Guidehouse
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White Paper

Linking Clean Energy and Clean Mobility via Resilient Microgrids

How Energy as a Service Business Models Foster Sustainability Solutions

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Introduction: Why Microgrids Foster Grid Resiliency for EV Infrastructure

If global EV adoption rates grow as projected, this represents a major step in reducing emissions that contribute to global climate change and local air pollution concerns. The shift to cleaner mobility does not occur in a vacuum; it has broad implications for vehicles and power infrastructure, prompting demand for all-inclusive rather than siloed solutions.

While the electrification trend in transportation is encouraging, it comes with complications. These complications are tied directly to incumbent grid structures that threaten the reliability of electricity supply and costs. Regarding the former, increased frequency of extreme weather events is a growing challenge for reliability and jeopardizes the push toward electrification. Recent long-term power outages in Texas and California point to the need for greater resilience. In addition, many incumbent grid demand management rate structures are not designed for the load profiles EV charging creates and this has created increased costs and challenges for commercial EV charging site hosts. Additionally, many incumbent grid management and retail structures were not designed to access the value EVs can provide the grid via vehicle grid integration technologies, which can tap the flexibility of EV charging loads to increase grid energy and emissions efficiency.

The answer to these complications comes in the form of microgrids and other grid infrastructure upgrades. Microgrids can create islands of power once the grid goes down, maintaining essential electricity supplies for various forms of electric transit. Microgrids can use onsite renewable technologies such as solar PV, batteries, and even EVs as grid support assets. If equipped with advanced software systems, these microgrids can support the larger grid with real time optimization of diverse distributed energy resource assets that make up a microgrid.

As state policymakers design and implement programs supporting the expansion of EV fleets at their own facilities and offer public financial support directly to consumers for adoption, they must account for the impact such well-intended programs will have on the reliability and efficiency of regional power grids.

What EVs and microgrids share in common is exponential growth. They are also typically deployed behind the meter (BTM) of the local distribution utility. Tying the development of each together is possible due to rapid innovation in technology and new financial business models. Microgrids can support EV charging and EVs can also support microgrids, resulting in the following benefits:

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- **Flexibility:** Flexibility of the microgrid and EV charging can be optimized to support each other.
- **Reliability and Resilience:** If the grid goes down for short periods (reliability issue) or long periods (resilience issue), a steady source of sustainable energy for EV charging is onsite.
- **Cost:** The generation source to load distance is zero, which improves efficient distribution of energy. That in turn lowers overall development and operational costs compared to status quo utility distribution upgrades.

State funding for grid infrastructure upgrades may be limited given the current economic climate, especially in light of the COVID-19 pandemic. The Biden administration's proposed federal infrastructure funding proposal could help overcome this limitation and is designed to provide a national network of EV charging stations. However, how such upgrades will be financed under this proposal is an area of political contention. As currently proposed, the infrastructure plan does not target heavy duty electric trucks, which will have some of the greatest impacts on the grid and major impacts for the environment, but instead targets light duty and public transit. The latter category will require significant distribution system upgrades. (The US Department of Transportation just launched two new electrification programs for heavy and medium duty trucks, further generating opportunities to increase resilience of electricity supply within the transportation sector.)

Perhaps one of the most promising solutions is an energy as a service business (EaaS) model where solution providers offer microgrids wrapped around EV charging stations with no upfront capital costs for the end user. Under this scenario, the risk for project performance falls on the shoulders of the solutions provider and its financial partners. This white paper includes a case study in Maryland, showing how EaaS microgrids can help support municipal EV fleets. This project represents a model that could be replicated throughout the US as states commit to net zero carbon goals. The white paper concludes with public policy considerations for state governments.

The Evolving US EV Landscape

We are nearing the tipping point where EVs become mainstream offerings. Fuel efficiency regulations and continued development of advanced battery chemistries and manufacturing capacity contribute to the steady reduction of the EV purchase costs premium over conventional internal combustion engine vehicles for all markets, consumer and commercial. For the electric power sector this is a boon, but a boon that requires active management. While basic load growth is good for the sector, the uneven distribution of that growth within a specific location or at a specific time of day could prove burdensome for utilities. Actively managing and spreading the EV charging load across infrastructure assets and time could prevent infrastructure upgrade costs and may also decrease grid balancing costs. This is an important aspect as more intermittent renewable resources are added to generation portfolios.

