

# Adapting to the growing demand for electric vehicles

The U.S. transition to electric vehicles (EVs) has been slow in coming, but 2018 signaled a turning point. With electric vehicle (EV) sales in the U.S. increasing 81 percent to an estimated 360,000 units,<sup>1</sup> preparations to grab market share with EV sales is revolutionizing strategies from the executive suite to the plant floor. Global sales of passenger EVs surged 63 percent to top two million units for the first time ever in 2018.<sup>2</sup> Bloomberg predicts that the momentum will continue in 2019, with global sales estimated to grow at a 40 percent clip. Additionally, the new self-driving vehicles that are under development are electric, so the growth of autonomous vehicles will provide another boost for EVs.

According to the latest estimates, the number of EVs on the road is predicted to surge from 1 million today to 25 million by 2025.<sup>3</sup> In terms of market share, EVs will increase from around three percent today to more than 30 percent by 2030.<sup>4</sup> Experts agree that eventually the internal combustion engine, a top contributor to global greenhouse gas emissions, will be replaced by clean, green, quiet, efficient EVs.

The surge in EV sales is being attributed to a number of factors, including improvements in EV technology that have extended range from less than 100 miles per charge to over 300 miles, lower sticker prices due to the dramatically reduced price of batteries, and the increased availability of charging stations.

At the same time, demand has spiked as more consumers become environmentally conscientious. Major corporations are making the replacement of their gas-powered fleets with EVs a key part of their efforts to go carbon neutral. In addition, regulatory and governmental pressures to cut greenhouse gas emissions are ratcheting up.



# New competitors fuel industry changes

In this highly competitive and fluid environment, automotive companies need to retrofit their traditional manufacturing facilities to accommodate EV production.

More than half of 2018 EV sales in the U.S. is coming from industry newcomer Tesla,<sup>1</sup> which is providing tough new competition for traditional auto manufacturers. In response, incumbent automakers are accelerating efforts to develop and produce EVs.

Electrification of a complex product like an automobile is not as simple as swapping out an internal combustion engine for a battery. The entire infrastructure of the vehicle needs to be re-designed and re-tooled, everything from air-conditioning units to brakes and steering systems. EV car production gives automakers an opportunity to rethink the design of their cars and integrate innovative ideas that might have been sitting on the shelf waiting for the right time to be incorporated into the new models.

Any strategy for transitioning to the production of EVs begins with power. Companies need to have an underlying power infrastructure that provides the capacity, reliability, flexibility, safety, efficiency, and automation required to compete in this fast-paced, dual-mode world.

### **Electrification adds new challenges**

Whether it is a new, single-purpose facility, a new multi-use manufacturing plant, or a retrofit that requires companies upgrade legacy equipment, automakers are looking to digitalization for design, production, and performance to transform and optimize their operations. Companies are deploying adaptable power management, robotics, IoT sensors, digital twin technologies and product-lifecycle management (PLM) software to cut costs and improve efficiency.

Electrification adds another layer of complexity in a variety of specific ways:

- The production of EVs will require a net increase in demand for electric power during the manufacturing process. Companies will need to install an entire network of new EV charging facilities inside of manufacturing plants as part of the production process. For example, Siemens is currently providing a charging infrastructure solution for a major auto manufacturer that includes six production plants and 650 charging points.
- Companies will be producing a mix of EVs and traditional vehicles for the foreseeable future, which requires sophisticated, automated, adaptable power management systems. Siemens MindSphere and Sm@rtGear<sup>™</sup> technologies enable manufacturers to install power quality meters, gather information from trip units with power circuit breakers, deploy new medium-voltage and low-

voltage switchgear, and to install a power monitoring system to collect and manage power quality and energy data flowing throughout the facility. In addition, MindSphere enables customers to transform this data into productive business results by connecting machines and physical infrastructures to the digital world.

- Just as Tesla built its own network of charging stations along major highways, competing auto manufacturers must deliver charging infrastructures for their customers. These charging stations need to be strategically located along well-traveled highways, as well as at places where large numbers of drivers congregate, like corporate headquarters, office parks and shopping malls. Siemens offers a full line of VersiCharge EV charging stations that range from low-power chargers targeted at residential garages to high-powered, multi-charging systems for public highways and charging depots. The Siemens portfolio of charging technology links those chargers with energy storage, management and distribution systems. Siemens customers and partners who have connected their charging stations to the network management software offered by Siemens are taking advantage of the advanced load-management functionality within this software to integrate chargers into electrical distribution infrastructure available on site, often times avoiding more costly infrastructure upgrades. Siemens also offers consulting services to help companies determine the optimal locations for charging stations.
  - The Siemens eMobility open charging technology is part of the PlugtoGrid<sup>™</sup> application, including energy storage, electrical distribution and managed services. Siemens customers and partners who have connected their charging stations to our managed services cloud offering are taking advantage of billing services, demand management and advanced max load control functionality.

