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Reducing Costs, Speeding Deployment, and Increasing Quality of EV Charging Installations

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Executive Summary

An innovative approach to EV charging system installation reduces capital costs, speeds deployment, and increases quality. Shoals Technologies Group delivers this with an above-ground, modular “plug and play” EV balance of system solution that supports any charger OEM—leveraging our extensive expertise at reducing cost and speeding deployment in the solar industry. We will share case studies with actual data for the above ground solution based upon deployed sites. Charge point operators and EV fleet managers will learn what worked well, what challenges were faced, and general key learnings.

1. Background

Electric Vehicles (EV) are becoming a much larger percentage of all vehicles and BloombergNEF estimates that the majority of vehicles purchased in the 2035 time frame will be EV [1]. This means a dramatic increased need for charging systems. BNEF estimates the deployment of nearly two million incremental charging stations worldwide by 2030 [1].

Capital is being spent to deploy charging stations in fleets, work places, and on the go. We want to explore if capital is being spent wisely and effectively. This paper discusses the benefits of using above ground electrical balance of systems as opposed to traditional methods of deployment including trenching and burying cable.

For many people in the EV industry, it’s hard to get excited about power entry equipment, cables, skids, civil work, and connectors. Those are the temporal aspects of any project that often get overlooked as simply part of what needs to get done. Most think, “We’ll let the general contractor sort all that out since the important decisions revolve around making the right choice for the charger OEM, the network provider, and who will do O&M for the next 5 years.”

These are incredibly important decisions and contribute significantly to the total cost of ownership (TCO) for electric vehicle infrastructure. Only 4% of the cost of public and commercial charging costs are for the charger. Fully 56% of the costs relate to the electrical balance of systems (EBOS) [1].

With more than half of an EV infrastructure deployment cost associated with EBOS, we must address this aspect of a deployment if we are to meet ambitious market deployment goals. Looking at EV BOS

components for time and cost savings can significantly reduce up front capital expenditures for charging assets. As an industry we must:

1. Reduce the up-front capital costs for labor and equipment.
2. Significantly speed project deployment time, resulting in minimized disruption to the site host's core business.
3. Increase quality by ensuring consistency of cable terminations and product performance.

This paper and solution focuses on the costs and challenges associated with deploying EBOS for EV charging infrastructure.

2. Solution

So, how do we fulfill these needs – lower cost, less site disruption, and higher quality?

In 2021 Shoals created an EV balance of systems (EV BOS) approach which addresses each of these needs. The Shoals system enables most of the EV charging deployment to be above ground versus buried under ground. Our time and motion studies indicate a 20-30% cost savings versus traditional underground methods.

For the power entry point, Shoals offers various power entry systems that we call a power center. For Level 2 charging at fleets, work place, or multi-unit dwellings, the offering (up to 500 MVA) includes a primary disconnect, stepdown transformer, and breaker panel. For high power sites, the power center includes a primary disconnect and protection panel.

Our charging systems include options for DC fast chargers up to 350kw or level two AC chargers that can be mounted individually or in dual or quad configuration. We support any make and model charger OEM's product.

Shoals Big Lead Assembly (BLA[®]) is used to connect the power entry skid with multiple charging skids. The BLA is open air, submersible, direct-bury rated and can be used on AC or DC systems. Our BLA solution replaces multiple home run cables with a pair of BLAs. This one-to-many approach in cabling results in cost savings in material and labor. Also, our BLAs can be placed above or below ground, so they are a safe fit for a raceway system. Our walk-over and drive-over raceways save considerable civil costs and enable a much more rapid site deployment.

When you consider the significant costs associated with the elements of an EV deployment, it underscores that we need to be thinking of how to cost-optimize these elements.

3. Use Cases and Value Propositions

3.1 Fleets

The business model for fleet conversion is already very compelling versus diesel vehicles according to the McKinsey Center for Future Mobility [2]. Also, the increasing availability of light and medium EVs has accelerated the conversion of fleet operators. Finally, fleets represent a large percentage of expected charging station additions as fleet operators move to migrate from ICE to EV.

Different applications and weight classes will see varying breakeven points for electric vehicle total cost of ownership.

