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Strategies in deploying grid compatible Electric Vehicle infrastructure

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Executive Summary

As governments and industries around the world embrace the all-electric mobility future, investment in electric vehicle (EV) charging infrastructure is substantially increasing to ensure a sustainable transition to electrified transportation. In order to accelerate the electrification of transportation, utilities, cities, automakers and energy companies will need to come together to provide customer value while efficiently integrating new EV load into today's electrical grid.

Keywords: EV infrastructure, EV charging standardization, Smart Charging, Open Charge Point Protocol, EV charging regulation

1 Introduction

Countries are beginning to ban internal combustion engine (ICE) vehicles and invest in EV charging infrastructure, and automakers are announcing bold investments in EVs. Bloomberg New Energy Finance estimates that nearly 20% of new vehicle sales will be electric vehicles by 2025 (1). To accommodate this massive growth in EVs, utilities, cities, automakers and energy providers need to collaborate to ensure safe, reliable and accessible charging that does not compromise the grid.

2 Growth in EVs

2.1 Strategy: Invest in EV charging infrastructure

Much investment is needed to accommodate the massive growth in electrified transportation. In the United States alone, there are almost 70,000 public charging outlets installed, which includes 9,200 fast charging outlets. BNEF estimates that an additional 21,000- 24,000 outlets must be added annually to support their expected growth of 500,000 EV sales per year by 2019. (2)

In the United States, there is a national effort to deploy coast to coast high power charging infrastructure. Electrify America, a subsidiary of Volkswagen, is investing over $2bn in deploying large scale charging infrastructure. The goal is for all 2,000+ stations to be "operational or under construction at 484 sites in 17 metropolitan areas and on highways in 39 states by the end of 2019 as part of its Cycle One infrastructure investment." (3) **.**

3 The need for open standards and interoperable networks

3.1 Strategy: Deploy charging infrastructure that's accessible to all

In addition to being readily available, new EV charging infrastructure must be compatible with today's electrical grid and also allow for seamless software-hardware communication. Each component of the charging process, whether it be the interactions between the grid and charging stations or the flow of charge to the EV, involves a complex interplay between software and hardware. Open standards and interoperability are therefore critical to both allow for flexibility for drivers to choose where and when they charge while simultaneously allowing the entire charging ecosystem to operate smoothly.

Moreover, to prevent the overload of our current electrical power infrastructure, energy demand from EV charging needs to be managed properly. Some industry analysts suggest that by 2040 EVs will consumer over 2000 TWh of electricity annually. To put it into perspective, the US alone consumed 3800 of TWh of electricity (this consumption is less than 1 percent of EVs on the road). There are several ways to better manage EV load by leveraging Demand Response (DR) techniques or integrating local power generation sources such as solar, wind or energy storage. However, in order to transform EV load into a flexible grid resource, the hardware and software needs to function on open standard communication protocols to be able to communicate with third party IT infrastructure.

Open Charge Point Protocol (OCPP) gives charging station owners the ability to not only monitor the condition of their charging stations, but to remotely authorize usage. The most recent version, OCPP 2.0, allows for a controlled charging process, which means the EV charging station and/or the central network system can set constraints to the amount of power that is delivered during a specific charge. OCPP can be used at a local or global level and supports many smart charging standards allowing for vehicle-to-charging station/grid communication.

Crucially, OCPP allows for both hardware *and* software interoperability, providing EV charging stakeholders with the flexibility to add new hardware, switch software, and otherwise scale infrastructure/network deployments. OCPP is emerging as the industry standard for catalyzing and facilitating software-hardware communication and ensuring seamless interaction among different players in

the ecosystem. EV charging infrastructure underlined with OCPP contributes the flexibility required to scale up charging networks and drive EV adoption in the long term. OCPP is not only a solution for public charging infrastructure, but is also suitable for future-proofing infrastructure deployment across a wide range of use cases, including workplaces, residences and fleets.

OCPP is the most widely adopted protocol for software-hardware communications in the EV charging industry. There are a number of other open protocols and standards that govern other aspects of the EV charging interoperability ecosystem, including between the grid or system operator and the charging network or equipment, driver billing and network interoperability for driver roaming, and between the vehicle and the charging system. There are other efforts underway to be able to communicate such elements as driver preferences to the charging system.

4 Conclusion

4.1 Strategy: Take a multi-stakeholder approach

Electrified transportation will require an infrastructure that is fully connected, shared and integrated into clean energy systems. This is only possible through a shared common vision from industry leaders and government officials, so that policies can be created to support broader environmental and economic objectives

For the EV charging infrastructure to meet the demands of the market and consumers, the adoption of open standards and interoperability will be necessary. Open standards will not only allow flexibility with charging equipment, ensuring that the EV charging networks stays up to date with the latest technology, but will also allow for open communications between the driver, the vehicle, the charging station and the grid. OCPP, with its inbuilt interoperability, instills confidence in the seamlessness of the EV charging ecosystem, allowing for larger-scale investments to drive EV adoption. Therefore, a comprehensive, multi-stakeholder approach underscored with interoperability is necessary to ensure that an optimal end-to-end customer experience of charging services is available, reliable and safely integrated into the electrical grid.

References

[1] “The future of electric vehicles,” Bloomberg New Energy Finance (April 2018).

[2] Salim Morsy. “Volkswagen’s Impact on EV Charging in the U.S.” Bloomberg New Energy Finance (Nov 2017).

[3] Fred Lambert. “Electrify America unveils map of planned charging stations for its massive network” Electrek (May 2018)

Authors

Scott Fisher is the Vice President of Market Development where he brings a wealth of experience in scaling energy and electric transportation technologies to Greenlots. In this role, Mr. Fisher engages the executive leadership team in identifying, assessing and executing strategies, while working closely with potential strategic customers and partners in developing new business opportunities for the company. Mr. Fisher is also currently serving as an Adjunct Professor at Columbia University in the Earth Institute's Masters of Sustainability Management Program and in the School of International and Public Affairs, where he focuses on teaching “Financing the Green Economy.” Prior to Greenlots, Mr. Fisher spent more than 15 years at NRG Energy and Public Service Electric and Gas (PSE&G) in market development, operations and strategy roles. Mr. Fisher is a seasoned industry veteran with a proven ability to create strategic growth opportunities with utilities, automakers and public agencies alike. Mr. Fisher holds a Bachelor of Arts in International Studies from Vassar College and a Master of Business Administration from

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