A successful EV transition for fleet operators requires interoperability

SIEMENS

Contents

CHAPTER 1

Introduction

The global commitment to decarbonization is now driving a steady shift toward electric commercial vehicle (EV) production and adoption. Commercial EV adoption is driven by cities, as urbanization and e-commerce are leading to new efforts to reduce local pollution and improve the quality of living. As a result, BloombergNEF predicts that by 2040 the electric fleet share will reach 47%.[1]

For fleet operators, the new opportunities introduced by an electric vehicle fleet include better performance and lower total cost of vehicle ownership, thanks to reduced spending on fuel and lower maintenance costs. McKinsey estimates that, by 2030, EV fleet total cost of ownership (TCO) will be 15 to 25 percent less than that of equivalent internal combustion engine (ICE) vehicles.[2]

With this opportunity, however, comes the challenge of business transformation due to an influx of new technology and processes for fleet operations that require an evolution from traditional fleet management practices. For fleet managers to ensure EV rollout success, a new ecosystem of partners including vehicle original equipment manufacturers (OEMs) and their component suppliers, battery manufacturers, electric utilities, fleet vehicle operators, and developers of charging infrastructure will need to collaborate.

This paper discusses key elements of successfully planning for, deploying, and operating electrified fleets.

CHAPTER 2

Collaborative planning for an EV infrastructure

Optimizing EV fleet TCO requires collaborative planning and design work between both traditional pre-EV stakeholders and new EV marketplace entrants.

Even before an EV is purchased, engagement among multiple stakeholders should occur. These include the vehicle maker, the charging infrastructure supplier, the local electric utility, and typically local and state safety regulators as well as the project owner. The collaborative input of the stakeholders will help manage the process, while lowering the risk of miscommunication and interoperability issues.

Fleet operators – or their expert partner – should lead this multi-stakeholder planning process to ensure a successful and profitable implementation. They should choose providers who not only can support them throughout the lifecycle of EV planning, deployment, and management, but whose products or systems can iteratively evolve with ongoing standards, and energy distribution changes to ensure interoperability.

Rapidly evolving EVs, business models, and charging standards combine to underscore the importance of strategic planning and collaboration. It will be important to build expectations to meet your goals and keep your eyes on achieving performance at the lowest possible cost by leveraging new opportunities for energy efficiency.

Planning for your fleet electrification is critical to your success. Looking beyond the vehicle and considering the charging infrastructure will help you make the most cost-effective implementation decisions so you can best optimize your investment.

CHAPTER 3

Charger considerations: Interoperability and the enhanced role of data agility

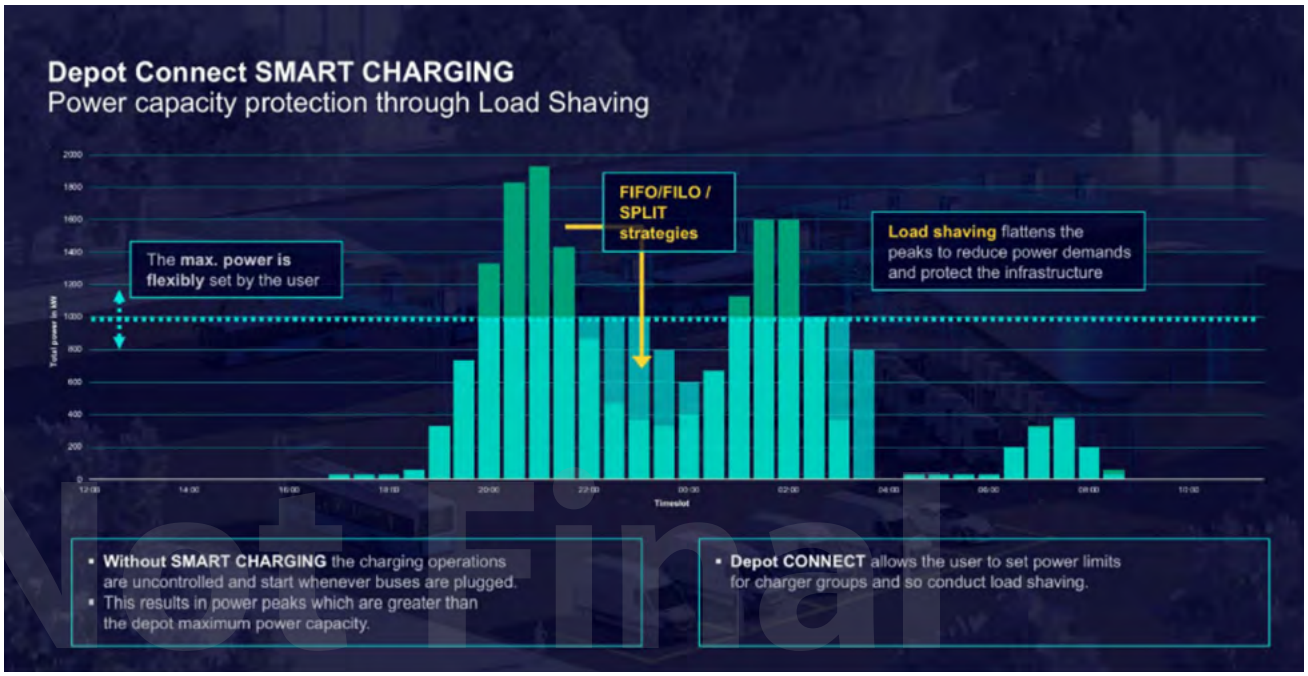
The selection and deployment of EV chargers and associated infrastructure is a critical enabler of profitable electrification of fleets.

