



© David Tonelson | Dreamstime.com
Tesla charging station pumps

CALIFORNIA EV – PHONE HOME

The need for ubiquitous electric vehicle infrastructure poses a significant impediment to the electrification of the transportation sector in California and beyond.

By **BARRY EPSTEIN** and **DANA PALMER, ALLEN MATKINS.**

Massive changes in infrastructure on an extremely ambitious schedule will be required to support vehicle electrification, a key component of the transition to a renewable energy economy. Within a few years, the global transportation sector will make a rapid pivot to vehicles powered by electricity rather than carbon-emitting fossil fuels. Cars, yes, but also trucks, buses, trains, construction vehicles, ferries, airplanes, and other methods of moving people and goods will have to be electric vehicles (EVs), run on batteries.

In California (a leader in mandating and incentivizing the transition to EVs, and by some reckonings the fourth largest economy in the world), for example, starting in model year 2026, 35% of new vehicle sales must be zero-emission vehicles (ZEVs), with a limited number of plug-in hybrids. This percentage escalates to 100% for model year 2035. For trucks, the sales obligations start earlier but ramp up in smaller increments. Beginning in model year 2024, five percent of sales within the smallest and largest truck classes must be ZEVs. Nine percent of sales within the medium class of trucks must be ZEVs.

A growing number of other states in the US have joined in adopting California's aggressive regulations for both cars and trucks. Several states and the District of Columbia are considering California's regulations on ZEVs. A larger number of states have adopted California's vehicle standards under the Federal Clean

Air Act. Those states include: New York, Massachusetts, Vermont, Maine, Pennsylvania, Connecticut, Rhode Island, Washington, Oregon, New Jersey, Maryland, Delaware, Colorado, Minnesota, Nevada, Virginia, and New Mexico.

SHIFT TO EVS IN PERSPECTIVE

Plans, mandates, and incentives aimed at converting the energy supply away from fossil fuels and to electricity have been under way for decades, with federal resources dedicated to clean energy research arising in the 1970s and a suite of tax incentives implemented with the passage of the federal Energy Policy Act in 2005.¹

Solar, wind, geothermal, and other renewable sources of that energy supply have experienced massive growth, with new data showing Renewables Portfolio Standard-eligible sources, including solar and wind, supplying nearly 40% of California's electricity compared with around 3% in 2020, and battery storage capacity in 2023 increasing 20-fold over 2019². Electric vehicles in California made up almost 20% of new car purchases in 2022, up from only 7% in 2020, despite only minimal zero emission vehicle offerings from major automakers, according to California Energy Commission (CEC) data.³

But the level of demand for that renewable energy supply is hardly static. Especially with the conversion

In 2018 former California Governor Edmund G Brown Jr signed an executive order that set a goal of putting at least 5m ZEVs on the road by 2030

of the transportation sector to rely on electricity as its fuel, renewables will not only have to replace fossil fuels as the source of electricity generation, but renewables will also have to meet the dramatically higher demand for electricity that an electrified transportation sector (coupled with increasing demand from the building sector driven by building decarbonisation) will bring.

Based on CEC figures, California will need nearly 1.2m public and shared-private chargers to support the roughly 8m zero emission vehicles that the California Air Resources Board expects will be on the road by 2030.⁴ An additional 157,000 chargers are needed to support 180,000 medium and heavy-duty vehicles forecast for 2030. Annual demand for electricity to charge these vehicles will jump to 230bn kilowatt-hours (kWh) in 2030 from current annual demand of 11bn kWh, based on 2022 McKinsey research.⁵

Key to this transition is not only the availability of electric-powered vehicles. Another absolute necessity is the infrastructure to charge them. That infrastructure involves a chain that ends with ubiquitous EV charging stations in every imaginable setting – at or near commercial buildings, public and private institutional facilities, distribution warehouses, hospitality and visitor-serving facilities, recreation and entertainment venues, fleet centres, parking lots, single and multi-family residences, transit centres, and at ports and along highways to name a few.

