint benefits of second-life electric vehicle battery use," Iscience 26.7 (2023), 2020.

[3] Beam Global, "Arc Mobility Trailer Information," December 2022. [Online]. Available: https://beamforall.com/wp-content/uploads/2022/12/BEAM-ARC-Mobility-Trailer-Info-Sheet-V1.0.pdf.

[4] Beam Global, "Beam Global Receives $2.9M Order From U.S. Department of Homeland Security for Sustainable EV Charging Infrastructure Products," 14 November 2022. [Online]. Available: https://beamforall.com/beam-global-receives-2-9m-order-from-u-s-department-of-homeland-security-for-sustainable-ev-charging-infrastructure-products/#:~:text=SAN%20DIEGO%20%E2%80%93%20November%2014%2C%202022%20%E2%80%93%20Beam,3%20ARC%20Mobility%E2%84%A2%2.

[5] Beam Global, "Beam Global Completes Deployment of 30 EV ARC Solar-Powered EV Charging Systems for Electrify America," 11 February 2021. [Online]. Available: https://beamforall.com/beam-global-completes-deployment-of-30-ev-arc-solar-powered-ev-charging-systems-for-electrify-america/.

[6] "SolarContainer," BoxPower, [Online]. Available: https://boxpower.io/products/solar-container/. [Accessed 12 September 2024].

[7] BP Pulse, "inrush: Non-permanent Charging Solutions," February 2023. [Online]. Available: https://bppulsefleet.com/wp-content/uploads/2023/02/bp-pulse_Brochure_inrush_v1.31.23_Digital.pdf.

[8] S. Lonsdale, "Five reasons fleets should consider mobile and non-permanent charging," BP Pulse Fleet, 17 January 2023. [Online]. Available: https://bppulsefleet.com/blog/five-reasons-fleets-should-consider-mobile-and-non-permanent-charging/.

[9] A. Sporrer, "Amply Power unveils shipping containers for cheaper, portable EV charging," Freight Waves, 05 November 2021. [Online]. Available:

https://www.freightwaves.com/news/amply-power-unveils-shipping-containers-for-cheaper-portable-ev-charging.

[10] "DC Fast Charging Stations," EvoCharge, [Online]. Available: https://commercial.evocharge.com/dc-fast-charging/. [Accessed 12 September 2024].

[11] FreeWire Technologies, Inc. , "Boost Charger Pro™," 2024. [Online]. Available: https://freewiretech.com/boost-charger-pro/.

[12] FreeWire Technologies, Inc. , "FreeWire Launches Mobilyze Pro," 22 August 2023. [Online]. Available: https://freewiretech.com/freewire-launches-mobilyze-pro/.

[13] Lightning eMotors, "Lightning Mobile," 2024. [Online]. Available: https://lightningsystems.com/lightning-mobile/.

[14] Shenzhen SETEC Power Co., Ltd, "56kWh Emergency mobile EV charging system," 2024. [Online]. Available: https://www.setec-power.com/emergency-mobile-ev-charging-system/.

[15] Sparkcharge, "Products: Roadie Portable," 2024. [Online]. Available: https://www.sparkcharge.io/pages/roadie-portable.

[16] "Electric Vehicle Fleet Charging Made Easy," SparkCharge, [Online]. Available: https://www.sparkcharge.io/fleet. [Accessed 12 September 2024].

[17] "Xos Hub," Xos, [Online]. Available: https://www.xostrucks.com/hub. [Accessed 12 September 2024].

[18] AAA, "Electrifying AAA Member Benefits," December 2022. [Online]. Available: https://newsroom.aaa.com/2022/12/electrifying-aaa-member-benefits/.

[19] International Fire Code, "Section 1207: Electrical Energy Storage Systems (ESS)," ICC, 2024.

[20] EVGo, "Connect the Watts: Best Practices for National Electric Vehicle Infrastructure Program (NEVI)," 2022. [Online]. Available: https://www.evgo.com/connect-the-watts/#ctw-best-practices.

[21] U. S. D. o. Energy, "The U.S. National Blueprint for Transportation Decarbonization," 2023.

[22] R. Walton, "Retailers warn demand charges, utility competition could impede national EV charging network," Utility Dive, 27 July 2022. [Online]. Available: https://www.utilitydive.com/news/EV-retailers-demand-charges-utility-competition-

charging-DOE-electric-vehicles/628210/#:~:text=Demand%20charges%20have%20been%20a,a%20charging%20station's%20electricity%20costs..

