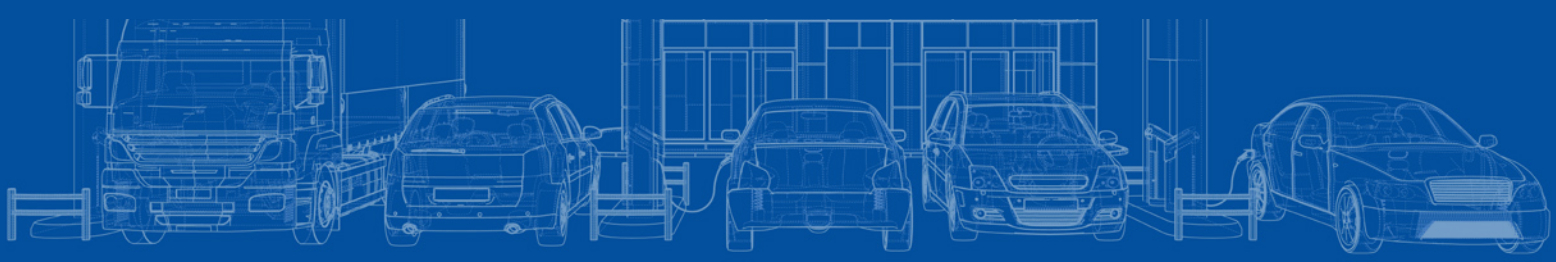
Electric Vehicle White Paper

IPKEYS CYBER PARTNERS

Solutions: Addressing the challenges of EV Infrastructure, Cybersecurity & Energy Demand



The number of electric vehicles on the road is steadily increasing. IPKeys Cyber Partners initial whitepaper, Electrification of the transportation grid & the promise of decarbonization, discussed the growing EV market and analyzed critical cybersecurity challenges. Pt. 2 takes a deeper look at solutions for addressing those challenges.

This e-paper is segmented into the following high-impact areas:

1. **Hyper Electricity Energy Demand Growth** - Explaining that the ability of energy providers to balance the significant additional demand for non-carbon-emitting electricity will be a daunting task for resiliency and reliability; the EV growth dilemma of balancing the supply forces of carbonization with low-emission fuels pinpoints the need for renewables and Distributed Energy Resources (DER).

2. **Can Cybersecure DERMS Deliver the Solution?** – In Utility Dive magazine's editorial response to The New York Times' powerful interactive essay "Postcards from a World on Fire" they mirrored with their headline "Can DERMS save the planet?" While the practicality of how this may work and the potential cybersecurity vulnerabilities are glossed over, we do elaborate on how this technology may make a difference in solving the EV infrastructure opportunities and challenges.

3. **Key Takeaways and Conclusions** – We provide a summary to the problems, solutions and opportunities we may realize with electrification of the transportation grid & the by addressing the challenges of Infrastructure, Cyber Security & Energy Demand

Hyper Electricity Demand Growth – The need for Distributed Energy Resources (DER)

The bipartisan National Electric Vehicle Infrastructure (NEVI) funding bill guidelines offer insight into how EV charging will impact the grid.

- NEVI plan calls for the installation of 500,000 DCFC stalls with a minimum of 4 ports capable of simultaneously charging four EVs that range from 150kw to 350kw per EV stall

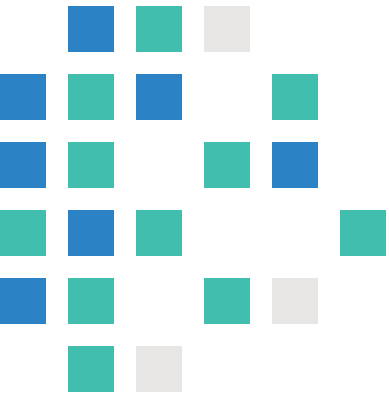
- The provisioning and deployment of the NEVI plan to filed 150 kW to 350kw per EV stall over 500,000 stalls into perspective would amount to a range of additional load capacity required by the grid in a range 75 million kW to 225 million kw.