EV chargers rely on a host of power electronics made around the world, and manufacturers have only recently scaled-up production to meet the demand, hamstrung in part by the same obstacles that the semiconductor industry has faced in recent years. One step up the chain will be the distribution-level electric wires infrastructure necessary to deliver such increased power to meet the increased loads of EV chargers, which are significant.

A recent Boston Consulting Group study foresees that an influx of electric vehicles will pose the biggest challenge for local power distribution, with utilities looking at investment of between US\$1,700 and US\$5,800 in grid improvements for each light-duty electric vehicle sold through to 2030.⁶ Even with wires already on the ground where EV chargers will be added, in many places the existing capacities of that wires infrastructure will require costly upgrades, including at substations and potentially hundreds of thousands of distribution-level transformers.

WHO CARES

The demand for EV charging services spreads far and wide, impacting virtually all constituents in the real estate sector. Owners of existing buildings and facilities of every type will need to provide EV charging at their sites or conveniently nearby. Employees, tenants, visitors, and delivery suppliers will all need it. The same is true for any new buildings or facilities – developers will need to factor in the provision of proximate EV charging services. At the passenger car-level, workplace charging will be needed – especially in dense, urban areas where single family homes with personal garages are the exception.

On the flip side, more and more market entrants are developing, owning, operating, and servicing EV charging stations. WattEV, Terrawatt Infrastructure, and others are developing public charging depots, both on a standalone basis and at existing sites, including fast charging facilities for light, medium, and heavy-duty vehicles. Developers are also expanding the concept of the traditional charging station. In California, Rove is rolling out full-service EV charging centres – the equivalent of the local urban gas service station, but with inviting services such as coffee bars, lounges, food, car washes, fast food and groceries, and even pet areas.

PLANS, MANDATES AND INCENTIVES

In 2018, former California Governor Edmund G Brown Jr signed an executive order that set a goal of putting at least 5m ZEVs on the road by 2030 and installing 10,000 direct current fast chargers (DCFCs) by 2025. Subsequently, current California Governor Gavin Newsom signed an executive order that set a goal that 100% of sales of new cars and trucks within the state will be ZEVs by 2035 and 100% of the medium and heavy-duty vehicles will be ZEVs by 2045.

By 2036, truck manufacturers will only be allowed to sell zero-emission models of heavy-duty and medium-duty trucks in California. Large trucking companies in California must convert their fleets to electric models.

Starting in 2036, manufacturers will only be allowed to sell zero-emission medium and heavy-duty trucks in California, under the California Air Resources Board's Advanced Clean Truck Regulation, adopted on June 25 2020. The corollary Advanced Clean Fleets Rule, adopted April 28 2023 and aimed at purchasers of trucks, requires the gradual transition of truck fleet purchases beginning in 2024 for medium and heavy-duty trucks, greater than 8,500 pounds.

The regulation applies to federal, state, and local government agencies, along with high-priority fleets, owned, operated, or directed by entities with over US\$50m in gross annual revenue in California and those with control of 50 or more vehicles in the state.⁷ California officials admit these programmes are aggressive and pending legal challenges may affect their ultimate outcome.

The need for the charging infrastructure to meet the needs of this growing population of EV vehicles has not escaped policymakers.

Several recent pieces of California legislation have been enacted in an attempt to smooth the

way for new EV charging infrastructure projects to be approved by local governments. This includes a permit streamlining directive to local agencies, binding maximum timelines for approving such projects, and a provision that an application for charging infrastructure will be “deemed approved” if the local agency does not act promptly.

Several other California laws require adoption of mandatory requirements for EV charging infrastructure at new residential and non-residential projects, and the near-term adoption of such requirements for existing buildings. Tenants also can insist on installation of EV chargers in buildings, and leases may not impose terms prohibiting or unreasonably restricting EV chargers. Also, funding programmes have been established or are in the works to support new EV facilities.