While growth in EV adoption is a worldwide phenomenon, this white paper focuses on trends and opportunities in the US. Despite 50 states each moving at their own pace, overriding trends exist that can guide each state on critical issues surrounding these rollouts:

- Availability of required energy capacity from incumbent distribution utilities
- The resilience and sustainability of needed energy supply
- Strained public and private capital budgets for critical infrastructure

To date, many states are rolling out programs to accelerate EV adoption and support EV charging infrastructure. Absent from this, however, is a strategy to move beyond the EV chargers to invest in the infrastructure that supports the goal of adequate electrical capacity that is resilient and sustainable. Public-private partnerships will be key since utilities tend to take long lead times to adapt new technology and are often viewing problems through the lens of protecting the utility franchise, not necessarily accelerating new technology adoption.

Absent from this, however, is a strategy to move beyond the EV chargers to invest in infrastructure that supports the goal of adequate electrical capacity that is resilient and sustainable.

With the right kind of help from the federal government in the form of targeted R&D, grants, and tax credits, states can supplement this newfound support with their own programs, along with commercial enterprises and other organizations. In the end, future investments in EV charging infrastructure need to navigate through what have been distinct regulatory initiatives, using private sector expertise, technology solutions, and capital to build microgrids to support EV charging.

Market Barriers to EVs

Cost, equity, and utility cost shifting concerns inevitably arise with EVs, as is the case with solar PV. However, well-crafted, market-based state regulatory programs can address these issues. A key factor is allowing for creative public-private partnerships, using new EaaS business models, to play a strategic role in addressing these larger societal concerns that require much broader solutions than one targeting EVs. The primary barriers to EV adoption specifically are the following:

- **Upfront capital costs.** Absent government subsidies, an EV's cost is still out of reach of many consumers and fleet managers. Additionally, many new EV owners still need to purchase and install charging infrastructure. While home-based systems are the preferred approach for many, since public charging stations are still limited, the need for public charging stations (and supporting grid infrastructure) will grow by necessity as EV adoption gains momentum.

- **Availability of public, fast EV charging infrastructure.** EVs have secured a foundation in the automotive market through consumers and fleets who can rely on their own charging infrastructure for energy needs. However, breaking into the rest of the market—consumers who primarily park on-street, or fleets that depend on third-party-owned refueling networks—requires denser fast charging networks and faster charging services. It is especially appealing to apply microgrids to fast charging due to the significant capacity additions these chargers represent, and because service operators are extraordinarily sensitive and vulnerable to power and cost disruptions.
- **Future-proofing EV chargers.** Fleet electrification is complex. Developing the charging solution for a fleet at a depot in many instances will require in-depth engineering work to optimize available space and vehicle ingress/egress of installed charge points. This is complicated as the fleet looking to electrify often may not own the depot property where the charging infrastructure needs to be deployed. These factors will often shape the contours of future solutions. Flexibility in design, implementation, and ongoing operations are attributes of any program likely to be successful. The rolling out of incremental improvements will be key to solving these barriers. For these reasons, mobile and modular power supply solutions will be highly valued in the market, matching some of the same characteristics that reside within EVs themselves.
- **Capacity for chargers.** While the grid has been able to handle most EV charging demands to date, heavy commercial vehicle electrification is coming. A large fleet of 100 EV trucks will require 5 MW to 10 MW of electrical capacity. At present, most depots typically have less than 0.5 MW of capacity installed. With electrification of heavy duty trucks and buses comes a greater need for localized DER assets and supporting infrastructure. Developing this increased resilience and more sustainable capacity for EV charging sites is likely to be a years-long process.

Market Barriers to Microgrids

The US is the largest market for microgrids integrating with EV charging infrastructure. Though progress has been made at the state level with a series of laws and regulations and public funding of microgrids, market barriers still stand in the way of widespread adoption. Usually the purview of state regulatory commissions, state legislation can still help address these barriers in the public policy arena.