- The US grid capacity in 2021 was 1.14 billion kW according to the US Energy Information Administration. The NEVI plan would require a minimum of an additional generating capacity of **7% to 15 % above current US grid levels with the potential of 7%-to-15% additional generating capacity in the short term of the next 5 years just from his federal infusion of funding.**

- **On the longer term, - Reuters research reported that the** estimated U.S. capacity will need to double if 66% of all cars are EVs by 2050

Grid Challenge Summary – How do we significantly grow the energy supply and reduce carbonization in a manner that is resilient and reliable?

The challenge we see is the need for a plan and discussion around the ability of Distributed Energy Resources (DER) such as wind, solar, back-up storage, barriers and flexible load management resources get us all the way to the supply requirements of the EV proliferation. Concerns about intermittent supplies such as solar and wind give way for the need to continue legacy supplies and current infrastructure. Battery and storage of alternative energy are rapidly improving but the technology is still the evolution of scale cycle and is not yet ready to power the entire economy.



The challenge summary may be characterized as a grid that aces daunting capacity and stability risks. As noted above, the energy load capacity necessary to charge EVs presents resilience and resilience and reliability threats to utilities. Additionally, the timing of when people charge—customer behavior—is also a high stress if all charge after work between 4:00 PM and 8:00 PM. This is an exacerbating of the "duck curve" concept known by utilities and energy suppliers. EVs exacerbate the load balancing and management challenges that utilities need to balance with the need for exponential growth in renewables.

Can Cybersecure DERMS Deliver the Solution?

There is an emerging consensus that Distributed Energy Resource Management Systems (DERMSs) are essential for solving most of the aforementioned plans for moving from carbon producing resources to non-carbon-emitting renewables.

A DERMS is a software-based and IoT solution that can, in real time, monitor, control, and dispatch grid-connected and behind-the-meter DERs across customer, utility and market applications. One may think of it as a nimble way to plan and switch from public service that is carbon fuel-laden to intermittent sources and vice versa only when needed.

Thus, DERMSs can provide utilities with the tools required to manage and facilitate faster and cheaper integration of DERs into the grid.

Utilities and Consumer Partnering

As more consumers install residential charging stations and allow utilities some degree of control over them, the risks to the grid can be mitigated over time. It is increasingly critical that utilities adopt solutions that can monitor and control EV charging in real-time, both to mitigate the distribution challenges posed by EVs unconstrained operation and to leverage their potential as flexible assets.

Additionally, utilities and suppliers will need to formulate and communicate incentives such as Time of Use (TOU) pricing to motivate behavior shifts to charging when supply is less costly and avoiding the after-work duck curve phenomena overload. DERMS is also a way to manage and monitor behavior through financial settlement payments to consumers.

Key Takeaways

- In addition to grid transmission complexities, EV charging may require 7% to 15% additional generating capacity in the short term and double in the longer term.
- Renewable energy is critical; however, the intermittent nature requires a need for planning and switching that may be solved by DERMS.
- Energy storage and DER are crucial in supporting grid capacity.
- EV charging requires high-capacity power.

Conclusion

Electric vehicle adoption is an essential step toward creating a more sustainable future—lower emissions, reducing the use of nonrenewable energy sources, and, ultimately, saving money and time by avoiding gas costs and waiting in line. But this initiative cannot succeed if not accompanied by a strong network of charging stations and protected by a robust cybersecurity infrastructure and electricity capacity plans that include growth in and delivery of renewable energy to offset the increased demand for electricity. We must ensure are taking proper steps to guarantee the safety and security of those adopting EVs as well as our power grid demand for electricity reliability and resilience.

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About the author

Robert Nawy is a co-founder and CEO of IPKeys Cyber & Power Partners. Robert was a founding member of the Advanced Energy Management Alliance (AEMA) and an active Board Member of the Open Automated Demand Response (OpenADR) Alliance. Robert's experience with IPKeys Technologies in the delivery of cyber security services for DoD agencies is a primary motivation in his vision to develop and provide software products that deliver Critical Infrastructure Protection (CIP) to the country's utility and public safety grids. With an MBA, CPA, and Civil Engineering credentials from Rutgers University, Robert oversees all strategic, tactical, and operational functions of IPKeys Cyber & Power Partners. His expertise includes raising capital, mergers and acquisitions, strategic partnership and solutions implementation, and the delivery of evolving IP technologies across sectors.