DC Fast Charging Helps Michigan Attain the Benefits of Transportation Electrification

Prepared by Jane McCurry, Executive Director of Clean Fuels Michigan

May 2021

Transportation electrification benefits the grid at large. Electric vehicles (EVs) are charged with electricity from the power grid. There are 3 types of EV charging:

1) Level 1: Uses a regular 120-volt outlet and adds approximately 5 miles of charge to the battery per hour. All electric cars come with a level 1 plug.
2) Level 2: Uses a 240-volt outlet, often with special equipment installed, and adds approximately 20 miles to the battery per hour. Some new electric vehicles come with a level 2 plug. Level 2 charging is used overnight or in public areas where drivers stay for a period of time, like at shopping malls, grocery stores, downtown areas, and tourism locations.
3) DC Fast Charging: Uses special equipment that can provide 440-volts and up and charge a vehicle in less than an hour. DC Fast Charging is done only occasionally, when a day's driving exceeds the range on the vehicle.

More than 80% of EV charging is done at home, overnight[1], using level 1 or level 2 charging. The electricity grid typically has excess capacity during nighttime hours when people are at home sleeping. The grid is built for the time of day that has the most energy use, typically during a hot afternoon when factories are running. This means that there are extra resources that can be leveraged during nighttime hours to charge electric vehicles without having to add infrastructure or electricity generation to the grid. Essentially, the efficient charging of electric vehicles during overnight could result in increased electricity sales without increasing fixed costs or requiring additional infrastructure.

The "load filling" capacity of EVs increasesp as the number of electric vehicles increases. The more EVs that are being driven in Michigan, the more EV charging happening overnight, and the greater the benefits of effectively using available grid resources overnight.

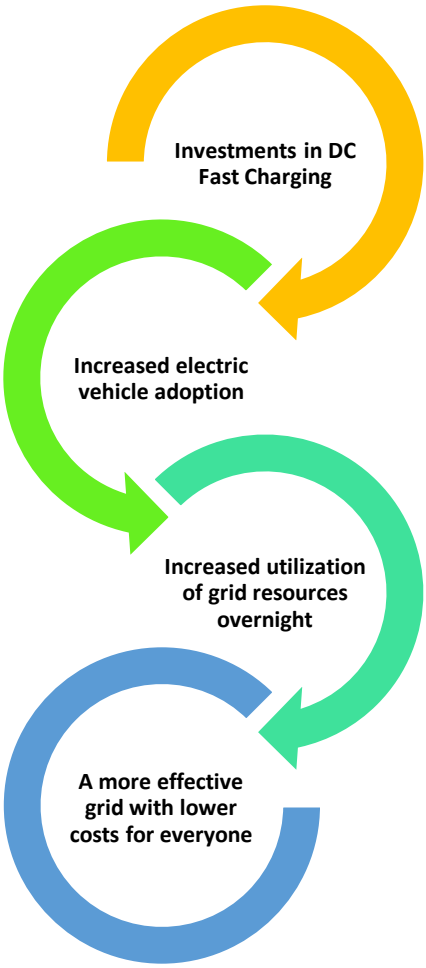
When grid resources are used more effectively, it means that everyone benefits, not just the drivers or owners of the electric vehicles. Electricity prices should come down for everyone as the low cost to provide electricity to EVs gets spread among all ratepayers. However, to reach the point where transportation electrification has enough of an impact to reduce prices for all, we need to reach critical mass on EV adoption.

[1] https://www.forbes.com/wheels/news/jd-power-study-electric-vehicle-owners-prefer-dedicated-home-charging-stations/#:~:text=In%20reality%2C%2080%25%20of%20EV,it%20costs%20in%20those%20places.

DC Fast Charging is one of the main barriers to EV adoption. The most cited barrier to EV adoption is "range anxiety" or the fear of not being able to find somewhere to charge in public[2]. It may seem paradoxical that the most effective way to encourage overnight EV charging is to invest in DC Fast Charging, however, it will take a ubiquitous and accessible network of DC Fast Charging to reach adoption in high enough numbers that would make a difference in overnight grid utilization.

DC Fast Charging is costly to install and is a difficult business case, making it a perfect market for utility engagement. Utilities have the knowledge and know-how to use their investments wisely and partner with site hosts to install charging stations in locations that will encourage EV adoption.

Of course, more DC Fast Chargers will mean an increase in total daytime EV charging. However, less than 20% of EV charging occurs at DC Fast Chargers, and even less during the day at DC Fast Chargers. The proportion of nighttime charging should remain unchanged, making the grid benefits of electric vehicles outweigh the potential increase in daytime electricity load from DC Fast Charging.



[2] Americans Cite Range Anxiety, Cost as Largest Barriers for New EV Purchases: Study