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Electric Vehicle Charging Stations at Gas Stations in Minnesota

Research Note

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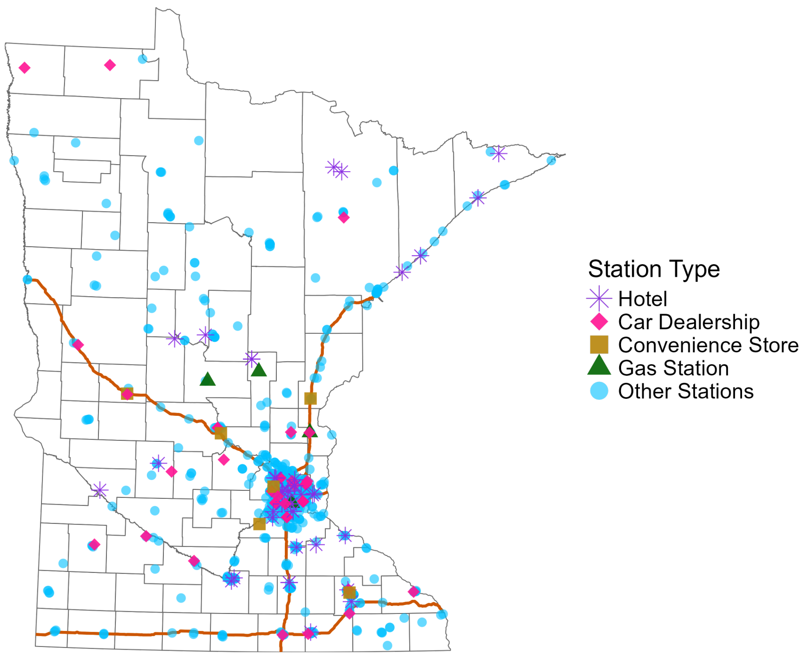
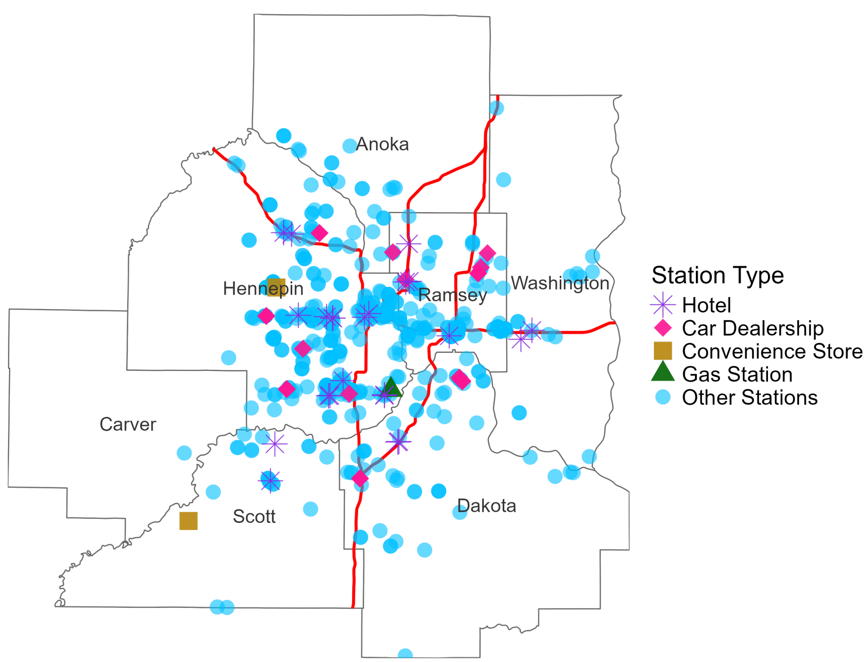
As the adoption of electric vehicles (EVs) continues to rise, the need for a robust and accessible charging infrastructure has become a concern for transportation planners and policymakers. In light of the evolving landscape, members of the TPEC board raised the question of whether EV charging stations were located at gas stations. This document responds to that inquiry by examining EV charging stations from the Department of Energy's alternative fuels data and reviewing existing literature.