- **Incumbent utilities are not early adopters.** When it comes to innovations, utilities are rarely in the driver's seat. Focused on traditional rate-basing business models, most are still adjusting to a new world where diverse DER assets, including EV charging infrastructure and EV batteries, become potential resources rather than problems. Microgrids have historically been looked at as BTM assets that threaten existing electricity suppliers, not as allies in improving overall grid reliability that reduce costs and support clean mobility mandates. As a result, microgrids deployed by utilities number far less and take much longer to deploy than microgrids deployed by third parties.
- **Existing utility regulations limiting microgrids designed to cross public rights-of-way.** Given the economics are improved for microgrids that can aggregate larger pools of DER assets, most states prohibit community-based microgrids since the only entity in many cases that can send electricity over a public road is a utility. Since utilities are historically slow to innovate and have faced several setbacks at state regulatory commissions in gaining approvals for rate-basing

microgrids, creative strategies need to be deployed to work around these barriers.

- **Interconnection with utility distribution networks.** Though states such as California are designing new microgrid tariffs that are designed, in part, to streamline interconnection, the process for third-party microgrids is still too complicated and takes too long. Guidehouse Insights analyzed the duration of the interconnection process for the first seven microgrids funded through the California Energy Commission (CEC) Electric Program Investment Charge (EPIC) program in 2015. Overall, the interconnection timelines varied due to different design elements, exporting restrictions, and technical studies required by the investor-owned utility. On average, it took approximately 17 months from application to receiving permission to operate from the utility, a range of 3 months to 3 years. As regulators become more familiar with microgrids, and as microgrids become more modular and standardized, the hope is to greatly reduce these time frames.
- **Uneven program supports for microgrids at the state level.** Connecticut was the first state to pass a microgrid law in 2011. At last count, analysis performed by the Smart Electric Power Alliance showed 112 bills have been proposed or enacted in 18 different states and in Washington, DC over the last 5 years. (This tally does not include those proposed in 2021.) Most recently, Ohio joined the state's seeking legislation to shape future microgrid policy. This list will keep growing as the reliability of the incumbent grid continues to decline. According to the National Conference of State Legislatures, lawmakers in 20 US states have introduced 69 microgrid-related bills so far in 2021.

Given these barriers, an integrated approach recognizing the needs of clean energy and clean mobility investments is paramount. The technologies required to facilitate these transitions will need to be capable of tying together real time data on electricity demand, the demands being places on the legacy distribution network, the microgrid, the building site's demand for electricity, and, finally, the load created by active EV charging.

Given these barriers, an integrated approach recognizing the needs of clean energy and clean mobility is paramount.

Market Drivers for Integrating EVs and Microgrids

Technology advances in the electricity and transportation sectors are converging and moving in a parallel fashion. Driven by rapid changes in the economy, the accelerated pace of climate change impacts and digital technology advances have coalesced to create an environment supporting crossover innovation. Though EVs and microgrids evolved independently, their future growth is now intertwined, along with energy storage and supportive grid infrastructure upgrades.

The consequences of not implementing a comprehensive integration of EV charging and a grid upgrade program that includes microgrids for the upcoming surge in EVs will be immense. Consider the following:

- **Traditional utility upgrade timelines are slow.** Since utilities can take between 18 and 24 months to do incremental upgrades to their distribution networks with highly variable cost structures due to different state market rules, EV charging infrastructure is difficult for them to implement consistently. Additionally, these upgrades may take place every few years as EV charging loads increase and onsite DER assets also grow incrementally. This combination of factors poses unique challenges to utilities on the EV side of this equation, especially so as the market for heavy commercial EVs with significantly increased power demands emerges. Microgrids can be used here to buffer the timeline demands of site hosts with the limitations of traditional utility business practices.

