



Convenience Store risk in the age of **ELECTRIC VEHICLES**

How Does an Electric Vehicle
Revolution Impact C-Stores?

INTRODUCTION

According to the US Environmental Protection Agency (EPA), 27 percent of all carbon emissions in the U.S. are caused by cars and trucks. Therefore, there is an ever-increasing push to reduce greenhouse gasses by 2030. One of the ways suggested by scientists and government officials is to introduce more electric vehicles (EVs) into the market. Like it or not, gasoline-powered combustion engines are becoming a thing of the past, and car makers in the U.S. scramble to catch up to the increasing demand for EVs.

The conclusion that EVs can readily use domestic energy and thereby lower greenhouse gas emissions is becoming more widely accepted. Despite that, government officials admit that modifications are needed for electric power generation and distribution systems. Also, uncertainty exists about how quickly drivers of gasoline-powered vehicles will come on board with going all-electric.

A recent U.S. Department of Energy study has attempted to answer this question. Forecasts of EV usage by 2030 are broken down into low, medium, and high categories. Several governmental agencies and scientific labs were involved in the study, which is an aggregate of all the combined data.

On the lower end of the spectrum, 320,000 drivers are projected to purchase EVs by 2030. The medium scenario suggests that 2.2 million electric vehicles will be bought, while on the high end, seven million drivers will purchase EVs by 2030.

If this is true, public charging stations will have to replace gasoline pumps sooner than later. For c-store owners and operators, it becomes a question of how to maintain current operating parameters. It also begs the question of whether having a charging station is worth it at all.

This detailed report aims to answer those questions. The first section provides a general background of vehicle charging and how it works. The types of charging stations and the differences between public and private models are also listed. In addition, potential revenue projections and capital requirements are discussed in detail, which will give the c-store operator a clearer picture of what is involved in providing a charging station to their customers.



ELECTRIC VEHICLE CHARGING EXPLAINED

Electric vehicles (EVs) use electricity stored in batteries to drive an electric motor. The motor shaft is typically connected directly to the wheels that, in turn, propels the vehicle forward. To understand the way batteries are charged, it is essential to first explore how an EV works.



A Quick Overview of EV Design

An EV uses an electric motor supplied by battery power as its propulsion system. Therefore, it is much simpler and more efficient than a vehicle utilizing an internal combustion engine. Also, it operates much cleaner since there are no gaseous emissions or hydrocarbon products, such as transmission or radiator fluids, within its systems.

Another advantage of EVs over standard vehicles is that they do not require a transmission. Instead, they use single-speed motors located close to the wheelbase, further increasing power and efficiency. This is why they typically outperform most gasoline-powered vehicles when accelerating from a complete stop.



EV BATTERIES

Several types of batteries are in use today to power EVs. However, not all are created equal. Lithium-ion batteries are the most common. They come in various options, including cylindrical and prismatic casing configurations.

The type of batteries used directly relates to the price of the vehicle. This is a crucial point to consider when planning c-store charging stations. Since some batteries take longer than others to charge, it is important to ask questions such as:



What is the best way to prioritize charging times between customers?



How many charging stations will be needed during peak hours?



Will multiple types of charging stations be needed based on the kind of batteries customers have?

It is also essential to consider how many miles a driver can go before needing another charge. Unfortunately, this number is hard to pin down since there are so many types of EV batteries available. With that in mind, aging EVs will likely need more frequent charging than newer models. That means lower-income drivers will be taking up most of the charging time on EV chargers, possibly crowding out those with more money to spend.

The good news is that EV battery technology is improving all the time. Hopefully, within the next few years, standardization will level the playing field for all consumers. Until then, a great deal of uncertainty looms over the industry.



TYPES OF EV CHARGING STATIONS

Level-one chargers

The level-one charger is for users who do not have access to a 240-volt outlet or dedicated docking station. It utilizes the same technology as standard trickle chargers and can be plugged into any 110-volt, three-prong outlet. In addition, most manufacturers include an extension cord between 20 feet and 25 feet long.

The level-one charger takes eight to 12 hours to fully charge a vehicle's battery pack. The drawback to this simple solution is that it only provides four to five miles of driving per hour of charging. Despite that, it is one of the most affordable options available.

Level-two chargers

Level-two chargers require either a 240-volt outlet or a docking station. When opting for a separate station, the homeowner must hire an electrician to connect it directly to the circuit breaker panel. Battery charging takes between four and eight hours, and the EV owner can drive up to 25 miles for every hour charged.

Level-three/DC fast chargers

DC fast chargers utilize pulse charging technology to quickly bring the vehicle's batteries up to full capacity. Input power is typically at 480 volts, so it is the fastest way to charge an EV (30 minutes on a DC fast charger equals approximately 170 to 200 miles of driving). However, these powerful units are only for commercial use and are not available for residences.



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AT-HOME CHARGING VS. PUBLIC CHARGING

Level-three fast chargers are not available for residential use. They require special permits in all but a few states and can be a hazard when not installed correctly. Also, residential infrastructure cannot handle the 480 volts needed for these systems.

