



City of Ann Arbor Electric Vehicle Readiness Ordinance Cover Memo

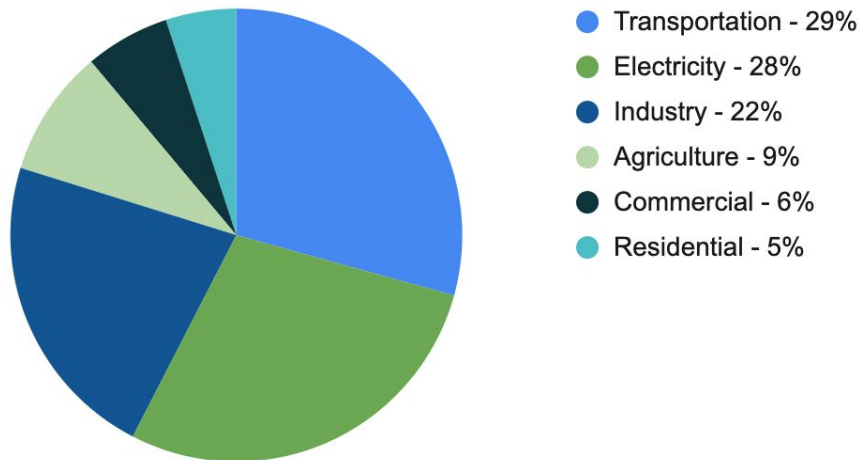
Produced by the Electric Vehicle Working Group of the Energy Commission
November 2019



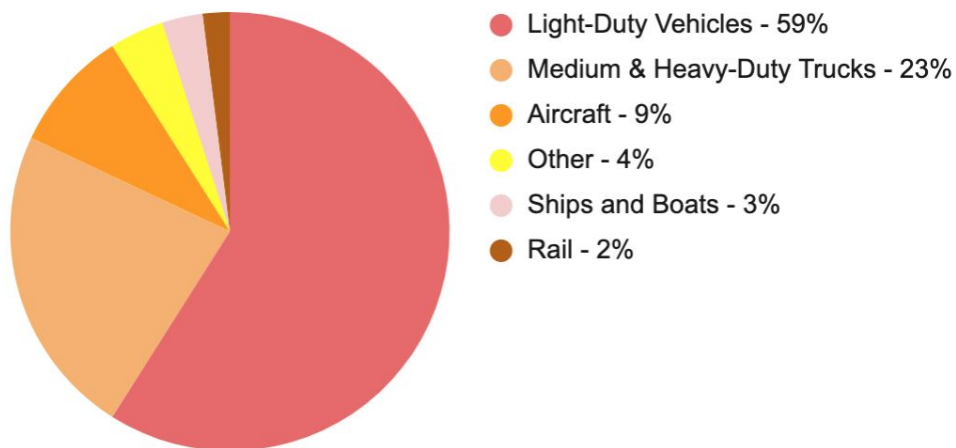
Why Do We Need EV Infrastructure Code Requirements?

With transportation-related emissions now constituting the largest greenhouse gas (GHG) contributor in the United States, electric vehicles have become one of the single most important initiatives for some of the most sustainable cities from a policy perspective.