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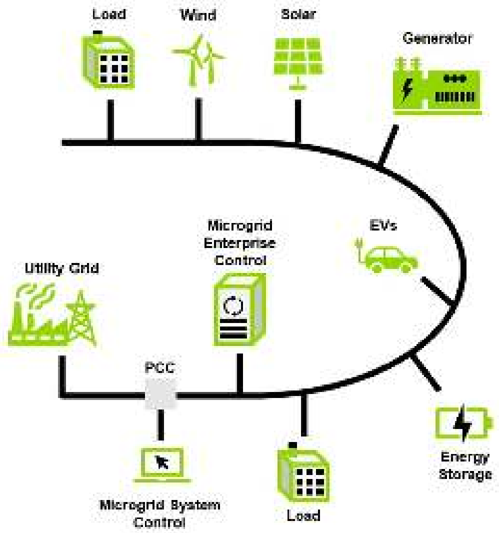
- **Declining grid reliability in the US.** The reliability of the US electricity grid continues to decline, in part due to increasing extreme weather events but also aging infrastructure. This increase in power outage rates can threaten the appeal of EVs since such outages will impact vital energy needs across multiple market segments and limit transportation, which could have severe consequences during extended outages for both public and private sector actors. Greater resilience is necessary to respond to these increasing reliability concerns.
- **The ability of EVs to provide grid services.** Guidehouse Insights' market forecasts show that beginning in 2021, annual DER capacity surpasses capacity provided by centralized generation; the gap between the two grows over time. EVs are among the largest new DER capacity categories. In 2020, it is estimated that 20,000 MW of EV charging loads had accumulated worldwide, enough electricity (or demand response capacity) to support more than 20 million homes. The use of an onboard EV battery to provide grid services may have an impact on the lifetime of an EV battery. Early results show the benefits far outweigh any possible impacts, especially if managed intelligently since the use of EV batteries is typically for short-term needs, not long duration storage.
- **Advances in digital controls.** The reason EVs can now have a positive rather than a negative impact on distribution and transmission systems is due to advances in digitalization of controls. These advances enable a diversity of resources, including EVs, to make electricity more resilient rather than less reliable. Harnessing AI, the cloud, and sophisticated hardware devices, these controls are the key enabling technology for integrating EVs into distribution networks—whether through microgrids or not.

Figure 1 Microgrid with Diverse Assets Connecting to Grid at Point of Common Coupling



(Source: Guidehouse Insights)

Microgrids are not the only solution for confirming adequate sustainable electricity is available for EV charging, but they should be a centerpiece for any strategy to facilitate reliability and resiliency. Existing distribution networks can also be enhanced by other technologies ranging from standalone energy storage devices to system upgrades to transformers, advanced metering, and data analytics. Utilities could deploy utility distribution microgrids to bolster weak spots on feeder networks to prepare for EV charging loads. An alternative would be third-party microgrids developed on behalf of local governments or commercial and industrial customers. Public and private institutions supporting EV fleets will need to turn to local or onsite electrical upgrades under an EaaS busines model.

Building the Business Case for EV Fleets and Microgrids

Third parties deploy the majority of microgrids today, especially in grid-tied markets in the US. As such, the primary purpose of these third-party microgrids is demand charge reduction for economic optimization, premium electric service reliability, and resiliency through islanding from the larger utility grid. Increasingly, microgrids are also seen as a key decarbonization initiative to expand sustainability measures to reduce greenhouse gas emissions. As such, EV fleets are good candidates for the early adoption of microgrids.

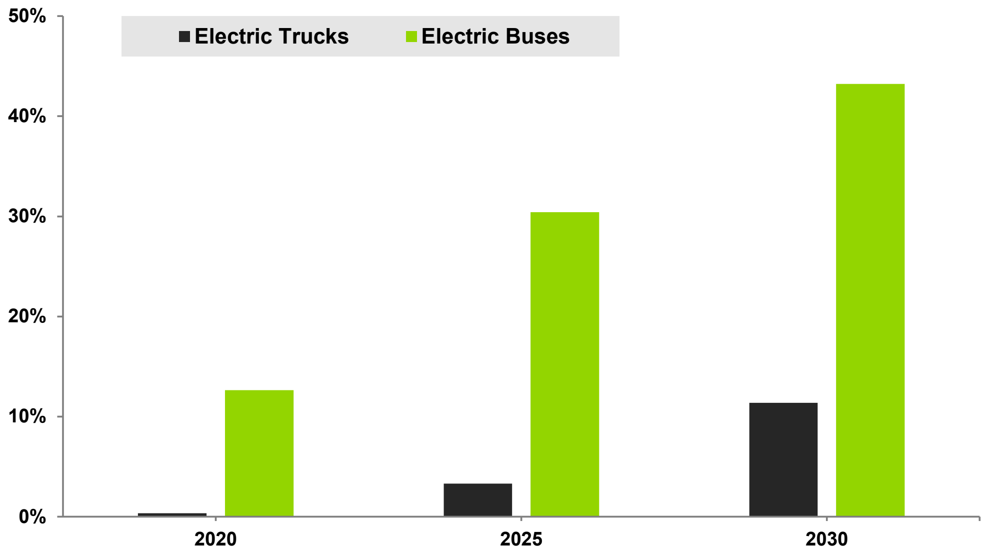
Investments in fleets realize a speedier return than investments in individually owned EVs because fleets have better potential to provide grid services due to overall available capacity of loads or mobile batteries. This improves the overall economics of any project linking EVs as grid resources for a microgrid. Additionally, fleets often have regimented drive schedules, making their downtime for charging much more predictable. This predictability enables greater optimization of EV charging for a variety of objectives both for the grid and BTM. The key is advanced data management made possible by Internet of Things platforms that can address wider ecosystem integration, tying into building management systems as well. The fleet advantage is amplified for heavy commercial vehicles, which are on the way.