Nearly 95 percent of all EV charging happens at the user's residence. California has tried making them available to the public in recent years without cost but has faced several challenges, including budget constraints. As a result, when the state asked EV drivers to start paying fees for the service, usage dropped by nearly eighty percent.

Nationwide, only about five percent of EV owners recharge their batteries at a public recharging station. The majority do it at home, which may present opportunities for c-store operators in the future. As demand for public charging increases, so will the number of locations.

Another variable in the equation is time. As EVs become increasingly popular, drivers will invariably need more charging options. For example, an employee of a company may suddenly get called into work to cover for a sick colleague. Instead of turning down the extra hours due to their car not being charged, they can receive a DC fast charge at a c-store just around the corner.



REGULATORY STANDARDS FOR PUBLIC CHARGING STATIONS

The National Electric Code (NEC), Underwriters Laboratories (UL), and The Society of Automotive Engineers (SAE) have all teamed up to provide a regulatory framework for states to follow. While federal laws have not caught up to the EV charging industry, it is only a matter of time before that happens.

These requirements include maximum power output, connectors, and interoperability between charging stations. It also covers infrastructure guidelines for commercial sites. However, state and federal regulations may supersede these codes and standards at any time. Therefore, it is essential for c-store operators considering the addition of EV charging stations to carefully review current state and federal laws before proceeding.



POTENTIAL PROBLEMS OF C-STORE EV CHARGING STATIONS

Many challenges present themselves when considering adding EV charging stations to a c-store. The first and most obvious one is the lack of driver participation. Dr. Henry Lee of Harvard Kennedy School states it this way:

Without an accessible infrastructure that can re-charge an EV in a reasonable time, most motorists will be unwilling to purchase one, even if it is cheaper and its performance is better. Admittedly, the risk of being stranded without power is small, but it is one that today's motorists have not faced in the vehicles that they have driven throughout their lifetimes.

In other words, there needs to exist a herd mentality. The vast majority of the population has to be on board with electric vehicles. Otherwise, the goal of adding charging station infrastructure would no longer be valid.

Space constraints

According to The American Petroleum Institute, drivers spend only about two minutes at the gas pump to fill their vehicles. In contrast, the average time for DC fast-charging a small EV is between 20 and 40 minutes. That means mid-sized and smaller cars will be parked at least ten times longer than at a gas station. Space will fill up fast as holiday travelers scramble to charge their vehicles.

The problem gets worse as more pickup trucks go electric. Many will be pulling trailers, adding at least 50 percent to the vehicle's overall length.



Disruption to normal operations

A driver stopping at a c-store for a pack of chewing gum and a fountain drink may find it oñ-putting to wait for parking. They may even balk at going into a location where so many people appear to be loitering. However, panhandlers could find it a golden opportunity to harass customers waiting for their vehicles to finish charging.

Despite the problems, EV charging is here to stay, and the c-store operator who can overcome these obstacles will be the ultimate winner.

WHAT DOES C-STORE EV CHARGING LOOK LIKE IN 2022?

A handful of C-stores and gas stations throughout the U.S. are already successfully installing EV charging stations. A prime example is RS Automotives in Takoma Park, Maryland. This small service station was built in the late 1950s but has recently been transformed into a magnet for local EV drivers.

The owner was reportedly tired of doing business with large oil conglomerates and wanted to make the switch to help protect the environment. Currently, there are no gas pumps on location, only EV charging stations. Because of that, revenues are down, so other income streams such as vehicle repair remain vital until demand for EV charging increases.

To combat the 30-minute customer wait times, the small waiting area was converted into an EV lounge. It contains couches, chairs, a large TV, and a coffee bar. Restrooms and free water are also available.

Small independents are not the only ones making the transition. For example, 7-Eleven, Inc. plans to install 500 direct-current, fast-charging stations throughout the U.S. by the end of 2020. This move by the leadership is designed to capture a portion of the growing EV charging market.

Current EV charging is typically relegated to scattered networks where the charging stations may be difficult to find. C-stores like 7-Eleven have the advantage of being located near major intersections and other high-traffic areas. Placing charging stations at these locations makes it more convenient for drivers needing a quick charge.

Unfortunately, older EV models remain on the road, so charging times are still an issue for c-store store operators. Also, there does not seem to be a push for expanding indoor waiting areas. These two challenges indicate that companies.

Rural EV charging

C-stores in rural areas face the unique challenge of finding enough demand for EVs. While that demand is currently growing, in the meantime, operators in remote locations are waiting to see how this new industry plays out in larger cities.

Despite that, recent federal infrastructure legislation allocates \$7.5 billion for electric vehicle charging stations. Besides that, lawmakers are calling on rural c-store operators to help alleviate the potential problems of access, but whether that includes subsidies to meet capital requirements remains to be seen.



CAPITAL REQUIREMENTS OF EV CHARGING

The cost of owning a level-three EV charging station is difficult to pin down. However, the latest estimates indicate a base capital expenditure of at least \$50,000. Figure in substantially more if electricity is not readily available to the immediate location of the charging site.

Energy Costs

Drivers are typically charged per kilowatt-hour (kWh) for electricity at DC charging stations. However, many c-stores and retailers charge by the minute. Therefore, when determining rates, it is essential to consider seasonal adjustments made by power companies, especially during peak summer months.