[23] Solar Energy Industries Association, "Initiatives: Solar Plus Storage," [Online]. Available: https://www.seia.org/initiatives/solar-plus-storage. [Accessed 14 July 2024].

[24] United States Department of Homeland Security, "DHS Electric Vehicle Program Accelerates with Debut of First Fully Electric Law Enforcement Vehicle," 19 September 2022. [Online]. Available: https://www.dhs.gov/news/2022/09/19/dhs-electric-vehicle-program-accelerates-debut-first-fully-electric-law-enforcement.

[25] J. Sensiba, "FEMA & EV Charging Providers Need To Talk About Post-Evacuation Bottlenecks," 23 March 2023. [Online]. Available: https://cleantechnica.com/2023/03/23/fema-ev-charging-providers-need-to-talk-about-post-evacuation-bottlenecks/.

[26] J. Ahl, "The military is converting to electric vehicles on bases, but charging them remains a challenge," WUSF 89.7; National Public Radio, 15 April 2023. [Online]. Available: https://www.wusf.org/transportation/2023-04-15/the-military-is-converting-to-electric-vehicles-on-bases-but-charging-them-remains-a-challenge.

[27] A. Roque, "Army greenlights Electric Light Reconnaissance Vehicle prototype buy in 2024," Breaking Defense, 28 Febraury 2023. [Online]. Available: https://breakingdefense.com/2023/02/army-greenlights-electric-light-reconnaissance-vehicle-prototype-buy-in-2024/.

[28] H. H. Seck, "As Tactical EV Plans Take Shape, Army Charges Ahead; Marines Stay Cautious," National Defense Magazine, 12 February 2024. [Online]. Available: https://www.nationaldefensemagazine.org/articles/2024/2/12/as-tactical-ev-plans-take-shape-army-charges-ahead-marines-stay-cautious.

[29] "Lithium Battery Guide for Shippers: A Compliance Tool for All Modes of Transportation," United States Department of Transportation, 2023.

[30] University of Alabama, "UA Leading Project to Give EV Batteries Second Life," 24 October 2024. [Online]. Available: https://news.ua.edu/2023/10/ua-leading-project-to-give-ev-batteries-second-life/.

[31] J. Brinn, "Building Batteries Better: Doing The Best With Less," National Reosurces Defense Council , 2023.

[32] H. Engel, P. Hertzke and G. Siccardo, "Second-life EV batteries: The newest value pool in energy storage," McKinsey & Company, 30 April 2019. [Online]. Available: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/second-life-ev-batteries-the-newest-value-pool-in-energy-storage.

[33] Federal Consortium for Advanced Batteries, "Executive Summary: National Blueprint for Lithium Batteries 2021-2030," United States Department of Energy, 2021.

[34] D. Walter, W. Atkinson, S. Mohanty, K. Bond, C. Gulli and A. Lovins, "The Battery Mineral Loop," RMI, 2024.

[35] "UL 1974," Underwriters Laboratories, [Online]. Available: https://www.shopulstandards.com/ProductDetail.aspx?UniqueKey=45060. [Accessed 12 September 2024].

[36] "UL 1973," Underwriters Laboratories, [Online]. Available: https://www.shopulstandards.com/ProductDetail.aspx?productId=UL1973. [Accessed 12 September 2024].

[37] "UL 1642," Underwriters Laboratories, [Online]. Available: https://www.shopulstandards.com/ProductDetail.aspx?productId=UL1642. [Accessed 12 September 2024].

[38] "Understanding the UL, CE, CSA Certification Process," Underwriters Laboratories, [Online]. Available: https://ulassistance.com/whitepapers/understanding-the-ul-ce-csa-certification-process. [Accessed 12 September 2024].

[39] D. Wilkins and J. Kuna, "ISRI Circularity & Electrification Action Summit," Institute of Scrap Recycling Industries; Atlas Public Policy, 2023.

[40] K. O'Neil, "Essential electric vehicle tech company set to close operations," MSN, 16 May 2024. [Online]. Available: https://www.msn.com/en-us/money/companies/essential-electric-vehicle-tech-company-set-to-close-operations/ar-BB1msMvz.

ATLAS
PUBLIC POLICY
WWW.ATLASPOLICY.COM