Contrary to gasoline or diesel fueling, electrical charging systems are intelligent systems that incorporate extensive data and controls to fuel EVs most efficiently and economically.

Data-driven insight into fleet charging, logistics and customer demand projections is a key requirement for a vehicle charging infrastructure. The value of this integration is unlocked via interoperable systems that automate data-sharing between an onboard vehicle computer, an electric charger's processor, and a fleet's back-office software system. Collecting, consolidating, and analyzing the data are critical to successfully drive the business, lower operating costs, improve sustainability, and increase supply chain efficiencies.

For example, if 80% of the vehicles return to base at 8pm, it may be good to delay charging for some of them and avoid costly consumption spikes. A well-planned EV structure and strategy can assist with these issues, and better manage overall energy efficiency through use of slow and fast charging stations.

The below examples illustrate how fleet managers can reduce expenses using intelligent, interoperable systems that can be managed using data-driven insights.



CHAPTER 4

Staying on top of and ahead of industry standards

The EV marketplace is evolving at a rapid pace. Rapid electric vehicle upgrades, changes in battery sizes, charging standards and regional differences between North America, Europe and China all combine to make for a volatile market.

As such, implementing established and emerging standardization across all aspects of the electrification process – mechanical, electrical, software, and communications – will be challenging, but are important to driving interoperability between systems and devices.

Standards awareness and compliance should be strongly considered before vehicle and charger purchases are made. The goal should be to identify unique EV infrastructure charging needs and available communication protocols and standards before selecting EV fleet vehicles.

Listed below is a sampling of relevant EV infrastructure standards:

– **OCPP** – This standard specifies the data structure of information between the charger and the cloud application. It is an open application protocol used by charger manufacturers and software providers worldwide, allowing EV charging stations and central management systems from different vendors to communicate with each other.

– **ISO15118** – Governing the electronic "handshake" between vehicle and charger, this standard impacts how charging can be optimized to reduce electrical costs, while preventing the system from incorrect fault readings. It also enables "Plug and Charge", a function that enables the vehicle to authenticate itself to the charger over the charging cable upon connecting the plug, to simplify and streamline the EV driver's experience.

Standards like OCPP and ISO15118 enable management of the delivery of power to a vehicle in a way that allows the vehicle owner to attain cheaper rates or access lower peak pricing as configured through charger-management software. This is important when working within the confines of the software standard. The vehicle should "understand" the delay in receiving power and avoid inadvertently shutting down the session because of a perceived fault. This can be illustrated when two vehicles are simultaneously accessing a single charger. The charger deploys power to one vehicle at a time to keep power peaks under control.
The vehicle not receiving power must understand and be able to wait in sequence for its turn to be charged.