2017 U.S. GHG Emissions by Sector



2017 U.S. Transportation GHG Emissions by Source



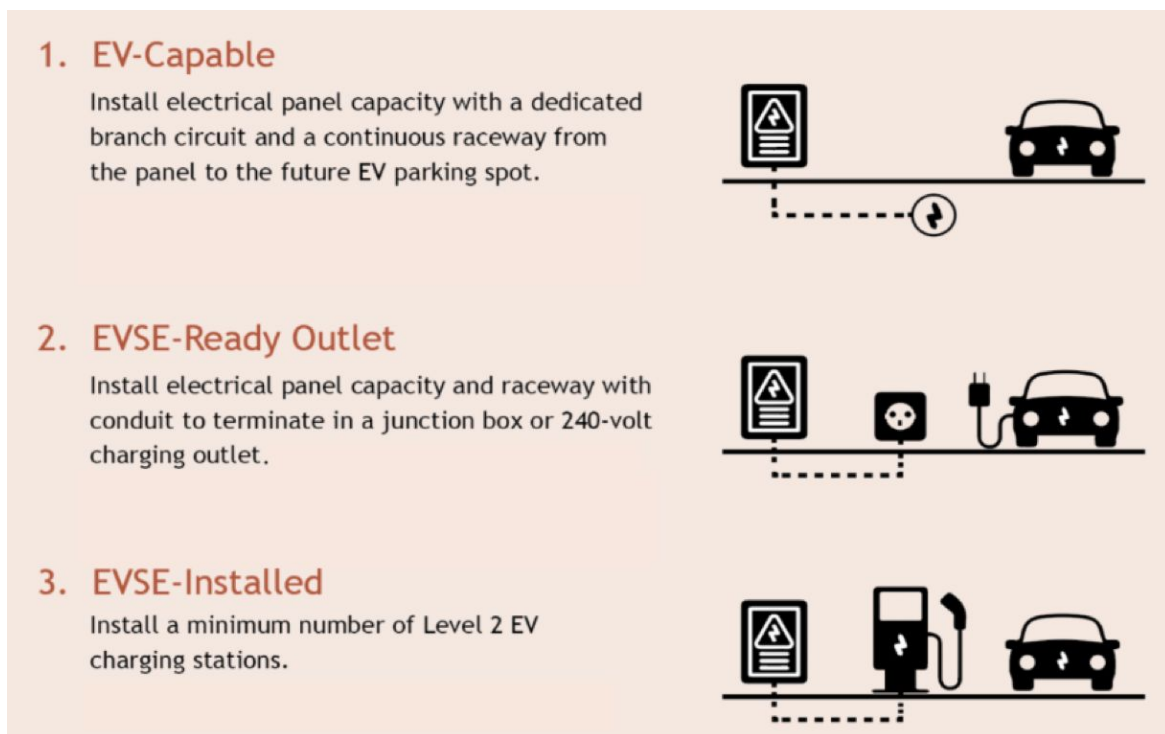
(1) <https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions>

Per mile, electric vehicles cost 1/10th as much to operate as their gasoline combustion counterparts¹ on average, yet widespread adoption has yet to be realized. Since the transition of both passenger and commercial transportation to electric vehicles (EVs) is still developing, supportive city policies to help remove potential barriers to their adoption are needed, primarily related to access to EV charging. The accessibility of EV charging stations in public, commercial and residential parking spaces and the ability

¹DTE “<https://www.newlook.dteenergy.com/wps/wcm/connect/dte-web/home/service-request/residential/electric/pev/pev-res-cost-savings>”

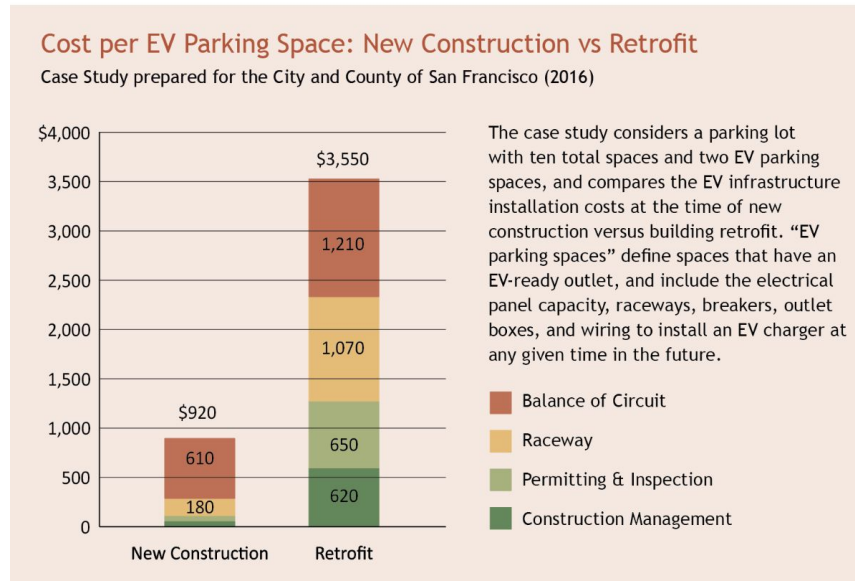
to connect future Electric Vehicle Supply Equipment (EVSE) in those spaces is critical to the adoption of EVs. However, the majority of these parking spaces do not have sufficient electrical capacity or wiring infrastructure to support both daytime and overnight charging of modern, 200+ mile range EVs. It is also much more economical if EV charging infrastructure is incorporated into these spaces at *pre-construction* phases in order to simplify the installation of future EVSE and to ensure that the necessary charging capacity is available for future EV drivers at a low cost to the building or parking lot owner.