The Federal Government also is involved in the ZEV transportation sector transition. Several recent presidential executive orders address this topic, including setting a goal that 50% of all new passenger cars and light trucks sold be ZEVs by 2030. The recently-enacted Infrastructure Investment and Jobs Act makes US\$7.5bn available to states for installation of EV charging infrastructure.

To help California meet its emissions reductions goals, the California Public Utilities Commission on November 17 2022 adopted a five-year transportation electrification programme, providing US\$1bn in funding for the three California investor-owned utilities to upgrade infrastructure, with 70% of the funds dedicated to charging medium and heavy-duty trucks.

IMPEDIMENTS

Notwithstanding all the attention focused on ZEVs generally and EV charging infrastructure specifically, significant impediments may slow the transition notwithstanding the governmental mandates and incentives.

- Supply chain shortages – Shortages of the equipment needed for EV charging stations – transformers, switchgear, and other building blocks of a new charging installation – are delaying the rollout of new facilities. For example, the lead time for certain power supply components rose to a year-and-a-half at the end of 2022, with at least one leading power supply manufacturer already reporting shortages.
- Electric grid supplies – The utilities that deliver electricity to end-users are far behind in being able to respond to requests for upgrades to meet the increased demand when EV chargers are installed at existing facilities, or to provide adequate electric services to new EV charging locations.
- Lack of integrated planning – Gaps can occur between planning for new buildings, or changes in the use of buildings, and the recognition that space and electrical capacity for EV chargers must be integrated into the plans.
- Permitting delays – Installations of EV charging facilities will require permits under the applicable building code. But other permits, such as land use approvals, often also will be needed. Local interests

Several other California laws require adoption of mandatory requirements for EV charging infrastructure at new residential and non-residential projects and the near-term adoption of such requirements for existing buildings

– neighbours and local government officials – are regularly impeding new EV infrastructure projects over real and imagined concerns with traffic, fire risk, and the cost of implementation.

IMPLICATIONS FOR INVESTORS AND FINANCIERS

Perhaps it is obvious that the availability of EV charging infrastructure seems destined to become a feature of virtually any type of building or facility. But that imperative has the potential to affect valuations for investors and financiers when EV charging needs are (or are not) folded into a project. Over time, the disparity in valuations between buildings and facilities that do or do not have EV charging functionality may increase, since the occupancy demands will increase as more and more vehicles are EVs.

The potential bumps in the road in the rollout of EVs that may occur if the charging infrastructure lags are also broader. Inadequate EV charging, such as fast charging for trucks, will slow deliveries – affecting the supply chain, particularly for just-in-time business models. In some situations, the added cost of installing or operating EV infrastructure could be a material cost factor – whether directly or because delays keep property off the market until compliance is achieved. For buildings and facilities heavily dependent upon on-site or proximate EV charging, having reliable arrangements in place for continuity of EV charging can be expected to become a new diligence item on financing checklists.

In short, transportation sector electrification is upon us and accelerating. Those not paying attention will be caught in the slow lane. ■

FOOTNOTES

- 1 - <https://sgp.fas.org/crs/misc/R40913.pdf>; <https://www.energy.gov/eere/eere-timeli>
- 2 - <https://blog.ucsusa.org/dave-reichmuth/californians-embrace-zero-emission-vehicles-with-record-sales/>
- 3 - <https://blog.ucsusa.org/dave-reichmuth/californians-embrace-zero-emission-vehicles-with-record-sales/>
- 4 - 2022-2023 Investment Plan Update for the Clean Transportation Program, CEC
- 5 - Building the electric-vehicle charging infrastructure America needs, McKinsey (April 18, 2022)
- 6 - “Can the Power Grid Handle a Wave of New Electric Vehicles?” Wall Street Journal (Feb. 5, 2023)
- 7 - CARB