Over the last decade, steady growth of the light duty EV market has driven investments in battery and charging technologies, which now enable EVs to enter heavy commercial vehicle markets. Transit, refuse, and parcel delivery fleets are racing toward electricity. On the horizon are fleets of regional and long-haul trucks. Fleet electrification momentum is pressed by government regulations, like California's plan to implement a zero emissions mandate in 2024, as well as by corporate adoption of climate action plans, which hope to make fleet emission characteristics a critical criterion for competitive assessment. The result is massive growth across the heavy vehicle classes. In a Guidehouse Insights' *Electric Truck and Bus* report, penetration rates for electric buses in the global market are expected to be over 40%, and for electric trucks, over 10% by 2030.

As these market forecasts show, state policymakers and regulators need to understand that accommodating this level of growth in larger load EVs will be a challenge that requires smart planning. This will be a long journey that will require an integrated strategy to tie together two major industries, electricity and transportation, in new and unprecedented ways. Without supporting infrastructure investments and planning, these EVs will not be able to drive or serve as supporting grid assets. California legislation, for example, requires that 30%-50% of new heavy commercial vehicles be zero emissions by 2030. Increased EV purchases will need to be matched in advance with reliable and clean electricity from microgrids and other utility and third-party supporting assets. If this incremental growth is not managed properly, there may not be enough electricity capacity to help manage EV fleets cost-effectively or too much capacity may be installed, resulting in higher costs than necessary. Finding the right balance requires good planning tools, creative public-private partnerships, and advanced hardware and software technologies.

To get a better sense of the changes on the horizon, see Chart 1. Note that penetration of electric buses in the bus market is far ahead of trucks worldwide. The trend is mirrored in the US, though this group will still be concentrated in key geographies. For Los Angeles and New York City, for example, which represent the two largest EV bus fleets in the country, plans are in place for 100% electrification by 2030 and 2040, respectively.

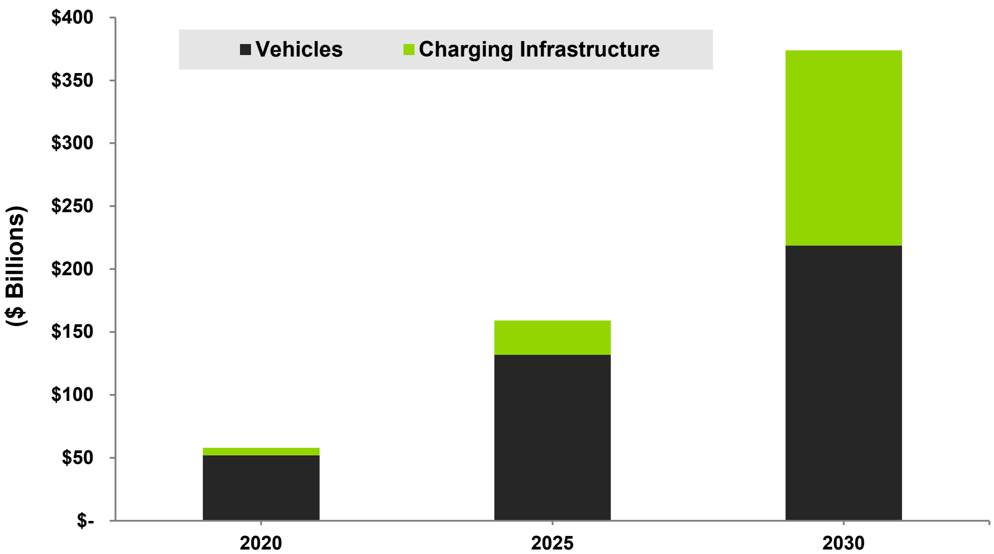
Chart 1 Penetration of EVs in Heavy Trucks and Buses, World Markets: 2020-2030