Proposal for EV-Ready Code Amendments to the Ann Arbor Unified Code Requirements for Parking



(2) <http://www.swenergy.org/cracking-the-code-on-ev-ready-building-codes>

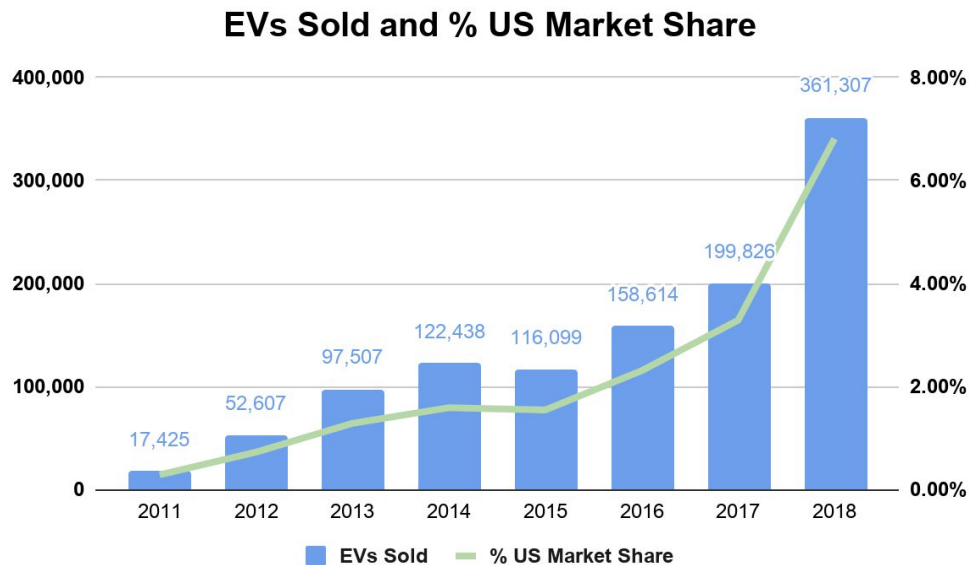
The proposed City of Ann Arbor Unified Development Code (UDC) amendments require a mix of three basic EV infrastructure requirements for any new parking in the City, depending on the particular building uses: EV-Capable (EV_C), EVSE-Ready (EV_R) and EVSE-Installed (EV_I). These EV parking requirements would apply to the construction of any new building or major renovation to an existing building. The three types of EV parking infrastructure requirements address the significant potential increase in costs when comparing new construction to retrofit costs. If construction has been completed and a building owner later needs to install EVSE, they must break up the surface of the parking lot in order to lay a raceway from the electric panel to the future EV parking spot(s). The steep expense associated with this retrofitting can be almost completely avoided under this proposed amendment. Image 3 (below) outlines the cost of EV infrastructure installation when completed during new construction versus retrofit installation.



(3) [Plug-In Electric Vehicle Infrastructure Cost-Effectiveness Report for San Francisco](#)

While the study referenced above was completed by the City of San Francisco, a similar analysis completed by the Ann Arbor Ecology Center based on local construction and permitting costs found similar results: that the total cost per EV space is projected to cost approximately **1.7 - 2.3 times more** for retrofit installation as opposed to initial construction.