EV charging stations in Minnesota are often more popular at public-facing sites such as hotels, restaurants, state government buildings, office buildings, parking lots, and shopping centers. Gas station locations, the traditional venue for internal combustion engine vehicles (ICEV), are less popular. According to the Department of Energy's alternative fuels data, there were 920 charging stations across Minnesota in January of 2025, most of which are concentrated in the Twin Cities seven-county metropolitan area (559 charging stations in the metro area compared to 361 in Greater Minnesota) (U.S. Department of Energy, 2025a). The dataset also contains information about the location of 232 charging stations (representing 25.2% of all charging stations). Of them, four are located at gas station locations. In addition, there are six located at convenience stores, which may have a gas station in the adjacent area. Figure 1 shows the distribution of charging stations by type in Minnesota (Panel A) and the Twin Cities seven-county metropolitan area (Panel B).



(a) In Minnesota



(b) In the Twin Cities Seven-County Metropolitan Area

Figure 1: Charging stations by type in Minnesota

Source: *Data from U.S. Department of Energy (2025a).*

Gas stations may be less popular locations for charging stations due to several factors categorized under demand, supply, and risk considerations.

From a demand perspective, consumer behavior associated with EV charging differs from that of refueling ICEVs. First, EV drivers are estimated to do **80 percent of their charging at home across the United States**. This method is generally cheaper than charging at public charging stations and allows EV drivers to charge their vehicles at night (Metz & London, 2021). Second, **when charging EVs outside of the home, users may prefer to do so while using the charging time for shopping or running errands**. Long charging times may cause consumers to want to spend more time around restaurants, shopping, or activities while their vehicle charges. This may incentivize EV owners to favor charging their vehicles in commercial areas over gas stations. Research found that charging stations lead to 4 percent more foot traffic and 5 percent more spending in nearby retail areas while consumers run errands or shop as their vehicle recharges (Toher, 2024).

Overall, research from Canada notes that residents of apartment buildings that do not have access to charging, freight vehicles that require a fast charge, and out-of-town travelers are the most likely users of EV charging stations at gas stations (Feng & Khan, 2024).

From a supply perspective, the deployment of charging stations at gas stations is influenced by logistical, technical, and economic factors. First, gas stations **lack the physical capacity needed for EV charging**. Charging at high-speed charging stations, for example, can take up to 30 minutes (Metz & London, 2021). Gas stations, which typically accommodate cars for much less time, may not have the space capacity needed to maintain the vehicle parked while charging (Metz & London, 2021). Feng and Khan describe that space for queueing of vehicles during peak charging demand may alleviate the space concerns for gas station charging facilities, which may involve modifications to the gas station layout to allow space for queued vehicles (Feng & Khan, 2024).

Second, **gas stations may have limited electrical capacity to support EV charging**. Gas stations may have limited access to electrical substations and power lines that can service the gas station's needs. Adding charging stations to gas stations could require utility service providers to construct new electrical substations or power lines to service the needs, which could be costly or a time-intensive process (Fast Company, 2024). Electrical capacity limitations are often more pronounced in rural areas than in urban settings, which can create greater challenges for the adoption and development of charging stations in those areas.

Third, **high EV charging installation costs and few financial incentives may constrain gas stations from installing such infrastructure**. Installation costs across the United States vary widely based on the type of charger, electrical capacity, permit requirements, and location. For example, the costs of installing Direct Current Fast Chargers (DCFC) are estimated to range between $20,000 and $1 million (see Table 1). This table focuses on DCFC station installations because they are the most frequently used chargers in public settings, such as gas stations, and are significantly more costly to install compared to level 1 or level 2 charging infrastructure.