(Source: Guidehouse Insights)

The power heavy EVs demand placed on the system will likely require grid capacity upgrades. Deployment of megawatt charging sites could take utilities years to plan and build. However, considering grid vulnerability issues, Guidehouse Insights expects site operators will supplement or offset grid upgrades on their side of the meter with generation, storage, and power management technologies. Overall, expect dramatic demand for charging equipment, for grid capacity upgrades, or for energy assets on the customer side of the meter. For example, Guidehouse Insights estimates investments in charging infrastructure amount to around 10% of total investments in heavy vehicle electrification, but by 2030 they are likely to account for over 40%. The second half of the decade surge is driven by the megawatt-scale charging development for the trucking industry (See Chart 2).

Chart 2 Heavy Vehicle Electrification Market Revenue, World Markets: 2020-2030



(Source: Guidehouse Insights)

Case Study: Maryland's Brookville Bus Fleet Microgrid

Montgomery County, Maryland was prompted to build a microgrid under an EaaS arrangement at its critical facilities headquarters in 2017. The pioneering project combined energy efficiency upgrades, new solar PV, and combined heat and power generation with supporting infrastructure to help the county move closer to achieving its sustainability goals. The county saved $4 million by using the EaaS business model. Green Business Certification Inc. recognized the microgrid for its design under its Performance in Excellence in Electricity Renewal program, a framework for defining, specifying, and assessing sustainable performance of power generation, transmission, and distribution. It also helped Maryland inch closer to a statewide target of net zero emissions by 2035.

To take further steps to meet the aggressive Maryland targets for emissions reduction, the state is working toward electrifying half of its bus fleet by 2030. The Brookville Smart Energy Bus Depot is showing how these commitments look in the real world and is notable for its ability to mitigate both fleet electrification and microgrid deployment barriers simultaneously. The 5.6 MW microgrid integrates onsite solar PV, battery storage, and natural gas gensets (which will be transitioned to renewable natural gas over time) with over 2 MW of EV charging capacity, with the capability of charging up 45 all-electric municipal buses.

The project, led by AlphaStruxure, a JV between Schneider Electric and The Carlyle Group, uses microgrid technology to enable electrification of Brookville bus fleet. Once the fleet transitions to electricity, it is estimated that over 155,000 tons of greenhouse gas emissions will be avoided over the lifetime of the microgrid, which represents a 62% reduction compared to business-as-usual. These climate mitigation gains are achieved while avoiding potential service disruptions from the larger grid. If the fleet grows to respond to more aggressive federal or state policy emissions to mitigate climate change, a flexible cloud-based infrastructure can easily accommodate additional DER assets or EV charging infrastructure. Finally, the microgrid offers the county operational and dispatch flexibility of the buses as well as a way to avoid upfront capital costs. Rather than being constrained by utility demand charges or time-of-use tariffs, the onsite energy provided by the EaaS microgrid allows the bus fleet to charge and operate with full flexibility. As Table 1 shows, the project mitigates the spectrum of fleet electrification deployment barriers, using an innovative contractual and financing approach to deploy and integrate leading edge technologies such as solar PV, onsite generation, battery energy storage, microgrid controls, and electric bus chargers.

Table 1 Brookville Microgrid Addresses Four EV Charging Market Barriers

Barrier	Mitigation
Upfront Capital Costs	EaaS approach to eliminate upfront cost for the project including all microgrid and charging infrastructure.
Availability of Public, Fast EV Charging Infrastructure	Brookville fleet depot to handle all bus charging demands as project is built to enable electrification of the fleet's longest route.
Future-Proofing Chargers	High touch design and plan process using technologies that fit within existing space constraints such as solar PV canopies and pantograph and multi-dispenser chargers.
Capacity for Chargers	Microgrid ensures uninterrupted bus services during emergencies, even in the event of multi-day utility grid outages.