Operation and maintenance

Maintenance cost estimates vary with the equipment. As a starting point, the average cost per year for equipment upkeep is between \$2,000 and \$3,000 per unit.

Revenue Potential of EV Charging Stations

Industry revenue estimates are difficult to ascertain since there are so few players in the market. However, individual EV network companies pulled in over \$200 million last year, with projected sales to reach one billion dollars by 2030. In contrast, gasoline sales in the U.S. will likely exceed \$110 billion by the end of 2020. In light of these differences, EVs have a long way to go before catching up to the demand for gasoline-powered vehicles.



THE EV CHARGING STATION BUSINESS MODEL

C-store operators can choose from several business models for their EV charging operations. These are presented below in order of popularity and widespread usage. They can also be combined in some instances.

Site-Owned Profit Model

The majority of C-store owners desire to use EV charging as another revenue stream. The company purchases the equipment and is responsible for the installation and maintenance. The manager sets the pricing and makes all the decisions regarding point-of-sale transactions.

The obvious drawback is the initial capital requirements to install the equipment. Unfortunately, the price tag for charging stations is out of reach for many independent C-stores. In addition, cost recovery can be difficult due to the need for competitive pricing in high-traffic, urban areas.

Cost-Recovery Model

In the cost-recovery business model, the c-store owner focuses on recouping costs rather than making a profit. The idea is to draw more customers to the store by offering EV charging at a competitive price. The added revenue from in-store sales helps pay for the initial cost of the equipment.

This model works well for c-stores willing to expand food and beverage offerings or have a franchised fast-food restaurant on site. However, c-stores without these extra amenities may struggle to recover the costs of their charging stations. Conversely, locations with exceptional profit margins may even be able to offer EV charging for free or at reduced rates.





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Network-owned Model

EV charging networks are similar to mobile phone networks. They typically offer a monthly membership fee and supply all the equipment to the consumer via charging sites. They also provide mobile apps that automatically collect charging fees and direct the driver to the nearest charging station.

This model is an excellent starting point for small c-stores in busy urban areas where competition is a major factor. The network agrees to install and maintain the equipment without cost to the business. In exchange, the c-store hopefully increases traffic by offering EV charging for its customers at network rates.

The primary benefit of this model is not having to pay equipment and installation costs. The downside is that networks tend to be selective about the c-stores they choose as partners. Also, a typical contract may last up to five years, so the business operator may feel stuck if the network falls out of favor with their customers.

Hybrid model

With the hybrid business model, the network and the c-store share in both the costs and the profits. Depending on the contract terms, the network will usually take on most of the costs, but they will also get to keep most of the profits.

Unfortunately, this arrangement is uncommon, and few networks offer a hybrid solution. However, with the rapid expansion of the market and more networks joining in, the c-store operator can expect more flexible terms in the future.

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THE EV CHARGING STATION OF THE FUTURE

Current charging stations offer little in the way of amenities. They are typically tucked away in a lonely corner of a parking lot or deep within an underground garage. Most do not offer seating areas or shelter from the weather.

Forward thinkers in the EV charging space view the offering as an experience rather than a service. For example, Electrify America is an EV charging network provider and a subsidiary of Volkswagen. CEO Giovanni Palazzo believes future charging stations will have “waiting areas and other conveniences.”

He goes further by painting a picture of the future charging station as an emotional experience for the customer that reflects the local landscape and culture. It also needs to be a safe space where the average driver feels comfortable pulling up at night. Therefore, his company is committed to providing well-lit stations with security cameras and coverings to keep mother nature at bay.

Electrify America is not the largest EV charging network provider but is on track to become the most luxurious. Curbside delivery options and valet charging at upscale retail locations set the company apart from its competition. There may even be room for on-site luxury dining, shopping, and entertainment, in some regions of the U.S.

BUSINESS OPPORTUNITY OR BOONDOGGLE?

The U.S. government plans to install over 500,000 EV charging stations nationwide through recent infrastructure legislation. However, officials fail to mention that they will be level-two chargers, meaning it could take several hours to top off one vehicle.

Many EV drivers suffer from “range anxiety,” which worries them about how far they can go before they run out of electricity to power their vehicle. This is because “EV charging deserts” exist, especially in the southwest, where you may have to travel hundreds of miles before seeing a charging station.

The rural c-store can capitalize on these concerns by offering charging stations where none currently exist. In addition, government officials are counting on businesses to step up and provide remote charging to increase the range of current electric vehicles, which will put non-users’ fears to rest.

Still, there are risks to the c-store operator venturing forward to install charging units at their location. The petroleum industry reigns supreme, at least for the foreseeable future. U.S. presidents will come and go, changing political parties every four to eight years and adding to the uncertainty. Also, there is no guarantee that drivers will fall in line with changing from gasoline-powered vehicles to EVs.



On the other side of the spectrum lies the argument for pressing ahead. There could be severe consequences to c-stores that fail to adapt in time to increasing demands for EV charging stations. Lost revenue and decreased market exposure in the face of growing competition can be the downfall of any retail business.

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