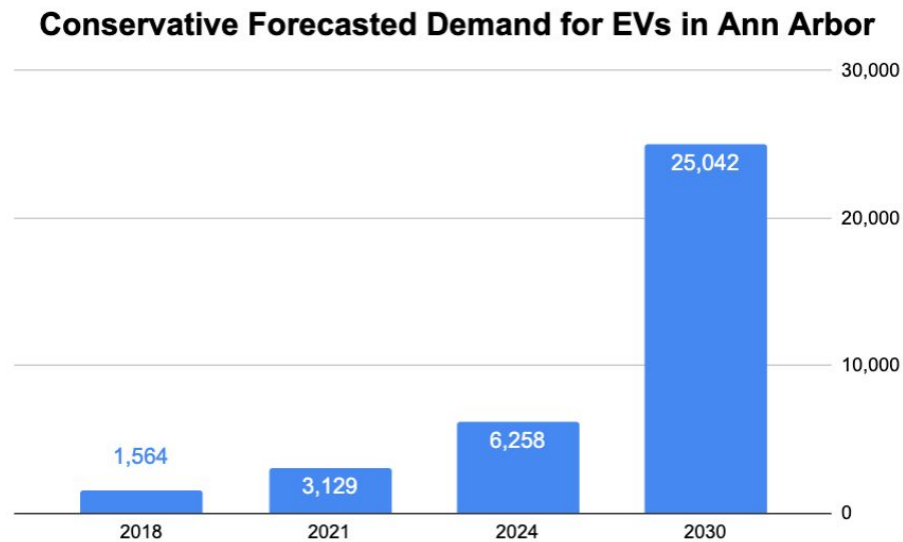
Growing Demand



Graph 1

The cost savings from investing in EVSE infrastructure during new construction becomes even more important in the context of the projected increase in EV demand anticipated over the next 5 - 10 years.

With electric vehicle sales displaying [52-straight months of year-over-year sales growth in the US](#) and [sales increasing 81% in 2018 compared to 2017](#),² the demand increase for EVs is apparent at the moment and inevitable in the future. Graph 1 (above) illustrates the increase not only in demand, but in US market share (or percentage of total cars sold in the US).



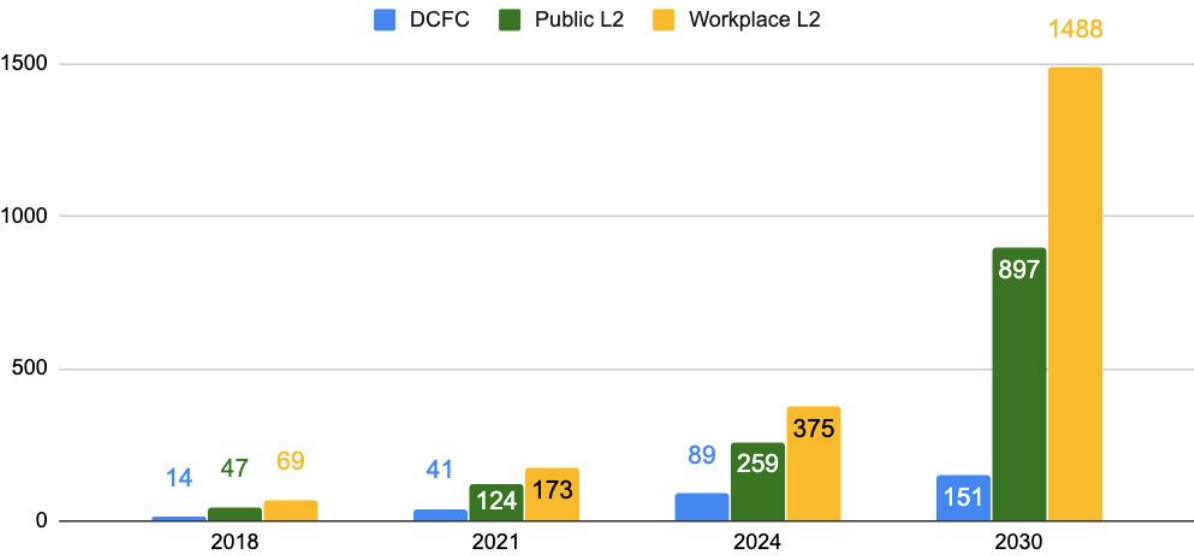
Graph 2

Looking forward, another Ecology Center study³ based on the Department of Energy's EVI-Pro Lite tool found that the number of EVs registered in the City of Ann Arbor would likely jump from 1,564 today to between 3,129 and 3,934 by 2021. The conservative estimate assumed 26% compound annual growth rate (CAGR) in the EV market by 2021, while a high-growth estimate was based on approximately 36% CAGR. Conservative estimates for 2024 and 2030 indicate an increase in the total Ann Arbor EV fleet to 6,258 and 25,042, respectively.

²Julia Pryor. "US Electric Vehicle Sales Increased by 81% in 2018," Jan. 7, 2019

³Tim Arvan, Charles Griffith. "Forecasting Demand for EV Charging Infrastructure in Ann Arbor," Aug. 2018.