These features can allow EV expansion without costly electrical infrastructure upgrades. To ensure an optimal EV solution, Siemens offers consulting services to help companies determine the optimal product mix, supporting infrastructure and services for their project.

Putting more clean cars on the streets is only one part of the equation. Manufacturers need to cut their own use of electricity in the production of EVs, both from a cost savings and an environmental perspective. According to the EPA, while vehicles are responsible for 28.5 percent of greenhouse gas emissions, electricity production is not far behind at 28.4 percent.<sup>7</sup> So, automakers are focusing on ways to more efficiently manage power at their facilities. Siemens IO-Link current and voltage monitors are being used in power distribution panels to monitor energy consumption of branch loads and important current data which can be used in predictive/preventative maintenance regimens. Another Siemens auto manufacturing customer is using Siemens 3VA circuit breakers with integrated power metering to measure energy consumption. Companies are also looking into integrating alternative power supplies, like solar into their power mix through the use of energy storage technology and microgrids. Siemens offers a variety of solutions for the creation of distributed energy systems (DES), energy storage solutions, and microgrids.

Siemens customers and partners who have connected their charging stations to our managed services cloud offering are taking advantage of billing services, demand management and advanced max load control functionality.



# New carbon emission goals increase need for charging infrastructure

Consumer demand is only one part of the EV equation, as governments are making bold commitments to reduce greenhouse gas emissions. California, the world's fifth largest economy, has committed to be carbon neutral by 2045 (starting by requiring all medium- and heavy-duty transport to be electrified by 2030). New York City has pledged to be carbon neutral by 2050. Globally, the UK is committed to 80 percent reductions by 2050, Germany aims to cut greenhouse gas emissions by 40 percent by 2020, and Sweden wants to be totally carbon neutral by 2045.

In addition, local transit agencies have committed to replacing buses, vans, and other types of public transportation with EVs. Private corporations are also moving to swap out their own vehicle fleets for EVs. In a recent survey of companies that belong to the EV100 group, an industry association dedicated to accelerating the transition to EVs, the lack of a charging infrastructure was cited as the top barrier to going electric. Siemens continues to work with cities, transit authorities and fleet operators to provide electrical distribution and charging technology for bus and truck charging depots as well as along scheduled routes for opportunity charging on the go. Our ongoing partnerships have driven the need for our new plant in Wendell, NC, to produce the new MaxxHP Plug-in eBus/ Fleet charger. The goal is for this plant to produce over 1,000 chargers per year.

An entire ecosystem needs to come together to plan strategic locations for EV charging stations, to manage power distribution and storage, to size manufacturing and distribution facilities and to equip the current infrastructure to interface with the new power transfer modes. Siemens provides consulting and planning services to help automotive and utility companies design, implement and manage an effective charging infrastructure.

# Choosing the right partner for managing the EV transition

As the influence of EVs grows across the global economy, partnerships will play a critical role for automakers who want to profitably manage the transition. Manufacturers should look for a partner with a track record of expertise in the auto industry who also specializes in the generation, distribution, and efficient management of electric power.

Whether a company is new to the market or transitioning an existing plant, Siemens provides PlugtoGrid<sup>™</sup>, as an end-to-end solution. Siemens, with long-standing experience deploying technology solutions across vehicle manufacturing, utility power distribution, and state and municipal government sectors, is uniquely positioned to offer a comprehensive perspective.

The depth and breadth of the Siemens portfolio is such that turnkey solutions can include feasibility studies, engineering and design services, site prep, production, procurement, factory testing, transport, on-site installation and commission, training, after-sales services, and recycling.



In addition to supplying core EV systems hardware and cloudbased software technologies, Siemens expertise includes consulting and financing, manufacturing operations, planning and simulation, engineering, network design, project management, ordering and delivery systems, and power component installation, commissioning and digital-enabled services.

By acting as a partner that offers services across the entire lifecycle of the EV spectrum, customers benefit from simplifying a complex project through a "one-stop shop" that includes power generation and distribution, plant and microgrid controls, and a long-term service program that ensures reliable operations.

### Resources:

- <sup>1</sup> GreenTechMedia, A Wood Mackenzie Business, Jan 7, 2019
- <sup>2</sup> EV-volumes.com, 2019
- <sup>3</sup> Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW)
- <sup>4</sup> Driving into 2025: The Future of Electric Vehicles, JP Morgan, October 10, 2018
- <sup>5</sup> Automotive News, January 14, 2019
- <sup>6</sup> Greentech Media, December 10, 2018
  <sup>7</sup> Electric Vehicle Sales Forecast and the Charging Infrastructure Required Through 2030, November 2019, Adam Cooper, Institute for Electric Innovation and Kellen Schefter, Edison Electric Institute

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