(Source: Guidehouse Insights)

The project is a first-of-its-kind EaaS EV fleet electrification infrastructure project. Due to its complexity, the client (Montgomery County, Maryland and the Ride On Montgomery County transit agency) did not want to take on the risk of designing and then operating and maintaining this new infrastructure. They were looking for an elegant solution similar to what the Montgomery County government did with its first microgrid. When completed, the project will deliver sustainable and resilient energy and EV charging infrastructure for the fleet's continuous operation, regardless of utility outages linked to future hurricanes or other forms of extreme weather or threats such as a terrorist attack.

The project uses Schneider Electric's EcoStruxure™ platform, a broad umbrella of integrated, energy-related hardware and software solutions that serves as the brains behind the microgrid controls and the machine learning algorithms to continually improve performance over time. With the help of distributed device-level controllers and sophisticated electrical distribution equipment, the microgrid will by managed via a cloud-connected AlphaStruxure Network Operations Center providing 24/7/365 operations, monitoring, and optimization of energy performance. Figure 2 highlights the three key pillars underpinning this innovative project.

Figure 2 Brookville Smart Energy Bus Depot Project EaaS Value Proposition

(Source: AlphaStruxure)

Conclusion: Moving Beyond the EV Charger with this Policy Menu

There are compelling market drivers for EV charging infrastructure with microgrids. Yet significant barriers remain. State policymakers can play a critical role by creating incentives for both the EVs and microgrids. But rather than view these clean mobility and clean energy initiatives as separate, it is wise to integrate these two solutions into policies concerning climate change, economic development, and necessary infrastructure upgrades.

Clean mobility options are not limited to EVs. There is growing interest in hydrogen, for example, and distributed hydrogen systems are now also being integrated into microgrids. Energy markets are constantly in flux, as are our transportation modalities. The current push is toward greater electrification; state governments looking to respond to needs for reliability and resilience, lower emissions, and economic development are wise to embrace the synergy created by linking clean mobility and clean energy microgrids.

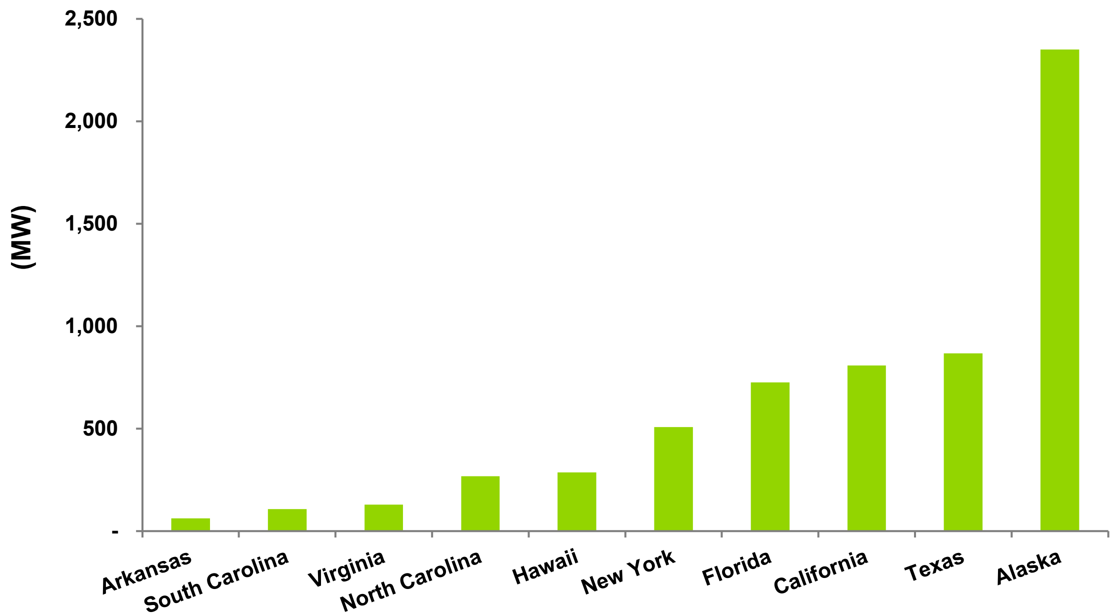
The seven most important policies states can design and implement today follow:

- Expand state energy efficiency and other demand side management programs relevant to EV charging and microgrids. This is not just a supply side issue. Flexibility resources, including EV loads, need to become part of a deep solution toolkit.
- Improve market conditions for the development of electricity and other low carbon fuels infrastructure via national programs modeled after California's Low Carbon Fuel Standard. Homogenous, technology agnostic, fuel market policies incentivize innovative solutions and enable scale.
- Set realistic targets for EV adoption and report such targets with corresponding planning for EV charging stations with clean energy microgrids. Instituting a national standard on EV-related targets and goals would help accelerate the role EVs could play in the energy transition, focused on a net zero carbon grid over the next decade or so.
- Use EaaS offers to help defray public costs of the required investments to shift from the status quo to more sustainable transportation and electricity delivery systems. These privately financed investments should focus on diverse DER assets since they are ideal components for scalable solutions that can respond to changing market conditions. With an EaaS model, incremental adjustments in scope, resources, and operations are more easily accommodated. Again, flexibility is the key.
- Identify strategic sites for charging supported by microgrids. Given the needs for transportation services and grid resiliency, these sites should take a high priority during grid infrastructure upgrade planning and be coordinated with other state policies on reducing emissions, economic development, and regional planning.
- Remove long-standing barriers to self-generation and transferring electricity over public right of ways from third-party developers microgrids to facilitate resiliency for entire neighborhoods and communities.
- Leverage emerging and existing federal funding initiatives to drive innovative public-private partnerships. Examples include, but are not limited to, the US Department of Transportation's

Port Infrastructure Development Program, the Federal Emergency Management Agency's Building Resilient Infrastructure and Communities (BRIC) program as well as federal tax credits such as those available to medium duty and heavy duty EVs.

Microgrids are here to stay and their appeal is only growing due to the explosion in DER assets being integrated into distribution networks, increasing occurrence of major power outages and declining costs attached to key enabling technologies. The top 10 states of cumulative identified microgrid capacity in the US showcase significant geographical diversity (Chart 3).

Chart 3 Top 10 US States in Total Microgrid Capacity: 1Q 2021



(Source: Guidehouse Insights)

What ties the states together (as well as all other US states) is the need to shift to a more sustainable mode of transportation. It appears that electrification may be the best route to achieve these goals. But this approach will only work if reliable and sustainable electricity is used to charge up these vehicles.

The Biden administration's proposed infrastructure program is an encouraging step forward for US transportation electrification. Funding directed toward transit and school buses will bring bus fleets to the table. These bus fleets, as well as trucking fleets currently left out of the proposal, will need energy cost certainty and resilience. Public-private partnerships for BTM microgrids under an EaaS framework (such as that being deployed at the Brookville Smart Bus Depot) will help achieve measurable results for clean energy and clean mobility no matter what Washington, DC decides in terms of scope and timing of any infrastructure program.

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Scope of Study

Guidehouse Insights prepared this white paper, commissioned by Schneider Electric, to provide a perspective on why microgrids and other grid infrastructure upgrades will be vital to the US and other countries to meet emerging carbon reduction goals in the transportation sector. It also addresses the financial barriers to fostering such innovation at the state level despite proposals at the federal government level that attempt to address some of these issues. The role of EaaS is highlighted in a case study of the Brookville Smart Bus Depot in Montgomery County, Maryland.

Sources and Methodology

Guidehouse Insights' industry analysts use a variety of research sources in preparing research reports and white papers. The key component of Guidehouse Insights' analysis is primary research gained from phone and in-person interviews with industry leaders including executives, engineers, and marketing professionals. Analysts are diligent in ensuring that they speak with representatives from every part of the value chain, including but not limited to technology companies, utilities and other service providers, industry associations, government agencies, and the investment community.

Additional analysis includes secondary research conducted by Guidehouse Insights' analysts and its staff of research assistants. Where applicable, all secondary research sources are appropriately cited within this report.

These primary and secondary research sources, combined with the analyst's industry expertise, are synthesized into the qualitative and quantitative analysis presented in Guidehouse Insights' reports. Great care is taken in making sure that all analysis is well-supported by facts, but where the facts are unknown and assumptions must be made, analysts document their assumptions and are prepared to explain their methodology, both within the body of a report and in direct conversations with clients.

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