Conservative Forecasted Demand for Charging Stations in Ann Arbor



Graph 3

The expected increase in electric vehicle adoption over the next decade necessitates a proportional increase in the availability of EV charging stations. The aforementioned 2018 Ecology Center study not only focused on projected EV demand in Ann Arbor, but the proportional increase in public EV charging stations as well. As outlined in Graph 3, workplace charging stations will make up the majority of public charging stations in Ann Arbor, while direct fast chargers (DCFCs) will be the least common. Residential charging stations are not accounted for by the EVI-Pro Lite tool, due to the fact that the Department of Energy is focused primarily on public install applications. Given the fact that the majority of charging will take place at homes, the proposed EV readiness requirements (see table 2 below) requires all new residential building developments to be 100% EV_R in order to facilitate the construction of infrastructure to meet this expected demand.

While the demand has yet to reach the level where mass installation of EV charging infrastructure is necessary, Ann Arbor needs to be prepared for when it is. Preemptive construction of EV charging infrastructure requirements as outlined by the proposed amendments to the UDC are intended to do just that, and would lower the costs for both building owners and EV drivers alike.

Cities leading the charge

Table 1: EV Readiness Policy in Other Cities

	Residential	Commercial		Multifamily	
	Spots (EV-Capable or EVSE-Ready)	Spots (EV-Capable or EVSE-Ready)	Chargers Installed (EV_I)	Spots (EV-Capable or EVSE-Ready)	Chargers Installed (EV_I)
Boulder, CO	100%	10% for buildings with more than 25 spaces	2 for parking lots with 25+ spaces	10% for buildings with 25+ spaces	2 for parking lots with 25+ spaces

Denver, CO	100%		1 for city parking lots with 100+ spaces		
Lansing, MI	*mixed-use applications require 1 per 50 spaces		1 for each parking lot, 1 additional per 50 spaces		1 for each 50 spaces
Los Angeles, CA	1 per dwelling unit	0-10+, depending on available spaces	0-4+, depending on available space	5% for residences with 17+ dwellings	
Palo Alto, CA	1 per dwelling unit	25%	5%	25% of visitor spaces	1 outlet per housing unit
San Francisco, CA	100%	90% EV-Capable, 10% EV-Ready		10%	
Atlanta, GA	1 per dwelling unit	20%		20%	

Table 1 outlines some of the key provisions of EV-readiness policy in seven US cities that have been some of the most proactive in addressing this issue. While the EV charging infrastructure provisions range in how comprehensive they are between cities, they all significantly lower barriers to entry for EV ownership in their respective locales.

Proposed Ann Arbor Code requirements

The proposed amendment to the UDC is therefore designed to require different types of buildings to possess varying degrees of EV charging readiness. Table 2 (below) provides an overview of those requirements:

Table 2: Examples of Proposed Ann Arbor EV Readiness Code Requirements

Building Type	EV-Capable (EV_C)	EV-Ready (EV_R)	EV-Installed (EV_I)
A - Residential: Single Family and Townhouses		100%	
B - Residential: Multi-family, Student Cooperatives and Assisted Living	75%	25%	
C - Schools, Offices, Parking Structures and Healthcare	25%	15%	10%
D - Hotels, B&Bs and Other Lodging		75%	25%
E - Recreational, Public, Institutional and Food Service	25%		
F - Retail	10%		
G - Transit Centers, Station, or Depot	50%	40%	10%

These requirements would align Ann Arbor with the likes of San Francisco, Palo Alto and Boulder, cities that are leaders in EV-readiness policy.

Residential Charging

Given that [the majority of EV drivers do more than 80% of their charging at home](#), where it's most convenient to charge and where most EV owners can take advantage of "off-peak" discounted electricity rates⁴, the highest percentage of EV-readiness is proposed for the residential sector.

Table 2 makes the important distinction between two different types of residential applications; single-family, and multi-family or group living locations. Since the majority of parking spaces at residential locations contained in Section A (single-family and townhouse) are generally adjacent to the residence in a garage or driveway that will already be wired for electrical capacity, ensuring that those parking spots are 100% EV_R is appropriate. Multi-family and other group living locations in Section B, however, are more likely to possess detached parking garages/lots, and be farther from the residence. A lower percentage of EV_R spaces may be more reasonable in these cases, and still provide a level of readiness that can meet both the projected EV charging demand and avoid undue costs on third-party building owners.

Please reference the Appendix for information on rebates available to residential EV owners.