Table 1: DCFC Installation Cost Estimates

Installation Cost Estimates	Description of Installation Cost Estimates	Location of Study	Source
-50 kW DCFC: $45,506 -150 kW DCFC: $47,781 -350 kW DCFC: $65,984	Costs are based on one charger per site. It includes installation costs, electrical equipment upgrades	Most populous 100 metropolitan areas in the United States	(Nicholas, 2019)
-50 kW DCFC: $20,000 for installation and $38,000 for equipment -150 kW DCFC: $60,000 for installation and $90,000 for equipment	Equipment and installation costs. Does not include land costs, subsidies, or incentive programs. The study assumes that operators will supply electricity at a "break-even price", but does consider the impact of higher costs due to electrical system upgrades.	100 fast charging stations in the United States (EV Project and Live Electric Data)	(Borlaug et al., 2020)
$75,841 – $118,131 total project cost per DCFC	Includes self-reported "final cost information of installing DCFC" from recipients of rebates from the California Energy Commission. Notes that "further inquiry revealed that CALeVIP (California Electric Vehicle Infrastructure Project) cost data may not reflect the full costs of DC fast charging station construction."	California	(Gamage et al., 2023)
$857,559 per DCFC unit with off-grid solar and battery capacity, intended for remote sites	In contrast to the other cost estimates listed in this table, this estimate pertains only to one solar-powered DCFC site in California, not connected to electrical service. It includes PV (photovoltaic) arrays with battery storage capacity, charging station, additional battery storage, taxes, training, testing, electrical trenching and backfill, site specific other costs, contractor's other costs	California	(Gamage et al., 2023)

Note: *DCFC installation and equipment cost data can be considered confidential information, making specific, detailed cost estimates less accessible to the public (Borlaug et al., 2020).*

There are several factors that may affect the overall costs associated with installing DC fast charging ports at gas station locations. A report from the Department of Energy, for example, finds that DCFC installation costs were the lowest on sites with existing electrical service, but higher on sites where electrical service needs to be established or upgraded (Smith & Castellano, 2015). Electrical capacity of the charging station itself also affects the overall installation costs (Horesh et al., 2024; Borlaug et al., 2020). Planning, permitting, construction, ordinance compliance, and accessibility requirements may also vary significantly by project location, which could affect overall costs (U.S. Department of Energy, 2025c).

The **lack of financial incentives** may also inhibit charging station deployment at gas stations. For example, gas station companies have been eligible to receive the National Electric Vehicle Infrastructure (NEVI) Formula Program through the Infrastructure Investment and Jobs Act (IIJA) (Kempower, 2024). The program provides funding for up to 80 percent of eligible project costs for installation, network connection, and acquisition of charging stations (U.S. Department of Energy, 2025b). Minnesota expects to receive $68 million in NEVI funding between fiscal years 2022-2026 (MnDOT, 2025). As of February 2025, however, NEVI funds have been paused by the federal government. While grants with fully executed agreements are able to continue, funding that has not yet been allocated is paused (Kim, 2025). Similarly, traditional transportation funding is not accessible for EV infrastructure. For example, funds available through the Highway User Tax Distribution Fund in Minnesota cannot be used for "the installation, construction, expansion, or maintenance of public electric vehicle infrastructure" (Minnesota Revisor of Statutes, 2024).

Lastly, from a risk perspective, **EV charging stations pose an increased risk of fire**. There is some evidence that EV charging stations pose an increased risk of fire, which is especially likely when there is outdated or improperly installed wiring. Lithium-ion batteries are also sensitive to high temperatures, which could cause self-ignition, especially when vehicles are charging (VFS Fire & Security Services, 2025). Charging stations at traditional gas stations may require additional safety equipment and safe handling or installation practices because of the high-voltage equipment involved in the process. Gas stations often install explosion-proof equipment to minimize safety hazards. Combining electrical equipment, which could cause fires, with the vapors from gas stations, could lead to increased risks and considerations in co-locating the two types of facilities (ChargedUp, 2024).

Overall, gas stations offer the opportunity to co-locate gasoline and electricity fueling stations. However, the adoption of charging stations at gas stations faces many challenges, including consumer behavior, lack of physical capacity, limits to electrical capacity, high installation costs, lack of financial incentives, and potential risk of fire. Based on these, EV charging stations are better suited for locations beyond gas stations to address demand, ensure supply, and manage associated risks.

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