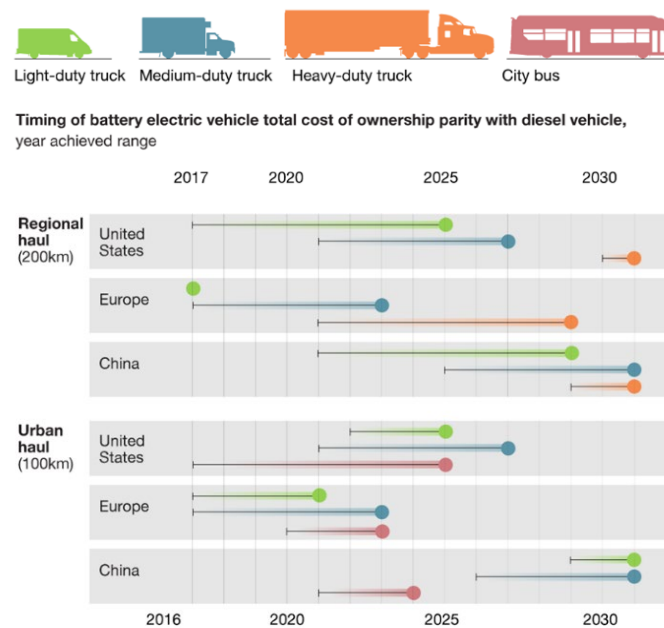


Figure 1 - Leading the Charge: Fleet Migration [2]

There are two challenges with fleet charging deployments: (1) Civil work required by charger deployments using traditional methods disrupts the fleet operator's primary business, and (2) The fleet depot is often on a leased property, so assets that cannot be relocated will be stranded at the conclusion of the lease.

3.2 On the Go

Per the Fuels Institute, on-the-go charging constitutes only 14% of all EV charging [3]. This category is the closest analogy to traditional fueling. This category is also what will enable EV drivers to feel comfortable taking extended trips outside of the city in which they live.

There are two challenges with on-the-go charging deployments: (1) Civil work is difficult in a traditional gas station convenience store because underground trenching is risky and expensive, and (1) Costs are higher for high power charging systems with electrical infrastructure upgrades.

3.3 Workplace

Workplace charging is available in about 16% of jobs in the United States [3]. As more workplaces install EV charging systems, this number can be expected to increase, especially if the employer provides this as a benefit to their employees for no cost or at reduced rates.

There are two challenges with workplace charging deployments: Employers and city-based work forces are unlikely to have either (1) excess electrical capacity or (2) parking structures to support the addition of large numbers of EV chargers.

4. Closing Summary

In closing, it is incredibly important that fleet owners and operators think about the expediency of site installations if they want to accomplish their goals of switching from traditional gas vehicles to electric vehicles. Many EV charging sites have struggled to maintain consistent operations during traditional EV charging installations. Shoals' above-ground solutions showcase an installation method not yet seen in the eMobility industry. This is only the beginning of expedited installation solutions from Shoals as we are consistently delivering products for installers that yield not only a more efficient installation but higher quality and more consistent installation process for the charging site owner.

References

- [1] *BloombergNEF*, <http://www.bnef.com>, accessed on 2022-07-06
- [2] McKinsey Center for Future Mobility, <https://www.mckinsey.com/features/mckinsey-center-for-future-mobility/overview>, accessed on 2022-08-04
- [3] Fuels Institute Electric Vehicles Council, <https://www.fuelsinstitute.org/Research/Reports/EV-Consumer-Behavior/EV-Consumer-Behavior-Report.pdf>, accessed on 2022-04-04

Presenter Biography

Alex Stonich is the Sales Manager of eMobility for Shoals Technologies Group. During his career, he has supported and lead the growth of new product introductions focused on challenging traditional installations of Renewable Energy projects..

In 2022, Alex entered the eMobility space at Shoals Technologies Group and has taken to the market this disruptive new technology for above-ground installations. He has worked directly with the top distributors and transportation companies to meet their year end goals for EV Fleet operations.

Prior to his experience in the eMobility space, Alex focused on Electrical Balance of Systems Solutions in the solar PV space with an emphasis on utility and large commercial installations.