Public and Workplace Charging

For charging at public and workplace parking locations, a lower level of readiness may be required. For this section of the proposed UDC amendment, the different levels of required EV_C, EV_R, and EV_I parking spaces is primarily influenced by the expected time that EV drivers will spend parked at those locations, in addition to the kind of EV drivers parked there. For example, in sections C and D of Table 2 (above), a higher number of EV_R and EV_I spaces are justified by the larger number of EV drivers likely to be parking there for long periods of the day. This extended parking time is either due to being employed by schools, offices and healthcare locations, or because they are customers who'll park at transit centers and hospitals for long periods of time.

Workplace charging opportunities will be instrumental to those without access to charging at home or for those with long commutes. Charging at these locations can also encourage the adoption of EVs by employees. In 2015, the US Department of Energy surveyed over 150 employers that installed EV charging stations at their workplaces.⁵ Not only did 90% of their employees express that they were satisfied with their employer's charging program, but they were **six times more likely to drive an EV compared to the average employee.**

Sections E and F of Table 2. consist of locations where the majority of people will be parked for less than 2 hours; retail and restaurant customers, recreational visitors (museums, movie theaters, athletic clubs, etc.), and public applications (park, correctional facility, and library visitors, among others). Finally, section G requires hotels, B&Bs, and other lodging locations to provide a high number of EV_R and EV_I spaces as the vast majority of drivers will stay overnight and may need to charge their electric vehicle.

⁴Energy.gov. "<https://www.energy.gov/eere/electricvehicles/charging-home>"

⁵U.S. Department of Energy. "*Workplace Charging Challenge, Progress Update 2016: A New Sustainable Commute*," 2016. A full copy of the report can be found [here](#)

When paired with requirements for residential applications, the proposed Ann Arbor UDC amendments for public and employee charging infrastructure will help to create a robust and comprehensive network of EV charging throughout the City.

Please reference the Appendix for additional information on rebates that are available for building owners who install charging stations for their employees, tenants, or the general public.

Equity

As with any policy enacted by the City, this EV readiness ordinance is geared towards the equitable distribution of EV chargers across all communities and socioeconomic backgrounds. Not only does it address public development locations throughout all of Ann Arbor (as opposed to just those in downtown areas), it mandates that all parking spaces at single, multi-family and group-living buildings be a combination of EV_C and EV_R. In a city with more renters than homeowners, providing EV charging in multifamily units is important. This is especially important given that lower income residents tend to live more in rentals than own their homes. This equity across the board will create a city-wide EV charging network that's accessible to everyone.

Conclusion

Even using the most conservative growth estimates outlined in the Ecology Center projections of increased EV demand in the Ann Arbor area, there is an imminent and undeniable exponential increase in electric vehicle ownership underway in the US. EV-readiness policy like the proposed UDC amendment would support and encourage this increase in EV adoption at a lower cost to building owners and developers than if such infrastructure is added later. The amendment would also help Ann Arbor meet its duty to serve those that live and travel to Ann Arbor, while also meeting sustainability goals, such as reducing greenhouse gas emissions and the use of fossil fuels that power a majority of personal transportation today.

APPENDIX

- a. For existing single-family homes, Ann Arbor residents can currently can take advantage of a financial incentive for the installation of EV charging stations through the DTE Energy's [Charging Forward Rebate](#) program.⁶ Those wishing to take advantage of the \$500 residential rebate must have recently purchased or leased an EV, install a qualified Level 2 charger, and enroll in a year-round time-of-use energy rate.
- b. For new construction residential applications, DTE has proposed an "EV-Ready Builder Rebate Pilot" of between \$100 and \$200 to encourage home builders to install wiring for Level 2 chargers at new single-family residences. However, this incentive must be approved by the Michigan Public Service Commission.
- c. For public and workplace charging, the [DTE Charging Forward Rebate](#) program provides incentives to help cover the cost of new charging station installations. Rebates are \$2,500 per charging port for Level 2 stations, up to a maximum of 20 ports, and up to \$20,000 for DCFC fast-charging stations. Matching funds from the State of Michigan's [Electric Vehicle Charging Incentive](#) program may also be available for the installation of DCFC stations that meet guidance established by the Department of Environment, Great Lakes, and Energy.

⁶DTE. "<https://www.newlook.dteenergy.com/wps/wcm/connect/dte-web/home/service-request/residential/electric/pev/pev-res-charge-frwd>"