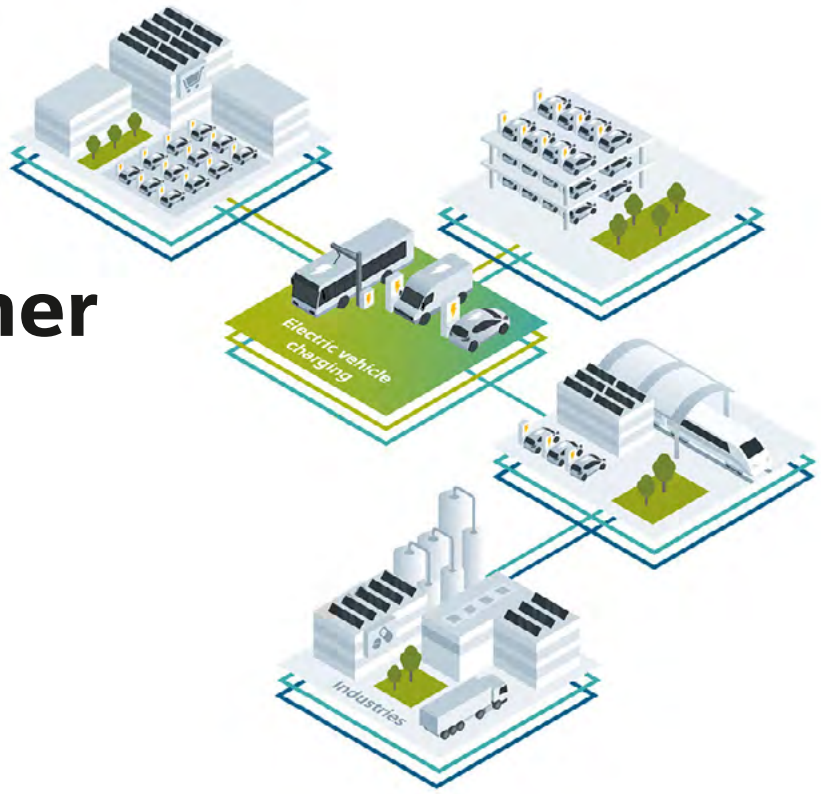
– **SAE J1772 (IEC 62196 Type 1)** – Maintained by SAE International, this is the North American standard for electrical connectors/physical charging-plugs for electric vehicles. This standard ensures that no matter where your EV truck may go, it will be able to plug into another charging station outside of its own hub if needed.

– **SAE J3105** – Also maintained by SAE International, this standard addresses the general physical, electrical, functional, testing, and performance requirements for a mechanized (hands-free) conductive power transfer system. This standard is primarily targeted towards transit buses using an overhead coupler capable of, but not limited to, transferring direct current (DC) power.

Standards will need to keep pace with the rapid evolution of the EV market. Siemens and many other vehicles and charging providers embrace standards, but others prefer proprietary approaches that lead to vendor lock-in. In addition, as various use cases are developed between a customer and their vehicle OEM, charger manufacturer, and software backend supplier, slightly different interpretations may come into play. An industry partner and advocate well-versed in vehicle charging infrastructure requirements and that truly adheres to industry standards can help drive these standards and promote interoperability throughout the lifetime of the fleet's EV infrastructure.

CHAPTER 5

Embracing the transition **together**



Given the complexity of the migration to EV, Siemens, as a planning and implementation partner, can help you drive internal and external collaboration to address issues such as:

- Connection to the grid, including collaboration with utilities.
- Financing, including the ownership model (CapEx versus OpEx).
- Facilities management, including site, space, equipment, and building needs.
- Integration with existing fleet management systems.
- Standards compliance, such as utilizing Open Charge Point Protocol (OCPI)-compatible hardware for sustainability.
- Software requirements, including managing power and charging, Radio Frequency Identification (RFID), and network capabilities.
- Design site planning, accounting for daily kWh requirements, charging times, charging speed, and utility tariffs.
- Power and renewables integration, including distributed energy systems (DES), utilities incentives/programs, and local, state and federal grants and rebates.

As a pioneer and innovator in electric mobility, Siemens is an active participant in shaping and promoting standardization for EV charging solutions worldwide, as well as manufacturing products and solutions that are built to evolve with emerging standards, business models, and OEM fleet requirements within the EV marketplace. This long-term perspective means we design hardware and software to accommodate technical projections five years from now in addition to today's planning and design needs for the initial charging station.

Through global experience and offerings that span the electrification value chain, Siemens is uniquely qualified to deliver consistent value through the complete duration of an EV fleet migration project. We help fleet operators to define their business models, to plan EV infrastructure deployments, and to implement the charging systems including full service and support assistance.

An example of leading electrification technologies is Siemens PlugtoGrid™, an end-to-end set of solutions for EV charging infrastructure. Fleet managers can easily connect chargers to the grid with Siemens eMobility open protocol charging technology and electrical power distribution solutions, as well as flexible options like energy storage, renewable power integration, and managed cloud services. We also understand that every company and fleet work within an ecosystem of different management systems, organizational structures, and paths to electrification. That's why we help fleet managers custom-build a step-by-step EV charging strategy to identify the most urgent priorities, all while protecting current investments. We focus on ways technology solutions can help fleet operators meet profitability and sustainability targets. We provide our fleet operator customers with more time to focus on their core competency: better managing fleet customer business requirements.

Together, we can improve and drive technology for EV charging infrastructure and a sustainable future in eMobility. Learn more.

1 BloombergNEF Electric Vehicle Outlook 2020

2 McKinsey Report, Charging electric-vehicle fleets: How to seize the emerging opportunity

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